An Roinn Cultúir,
Oidhreachta agus Gaeltachta
Department of Culture,
Heritage and the Gaeltacht

The Status of EU Protected Habitats and Species in Ireland

HABITAT ASSESSMENTS

Volume 2

2019

OVERVIEW

Every six years, Member States of the European Union are required to report on the conservation status of all habitats and species listed on the annexes of the Habitats Directive. This volume presents the detailed assessments for 59 habitats listed on the Directive that occur in Ireland.

The conservation status assessment uses a format agreed at a European level. For background information on how these assessments were derived please visit:
http://cdr.eionet.europa.eu/help/habitats_art17.

CITATION

NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill

COVER IMAGE

Vegetated shingle: Emmi Virkki

CONTENTS

HABITATS

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**1110 Sandbanks which are slightly covered by sea water all the time**
1.2i Habitat short name	**Sandbanks**
1.3i Habitat description	The EU interpretation manual describes Sandbanks which are slightly covered by seawater all the time as permanently submerged sandbanks where the water depth is seldom more than 20m Below Chart Datum (BCD). In the North Atlantic these include non-vegetated sandbanks or sandbanks with vegetation belonging to the *Zostera sp.* and free-living species of the *Corallinaceae* family. In Irish waters this habitat, where it occurs, is comprised of distinct banks (i.e. elongated, rounded or irregular 'mound' shapes) that may arise from horizontal or sloping plains of sediment that ranges from gravel to fine sand. They are primarily composed of sandy sediments permanently covered by water, at depths of less than 20m below chart datum (though the banks may extend to water depths greater than 20m e.g. Hempton's Turbot Bank). The diversity and types of community associated with this habitat are determined particularly by sediment type together with a variety of other physical, chemical and hydrographical factors. These include geographical location (influencing water temperature), the relative exposure of the coast, topographical structure of the habitat and differences in the depth, turbidity and salinity of the surrounding water. Acoustic sea bed mapping has aided greatly in understanding these habitat types in recent times. Seismic profiling has interpreted the origin of near-shore Sandbanks in the Irish Sea as moraines formed during de-glaciation and this may be typical across the range. Near-shore hydrodynamics have been identified as a major control on Sandbank morphology and coastal configuration. Soft glacial coastal sediments have little resistance to wave and hydrodynamic action and on the eastern seaboard of Ireland are slowly eroding over a geological period. Side-scan sonar and multibeam sonar have shown that Sandbank habitat is typically composed of superficial mobile sediment that forms into sand-waves or "stippled bank crest facies" as noted at Kish Bank. This morphological expression is also apparent at the Hempton's Turbot Bank off Donegal and a range of coastal features recently mapped in the Irish Sea. The movement of sediment over Sandbanks appears to be typical of a dynamic substrate, supplied and stripped of sediment in apparent equilibrium. Sand-waves increase in amplitude approaching the edge of the banks and this is thought to be indicative of a current being concentrated in shallower water. The morphology and resistance of banks to bottom current is such that it tends to produce a more dynamic environment than that in the adjacent areas. There are currently 19 identified Sandbank features in Ireland. A wide range of sandbanks have been surveyed biologically in Ireland, including Ballybunion/Turbot Bank at the mouth of the River Shannon and Long Bank/Holden's Bed, Blackwater Bank and Kish Bank, Lucifer

	Bank/Bray Bank, Hempton's Turbot Bank and surveys over areas not conforming to the morphotype, notably Greater Codling Bank. Sandbank habitats in Irish waters are predominantly composed of a fine sand to sand community typified by the presence of the polychaete worm *Nephtys cirrosa*. These habitats commonly record a range of species including *Bathyporeia elegans*, *Polygordus lacteus*, *Saccocirrus papillocercus*, *Pisione remota*, *Nephtys cirrosa*, *Magelona mirabilis*, *Eumida bahusiensis*, *Nephtys longosetosa*, *Spiophanes bombyx*, *Donax vittatus*, *Glycera lapidum*, *Urothoe brevicornis*, *Pontocrates altamarinus*, *Fabulina fabula*, and *Pisidia longicornis*. The species found tend to be those adapted to mobile substrates but all of the noted species recorded in Irish waters are also frequently found in similar shallow coastal sediment habitats. However, sandbanks with a significant proportion of coarse sediment are also present, e.g. Hempton's Turbot Bank. There is some indication that mobile predators such as birds and marine mammals aggregate around sandbanks but it is not known if this is a function of the features themselves or the accessibility of shallow water.

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***2007-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The 19 sandbanks were originally identified through Admiralty Charts and this has been supplemented by more recent seabed mapping.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
3.2 Sources of information	Aqua-Fact International Services Ltd. (1989) *Benthic studies off the Wexford coast. Faunal and sedimentological studies at Long Bank and Ballyteigue Bay*. 48pp.

	Aqua-Fact International Services Ltd. (2007) Marine Surveys of two Irish Sandbank cSACs. A report to National Parks and Wildlife Service. 32pp. Aqua-Fact International Services Ltd. (2008) Analysis of samples from the Hempton's Turbot Bank. A report to National Parks and Wildlife Service. 8pp. Aqua-Fact International Services Ltd. (2012) Subtidal Benthic Investigations of the Greater Codling Bank. A report to National Parks and Wildlife Service. 139pp. Aquatic Services Unit (2010) A benthic survey of sandbank features in the Irish Sea: A biological survey of the Bray, Money-weights and Lucifer Banks. A report to National Parks and Wildlife Service. 42pp. CMRC (2006-12) Marine Irish Digital Atlas. http://mida.ucc.ie/. DCENR (2013) Spatial data for seismic surveys and Hydrocarbon Wells. http://www.dcenr.gov.ie/Spatial+Data/Petroleum+Affairs/PAD+Spatial+Data+Downloads.htm . Environmental Impact Statement: Kish/Bray Wind Park. Saorgus Energy Ltd, Tralee, Co. Kerry. Roche, C., Lyons, D.O., Fariñas Franco, J. & O'Connor, B. (2007) Benthic surveys of sandbanks in the Irish Sea. National Parks and Wildlife Service. *Irish Wildlife Manuals,* No. 29. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. Scally, L., Pfeiffer, N.J., & Hewitt, E. (in prep.) The monitoring and assessment of six Annex I marine habitats. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland. Seazone (2011). UKHO Admiralty Raster Charts for Irish Waters. Service, M., Brown, C. & A. McDougall. (2004) MESH Habitat Mapping: Hempton's Turbot Bank. Cruise Report LF004 13-06-04 to 17-06-04. Wheeler, A.J., Walshe, J. & Sutton, G.D. (2000) Geological appraisal of the Kish, Burford, Bray and Fraser Banks, Outer Dublin Bay Area. Marine Resource Series No. 13: pp. 35. White, J. (2006) Survey Data Analysis for Hempton's Turbot Bank: An investigation into the categorisation of survey data sets for mapping a sand wave seafloor system. Undertaken as part of the INTERREG IIIB project Mapping European Seabed Habitats. Published by the Marine Institute.
3.2i Additional information	Borja, Á., Franco, J. & Pérez, V. (2000) A marine biotic index to establish the ecological quality of soft-bottom benthos within European estuarine and coastal environments. *Marine Pollution Bulletin* 40: 1100-1114. Borja, Á., Muxika, I. & Franco, J. (2003) The application of a Marine Biotic Index to different impact sources affecting soft-bottom benthic communities along European coasts. *Marine Pollution Bulletin* 46: 835-845. Lincoln, R.J. (1979) *British Marine Amphipoda: Gammaridea*. British

	Museum (Natural History). London 1979. MERC (2013) Subtidal Benthic Survey of Hempton's Turbot Bank. Unpublished report to the Marine Institute.

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***2,800 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 2,800 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	

	d) Indicate method used to set reference value if other than operators The Favourable reference range has been set as the current range as there is no evidence of decline since the Directive came into force. This range is likely to encompass all geographical, geological and ecological variation of Sandbanks which are slightly covered by seawater all the time.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods? YES/**NO***	
	If yes, provide the nature of that change. More than one option (a to d) can be chosen	
	a) yes, due to genuine change	*YES/NO*
	b) yes, due to improved knowledge/more accurate data	*YES/NO*
	c) yes, due to the use of different method	*YES/NO*
	d) yes, but there is no information on the nature of change	*YES/NO*
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data / the use of a different method*	
4.12 Additional information *Optional*	Range was estimated based on partial data with some extrapolation and/or modelling. The current range is considered to be the baseline value. The FRR is equal to the current range as there is no evidence of a decline since the Directive came into force and it is likely to encompass all geographical and ecological variation. There is no evidence of any change to the range of this habitat feature in Ireland since the last reporting period.	

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2007-2018***	
5.2 Surface area *(in km²)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***247 km²***
5.3 Type of estimate	***Best estimate** / 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** ***c****) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994-2018***	
5.10 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	***a) 247 km²***	
	b) Indicate if operators were used (≈, >, >>, <) or	
	c) If favourable reference area is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The FRA has been set as the current area as it is considered sufficient for the long-term viability of the habitat.	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods? YES/****NO*** *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/NO*
	b) yes, due to improved knowledge/more accurate data	*YES/NO*
	c) yes, due to the use of different method	*YES/NO*

	d) yes, but there is no information on the nature of change	*YES/NO*
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data / the use of a different method*	
5.15 Additional information *Optional*	Mapping of Sandbank habitat was completed primarily using GIS methods. The main source of information on the bathymetry was the UK Home Office Admiralty Charts. These were used because they provide a consistent 20m contour on which to estimate the margins of the Sandbank feature. A significant problem in calculating the national resource of Sandbanks in Ireland is applying a consistent rule to include or exclude the habitat feature. In the western and northern coasts the Sandbanks are apparently clearly defined and distinct in accordance with the Commission definition. The Irish Sea, which also holds the greatest resource of this feature, poses geographical difficulties. The shallower waters in the coastal zone of the southern Irish Sea show areas of Sandbank and in the northern part the features are noted to be in deeper waters. Because of this natural variability the best available approach is to look to the prominence or elevation of the habitat relative to its actual location and that of the surrounding waters and use expert judgement to define the lower limit. In deriving this estimate no areas below the 20m contour are identified because resolved contours generated by sea bed mapping data are incomplete across the range of the feature. There has been an extensive programme of sea bed mapping in Ireland over the last 15 years. Some areas fringing Sandbank habitat have been mapped and it is possible with more complete coverage in the future that a more complete map of Sandbank features may be possible. However, in mobile sediments with a high degree of turbidity it is likely that the most biologically important area would be already mapped using the current approach. No impacts with the potential to lead to a change in the area of Sandbanks which are slightly covered by seawater all of the time have been identified since the last reporting period.	

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***247 km²***
		Maximum	***247 km²***
	b) Area in not-good condition	**Minimum**	***0 km²***
		Maximum	***0 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data*		

	c) Based mainly on expert opinion with very limited data *d) Insufficient or no data available*
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period?* ***YES****/NO* The updated list has been provided as an additional spreadsheet and the species are listed in field 6.7.
6.7 Typical species Method used *Optional*	The typical species list has been updated to include additional species considered to be typical of the habitat based on survey data collected during the current reporting period and to reflect changes in taxonomic nomenclature as appropriate. Typical species for the habitat were derived from samples taken from stations sampled at a variety of locations throughout this habitat. Multivariate analysis in Primer version 7 was subsequently used to assess the frequency of species within the habitat and aid in the identification of typical species. Some expert judgment was also used in the identification of typical species, for example to avoid bias as caused by juveniles or chance capture. These typical species included in the 2016-2017 survey include *Bathyporeia elegans, Pisione remota, Fabulina fabula, Saccorcirrus papillocercus, Magelona mirabilis, Eumida bahusiensis, Spiophanes bombyx, Donax vittatus, Glycera lapidum, Urothoe brevicornis, Pontocrates altamarinus, Haustorius arenarius, Mediomastus fragilis, Nephtys cirrosa, Spisula elliptica* and *Syllis garcia.*
6.8 Additional information *Optional*	69km^2 of the total resource of 247km^2 of the Sandbanks habitat within four Special Areas of Conservation (SACs) around the coast of Ireland were surveyed to assess the Structure and functions of this habitat during the current reporting period. This represents 28% of the total national resource for this habitat. The overall assessment of Structure and functions was Favourable. A single Marine Community Type (MCT) is recorded for each of the sandbanks surveyed (Scally *et al.,* in prep.). At the Blackwater Bank SAC and Long Bank SAC, off the east coast of Ireland, this consists of a fine sand community while at the Lower River Shannon SAC, a similar MCT but one comprised of slightly coarser sediments occurs. At Hempton's Turbot Bank SAC, an MCT characteristic of much coarser sediment occurs. In all cases no changes to the MCTs, i.e. sediment structure or typical species, were recorded from the

	previous reporting period. These typical species included in the 2016-2017 survey are listed in field 6.7 above. Sampling of the Hempton's Turbot Bank SAC during the current reporting period, and in the past, has demonstrated that this sandbank feature is comprised of a considerable amount of very coarse sediment, typically cobble and broken shell. Therefore sampling with the use of a Day grab is not possible throughout the full extent of this habitat within this SAC. Samples can only be successfully retrieved from a limited amount of stations where pockets of sandy sediment occur. It is considered that the habitat within this SAC is not fully characteristic of the Sandbanks which are slightly submerged by sea water all the time habitat as described in the EU Interpretation manual.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**Xxp** No pressures	**Xxt** No threats

7.2 Sources of information *Optional*	
7.3 Additional information *Optional*	No visible pressures were recorded during field surveys between 2016 and 2018. Threats were selected based on best expert judgement. Changes to the habitat as a result of natural causes, e.g. natural forces leading to a change in the area or general topographical feature of the habitat, are considered a neutral impact. Climate change is considered a threat to this habitat although sufficient information is not available to discern the nature and severity of this threat. The development of windfarms on shallow sandbanks has the potential to lead to an indirect impact on the habitat. Impacts from benthic dredging (fisheries) are also considered to be a potential threat to this habitat. The development of Natura Fisheries Plans as required under "Fisheries Act" should mitigate the risk to this habitat.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (YES/**NO**)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* *b) Measures identified and taken or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* a) Short-term results (within the current reporting period, 2013-2018) or *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	None
8.6 Additional information *Optional*	The conservation status of this habitat is Favourable but it is vulnerable to the potential impacts of wind energy infrastructure in the vicinity of the habitat. Benthic dredging from commercial fishing vessels is also considered a potential threat. Therefore conservation measures to ensure that the conservation status of the habitat remains Favourable are necessary. This will be achieved by ensuring that appropriate assessment fully considers the indirect impacts of developments outside of the SAC network.

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	***Good*** */ Poor / Bad / Unknown*

9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as Stable. Current range is equal to Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as Stable, as no change in range is expected as the physical and geological nature of the habitat makes a change in range unrealistic. Future prospects of Range are therefore Good. Short-term trend direction of Area is assessed as Stable. The potential for a significant change (increase or decrease) in the area is considered highly unlikely in the medium term. Conservation status of Area is therefore Favourable. Future trend of Area is assessed as Stable, as no change in area is expected based on the current threats, conservation measures and the physical structure of the habitat. Future prospects of Area are therefore Good. Current Structure and functions are assessed as Good. An assessment of Good was recorded at all four sites assessed. Short-term trend direction of Structure and functions is Stable. Conservation status of Structure and functions is therefore Good. Future prospects of Structure and functions are therefore Good.

10 Conclusions

Assessment of conservation status at end of reporting period

10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/****NO***	*YES/****NO***
	b) yes, due to genuine change	*YES/NO*	*YES/NO*

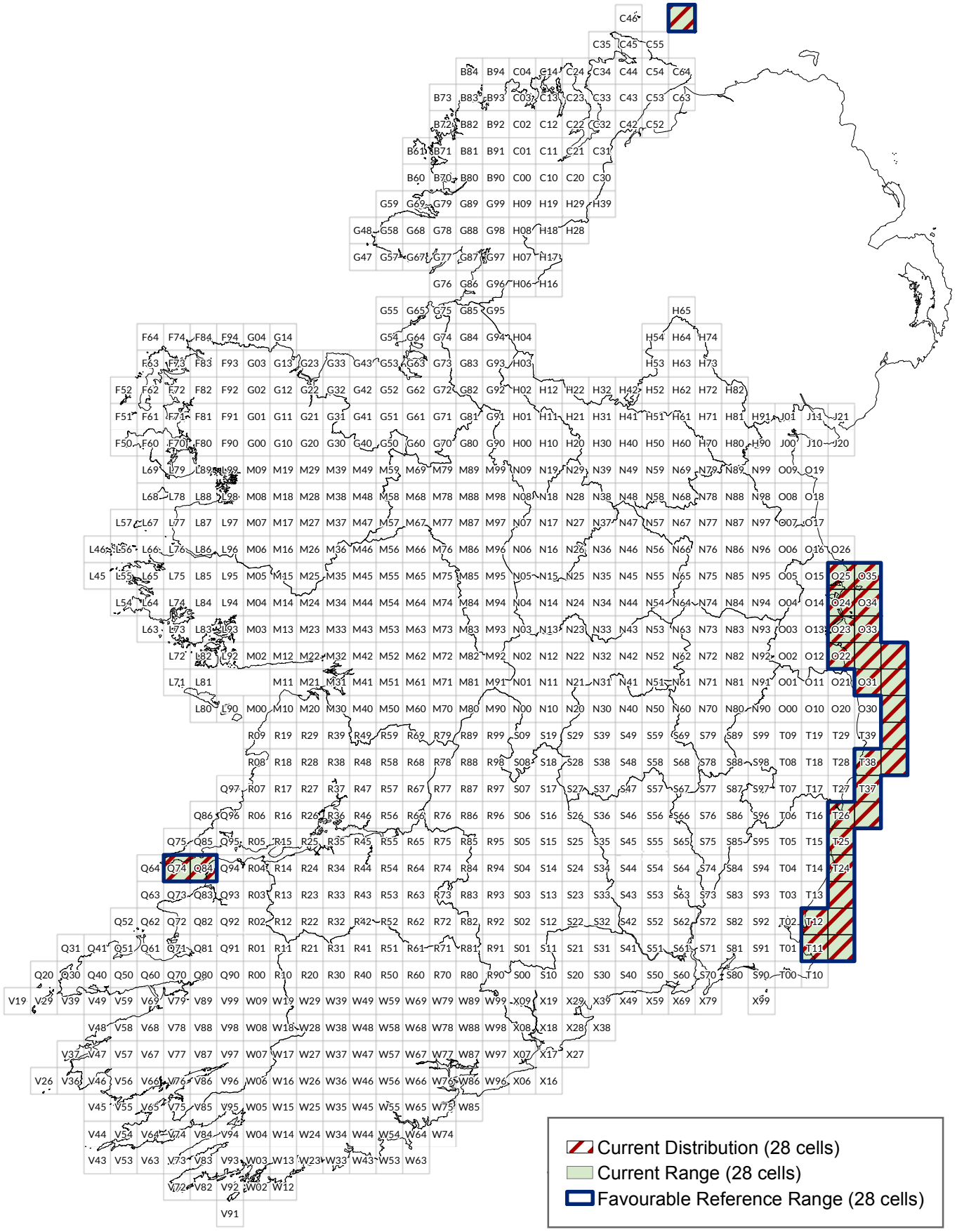
	c) yes, due to improved knowledge/more accurate	*YES/NO*	*YES/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	There have been no changes in Range or Area since the Directive came into force. 69km^2 of the total resource of 247km^2 of the Sandbanks habitat within four Special Areas of Conservation (SACs) around the coast of Ireland were surveyed to assess the Structure and functions of this habitat during the current reporting period. This represents 28% of the total national resource for this habitat. This habitat is comprised of a low number of sublittoral soft sediment communities with a limited range of species and sediment types. No changes in any of the indicators used (change to typical species, change to sediment composition, and presence of negative indicator species) were identified at any of the stations sampled. No visible pressures have been identified that are currently acting on the site. Potential threats to the habitat have been identified. However it is considered that the current process of appropriate assessment will prevent the identified threats leading to an impact. Therefore all attributes were assessed as Favourable.		

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km^2 in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***129 km^2***
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	

11.3 Surface area of the habitat type inside the network **Method used**	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
11.4 Short-term trend of habitat area in good condition within the network **Direction**	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable** / increasing / decreasing / uncertain/ unknown*
11.5 Short-term trend of habitat area in good condition within network **Method used**	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
11.6 Additional information *Optional*	Sampling was undertaken within the SAC network between 2016 and 2017. Comparative analysis with previous surveys (Scally *et al.*, in prep.) showed there to be no change in the marine community types previously described and therefore the habitat was assessed as being in good condition.

12 Complementary information

Sandbanks (1110)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**1130 Estuaries**
1.2i Habitat short name	**Estuaries**
1.3i Habitat description	The EU interpretation manual describes the habitat Estuaries as the downstream part of a river valley, subject to the tide and extending from the limit of brackish waters. River estuaries are coastal inlets where, unlike 'Large shallow inlets and bays', there is generally a significant freshwater influence. Estuaries are an extremely diverse and dynamic habitat and play a major role in maintaining the health of coastal ecosystems. They support a mosaic of other habitats depending on their geomorphology and hydrology. Boulder and cobble beds frequently fringe the margins of estuaries, especially further upstream, and intertidal mudflats are often associated with the margins of estuaries where the tidal influence is stronger. Many estuaries in Ireland have been canalised and here the margins of the estuaries are often formed from concrete and other man-made materials. The estuarine bed or channel is subject, by various degrees, to the erosional forces of the outflowing river and is often characterised by coarse material, cobble or bedrock. However in some estuaries muddy fine sands dominate. The topographical gradient of the estuary heavily influences the type of flanking material and the rate of deposition. One of the most important factors in the prevailing estuarine conditions is the degree of fresh and saltwater mixing and the rate at which this mixing occurs. Mixing is influenced by a number of factors including the size and shape of the inflowing river. This mixing is constantly changing as it also depends on the influence of wind, swell and the state of the tide. Seasonality plays an important role in the prevailing conditions of an estuary, with the amount of riverine water and seawater entering and exiting the habitat being subject to flux. In Ireland winter floods can carry large volumes of water and their associated sediment load into an estuarine system while during the summer months the influence of freshwater and sediment loading can be less. The gradient in salinity along the system, from the mouth of the estuary to the limit of the tidal influence, dictates the diversity of species present along the length of the estuary. Sediment deposition on the estuary bed and suspended solids within the water column also greatly influence species distribution and abundance within the habitat. While increased turbidity of the waterbody can be caused by natural forces leading to the resuspension of bottom sediments, the dredging of estuary channels to facilitate navigation can also contribute to increased water turbidity in addition to disturbing benthic species. The size of estuaries in Ireland varies greatly from the 3 hectare Easky Estuary in Co. Sligo to the Lower River Shannon Estuary of 242 square kilometres. The range of Marine Community Types (MCT)

	found within Estuaries is quite variable across Ireland. However as the Lower River Shannon is by far the largest estuary in Ireland, representing 37% of the national resource, the MCTs which occur there determine the ranking of MCTs within the habitat at a national scale. For example the most prevalent community in this habitat is the Mud to fine sand community, where a third of the national resource of this community is within Lower River Shannon SAC. The next most prevalent MCT, recognised at around 30% of Estuaries, habitat is Fine sand to sand, and again the largest proportion of the national resource is within Lower River Shannon SAC. 20% of the remaining Estuaries habitat is identified as being Muddy sands/Sandy Muds Community and the greatest proportion of this community is found within Lough Swilly SAC. Additional Annex I habitats such as Reefs (1170) are also found within this habitat. Estuarine habitats also form a significant resource for various bird and mammal species for feeding, breeding and resting.

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***2007-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted.
2.5i	GIS mapping of Estuary habitat was primarily achieved by use of a data set generated by the Environmental Protection Agency in fulfilment of the Water Framework Directive identifying transitional water bodies subject to freshwater influence. This data set was cross-referenced against the high and low water marks/vectors delineated by the Ordnance Survey of Ireland (OSI) Discovery Series (1:50,000). This was supplemented with reference and verification from the aerial ortho-photography data set published by the OSI in 2005. Smaller estuaries that were below the resolvable power of about 0.5 hectare were excluded from the polygon shapefile. This was supplemented by NPWS Site-Specific Conservation Objectives spatial data where available. Manual edits were carried out based on Expert Opinion.

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned	
3 Biogeographical and marine regions	
3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
3.2 Sources of information	Aquafact International Services Ltd. (2006) A Survey of Intertidal Mudflats and Sandflats in Ireland. A report to National Parks and Wildlife Service. 314pp. Aquatic Services Unit (2007) A Survey of Mudflats and Sandflats. A report to National Parks and Wildlife Service. CMRC (2006-12) Marine Irish Digital Atlas. http://mida.ucc.ie/. Crowe *et al*. (2011) A framework for managing sea bed habitats in near shore Special Areas of Conservation. A report to National Parks and Wildlife Service. Cummins *et al*. (2002) An assessment of the potential for the sustainable development of the Edible Periwinkle, *Littorina littorea*, Industry in Ireland. *Marine Resource Series*: 23. DCENR (2013) Spatial data for seismic surveys and Hydrocarbon Wells. http://www.dcenr.gov.ie/Spatial+Data/Petroleum+Affairs/PAD+Spatial+Data+Downloads.htm.EPA. (2013). EPA Ireland GeoPortal. http://gis.epa.ie/DataDownload.aspx. Falvey, J.P., Costello, M.J. & S. Dempsey. 1997. A survey of intertidal mudflats. Unpublished report to the National Parks and Wildlife Service, Dublin. NPWS (2011/17) Conservation Objective Series. ISSN 2009-4086. Scally, L., Pfeiffer, N.J. & Hewitt, E. (in prep.) The monitoring and assessment of six Annex I marine habitats. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.
3.2i Additional information	Borja, Á., Franco, J. & Pérez, V. (2000) A marine biotic index to establish the ecological quality of soft-bottom benthos within European estuarine and coastal environments. *Marine Pollution Bulletin* 40: 1100-1114. Borja, Á., Muxika, I. & Franco, J. (2003) The application of a Marine Biotic Index to different impact sources affecting soft-bottom benthic communities along European coasts. *Marine Pollution Bulletin* 46: 835-845. CABI (2018) *Crassostrea gigas*. In: *Invasive Species Compendium*. Wallingford, UK: CAB International. www.cabi.org/isc. Lincoln, R.J. (1979) *British Marine Amphipoda: Gammaridea*. British Museum (Natural History). London 1979.

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***16,300 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 16,300 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable reference range has been set as the current range as there is no evidence of decline since the Directive came into force. This range is likely to encompass all geographical, geological and ecological variation of Estuaries.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	

	a) yes, due to genuine change	*YES/**NO***
	b) yes, due to improved knowledge/more accurate data	*YES/**NO***
	c) yes, due to the use of different method	***YES**/NO*
	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data / **the use of a different method***	
4.12 Additional information *Optional*	Range was estimated based on partial data with some extrapolation and/or modelling. The Range Map for this habitat is the intersection of the polygon generated through the mapping of the habitat feature with a 10 x10 km grid generated on Irish National Grid. The intersection of this transformed ING grid was used to intersect with the 10 km^2 LAEA grid. There is no evidence of any genuine change to the range of this habitat feature in Ireland since the last reporting period. FRR was considered to be the same as the current range as there is no evidence of decline since the Directive came into force.	

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2007-2018***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***761 km^2***
5.3 Type of estimate	***Best estimate** / 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude	**a) Minimum**	
	b) Maximum	

Optional	**c) Confidence interval**	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994-2018***	
5.10 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	***a) 761 km²***	
	b) Indicate if operators were used (≈, >, >>, <) or	
	c) If favourable reference area is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The FRA is set as the current area as there is no evidence of a decline since the Directive came into force and it is considered adequate to ensure the long-term viability of the habitat.	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	*YES/****NO***
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data /* ***the use of a different method***	

5.15 Additional information *Optional*	No impacts with the potential to lead to a change in the area of the Estuary habitat have been identified since the last reporting period.

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***178 km²***
		Maximum	***178 km²***
	b) Area in not-good condition	**Minimum**	***583 km²***
		Maximum	***583 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	*stable / increasing /* ***decreasing*** */ uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period?* ***YES****/NO* The updated list has been provided in an additional spreadsheet and the species are listed in field 6.7.		
6.7 Typical species Method used *Optional*	The typical species list has been updated to include additional species considered to be typical of the habitat based on survey data collected during the current reporting period and to reflect changes in taxonomic nomenclature as appropriate. Typical species for estuarine sediments were derived from samples taken from a range of subtidal and intertidal locations along the length of each estuary surveyed. Stations were selected to target the Marine Community Types (MCTs) previously identified and mapped for a site. Estuarine sediments vary considerably in their sediment composition and associated species. Typical species are dependent not just on the sediment structure but also their location within the estuary; the species present at any point being reflective of the		

	physical structure of the estuary which affects water flow rates and salinity gradients in addition to other biotic and abiotic factors. Notwithstanding this variability, a list of species commonly found in Irish Estuaries was prepared. Typical species from intertidal estuarine sediments were identified and enumerated from 5 x 0.01m^2 sediment cores collected from three stations within each of the MCTs described and mapped for a site. Typical species for subtidal estuarine sediments were identified and enumerated from Day grab samples collected from three stations within each of the MCTs described and mapped for a site. Multivariate analysis in Primer version 7 was subsequently used to assess the frequency of species within the habitat and aid in the identification of typical species. Some expert judgment was also used in the identification of typical species, for example to avoid bias as caused by juveniles or chance capture. This list of typical species includes the following species: *Baltidrilus costatus, Bathyporeia* spp*., Chaetozone gibber, Corophium volutator, (C. arenarium* in upper estuary), *Crangon crangon, Eteone longa, Fabulina fabula, Hediste diversicolor, Heteromastus filiformis, Limecola balthica, Nephtys cirrosa, Nephtys hombergii, Nucula nucleus, Owenia* spp., *Peringia ulvae, Pygospio elegans, Scrobicularia plana, Spio martinensis, Tharyx robustus, Thyasira flexuosa, Tubificoides benedii, Tubificoides pseudogaster, Capitella* species complex, *Streblospio* sp. and *Mytilus edulis.*
6.8 Additional information *Optional*	433km^2 of the total resource of 761km^2 of the Estuary habitat within 11 Special Areas of Conservation (SACs) around the coast of Ireland were surveyed to assess the Structure and functions of this habitat during the current reporting period. This represents 56.9% of the total national resource for this habitat. The overall site-based conservation assessment was recorded as Unfavourable-Inadequate at three sites (Lough Swilly SAC, Dundalk Bay SAC and Lower River Shannon SAC). This amounted to 33,190ha or 76.6% of the area surveyed, but only accounts for 27.3% of the sites surveyed. The remaining eight sites (Castlemaine Harbour SAC, Blackwater River (Cork/Waterford) SAC, Ballymacoda (Clonpriest & Pillmore) SAC, Bannow Bay SAC, Slaney River Valley SAC, West of Ardara/Maas Road SAC, Tralee Bay & Magharees Peninsula, West to Cloghane SAC and River Barrow & River Nore SAC) were assessed as Favourable. This amounted to 10,154ha or 23.4% of the area sampled but represents 72.7% of the sites surveyed. Using the Structure and functions criteria in the Annex E evaluation matrix would result in the habitat being assessed as Unfavourable-Bad. However, this does not accurately reflect the conditions at a site level and highlights the difficulties in using area to assess Structure and functions in an aquatic environment. For this habitat therefore, the more accurate assessment of Structure and functions was deemed to be Unfavourable-Inadequate. Two SACs (Dundalk Bay SAC and Lower River Shannon SAC) failed to meet Favourable Conservation Status due to changes to the sediment composition in one MCT within each site. In each of these cases an increase in the proportion of fine sediment grain size classes

	was recorded. It is considered highly likely that the recorded changes in sedimentology over the reporting period have resulted from increased rates of sedimentation. Estuaries surrounded by urban settlements are vulnerable to the impact of run-off from storm water and may also be impacted by on-going discharge of inadequately treated water. At Lough Swilly SAC an increase in the negative indicator species Pacific oyster *Magallana gigas* (syn. *Crassostrea gigas*) was recorded at three intertidal stations and was associated with samples that also contained the reef-building polychaete *Sabellaria alveolata*. A number of pressures listed in section 7.1 are known to act on the sites and are considered to be responsible for some of the changes recorded.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**F20** Residential or recreational activities and structures generating marine pollution (excl. marine macro- and micro-particular pollution (H) **A28** Agricultural activities generation marine pollution (H) **G16** Marine aquaculture generating marine pollution (H) **I02** Other invasive alien species (other than species of Union concern) (H) **XU** Unknown pressure (M)	**F20** Residential or recreational activities and structures generating marine pollution (excl. marine macro- and micro-particular pollution (H) **A28** Agricultural activities generation marine pollution (H) **G16** Marine aquaculture generating marine pollution (H) **I02** Other invasive alien species (other than species of Union concern) (H)
7.2 Sources of information *Optional*	Scally, L., Pfeiffer, N.J. & Hewitt, E. (in prep.) Monitoring and assessment of six EU Habitats Directive Annex I marine habitats. *Irish Wildlife Manual*s, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.	
7.3 Additional information *Optional*	Threats were selected based on best expert judgement and a review of the pressures observed. Increased sedimentation as a result of surface waters via storm overflows or urban run-off in estuaries surrounded by or downstream of large urban settlements and maintenance dredging, e.g. Dundalk Bay SAC and Lower River Shannon, is considered to be a significant factor in the changes observed to sediment composition	

	and typical species changes. Certain activities such as the picking of shellfish on the shore and certain sport and leisure activities are currently considered as a low pressure and threat. Bottom culture of Pacific oyster *Magallana gigas* (syn. *Crassostrea gigas*) in Lough Swilly SAC where this invasive species is known to be naturalised is considered a significant pressure. In some cases the pressures acting on an area were unknown. This was particularly the case where changes in benthic sediment communities occurred but no obvious source of the impact could be identified. Changes like increased sedimentation as seen in Dundalk Bay SAC and the Lower River Shannon may increase with climate change. Such increases in sedimentation and possible mitigation measures required warrant investigation.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* ***d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')***
8.3 Location of the measures taken	*Indicate the location of measures taken:* ***a) Only inside Natura 2000** or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* a) Short-term results (within the current reporting period, 2013-2018) or ***b) Medium-term results (within the next two reporting periods, 2019-2030)** or* *c) Long-term results (after 2030)*

8.5 List of main conservation measures	**CG08** Reduce/eliminate marine pollution from marine aquaculture **CG09** Other measures to reduce impacts from marine aquaculture infrastructures and operation.
8.6 Additional information *Optional*	The implementation of the following conservation measures would improve the Structure and functions of this habitat: **CA13** Reduce/eliminate marine pollution from agricultural activities **CF04** Reduce/eliminate point source pollution to surface or ground waters from industrial, commercial, residential and recreational areas and activities. The River Basin Management Plan for Ireland 2018-2021 sets out the actions that Ireland will take to improve water quality and achieve 'good' ecological status in water bodies (rivers, lakes, estuaries and coastal waters) by 2027. The main regulatory measure taken has been the implementation of appropriate assessment to ensure potential threats from development activities, within and outside of the Natura 2000 network, do not negatively impact on the conservation objectives of Estuaries. This includes appropriate assessment of planned aquaculture activities and the preparation of Fisheries Natura Plans for aquaculture within or with the potential to impact on Natura 2000 sites. Changes to the sediment composition of MCTs were the main reason for the failure of two sites to reach Favourable conservation status. It is considered highly probable that increased sediment input and sediment mobilisation as a result of agriculture, maintenance dredging and urbanisation are significant contributing factors to the changes recorded in MCTs. The source of the majority of these impacts is outside of the SAC network. Appropriate assessment of such activities should fully consider the potential sphere of influence of such activities and assess fully the indirect impacts. The presence of the non-native Pacific oyster was a recorded impact within Lough Swilly SAC and highlights the importance of using best practice in the Aquaculture sector to ensure that non-native species such as the Pacific oyster do not become naturalised.

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	*Good /* ***Poor*** */ Bad / Unknown*

9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as Stable. Current range is equal to Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as Stable, as no change in Range is expected as the physical and geological nature of the habitat makes a change in range unrealistic. Future prospects of Range are therefore Good. Short-term trend direction of Area is assessed as Stable The potential for a significant change (increase or decrease) in the area is considered highly unlikely in the medium term. Conservation status of Area is therefore Favourable. Future trend of Area is assessed as Stable, as no change in area is expected based on the current threats, conservation measures and the physical structure of the habitat. Future prospects of Area are therefore Good. Short-term trend direction of Structure and functions is Decreasing. An assessment of Unfavourable-Inadequate was recorded at two SACs. The failure of this habitat within the Lower River Shannon SAC was a significant contributing factor to the failure of the habitat to meet Favourable Conservation Status at a national level. Future prospects of Structure and functions are therefore Poor.

10 Conclusions

Assessment of conservation status at end of reporting period

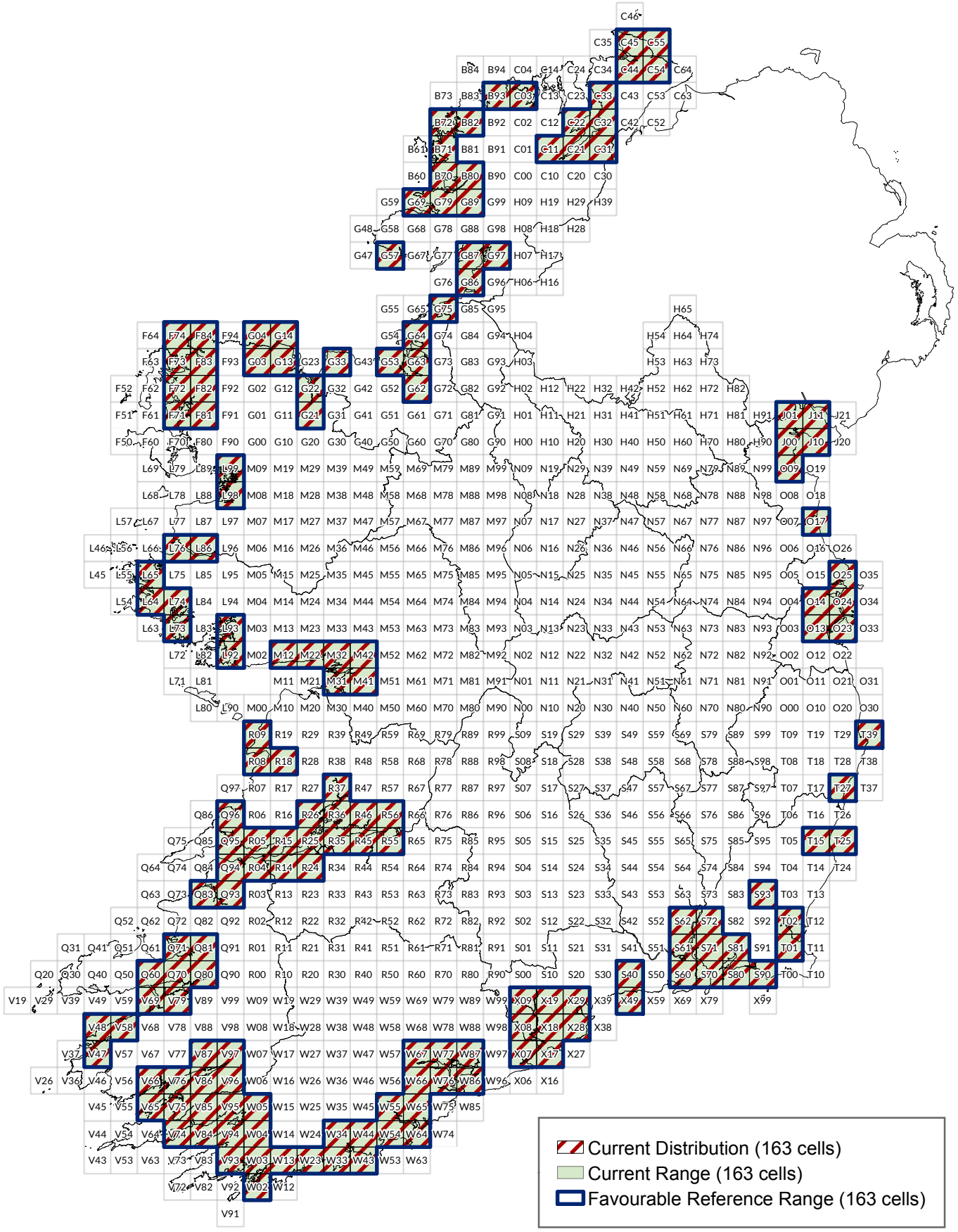
10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving /* ***deteriorating*** */ stable / unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/****NO***	***YES****/NO*

	b) yes, due to genuine change	*YES/NO*	***YES****/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	***YES****/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/**NO***
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/**NO***
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	***genuine change** / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	The overall conservation status of Estuaries has been assessed as Unfavourable-Inadequate. 479km^2 of the total resource of 761km^2 of the Estuary habitat within 11 Special Areas of Conservation (SACs) around the coast of Ireland were surveyed to assess the Structure and functions of this habitat during the current reporting period. This represents 56.9% of the total national resource for this habitat. The overall assessment of Structure and functions was Unfavourable-Inadequate. The principal reason for the failure of the habitat to meet Favourable Conservation Status was a change in sediment composition. The large area of the total national resource of the Estuary habitat within Lower River Shannon SAC, where a change in sediment composition was recorded, was a significant factor in the overall failure of the habitat to meet Favourable Conservation Status. The presence of negative indicator species was the reason for the failure at one site (Lough Swilly SAC). It is considered highly likely that the pressures recorded have resulted from increased sedimentation. Estuaries surrounded by urban settlements are vulnerable to the impact of run-off from storm water; they are also impacted by waste water discharge in these areas in Ireland. Those surrounded by, and down-stream of, areas of intensive agriculture and/or commercial forestry operations are frequently impacted by the increased sediment input caused by this activity. The Overall trend was considered to be improving in 2013, this was based on expert judgement rather than field-based survey and analysis.		

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***640 km²***
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* *stable / increasing /* ***decreasing*** */ uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.6 Additional information *Optional*	A total of 56.9% of the national resource of this habitat was surveyed during the current reporting period. All surveys were undertaken in the SAC network, therefore the trend of Area in Good condition reflects the national trend. The total area of the habitat within the SAC network is 640 km^2; this includes 117 km^2 in SACs where the Estuaries habitat is not listed as a qualifying interest (QI). The total area of the habitat that occurs in SACs where Estuaries is listed as a QI is 523 km^2.	

12 Complementary information

Estuaries (1130)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**1140 Mudflats and sandflats not covered by seawater at low tide**
1.2i Habitat short code	**Tidal mudflats and sandflats**
1.3i Habitat description	Mudflats and sandflats not covered by seawater at low tide are comprised of the intertidal section of the coastline where sands and muds dominate. They are dynamic ecosystems, dependent on the balance of natural accretion and erosion. The fundamental building block of this habitat is sediment ranging from around 1 micron to 2 millimetres. The finer silt and clay sediments are dominant in mudflats and the larger sand fractions are associated with areas exposed to significant wave energy. The fine sediment of intertidal mudflats is most often associated with rivers. The limit of tidal ingress often coincides with the beginning of flanking mudflat habitats. The competing forces of seaward-flowing freshwater meeting the flooding tide reduces net flow velocity and consequently the carrying capacity for sediment, leading to deposition. A range of physical pressures operate in these habitats including dynamic fluctuations in salinity, temperature, and immersion. Small sediment grains can be very closely packed and the consequent minimal exchange of water may lead to oxygen deprivation of underlying sediments. Sandflats associated with larger estuaries are frequently shaped by locally generated or coastal wind-waves. The force required to dislodge sediment is dependent on the mass and cohesion of the material. Smaller lighter fractions are easily removed and become less dominant in areas exposed to wind waves. However, the packing arrangement of larger grained material allows space between grains for accumulations of finer material. This can produce cohesive and extensive flats not susceptible to eroding forces. Due to the relatively low gradient of the sandflat, wave energy is dissipated over a greater surface area. The combination of grain sizes also leads to a high retention of water within the flats producing a fairly stable physical environment with good biological productivity. In areas exposed to large waves with little or no source of riverine material, the habitat is often characterised by large grains resulting from erosion or long-shore drift. Without a source of binding fine sediments these coarse sands are susceptible to frequent mobilization. The packing arrangement also allows for a free-draining habitat. These coarse beaches are consequently not only susceptible to marine forces but can be mobilized by wind to form coastal habitats. The degree of mobility and harsh physiological conditions poses a significant challenge to marine flora and fauna. The type of biological communities found at Mudflats and Sandflats is quite variable across Ireland. Currently, approximately 50% of the national resource of this habitat has been analysed as part of baseline mapping to set conservation objectives. The most prevalent community identified through this process was the Mud to Fine Sand community. 44% of the national resource of this community was within Lower River Shannon SAC. The next most prevalent broad

	community type recognised at around 40% of the habitat resource was Fine Sand to Sand community, and again the largest proportion of the national resource of this community was within Lower River Shannon SAC. The largest contribution of the remaining habitat was identified as being Muddy sands/Sandy muds Community. The only vascular plant associated with this habitat is *Zostera noltei* and this species is found within a number of SACs. The bivalve *Barnea candida,* also known as White piddock, is rarely recorded in Ireland and is recorded from the intertidal at Bannow Bay SAC and Galway Bay Complex SAC.

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***2007-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	GIS mapping of Mudflats and sandflats habitat was primarily achieved by use of a data set generated by use of high and low water marks/vectors delineated by the Ordnance Survey of Ireland (OSI) Discovery Series (1: 50,000). This was validated by the use of the national aerial ortho-photography data set published by the OSI in 2005. Smaller polygons that were below the resolvable power of about 0.5 hectare were excluded from the polygon shapefile dataset. This was supplemented by NPWS Site-Specific Conservation Objectives spatial data where available. Manual edits were carried out based on Expert Opinion.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***

3.2 Sources of information	Aquafact International Services Ltd. (2006) A Survey of Intertidal Mudflats and Sandflats in Ireland. A report to National Parks and Wildlife Service. Aquatic Services Unit (2007) A Survey of Mudflats and Sandflats. A report to National Parks and Wildlife Service. CMRC (2006-12). Marine Irish Digital Atlas. http://mida.ucc.ie/. Crowe *et al*. (2011) A framework for managing sea bed habitats in near shore Special Areas of Conservation. A report to National Parks and Wildlife Service. Cummins *et al*. (2002) An assessment of the potential for the sustainable development of the Edible Periwinkle, *Littorina littorea*, Industry in Ireland. *Marine Resource Series*: 23. DCENR (2013) Spatial data for seismic surveys and Hydrocarbon Wells. http://www.dcenr.gov.ie/Spatial+Data/Petroleum+Affairs/PAD+Spatial+Data+Downloads.htm.EPA. (2013). EPA Ireland GeoPortal. http://gis.epa.ie/DataDownload.aspx. Falvey, J.P., Costello, M.J. & S. Dempsey (1997) A survey of intertidal mudflats. Unpublished report to the National Parks and Wildlife Service, Dublin. NPWS (2011/17) Conservation Objective Series. ISSN 2009-4086. Scally, L., Pfeiffer, N.J. & Hewitt, E. (in prep.) The monitoring and assessment of six Annex I marine habitats. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.
3.2i Additional information	Borja, Á., Franco, J. & Pérez, V. (2000) A marine biotic index to establish the ecological quality of soft-bottom benthos within European estuarine and coastal environments. *Marine Pollution Bulletin* 40: 1100-1114. Borja, Á., Muxika, I. & Franco, J. (2003) The application of a Marine Biotic Index to different impact sources affecting soft-bottom benthic communities along European coasts. *Marine Pollution Bulletin* 46: 835-845. Lincoln, R.J. (1979) *British Marine Amphipoda: Gammaridea*. British Museum (Natural History). London 1979.

4 Range

Range within the biogeographical/marine region concerned

4.1 Surface area	***23,800 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend	**a) Minimum**	

Magnitude *Optional*	**b) Maximum**	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 23,800 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable Reference Range has been set as the current range as there is no evidence of decline since the Directive came into force. This range is likely to encompass all geographical, geological and ecological variation of Mudflats and sandflats not covered by seawater at low tide.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods? YES/**NO*** *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/NO*
	b) yes, due to improved knowledge/more accurate data	*YES/NO*
	c) yes, due to the use of different method	*YES/NO*
	d) yes, but there is no information on the nature of change	*YES/NO*

	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data / the use of a different method*
4.12 Additional information *Optional*	Range was estimated based on partial data with some extrapolation and/or modelling. The Range Map for this habitat is the intersection of the polygon generated through the mapping of the habitat feature with a 10 x10 km grid generated on Irish National Grid. The intersection of this transformed ING grid was used to intersect with the 10 km^2 LAEA grid. There is no evidence of any change to the range of this habitat feature in Ireland since the last reporting period. FRR was considered to be the same as the current range as there is no evidence of decline since the Directive came into force.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2007-2018***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***646 km^2***
5.3 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

5.9 Long-term trend Period *Optional*	***1994-2018***	
5.10 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	***a) 646 km²***	
	b) Indicate if operators were used (≈, >, >>, <) or	
	c) If favourable reference area is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The FRA is set as the current area as there is no evidence of a decline since the Directive came into force and this is considered adequate to ensure the long-term viability of the habitat.	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods? YES/**NO*** *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/NO*
	b) yes, due to improved knowledge/more accurate data	*YES/NO*
	c) yes, due to the use of different method	*YES/NO*
	d) yes, but there is no information on the nature of change	*YES/NO*
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data / the use of a different method*	
5.15 Additional information *Optional*	No impacts with the potential to lead to a change in the area of Mudflats and sandflats not covered by seawater at low tide have been identified since the last reporting period.	

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***285 km²***
		Maximum	***285 km²***
	b) Area in not-good condition	**Minimum**	***361 km²***
		Maximum	***361 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	*stable / increasing /* ***decreasing*** */ uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period?* ***YES****/NO* The updated list is provided in an additional spreadsheet and the species are listed in field 6.7.		
6.7 Typical species Method used *Optional*	A variety of Marine Community Types (MCTs) are found in the sediments of intertidal flats. The typical species found are largely dependent on the sediment composition of the area sampled. These vary considerably from species typical of sediments with small particle sizes, e.g. silts, to those associated with the larger particle sizes of sands. Typical species also vary for a variety of other factors including the height of the shore at which the sediment was collected and exposure. Notwithstanding this variability, those species commonly found in a range of Irish intertidal sand and mud flat sediments have been provided. The typical species list has been updated since the last reporting period to include additional species considered to be typical of the habitat based on survey data collected during the current reporting period and to reflect changes in taxonomic nomenclature as appropriate. Typical species for intertidal sediments collected within this habitat		

	were identified and enumerated from three 5 x 0.01m^2 sediment cores within each of the MCTs described and mapped for a site. Multivariate analysis in Primer version 7 was subsequently used to assess the frequency of species within the habitat and to aid in the identification of typical species. Some expert judgment was also used in the identification of typical species, e.g. to avoid bias caused by juveniles or chance capture. Changes in typical species between the present and previous reporting period do not necessarily indicate a change. The list of typical species includes the following species: *Arenicola marina, Baltidrilus costatus, Bathyporeia pilosa, Bathyporeia sarsi, Cerastoderma edule, Chaetozone gibber, Corophium volutator, Crangon crangon, Eteone longa, Eurydice pulchra, Fabulina fabula, Hediste diversicolor, Heteromastus filiformis, Limecola balthica, Macomangulus tenuis, Nephtys cirrosa, Nephtys hombergii, Nucula nucleus, Peringia ulvae, Pisione remota, Pontocrates* spp*., Pygospio elegans, Scolelepis squamata, Scrobicularia plana, Scoloplos armiger, Spio martinensis, Tubificoides benedii*.
6.8 Additional information *Optional*	313km^2 of the total national resource of 646km^2 of Mudflats and sandflats not covered by seawater at low tide within 21 Special Areas of Conservation (SACs) around the coast of Ireland were surveyed to assess the Structure and functions of this habitat during the current reporting period. This represents 49% of the total national resource for this habitat. The overall site-based conservation assessment was recorded as Unfavourable-Inadequate in three sites (Dundalk Bay SAC, Lower River Shannon SAC and Castlemaine Harbour SAC). This amounted to 17,470ha or 56% of the area sampled and represents 14% of the sites surveyed. The remaining 19 were assessed as Favourable. This represents 13,786ha or 44% of the area sampled but represents 86% of the sites sampled. Using the Structure and functions criteria in the Annex E evaluation matrix would result in the habitat being assessed as Unfavourable-Bad. However, this does not accurately reflect the conditions at a site level and highlights the difficulties in using area to assess Structure and functions in an aquatic environment. For this habitat, therefore, the more accurate assessment of Structure and functions was deemed to be Unfavourable-Inadequate. Dundalk Bay failed to meet Favourable Conservation Status due to a change in the sediment composition of the intertidal stations sampled. An increase in fine grain size classes, indicative of an increase in sedimentation, was recorded. Two intertidal stations on the north and south sides of the Lower River Shannon also failed to meet Favourable Conservation Status due to an increase in fine grain size classes. Castlemaine Harbour SAC failed to meet Favourable Conservation Status due to the presence of invasive alien species impacting on the intertidal *Zostera noltei* beds. The large area of intertidal flats (174 km^2) within the three sites which failed to meet Favourable Conservation Status represents a considerable proportion of the national resource of this habitat and significantly contributed to the overall failure of the habitat to meet Favourable Conservation Status.

	A number of pressures, listed in section 7.1, acting on the site are known and considered to be responsible for some of the changes recorded.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**F20** Residential or recreational activities and structures generating marine pollution (excl. marine macro- and micro-particular pollution (H) **A28** Agricultural activities generation marine pollution (H) **G16** Marine aquaculture generating marine pollution (H)	**F20** Residential or recreational activities and structures generating marine pollution (excl. marine macro- and micro-particular pollution (H) **A28** Agricultural activities generation marine pollution (H) **G16** Marine aquaculture generating marine pollution (H)

7.2 Sources of information *Optional*	Scally, L., Pfeiffer, N.J. & Hewitt, E. (in prep.) Monitoring and assessment of six EU Habitats Directive Annex I marine habitats. *Irish Wildlife Manual*s, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.
7.3 Additional information *Optional*	Threats were selected based on best expert judgement and a review of the pressures observed. Nutrient enrichment of enclosed bays with poor mixing was particularly evident. The main contributing factor to increased nutrient enrichment on the intertidal flats was considered to be diffuse pollution as a result of agricultural and forestry activities and wastewater discharges. In some cases the pressures acting on an area were unknown. Effective loss of the habitat area of Mudflats and sandflats not covered by seawater at low tide has been driven by the expansion in bottom culture of oysters. Compaction of sediments within the intertidal area as a result of machinery associated with oyster bottom culture driving over intertidal flats and litter associated with this industry was frequently noted.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* ***d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')***
8.3 Location of the measures taken	*Indicate the location of measures taken:* ***a) Only inside Natura 2000** or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* a) Short-term results (within the current reporting period, 2013-2018) or ***b) Medium-term results (within the next two reporting periods, 2019-2030)** or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	**CG08** Reduce/eliminate marine pollution from marine aquaculture **CG09** Other measures to reduce impacts from marine aquaculture infrastructures and operation
8.6 Additional information *Optional*	The implementation of the following conservation measures would improve the structure and function of this habitat: **CA13** Reduce/eliminate marine pollution from agricultural activities **CF04** Reduce/eliminate point source pollution to surface or ground waters from industrial, commercial, residential and recreational areas and activities. The River Basin Management Plan for Ireland 2018-2021 sets out the actions that Ireland will take to improve water quality and achieve 'good' ecological status in water bodies (rivers, lakes, estuaries and coastal waters) by 2027. The main regulatory measure taken has been the implementation of appropriate assessment to ensure that potential threats from development activities, within and outside of the Natura 2000 network, do not negatively impact on the conservation objectives of Mudflats and sandflats not covered by seawater at low tide. This includes appropriate assessment of planned aquaculture activities and

	the preparation of Fisheries Natura Plans for aquaculture within or with the potential to impact on Natura 2000 sites. Over-enrichment of Large shallow inlets and bays as a result of agricultural intensification, wastewater discharge, commercial forestry and aquaculture, alone and in combination, appear to be the most significant pressures acting on Mudflats and sandflats not covered by seawater at low tide. The impact of commercial dumping was a significant noted impact at one site (Mulroy Bay SAC). The impact of the bottom culture of oysters has resulted in an effective loss of habitat at a number of sites. Litter and the use of heavy vehicles associated with this activity were also frequently noted on sandflats adjacent to oyster farms.

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	*Good /* ***Poor*** */ Bad / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as Stable. Current range is equal to Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as Stable, as no change in range is expected as the physical and geological nature of the habitat makes a change in range unrealistic. Future prospects of Range are therefore Good. Short-term trend direction of Area is assessed as Stable. The potential for a significant change (increase or decrease) in the area is considered highly unlikely in the medium term. Conservation status of Area is therefore Favourable. Future trend of Area is assessed as Stable, as no change in area is expected based on the current threats, conservation measures and the physical structure of the habitat. Future prospects of Area are therefore Good. Short-term trend direction of Structure and functions is Decreasing. An assessment of Unfavourable-Bad was recorded at two SACs. An assessment of Unfavourable-Inadequate was recorded at one site. Conservation status of Structure and functions is therefore Inadequate. Future prospects of Structure and functions are therefore Poor.	

10 Conclusions

Assessment of conservation status at end of reporting period

10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving /* ***deteriorating*** */ stable / unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/****NO***	***YES****/NO*
	b) yes, due to genuine change	*YES/NO*	***YES****/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	***YES****/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/****NO***
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/****NO***
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	***genuine change*** */ improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	313km^2 of the total national resource of 646km^2 of Mudflats and sandflats not covered by seawater at low tide within 21 Special Areas of Conservation (SACs) around the coast of Ireland were surveyed to assess the Structure and functions of this habitat during the current reporting period. This represents 49% of the total national resource for this habitat.		

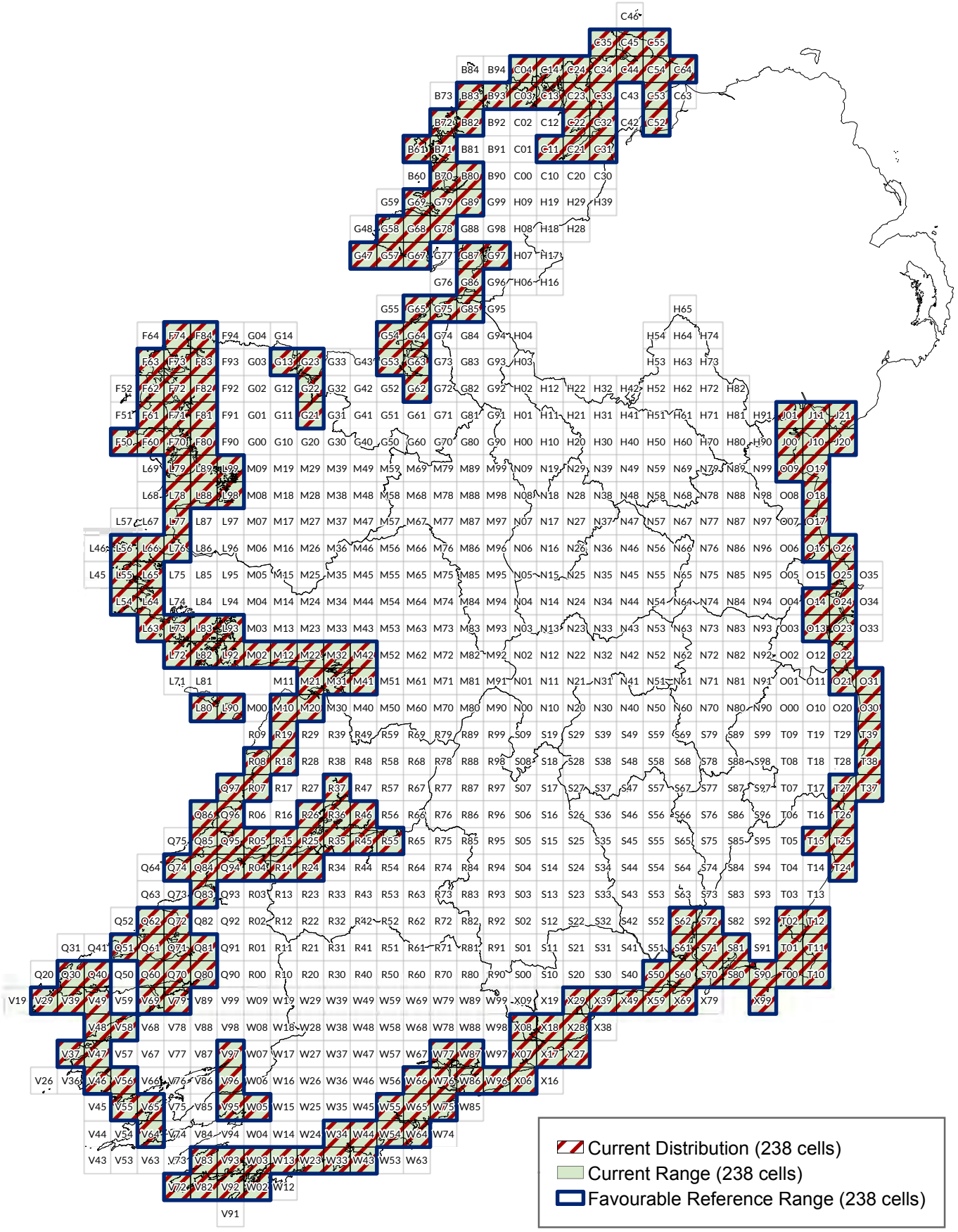
	The Overall Conservation Status of Mudflats and sandflats not covered by seawater at low tide has been assessed as Unfavourable-Inadequate. The majority of SACs surveyed (18 of the 21 sites surveyed) were assessed as being at Favourable Conservation Status. However 174Km^2 of the total national resource of Sandflats and mudflats not covered by seawater at low tide is located within the three sites which failed to meet Favourable Conservation Status. This represents 27% of the national resource and was a significant factor in the overall failure of the habitat to meet Favourable Conservation Status. The principal reason for the failure of the habitat to meet Favourable Conservation Status was a change in sediment composition (two sites) and an increase, or potential for increase, of alien invasive species (one site). It is considered highly likely that the pressures recorded have resulted from increased sedimentation. Mudflats are vulnerable to increased sediment loads, resulting from activities upstream of rivers, entering a bay. The most likely cause of these increased sediment loads is considered to be a combination of the discharge of untreated effluent and intensive agriculture. The encroachment of the invasive alien species *Spartina anglica* on *Zostera noltei* beds and the potential threat of other invasive species from the re-laying of mussel seed gathered from other parts of the coast is the principal reason for the failure of Castlemaine Harbour SAC to meet Favourable Conservation Status.

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km^2 in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***545 km^2***
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* *stable / increasing /* ***decreasing*** */ uncertain/ unknown*	

11.5 Short-term trend of habitat area in good condition within network **Method used**	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
11.6 Additional information *Optional*	All surveys were undertaken in the SAC network, therefore the trend of Area in Good condition reflects the national trend.

12 Complementary information

Tidal mudflats (1140)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**1150 Coastal lagoons***
1.2i Habitat short name	**Lagoons**
1.3i Habitat description	Lagoons are expanses of coastal salt water, of varying salinity, which are wholly or partially separated from the sea. There are five morphological lagoon types in Ireland and, with the exception of karst lagoons which are confined to mid-west and rock/peat lagoons to the west and northwest, they occur all around the coast. The type of lagoon may determine to a certain extent the typical species found within it. Numerically, artificial lagoon is the most common type and represents 33.3% of the habitat area. The classic "sedimentary" lagoons with a sedimentary barrier represent the highest proportion of the habitat area (43.8%). These may or may not have a permanent tidal inlet but more than half of these have a barrier of cobbles rather than sand or shingle; this is considered unusual in Europe. 19 lagoons (20.1% of habitat area) are referred to as the "rock/peat" lagoons. These "rock/peat" lagoons, which are found on the west coast, are high-salinity lagoons with rock barriers similar to the Scottish "obs" and are a particularly unusual type of lagoon in European terms. 11 relatively small lagoons (1.7% of habitat area) are referred to as "karst" lagoons and are found in the limestone areas of Counties Clare and Galway. They may have a permanent tidal inlet and even a cobble barrier but many are some distance from the sea with no visible connection to it. All receive both fresh and seawater through subterranean fissures in the bedrock. Finally there are a small number (six lagoons, 1.1% of habitat area) referred to as "saltmarsh" lagoons, these are very much like very large permanent saltmarsh pools.

2 Maps	
2.1 Year or period	***1996-2017***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted

2.5i	For the 2001-2006 assessment the mapping of distribution was based on a point distribution file and 62 x 10km cells were identified. In 2011 the lagoon maps were digitised, which added four new cells to the distribution due to increased accuracy and realisation that the boundary of some lagoons projected into an adjacent cell (North Slob channel T12, Lough Gill Q51, Durnesh Lake G87, Broadmeadow O14). Shannon Airport was plotted in the wrong position due to inaccurate mapping so that one cell was lost (R36) but the adjacent cell was gained (R35). The boundary for Tacumshin Lake was modified in 2013 following an OPW level survey of areas below 1m. One new site (Coornagillah) was added to the Inventory in 2013, which added one new cell to the distribution (V86). In 2017 one new site (Ardbear Salt Lake) was added to the Inventory but this did not require the addition of any new cells to the distribution.

BIOGEOGRAPHICAL LEVEL

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	***Atlantic***, *Marine Atlantic*
3.2 Sources of information	AQUAFACT & Roden Oliver Associates (2017) Monitoring and assessment of Irish lagoons for the purpose of the EU Water Framework Directive, 2016-2017. Unpublished report on behalf of the Environmental Protection Agency. Anon. (2011) Sampling fish for the Water Framework Directive, WFD Summary Report 2010, Inland Fisheries Ireland, Dublin Anon. (2012) Sampling fish for the Water Framework Directive, WFD Summary Report 2011, Inland Fisheries Ireland, Dublin Cronin Millar (2012) Technical report on Reenydonegan Lake Coastal Bar Breach, Bantry, Co. Cork. Cronin Millar Consulting Engineers, Cobh, Co. Cork. Good, J.A. & Butler, F.T. (1996) A survey of Irish coastal lagoons. Ecotonal Coleoptera (Staphylinidae and Carabidae). Dúchas, Dublin. Good, J.A. & Butler, F.T. (1998) Coastal lagoon shores as a habitat for Staphylinidae and Carabidae (Coleoptera) in Ireland. *Bulletin of the Irish Biogeographical Society* 21: 22-65. Good, J.A. & Butler, F.T. (1999) A survey of Irish coastal lagoons. Vol V. Ecotonal Coleoptera (Staphylinidae and Carabidae). Dúchas, Dublin. Good, J.A. & Butler, F.T. (2000) Coastal lagoon and saline lake shores as a habitat for Staphylinidae, Carabidae and Pselaphidae (Coleoptera) in Ireland. Part 2. *Bulletin of the Irish Biogeographical Society* 24: 111-41 Hatch, P. & Healy, B. (1998) Aquatic vegetation of Irish coastal lagoons. *Bulletin of the Irish Biogeographical Society* 21: 2-21. Healy, B. (1994) *Lagoons and other enclosed brackish waters in the Republic of Ireland.* Department of Zoology, UCD, Dublin. 50pp.

Healy, B. (1997) Long-term changes in a brackish lagoon, Lady's Island Lake, south-east Ireland. *Biology and Environment: Proceedings of the Royal Irish Academy* 97B: 33-51.

Healy, B. (1999a) Survey of Irish coastal lagoons. 1996 and 1998. Vol. 1 Part 1. Background, description and summary of the surveys. Dúchas, Dublin.

Healy, B. (1999b) Survey of Irish coastal lagoons. 1996 and 1998. Vol. 1 Part 2. Lagoons surveyed in 1998. Dúchas, Dublin.

Healy, B. (2003) Coastal Lagoons. In: *Wetlands of Ireland*. R. Otte (ed). Chapter 4. University College Dublin Press. Dublin. 44-78.

Healy, B., Bates, R. & McGrath, D. (1982) Marine Fauna of Co. Wexford - 5. Lady's Island Lake. *Irish Naturalists' Journal* 20: 509-560.

Healy, B. & Oliver, G.A. (1998) Irish coastal lagoons: summary of a survey. *Bulletin of the Irish Biogeographical Society* 21: 116-50.

Healy, B., Oliver, G.A., Hatch, P. & Good, J.A. (1997a) Coastal lagoons in the Republic of Ireland. Vol. 1. Background, outline and summary of the survey. Report to the National Parks and Wildlife Service, Dublin.

Healy, B., Oliver, G.A., Hatch, P. & Good, J.A. (1997b) Coastal lagoons in the Republic of Ireland. Vol. 2. Inventory of lagoons and saline lakes. Report to the National Parks and Wildlife Service, Dublin.

Healy, B., Oliver, G.A., Hatch, P. & Good, J.A. (1997c) Coastal lagoons in the Republic of Ireland. Vol. 3. Results of site surveys Parts 1-20. Report to the National Parks and Wildlife Service, Dublin.

Oliver, G.A. (1996) A survey of Irish coastal lagoons: Aquatic Fauna. Unpublished report for Dúchas, The Heritage Service. Dublin.

Oliver, G.A. (1999) A survey of Irish coastal lagoons. Vol. IV: Aquatic Fauna. Unpublished report for Dúchas, The Heritage Service. Dublin.

Oliver, G.A. (2005) Seasonal changes and Biological Classification of Irish Coastal Lagoons. Ph.D. thesis. University College, Dublin.

Oliver, G.A. (2007a) Inventory of coastal lagoons in the Republic of Ireland. Unpublished report on behalf of NPWS.

Oliver, G.A. (2007b) Assessment of conservation status of coastal lagoon habitat in Ireland. Unpublished report on behalf of NPWS.

Oliver, G.A. & Healy, B. (1998) Records of aquatic fauna from coastal lagoons in Ireland. *Bulletin of the Irish Biogeographical Society* 21: 66-115.

Oliver, G.A. (2008) Report on current conservation status and future prospects of Lough Donnell lagoon, Co. Clare. 3rd March 2008. Unpublished report to NPWS.

Oliver, G. A. (2011) Survey of aquatic invertebrates of Shannon Airport Lagoon, Co. Clare. September 2011. Report on behalf of Scott Cawley, Dublin.

Oliver, G.A. (2012) Hydrological and chemical survey of Cuskinny Lake, Great Island, Cork Harbour, Co. Cork. April – June 2012. Unpublished report for Cork County Council.

Roche, C., Oliver, G.A. & Roden, C. (in prep.) Coastal Lagoon Monitoring Programme 2016-2017 Volume I. Background

	document for Conservation Status of the habitat Coastal Lagoons 1150. *Irish Wildlife Manuals,* No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland. Roden, C. (1999) Irish coastal lagoon survey, 1998. Vol. III, Flora. Dúchas, Dublin. Roden, C. (2004) Irish coastal lagoon survey, 2003. Dúchas, Dublin. Roden, C.M & Oliver, G.A. (2012) Monitoring and assessment of Irish lagoons for the purpose of the EU Water Framework Directive, 2011. Parts 1 and 2. Unpublished report on behalf of the Environmental Protection Agency. Roden, C.M & Oliver, G.A. (2013) Monitoring and assessment of Irish lagoons for the purpose of the EU Water Framework Directive, 2009-2011. Parts 1 and 2. Unpublished report on behalf of the Environmental Protection Agency.
3.2i	

4 Range		
4.1 Surface area	***6,700 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable**/ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994-2018***	
4.7 Long-term trend Direction *Optional*	***stable**/ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	

4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 6,700 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable reference range has been set as the current range as there is no evidence of decline since the Directive came into force and there is no reason to assume that the range is not large enough to allow for the long-term survival of the habitat.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods? YES/**NO***	
	If yes, provide the nature of that change. More than one option (a to d) can be chosen	
	a) yes, due to genuine change	*YES/NO*
	b) yes, due to improved knowledge/more accurate data	*YES/NO*
	c) yes, due to the use of different method	*YES/NO*
	d) yes, but there is no information on the nature of change	*YES/NO*
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data / the use of a different method*	
4.12 Additional information *Optional*	The calculation of range was refined for the 2007-2012 assessment using more accurate mapping and this value was also used for the current assessment. As there is no evidence of a true change since the Directive came into force and there is no reason to assume that the range is not large enough to allow for the long-term survival of the habitat, the current range is set as the Favourable Reference Range. Range is stable and not smaller than the Favourable Reference Range and is therefore assessed as Favourable. The short-term trend was assessed as stable over the period 2005-2018; this is assumed to hold also over the default trend period of 2007-2018. Similarly, the long-term range was assessed as stable over the period 1996-2018, and this is assumed to hold over the default trend period of 1994-2018.	

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***1996-2018***

5.2 Surface area *(in km²)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***24.2 km²***
5.3 Type of estimate	***Best estimate**/ 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007-2018***	
5.6 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994-2018***	
5.10 Long-term trend Direction *Optional*	***stable**/ increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	***a) 24.2 km²***	
	b) Indicate if operators were used (≈, >, >>, <) or	

<table>
<tr><td></td><td colspan="2">c) If favourable reference area is unknown indicate by using ‘x’</td></tr>
<tr><td></td><td colspan="2">d) Indicate method used to set reference value if other than operators
As there is no evidence of a true change since the Directive came into force and there is no reason to assume that the area is not large enough to allow for the long-term survival of the habitat, the current area is set as the Favourable Reference Area.</td></tr>
<tr><td>5.14 Change and reason for change in surface area</td><td colspan="2">Is there a change between reporting periods? <u>YES</u>/NO
If yes, provide the nature of that change. More than one option (a to d) can be chosen.</td></tr>
<tr><td></td><td>a) yes, due to genuine change</td><td>YES/<u>NO</u></td></tr>
<tr><td></td><td>b) yes, due to improved knowledge/more accurate data</td><td><u>YES</u>/NO</td></tr>
<tr><td></td><td>c) yes, due to the use of different method</td><td><u>YES</u>/NO</td></tr>
<tr><td></td><td>d) yes, but there is no information on the nature of change</td><td>YES/<u>NO</u></td></tr>
<tr><td></td><td colspan="2">The change is mainly due to (select one of the reasons above):
genuine change /<u>Improved knowledge or more accurate data</u>/the use of a different method</td></tr>
<tr><td>5.15 Additional information
Optional</td><td colspan="2">The habitat was first surveyed between 1996 and 2006 and some sites were revisited in 2016-2017 for NPWS and the Environmental Protection Agency (EPA). Surveys on behalf of the EPA were carried out between 2009 and 2012. These are described in more detail below.
The reporting period for the short-term trend is 2007-2018, but as a survey event was carried out over the 2005/2006 period, the period over which the trend was assessed was extended back to 2005. However, it is assumed that the trend assessment also applies across the default trend period.
The short-term trend was assessed as stable. 27 lagoons were surveyed between 2005 and 2006 in order to complete the surveys of all known lagoons in the Republic of Ireland (Oliver 2005, 2007; Roden, 2004). Between 2009 and 2012 the EPA commissioned surveys of 25 lagoons as part of Ireland’s obligations under the Water Framework Directive (WFD) (Roden & Oliver, 2012); over this period 18 lagoons were sampled on 12 occasions between September 2009 and August 2012. The remaining lagoons were sampled between three and eight times during this period. Between 2016 and 2017 the EPA in conjunction with the NPWS commissioned surveys of 39 lagoons as part of Ireland’s obligations under the WFD and Habitats Directive. 58 of the 89 lagoon sites have been surveyed during the reporting period (AQUAFACT & Roden Oliver Associates, 2017; Roche et al. in prep.), which represents 70.6% of the lagoon habitat area in the country. Aerial photographs of the remaining 31 sites were examined using Bing maps (bing.com). There is no evidence to suggest a true change in area.
Surveys of Irish lagoons did not commence until 1996 and as a result the period over which the long-term trend was assessed (1996-2018) was shorter than the default reporting period (1994-2018), but the</td></tr>
</table>

	trend is assumed to be the same over the default period. The long-term trend is stable. 88 of the 89 lagoon sites have been surveyed during the reporting period which represents 99.98% of the lagoon habitat in the country (AQUAFACT & Roden Oliver Associates, 2017; Roche *et al*. in prep.). Coornagillah has not been surveyed (0.5ha; 0.02% of total habitat area). As there is no evidence of a true change since the Directive came into force and there is no reason to assume that the area is not large enough to allow for the long-term survival of the habitat, the current area (24.2km^2) is set as the Favourable Reference Area. The true area of habitat is stable and is not smaller than the Favourable Reference Area and is without significant changes in distribution pattern within the range. Therefore Area is assessed as Favourable.

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***3.66 km²***
		Maximum	***3.66 km²***
	b) Area in not-good condition	**Minimum**	***20.58 km²***
		Maximum	***20.58 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	*stable / increasing / **decreasing**/ uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? **YES**/NO*		

6.7 Typical species Method used *Optional*	The amphipod *Allomelita pellucida* was on earlier lists but is now regarded as a "rare species" but not as a lagoonal specialist. The Baltic prawn *Palaemon adspersus* has not been recorded in an Irish lagoon before. It was found in 2017 in Doire Bhanbh, Loch an Aibhnín, Ardbear Salt Lake (all in Galway) and Sally's Lough in Donegal (Roche *et al*., in prep.). It is very common in the Baltic where it is fished commercially but rare elsewhere and is hereby proposed as a lagoonal specialist for Ireland.
6.8 Additional information *Optional*	A lagoon in Favourable condition, as determined by the site-specific conservation objectives (https://www.npws.ie/protected-sites), is said to have a median annual salinity and temporal variation within natural range; annual water level fluctuations and minima within natural range; appropriate hydrological connections between lagoons and sea including, where necessary, appropriate management; annual median chlorophyll a within natural ranges and <5µg/l (or <2.5 µg/l in one case); annual median MRP within natural ranges and <0.1mg/l (or <0.01mg/l in one case); annual median DIN within natural ranges and less than 0.15mg/l, macrophyte colonisation to maximum depth for shallow (<2m) lagoons or to >2m (or >4m) for all other lagoons; maintain number and extent of listed plant lagoonal specialists, subject to natural variation, maintain listed animal lagoonal specialists, subject to natural variation, and negative indicator species absent or under control. The main reason that sites failed the Structure and functions assessment was predominantly water quality followed by barrier condition (Roche *et al*., in prep.). Using this assessment method, 366.01 ha (15.1% of the total habitat area) was rated as Favourable, 924.24 ha (38.13% of the total habitat area) was rated as Unfavourable-Inadequate and 1,133.67 ha (46.77% of the total habitat area) was rated as Unfavourable-Bad. It has been observed during the current reporting period that increases in BOD and in peaty sedimentation from catchments in formerly good-quality lagoons, presumably resulting from activities relating to peat extraction and forestry, have reduced the quality of a number of lagoons (Roche *et al*., in prep.). There are two changes to the typical species list. The amphipod *Allomelita pellucida* was on earlier lists but is now regarded as a "rare species" but not as a lagoonal specialist. The "Baltic prawn" *Palaemon adspersus* has now been added to the list following records of its occurrence for the first time in four lagoons in Ireland in 2017. The full list of typical species is therefore: *Chara canescens*, *Chara baltica*, *Chara connivens*, *Lamprothamnium papulosum*, *Palaemon adspersus* and *Ruppia maritima*.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**J02** Mixed source marine water pollution (marine and coastal) (H) **K04** Modification of hydrological flow (H) **K02** Drainage (H) **L01** Abiotic natural processes (e.g. Erosion, silting up, drying out, submersion, salinization (M) **L03** Accumulation of organic material (M) **C12** Extraction activities generating marine pollution (M)	**J02** Mixed source marine water pollution (marine and coastal) (H) **K04** Modification of hydrological flow (H) **K02** Drainage (H) **L01** Abiotic natural processes (e.g. Erosion, silting up, drying out, submersion, salinization (M) **L03** Accumulation of organic material (M) **C12** Extraction activities generating marine pollution (M) **N04** Sea-level and wave exposure changes due to climate change (M)

7.2 Sources of information *Optional*	Pressures were recorded during 2016 and 2017 field surveys (Roche *et al*., in prep.).
7.3 Additional information *Optional*	Pressures and threats were selected and ranked from data gathered during the 2017 monitoring programme. Climate change has not been added as a current pressure but it is likely to severely impact lagoons in the future in the form of higher sea levels linked to increased storm surges. The impact of the 2013/14 storms are very evident on the shingle barrier at Aughinish which has been dramatically remodelled with a tarred road destroyed and seawater now occasionally entering from the west of the site. Equally the barrier at Lough Donnell has been greatly altered. Similar changes may be expected at many other sites in coming years. In addition certain coastal freshwater lakes (e.g. those near Roonagh lagoon, Co. Mayo) may well become saline in the future. The 2016-2017 survey classified 39 sites (68% of the total habitat area) in terms of water quality, based on measurements of water chemistry, phytoplankton and benthic vegetation. This work showed that 22 sites (20.98% of the total habitat area) were rated poor or bad due to eutrophication. Drainage is an issue in two sites (Tacumshin and Shannon Airport lagoon). Sedimentation from peaty material from the catchment is reducing the quality of a number of lagoons (e.g. Drongawn, Cloonconeen, L. Donnell, Loch an Aibhnín, L. Ahalia, Aconeera and Moorlagh). The likely cause of this is the use of machines related to turf cutting

	and/or forestry activities. The natural accumulation of seaweed affects a number of lagoons (e.g. Kilmore, Farranamanagh, Cuskinny, Drongawn, Scattery, Cloonconeen, Cuskinny, Portavaud, Port na Cora and L. Dearg). Erosion of, or damage to, the barrier and silting up impacts a number of lagoons, most noticeably L. Donnell, Aughinish, Reenydonegan, Tacumshin, Kilmore and Scattery. There also appeared to be anthropogenic modifications to the outlets of two lagoons (Aughinish, Maghery). In the case of the former, the impact on the hydrographic functioning is uncertain while in the case of the latter there was an apparent decline in salinity. J02 Mixed source marine water pollution (marine and coastal) (H) impacts 84.5% of the lagoon habitat surveyed between 2016 and 2017 (57.5% of the total habitat area). K04 Modification of hydrological flow (H) impacts 65.9% of the lagoon habitat surveyed between 2016 and 2017 (44.8% of the total habitat area). K02 Drainage (H) impacts 17.2% of the total habitat. L01 Abiotic natural processes (e.g. Erosion, silting up, drying out, submersion, salinization (M) impacts 31.2% of the lagoon habitat surveyed between 2016 and 2017 (21.2% of the total habitat area). L03 Accumulation of organic material (M) pressure impacts 22% of the lagoon habitat surveyed between 2016 and 2017 (14.9% of the total habitat area). C12 Extraction activities generating marine pollution (M) impacts 9.4% of the lagoon habitat surveyed between 2016 and 2017 (6.4% of the total habitat area).

8 Conservation measures	
8.1 Status of measures	*Are measures needed?(**YES**/NO)* *If yes, indicate the status of measures:* ***a) Measures identified, but none yet taken** or* *b) Measures identified and taken or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*

8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	None taken
8.6 Additional information *Optional*	Based on the identified pressures and threats, the implementation of the following conservation measures would improve the structure and functions of this habitat: **CJ01** Reduce impact of mixed source pollution **CJ02** Reduce impact of multi-purpose hydrological changes **CJ04** Other measures related to mixed source pollution and multi-purpose human-induced changes in hydraulic conditions **CC11** Manage/reduce/eliminate marine pollution from resource exploitation and energy production **CL01** Management of habitats (other than agriculture and forest) to slow, stop or reverse natural processes **CA10** Reduce/eliminate point pollution to surface or ground waters from agricultural activities.

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	***Good****/ Poor / Bad / Unknown*
	b) Area	***Good****/ Poor / Bad / Unknown*
	c) Structure and functions	*Good/Poor/**Bad**/Unknown*
9.2 Additional information *Optional*	In relation to hydrographic functioning, there is potential to control anthropogenic impacts. For some sites (Tacumshin, Shannon, L. Donnell, Maghery and Lady's Island Lake) issues of drainage and hydrology have arisen but progress to resolve them is slow. The most widespread issue concerning lagoons is water quality. In the current survey all lagoons on the south and east coasts showed evidence of eutrophication ranging from moderate to very severe (AQUAFACT & Roden Oliver Associates, 2017). There has been no improvement in this situation since 2007. Occasional algal blooms in lagoons are typically a natural process especially in response to a change in salinity and the addition of a limiting nutrient, such as	

	phosphate in seawater; this may trigger a bloom when mixed with nitrate-rich river water. However man-made blooms can be almost permanent and can result in obvious fish-kills. These appear to be a much more recent phenomenon, probably associated with intensification of agricultural practices within the catchment of watercourses entering lagoons. As a consequence, Future prospects must be considered Unfavourable-Bad.

10 Conclusions

Assessment of conservation status at end of reporting period

10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2****) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*improving /* ***deteriorating****/ stable / unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/****NO***	***YES****/NO*
	b) yes, due to genuine change	*YES/NO*	***YES****/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	***YES****/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/****NO***
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/****NO***

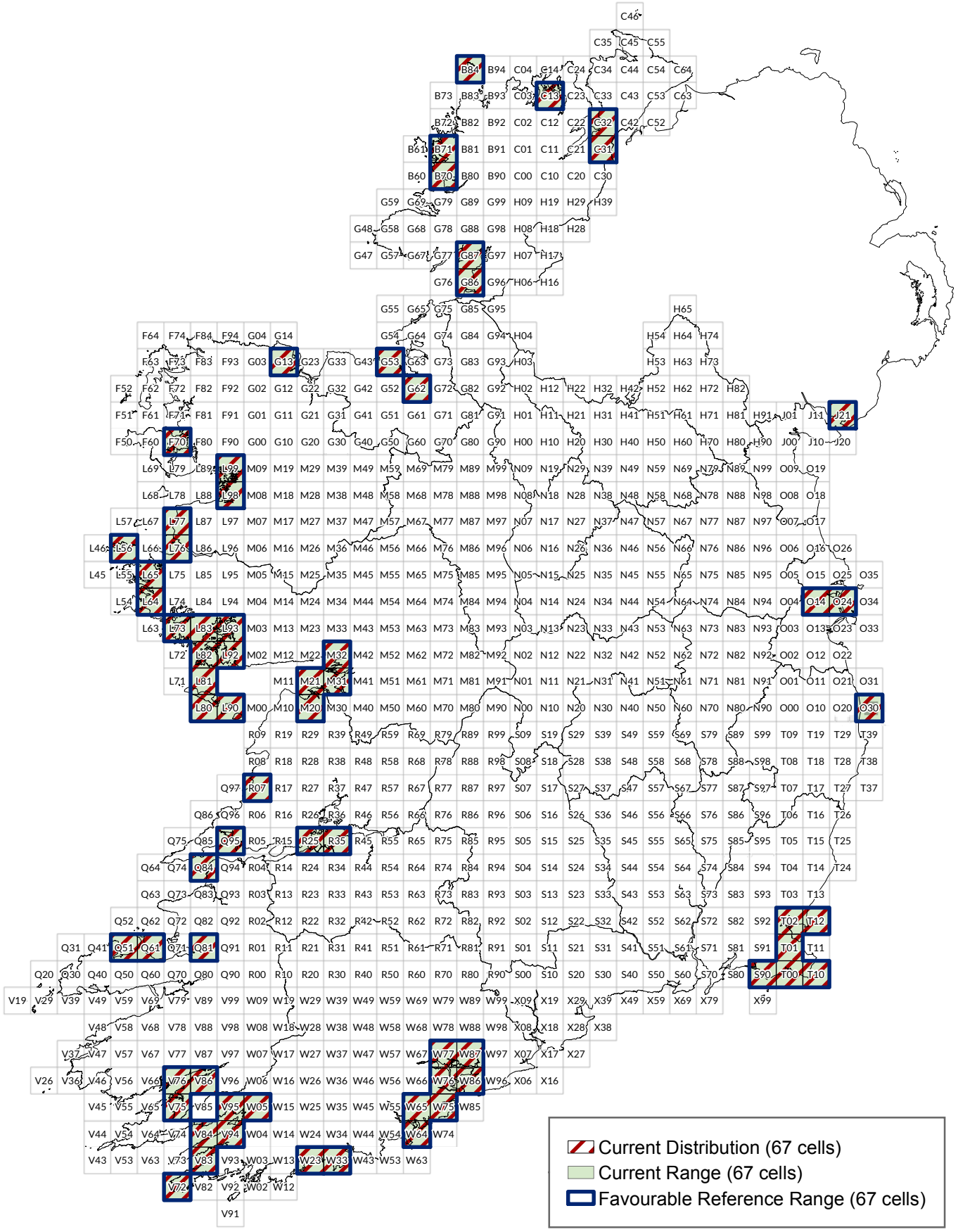
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	***genuine change** / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	The Conservation Status of Range and Area are Favourable in this reporting period, as they were in the previous reporting period. The Conservation Status of Structure and functions and Future prospects are Unfavourable-Bad in this reporting period, as they were in the previous reporting period. The Overall assessment of Conservation Status for the current reporting period is Unfavourable-Bad, as it was the last reporting period. The overall trend in Conservation Status is assessed as deteriorating in the current reporting period. This is a genuine decline since the previous reporting period, when the trend was assessed as stable. An example of recent decline is the siltation of lagoons with peaty silt in parts of the west, especially Connemara, in previously High/Good-quality oligotrophic lagoons.		

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***22.03 km²***
11.2 Type of estimate	***Best estimate**/ 95% confidence interval / minimum*	
11.3 Surface area of the habitat type inside the network Method used	***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*stable / increasing / **decreasing** / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Out of the 39 lagoons surveyed in the current reporting period, 16 of the sites rated as Favourable (248.83 ha; 15.1% of habitat area surveyed), 12 rated as Unfavourable-Inadequate (628.3 ha; 38.13% of habitat area surveyed) and 11 rated as Unfavourable-Bad (770.65 ha; 46.77% of habitat area surveyed). Scaled up to a national level,	

	366.01 ha (15.1% of the total habitat area) was rated as Favourable, 924.24 ha (38.13% of the total habitat area) was rated as Unfavourable-Inadequate and 1,133.67 ha (46.77% of the total habitat area) was rated as Unfavourable-Bad. When only focusing on those lagoons located within the Natura 2000 network (37 of the 39 above), 10 sites (766.45 ha, 31.62% of total habitat area) were classified as Unfavourable-Bad, 12 sites (628.3 ha; 25.92% of total habitat area) were classified as Unfavourable-Inadequate and 15 sites (243.53 ha; 10.05% of total habitat area) were classified as Favourable. Of the 16 sites in a Favourable condition, all bar Kilmore Lake are within the Natura 2000 network. There has been a slight decline in the area in good condition due to new peaty sediment at some stations in SACs previously assessed as being in good condition (Ahalia, Aibhnín).

12 Complementary information

Lagoons* (1150)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**1160 Large shallow inlets and bays**
1.2i Habitat short name	**Large shallow inlets and bays**
1.3i Habitat description	The EU interpretation manual describes Large shallow inlets and bays as indentations of the coast where, in contrast to estuaries, the influence of freshwater is generally limited or reduced. These habitats are typically shallower and more sheltered than open coasts. They generally constitute a large physiographic feature that may wholly or partially incorporate other Annex I habitats including, for example, Mudflats and sandflats not covered by seawater at low tide, Estuaries and Reefs. Large shallow inlets and bays vary widely in habitat and species diversity depending on their location, exposure, geology and sediment composition, which determine their constituent habitat communities. They are host to a range of soft sediment benthic communities. The three most prevalent sediment communities which account for 70% of the examined habitats of Large shallow inlets and bays in Ireland include: Fine Sand to Sand community, Mud to Fine Sand Community and Muddy Sands/Sandy Muds Community. A very significant proportion of keystone species in Ireland are found within the boundaries of Large shallow inlets and bays including 85% of mapped maërl (*Lithothamnion corallioides* and *Phymatolithon calcareum*) and 70% of mapped eelgrass beds (*Zostera marina* and *Z. noltei*). A number of rare and/or unusual species also occur in this habitat including the rare anemones, *Edwardsia delapiae* and *Pachycerianthus multiplicatus*; the majority of sensitive subtidal species such as *Neopentadactyla mixta*, *Sabella pavonina*, *Virgularia mirabilis* and *Limaria hians* also occur within this habitat. The remainder of this habitat is variously composed of hard substrate communities including geogenic subtidal and intertidal reef and sea caves. A diverse range of reef communities reflective of the exposure regime are found within this habitat in Ireland. Geogenic intertidal reef, ranging from exposed to sheltered shores, dominates a high proportion of the landward margins of Large shallow inlets and bays, especially on the west coast of Ireland. Depending on exposure, intertidal reef habitats are characterised by sheltered fucoid-dominated shores to exposed mussel (*Mytilus edulis*) and barnacle-dominated shores. Intertidal reef is frequently found in continuum with subtidal reef and there is a marked zonation from shallow infralittoral to deep circalittoral reef communities. Subtidal reef is also found throughout the habitat and is characterised by bedrock or cobble and boulder fields. Biogenic reef habitats formed from mussels (*M. edulis*) and the ross worm (*Sabellaria spinulosa*) are also present in the intertidal areas of this habitat. Submerged or partially submerged sea caves are common around

	the coast of Ireland. This poorly known habitat hosts a range of distinct communities which vary considerably from the surrounding reef habitats. Large shallow inlets and bays also form an important resource for various bird and mammal species (including Annex II marine mammals) for feeding, breeding and resting.

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***2007-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The primary source of data in relation to Large shallow inlets and bays in Ireland was Ordnance Survey of Ireland 1:50,000 Discovery Series maps and the Environmental Protection Agency Transitional Water Body area mapping as defined under the Water Framework Directive. This was supplemented by NPWS Site-specific Conservation Objectives spatial data where available. Manual edits were carried out based on Expert Opinion.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
3.2 Sources of information	Aquafact International Services Ltd. (2006) A Survey of Intertidal Mudflats and Sandflats in Ireland. A report to National Parks and Wildlife Service. 314pp. Aquatic Services Unit (2007) A Survey of Mudflats and Sandflats. A report to National Parks and Wildlife Service. 253pp. Cameron & Askew (2011) EUSeaMap - Preparatory Action for development and assessment of a European broad-scale seabed habitat map final report. Available at http://jncc.gov.uk/euseamap. CMRC (2006-12) Marine Irish Digital Atlas. http://mida.ucc.ie/.

	Crowe *et al*. (2011) A framework for managing sea bed habitats in near shore Special Areas of Conservation. A report to National Parks and Wildlife Service. 99pp. Coast of Ireland, 2003 Oblique Imagery Survey Viewer. http://www.coastalhelicopterview.ie/. EPA. (2013). EPA Ireland GeoPortal. http://gis.epa.ie/DataDownload.aspx. Falvey, J.P., Costello, M.J. & S. Dempsey (1997) A survey of intertidal mudflats. Unpublished report to the National Parks and Wildlife Service, Dublin. 258 pp. MERC (2005-2009) Surveys of sensitive sublittoral benthic communities. Reports to National Parks and Wildlife Service. MERC (2010) Irish Sea Reef Survey. A report to National Parks and Wildlife Service. 32 pp. NPWS (2010) A desk study of intertidal sea caves. Unpublished report. Scally, L., Pfeiffer, N.J. & Hewitt, E. (in prep.). The monitoring and assessment of six Annex I marine habitats. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.
3.2i Additional information	Connor, D.W., Allen, J.H., Golding, N., Howell, K.L., Lieberknecht, L.M., Northern, K.O. & Reker, J.B. (2004) The Marine Habitat Classification for Britain and Ireland Version 04.05. JNCC, Peterborough ISBN 1 861 07561 8 (internet version). MERC (2005) Survey of sensitive subtidal benthic marine communities in Kilkieran Bay and Islands SAC and Kingstown Bay SAC. Carried out by MERC on behalf of National Parks and Wildlife Service, Department of Environment, Heritage and Local Government. MERC (2006) Survey of sensitive subtidal benthic marine communities in Slyne Head Peninsula SAC, Clew Bay Complex SAC and Galway Bay Complex SAC. Carried out by MERC on behalf of National Parks and Wildlife Service, Department of Environment, Heritage and Local Government. MERC (2007a) Survey of sensitive subtidal benthic marine communities in Roaringwater Bay and Islands SAC, Lough Hyne Nature Reserve and Environs SAC, Valentia Harbour/Portmagee Channel SAC and Broadhaven Bay SAC. Carried out by MERC on behalf of National Parks and Wildlife Service, Department of Environment, Heritage and Local Government. MERC (2007b) Survey of the distribution of the anemone *Edwardsia delapiae* (Carlgren and Stephenson, 1928) in Valentia Harbour and Portmagee Channel SAC, Co Kerry. Carried out by MERC on behalf of National Parks and Wildlife Service, Department of Environment, Heritage and Local Government. MERC (2008a) Survey of sensitive subtidal benthic marine communities in Mullet/Blacksod Bay Complex SAC, Rutland Island and Sound and Mulroy Bay SAC. Carried out by MERC on behalf of National Parks and Wildlife Service, Department of Environment, Heritage and Local Government. MERC (2009) Survey of sensitive subtidal benthic marine

	communities in Kenmare River SAC and Tralee Bay and Magharee Peninsula, West to Cloghane SAC. Carried out by MERC on behalf of National Parks and Wildlife Service, Department of Environment, Heritage and Local Government. MERC (2014a) Trial monitoring of Roaringwater Bay and Islands SAC: Site monitoring report. Carried out by MERC on behalf of National Parks and Wildlife Service, Department of Environment, Heritage and Local Government. MERC (2014b) Trial monitoring of Roaringwater Bay and Islands SAC: Monitoring methodology report. Carried out by MERC on behalf of National Parks and Wildlife Service, Department of Environment, Heritage and Local Government. Picton, B.E., Emblow, C.S., Morrow, C.C., Sides, E.M., Tierney, P., McGrath, D., McGeough, G., McCrea, M., Dinneen, P., Falvey, J., Dempsey, S., Dowse, J. & Costello, M. J. (1997) Marine sites, habitats and species data collected during the BioMar survey of Ireland.

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***21,300 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	

4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 21,300 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable reference range has been set as the current range as there is no evidence of decline since the Directive came into force. This range is likely to encompass all geographical, geological and ecological variation of Large shallow inlets and bays.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods? **YES**/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/**NO***
	b) yes, due to improved knowledge/more accurate data	***YES**/NO*
	c) yes, due to the use of different method	*YES/**NO***
	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*	
4.12 Additional information *Optional*	Range was estimated based on partial data with some extrapolation and/or modelling. The change in range since the last reporting period is due to improved knowledge/more accurate data relating to the distribution of the habitat. FRR was considered to be the same as the current range as there is no evidence of decline since the Directive came into force. Due to the physical nature of this habitat change in range is considered highly unlikely.	

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2007-2018***	
5.2 Surface area *(in km²)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***4,768 km²***

5.3 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994-2018***	
5.10 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	***a) 4,768 km^2***	
	b) Indicate if operators were used (≈, >, >>, <) or	
	c) favourable reference area is unknown	
	d) Indicate method used to set reference value if other than operators The FRA is set as the current area as there is no evidence of a decline since the Directive came into force and this is considered adequate to ensure the long-term viability of the habitat.	

5.14 Change and reason for change in surface area	*Is there a change between reporting periods? **YES**/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/**NO***
	b) yes, due to improved knowledge/more accurate data	***YES**/NO*
	c) yes, due to the use of different method	*YES/**NO***
	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*	
5.15 Additional information *Optional*	GIS mapping of Large shallow inlets and bays was primarily achieved by reference to a dataset generated by the Environmental Protection Agency in fulfilment of the Water Framework Directive requirement of identifying transitional and coastal water bodies. This dataset was generated by reference to salinity values and was digitised from the open coast by prominence of enclosing headlands. This data was cross-referenced against the high and low water marks/vectors delineated by the Ordnance Survey of Ireland (OSI) Discovery Series (1:50,000). This was supplemented with reference and verification from the aerial ortho-photography data set, where appropriate, published by OSI in 2005. Minor change to the area of Large shallow inlets and bays due to erosion of soft sediment features, e.g. sand spits, is possible and has occurred at one location in the south-west of Ireland. However, the resulting change has altered the form rather than reduced the area of the habitat in this instance. The current distribution includes areas that were omitted in error from the distribution in the previous reporting period. This does not represent a genuine increase in area.	

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***1,754 km²***
		Maximum	***1,754km²***
	b) Area in not-good condition	**Minimum**	***3,014 km²***
		Maximum	***3,014 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***

6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***
6.4 Short-term trend of habitat area in good condition Direction	*stable / increasing /* ***decreasing*** */ uncertain/ unknown*
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period?* ***YES****/NO* Updated list provided in additional spreadsheet and listed in field 6.7.
6.7 Typical species Method used *Optional*	A range of highly variable Marine Community Types (MCTs) are found within the benthic soft sediments of Large shallow inlets and bays. The MCTs found vary considerably depending on the geographical location, exposure and sediment type within the habitat. However those species that are commonly found in a range of Irish benthic soft sediments have been provided. The typical species list has been updated since the last reporting period to include additional species considered to be typical of the habitat based on survey data collected during the current reporting period (Scally *et al*., in prep.) and to reflect changes in taxonomic nomenclature as appropriate. Typical species for subtidal sediments were identified and enumerated from Day grab samples collected from three stations within each of the MCTs described and mapped for a site. Multivariate analysis in Primer version 7 was subsequently used to assess the frequency of species within the habitat and aid in the identification of typical species. Some expert judgment was also used in the identification of typical species, for example to avoid bias as caused by juveniles or chance capture. Changes in typical species between the present and previous reporting period do not necessarily indicate an actual change. This list of typical species includes the following species: *Abra alba, Arenicola marina, Ampelisca brevicornis, Aonides oxycephala, Bathyporeia* elegans, *Bathyporeia guilliamsoniana, Bathyporeia pelagica, Bittium reticulatum,* Caprellidae spp., *Caprella acanthifera*, *Phtisica marina*, *Chamelea striatula, Chaetozone gibber, Crangon crangon, Diplocirrus glaucus, Donax vittatus, Euclymene oerstedii, Fabulina fabula, Hilbigneris gracilis, Iphinoe trispinosa, Kurtiella bidentata, Leptochiton asellus, Lithothamnion corallioides, Magelona filiformis*, *Magelona*

	alleni, *Magelona johnstoni, Mediomastus fragilis, Melinna palmata, Monocorophium sextonae, Nephtys cirrosa, Nephtys hombergii, Nucula nitidosa, Owenia spp., Pontocrates arenarius, Pygospio elegans, Pholoe baltica, Pisidia longicornis, Phymatolithon calcareum, Scoloplos mesnili, Scoloplos armiger, Sigalion mathildae, Socarnes erythrophthalmus, Spio symphyta, Spio martinensis, Spiophanes bombyx, Spirobranchus lamarcki, Spirobranchus triqueter, Tellina fabula, Terebellides stroemi, Thracia phaseolina* and *Thyasira flexuosa*. Typical species found within the intertidal area of this habitat are provided in the Article 17 report for the Annex I habitat Mudflats and sandflats not covered by seawater at low tide. Dropdown video supplemented by diver survey was used to assess the typical species associated with keystone communities (maërl, eelgrass, *Pachycerianthus multiplicatus* and *Serpula vermicularis*). Species abundance was subsequently assessed on a SACFOR (**S**uper abundant, **A**bundant, **C**ommon, **F**requent, **O**ccasional, **R**are) scale. Typical species associated with *Limaria hians* and *Edwardsia delapiae*-associated communities were assessed by recording abundance on a SACFOR scale during diver surveys.
6.8 Additional information *Optional*	1,690 km^2 of the total resource of 4,768 km^2 of Large shallow inlets and bays within fourteen Special Areas of Conservation (SACs) around the coast of Ireland were surveyed to assess Structure and functions of this habitat during the current reporting period (Scally *et al*., in prep.). This represents 35% of the total national resource of this habitat and it was deemed to be representative of the national resource. The site-based conservation assessment was Unfavourable-Bad at eight sites (Kenmare River SAC, Valentia Harbour/Portmagee Channel SAC, Mulroy Bay SAC, Clew Bay Complex SAC, Broadhaven Bay SAC, Mullet/Blacksod Bay Complex SAC, Kingstown Bay SAC and Roaringwater Bay SAC). This amounted to 88,037ha or 52% of the area surveyed and 57% of the sites sampled. One site, Kilkieran Bay and Islands SAC, was assessed as Unfavourable-Inadequate, representing 18,760ha or 11% of the area sampled. Four sites (West of Ardara/Mass Road SAC, Galway Bay Complex SAC, Tralee Bay and Magharees Peninsula, West to Cloghane SAC and Lower River Shannon SAC) were assessed as Favourable. This represents 62,169ha or 37% of the area sampled. Therefore Structure and functions have been assessed as Unfavourable-Bad for this habitat. During the most recent monitoring project (Scally *et al*., in prep.), subtidal soft sediments were sampled using a 0.1m^2 Day grab from three stations within each of the MCTs described and mapped for a site. Multivariate analysis in Primer version 7 was subsequently used to assess the frequency of species and to aid the identification of community complexes and changes in benthic communities between the present and previous reporting period. Keystone species (maërl, eelgrass, *Pachycerianthus multiplicatus* and *Serpula vermicularis*) were surveyed using spatially encoded dropdown video transects across previously mapped areas of these communities. The video imagery derived from these surveys was reviewed by examining the video footage in ESRI ArcGIS Full Motion Video® as an

	overlay on the previously mapped areas of these marine communities. This provided a method to calculate the current extent of the area occupied by these species and their associated communities and to calculate change, should it have occurred, since the last reporting period. It also provided the method by which to assess the health, presence of negative indicators, e.g. invasive alien species, opportunistic species and other pressures on these communities. Assessment of the Structure and functions of *Limaria hians* and *Edwardsia delapiae* communities was conducted by diver survey within previously mapped locations for these species and their associated communities. Species abundance was recorded on a SACFOR scale and characterising features ware noted and photographed. The presence of negative indicators was also recorded. The principal reason for the failure of the habitat to meet Favourable Conservation Status in the majority of SACs was the loss of eelgrass beds (*Z*ostera *marina* in particular); this occurred in seven SACs (Kenmare River SAC, Valentia Harbour/Portmagee Channel SAC, Mulroy Bay SAC, Clew Bay Complex SAC, Broadhaven Bay SAC, Mullet/Blacksod Bay Complex SAC and Kingstown Bay SAC). This ranged from a gross negative change in abundance to a total loss of an area of eelgrass. A change in the sediment composition was also a significant contributing factor to a negative assessment of this habitat. Within the fourteen SACs assessed, three recorded a negative assessment for this indicator. In each of these cases an increase in the proportion of fine grain size classes was recorded. The loss of 23.99% of the very vulnerable *Edwardsia delapiae*-associated community was a factor in the negative assessment for one SAC (Valentia Harbour/Portmagee Channel SAC) and the damage to 8.54km^2 or 100% of the keystone community *Serpula vermicularis*-associated community for the negative assessment in another (Mullet/Blacksod Bay Complex SAC).

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**F20** Residential or recreational activities and structures generating marine pollution (excl. marine macro- and micro-particular pollution (H) **A28** Agricultural activities generating marine pollution (H) **B23** Forestry activities generating pollution to surface or ground	**F20** Residential or recreational activities and structures generating marine pollution (excl. marine macro- and micro-particular pollution (H) **A28** Agricultural activities generating marine pollution (H) **B23** Forestry activities generating pollution to surface or ground

	waters (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (H) **G16** Marine aquaculture generating marine pollution (H) **I02** Other invasive alien species (other than species of Union concern) (H) **Xu** Unknown pressure (M)	waters (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (H) **G16** Marine aquaculture generating marine pollution (H) **I02** Other invasive alien species (other than species of Union concern) (H)
7.2 Sources of information *Optional*	Scally, L., Pfeiffer, N.J. & Hewitt, E. (in prep.) Monitoring and assessment of six EU Habitats Directive Annex I marine habitats. *Irish Wildlife Manual*s, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.	
7.3 Additional information *Optional*	Pressures were recorded during field surveys between 2016 and 2018 (Scally *et al.*, in prep.). Threats were selected based on best expert judgement and a review of the pressures observed. The extremely hot summer of 2018 may be a contributing factor in the pressures observed in subtidal eelgrass beds towards the end of the summer in 2018. On-going analysis on the cause of the widespread loss of eelgrass beds across Europe during the summer of 2018 will provide further information on this issue. Nutrient enrichment of enclosed bays with poor mixing was particularly evident, especially in Mulroy Bay in Co. Donegal where almost 50% of the eelgrass beds have disappeared since they were last surveyed in detail in 2008. Here, they have been replaced with dense mats of *Chaetomorpha linum*, an algal species well known to be an indicator of nutrient enrichment. The presence of epiphytic algae on eelgrass leaf blades and associated dieback of *Zostera marina* was a noted pressure in many areas around the coast of Ireland and considered to be due to nutrient enrichment. Benthic dredging is the most likely cause of the loss of the *Serpula vermicularis* reef habitat within Blacksod Bay. The invasive alien species *Sargassum muticum* has now become established in most bays in Ireland. The increasing abundance of this species has the potential to lead to significant ecosystem changes in the short to medium term. In some cases the pressures acting on an area were unknown. This was particularly the case where changes in benthic sediment composition occurred but no obvious source of the impact could be identified.	

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* ***a) Measures identified, but none yet taken** or* *b) Measures identified and taken or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* a) Short-term results (within the current reporting period, 2013-2018) or *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	None taken
8.6 Additional information *Optional*	The implementation of the following conservation measures would improve the Structure and functions of this habitat: **CA13** Reduce/eliminate marine pollution from agricultural activities **CF04** Reduce/eliminate point source pollution to surface or ground waters from industrial, commercial, residential and recreational areas and activities. Over-enrichment of Large shallow inlets and bays appears to be the most significant pressure acting on the habitat. Those Large shallow inlets and bays, and parts thereof, with low mixing capacity were recorded as being particularly vulnerable to the effects of nutrient enrichment. Benthic dredging has had significant impacts on sensitive subtidal communities (*Serpula vermicularis* and maërl). The establishment of the invasive alien species *Sargassum muticum* in eelgrass beds and maërl beds was a noted impact with the potential to lead to significant ecosystem change in the future.

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	*Good / Poor /* ***Bad*** */ Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as stable. Current range is equal to Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as stable, as no change in range is expected as the physical and geological nature of the habitat makes a change in range unrealistic. Future prospects of Range are therefore good. Short-term trend direction of Area is assessed as stable. The potential for a significant change (increase or decrease) in the area is considered highly unlikely in the medium term. Conservation status of Area is therefore Favourable. Future trend of Area is assessed as stable, as no change in area is expected based on the current threats, conservation measures and the physical structure of the habitat. Future prospects of Area are therefore good. Current Structure and functions are assessed as Unfavourable-Bad. Significant losses in the area of eelgrass beds (*Zostera marina*) have been recorded since the last reporting period. The health of eelgrass appears to be compromised by the presence of epiphytic algae. The invasive alien species) *Sargassum muticum* has become established within the majority of Large shallow inlets and bays. The biogenic reef formed by *Serpula vermicularis* has been destroyed in Blacksod Bay, Co. Mayo. A significant proportion of the habitat for the rare anemone *Edwardsia delapiae* has been lost in Valentia Harbour/Portmagee Channel SAC. Changes in benthic sediment composition have been recorded within a number of bays. Short-term trend direction of Structure and functions is decreasing. Conservation status of Structure and functions is therefore Unfavourable-Bad. Future prospects of Structure and functions are therefore Bad.	

10 Conclusions	
Assessment of conservation status at end of reporting period	
10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*
10.4 Future prospects	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*

<table>
<tr><td>10.5 Overall assessment of Conservation Status</td><td colspan="3">Favourable (FV) / Inadequate (U1) / <u>Bad (U2)</u> / Unknown (XX)</td></tr>
<tr><td>10.6 Overall trend in Conservation Status</td><td colspan="3">Indicate the trend (qualifier) for FV, U1 and U2:

improving / <u>deteriorating</u> / stable / unknown</td></tr>
<tr><td rowspan="8">10.7 Change and reasons for change in conservation status and conservation status trend</td><td colspan="3">Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.</td></tr>
<tr><td></td><td>Overall assessment of conservation status (10.5)</td><td>Overall trend in conservation status (10.6)</td></tr>
<tr><td>a) no, there is no difference</td><td><u>YES</u>/NO</td><td><u>YES</u>/NO</td></tr>
<tr><td>b) yes, due to genuine change</td><td><u>YES</u>/NO</td><td><u>YES</u>/NO</td></tr>
<tr><td>c) yes, due to improved knowledge/more accurate</td><td><u>YES</u>/NO</td><td><u>YES</u>/NO</td></tr>
<tr><td>d) yes, due to the use of different methods (including use of different thresholds)</td><td>YES/<u>NO</u></td><td>YES/<u>NO</u></td></tr>
<tr><td>e) yes, but there is no information on nature of change</td><td>YES/<u>NO</u></td><td>YES/<u>NO</u></td></tr>
<tr><td>The change is mainly due to (select one of the reasons above):</td><td><u>genuine change</u> / improved knowledge or more accurate data / the use of a different method</td><td><u>genuine change</u> / improved knowledge or more accurate data / the use of a different method</td></tr>
<tr><td>10.8 Additional information

Optional</td><td colspan="3">1,690 km^2 of the total resource of 4,768 km^2 of Large shallow inlets and bays within fourteen Special Areas of Conservation (SACs) around the coast of Ireland were surveyed to assess Structure and functions of this habitat during the current reporting period (Scally et al., in prep.). This represents 35% of the total national resource for this habitat.

Eight of the fourteen sites surveyed (57%) and 52% of the area sampled was assessed as Unfavourable-Bad. The conservation status of Large shallow inlets and bays has been therefore assessed as Unfavourable-Bad.

A change in sediment composition, resulting in an increased proportion of fine grain size class, was recorded at three of the SACs surveyed. An increase in fines within a sediment is considered an indicator of increased sedimentation.

Significant changes were documented in the areas previously recorded for eelgrass beds between 2005 and 2009. In some SACs</td></tr>
</table>

	the loss of entire eelgrass beds was recorded in a number of places (Mulroy Bay SAC, Valentia Harbour/Portmagee Channel SAC, Clew Bay Complex SAC and Mullet/ Blacksod Bay Complex SAC). In these and other SACs a significant decrease in the abundance of eelgrass within a bed from the previous baseline survey was also recorded. An increase in negative indicators, e.g. epiphytic algal cover on eelgrass leaves, the presence of opportunistic species and invasive alien species, was also recorded in many of the eelgrass beds surveyed. Eelgrass beds are considered sensitive subtidal communities and pressures are likely to be noted in these communities prior to more resilient communities. The *Serpula vermicularis*-dominated community complex in Blacksod Bay, which had previously (2008 survey) been shown to be comprised of large aggregations of biogenic reef formed by *Serpula vermicularis*, now consists of broken tubes of *Serpula vermicularis.* Very few living aggregations are still present and the total habitat area of this MCT has been negatively impacted. The cause of this impact is physical damage due to benthic dredging. Physical damage to maërl thalli was also observed in the maërl beds adjacent to the *Serpula vermicularis*-dominated community complex. Significant negative impacts were recorded in the maërl community within Roaringwater Bay SAC. Here pseudofaeces deposition and/or extensive algal cover over the maërl beds, including the rare *Lithothamnion dentatum,* were recorded in the vicinity of mussel longlines. The opportunistic ascidian *Ascidiella aspersa* was also recorded as "dominant" within the maërl beds in the immediate vicinity of the mussel longlines. A total of 0.29ha or 23.99% of the total known national resource of the marine community type for the rare burrowing worm anemone *Edwardsia delapiae* within Valentia Harbour/Portmagee channel SAC has been lost. This has resulted from the indirect impact of the construction of a floating breakwater over this MCT leading to a negative change in the sediment requirements for this species. Minor increases in the habitat for *Pachycerianthus multiplicatus* were recorded in Kenmare River SAC and Kilkieran Bay and Islands SAC. However these increases are considered to be the result of increased survey effort rather than an increase in species distribution. No significant increase in the extent of the area of other keystone species was recorded.

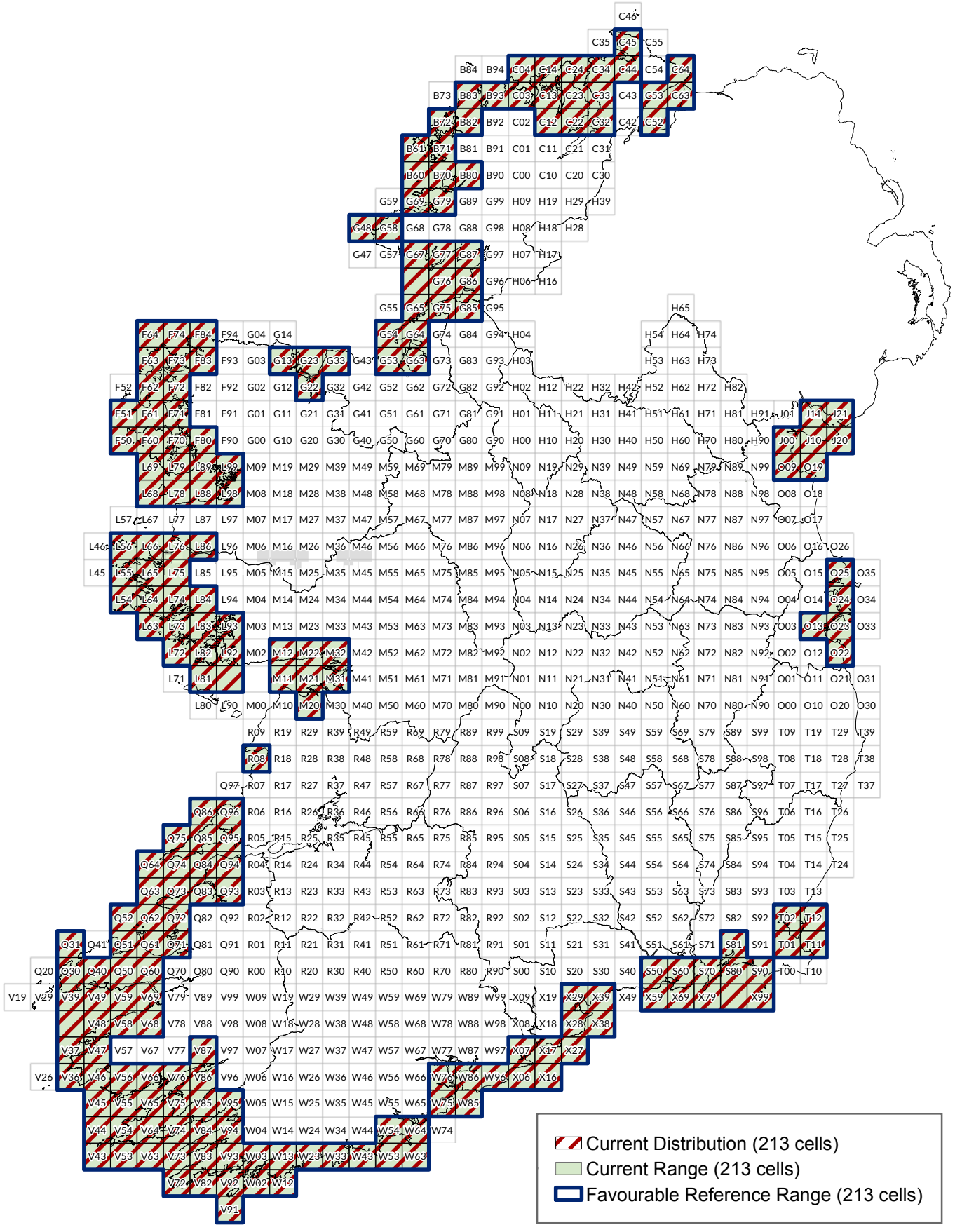
11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***2,250 km²***
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	

11.3 Surface area of the habitat type inside the network **Method used**	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
11.4 Short-term trend of habitat area in good condition within the network **Direction**	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* *stable / increasing /* ***decreasing*** */ uncertain/ unknown*
11.5 Short-term trend of habitat area in good condition within network **Method used**	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
11.6 Additional information *Optional*	As all sites surveyed were within the SAC network the short-term trend of habitat area in good condition within the network is the same as the national trend.

12 Complementary information

Large shallow inlets and bays (1160) Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**1170 Reefs**
1.2i Habitat short name	**Reefs**
1.3i Habitat description	Reef habitats are widespread marine features with immobile hard substrate available for colonisation by epifauna. Reef habitat in Irish waters ranges from the intertidal to 4500m below the sea surface and more than 400km from the coast. Intertidal Reefs are familiar and widespread habitats characterised by hard rock washed by the tide. There are a number of factors that influence this habitat type including tidal immersion, influence of freshwater (riverine and rainwater), variation in temperature, desiccation, exposure to waves, stability of substrate, and weathering of substrate. With distance from the intertidal these parameters become less active in influencing the habitat. Subtidal Reefs are most often found in exposed areas with little influence of freshwater. In depths down to 30m along the Atlantic margin there is still a significant penetration of light and swell waves reach the reef. In depths below 30m (or shallower in some coastal areas) insufficient light penetrates to hard rock structures to allow photosynthesis of algae and the habitat usually becomes dominated by fauna. In the offshore, hard rock structures occur intermittently between soft sediment, mostly along the shelf margin. In depths of several hundred meters no light reaches the bottom and temperatures are usually cool and fairly constant. A significant type of the Reef habitat is that generated by the habitat-forming accretions of animals. These Biogenic Reefs increase the structural complexity beyond the surrounding areas and usually result in greater biodiversity. In the inshore these may be formed by the protective structures of worms and in the offshore, by stony deep-water coral species. Recent work on Annex I habitats (Scally *et al.,* in prep.) in the inshore has highlighted usual species or communities. Mulroy Bay, which is Ireland's only example of sheltered reef, reported a few notable species including the sponges *Dercitus bucklandi*, *Stelletta grubii* and an undescribed species of *Polymastia* and the anthozoan *Parerythropodium coralloides*. Reef habitat in Kilkieran showed some unusual presentations of the sponge and ascidian community, particularly the Gurraig Sound, typified by the presence of the sponges *Esperiopsis fucorum*, *Haliclona simulans*, *Myxilla incrustans*, *Polymastia mamillaris*, *Raspailia* sp. and *Suberites* sp., *Plakortis simplex* and *Tricheurypon viride* and ascidians *Ascidiella aspersa*, *Ascidia mentula*, *Ciona intestinalis*, *Corella parallelogramma* and *Dendrodoa grossularia*. The occurrence of *Phakellia vermiculata* and *Axinella damicornis* is also notable. Similarly in Kenmare River rare species included the brachiopod *Neocrania anomala* and at Slyne Head the nudibranch *Aldisa zetlandica*. The urchin *Paracentrotus lividus*, a once typical intertidal Reef species, shows a restricted

	distribution with few records nationally. During recent surveys (Ross *et al.,* 2018 and 2019) of offshore reefs, the depth range of the cold water coral *Solenosmilia variabilis* was found at previously unrecorded depths (>1600m). On the Rockall Bank, a highly unusual accumulation of living and dead sponges forming a complex habitat was found. These areas of potential 'sponge reef' formations are very rare and have previously only been recorded in Canadian waters.

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***2007-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	Mapping of the habitat was carried out using a number of data sets, including those related to the incidence of coastal habitats, predicted and modelled habitat maps, hydrocarbon exploration, sustainable harvest, physical oceanographic surveys, geophysical and geotechnical surveys, and dedicated biological mapping using direct sampling and remote acquisition techniques. This was supplemented by NPWS Site-Specific Conservation Objectives spatial data where available. Manual edits were carried out based on Expert Opinion.

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned	
3 Biogeographical and marine regions	
3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
3.2 Sources of information	Cameron & Askew (2011) EUSeaMap - Preparatory Action for development and assessment of a European broad-scale seabed habitat map final report. Available at http://jncc.gov.uk/euseamap. CMRC (2006-12) Marine Irish Digital Atlas. http://mida.ucc.ie/. Crowe *et al*. (2011) A framework for managing sea bed habitats in

	near shore Special Areas of Conservation. A report to National Parks and Wildlife Service. 99pp. Davies *et al*. (2007) MESH South West Approaches Canyons Survey (MESH Cruise 01-07-01) Final Report. 156 pp. DCENR (2003) Coast of Ireland, 2003 Oblique Imagery Survey Viewer. http://www.coastalhelicopterview.ie/.EPA. DCENR (2013) Spatial data for seismic surveys and Hydrocarbon Wells. http://www.dcenr.gov.ie/Spatial+Data/Petroleum+Affairs/PAD+Spatial+Data+Downloads.htm. EPA Ireland GeoPortal. http://gis.epa.ie/DataDownload.aspx. Huvenne *et al*. (2009) RRS James Cook Cruise 35, 7-19 Jun 2009. Sidescan sonar mapping of the Whittard Canyon, Celtic Margin. Southampton, UK: National Oceanography Centre, Southampton, 35pp. Long *et al*. (1999) Occurrences of *Lophelia pertusa* on the Atlantic margin. British Geological Survey Technical Report WB/99/24. MERC (2010) Irish Sea Reef Survey. A report to the National Parks and Wildlife Service. 32 pp. Guinan & Leahy (2010) Habitat Mapping of Geogenic Reef Offshore Ireland. Unpublished report to National Parks and Wildlife Service. 193 pp. NPWS. (2011/2). Conservation Objective Series. ISSN 2009-4086. Marine Ecological Surveys Limited (MESL) (2017) Reef habitat in Irish Intertidal and near-shore waters. Unpublished report to National Parks and Wildlife Service. 90pp. Edited by David Alexander, Elena Maher and Vicky West. Poulsen & Suzyumov (2004) North Atlantic and Labrador Sea Margin Architecture and Sedimentary Processes. International Conference and Twelfth Post-Cruise Meeting of the Training-Through-Research Programme. 57pp. RPS (2016) Reef Habitat in Irish Offshore Waters – A synthesis of current knowledge. Unpublished report to National Parks and Wildlife Service. Ross *et al*. (2018) SEAROVER 2017 Deep Water Reef Habitat & Species Video Analysis. Unpublished report to Marine Institute. Ross *et al*. (in prep.) SEAROVER 2018 Deep Water Reef Habitat & Species Video Analysis. Unpublished report to Marine Institute. Scally, L., Pfeiffer, N.J. & Hewitt, E. (in prep.). The monitoring and assessment of six Annex I marine habitats. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.
3.2i Additional information	Connor, D.W., Allen, J.H., Golding, N., Howell, K.L., Lieberknecht, L.M., Northern, K.O. & Reker, J.B. (2004) The Marine Habitat Classification for Britain and Ireland Version 04.05. JNCC, Peterborough ISBN 1 861 07561 8 (internet version). Picton B.E., Emblow, C.S., Morrow, C.C., Sides, E.M., Tierney, P., McGrath, D., McGeough, G., McCrea, M., Dinneen, P., Falvey, J., Dempsey, S., Dowse, J. & Costello, M. J. (1997) Marine sites, habitats and species data collected during the BioMar survey of

	Ireland. Wells, E. (2006) Intertidal Coastal Waters Macroalgae – Rocky Shore Tool. Version 3. Paper No. MPTT/MAT01. Water Framework Directive Marine Plants Task Team.

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***143,900 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 143,900 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	

	d) Indicate method used to set reference value if other than operators The Favourable reference range has been set as the current range as there is no evidence of decline since the Directive came into force. This range is likely to encompass all geographical, geological and ecological variation of Reefs.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods? **YES**/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/**NO***
	b) yes, due to improved knowledge/more accurate data	***YES**/NO*
	c) yes, due to the use of different method	*YES/**NO***
	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*	
4.12 Additional information *Optional*	Range was estimated based on partial data with some extrapolation and/or modelling. The change in range is due to increased knowledge of the offshore, particularly the area between the near shore and 200m contour (MESL 2017).	

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2007-2018***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***22,147 km^2***
5.3 Type of estimate	***Best estimate** / 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend	**a) Minimum**	

Magnitude *Optional*	**b) Maximum**	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994-2018***	
5.10 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	***a) 22,147 km²***	
	b) Indicate if operators were used (≈, >, >>, <) or	
	c) favourable reference area is unknown	
	d) Indicate method used to set reference value if other than operators The FRA is set as the current area as there is no evidence of a decline since the Directive came into force and this is considered adequate to ensure the long-term viability of the habitat.	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***

	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*
5.15 Additional information *Optional*	Short-term and long-term trends were estimated based on best expert judgement. It is considered highly unlikely that the area of this habitat will change significantly due to the physical and geological nature of the habitat. The change in area is due to technical issues which overestimated the area in the previous round.

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***619 km²***
		Maximum	***619 km²***
	b) Area in not-good condition	**Minimum**	***0 km²***
		Maximum	***0 km²***
	c) Area where condition is not known	**Minimum**	***21,528 km²***
		Maximum	***21,528 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	***stable** / increasing / decreasing / uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? **YES**/NO*		
6.7 Typical species Method used *Optional*	The typical species list has been updated since the last reporting period to include additional species considered to be typical of the habitat based on survey data collected during the current reporting period and to reflect changes in taxonomic nomenclature as appropriate.		

	Typical species observed during the survey of inshore sublittoral reef were recorded on a SACFOR (**S**uper abundant, **A**bundant, **C**ommon, **F**requent, **O**ccasional, **R**are) scale from drop-down video surveys and diver surveys. Those that were recorded at a frequency of Frequent or higher were designated as typical species. However some expert judgement was also applied to remove bias caused by unusually high abundance at some locations. Typical species recorded during the survey of intertidal reef were based on the reduced species list for Ireland in accordance with the methods described in the Water Framework Directive (WFD) rocky shore macroalgal species richness tool. For the offshore surveys, species identification was carried out in real time on board and then the videos were further reviewed at a later stage to give a more complete record of the species and communities observed (Ross *et al.,*2018; Ross *et al*., in prep.). Typical species occurring on intertidal and subtidal reef include the algal species *Ulva* spp., *Chaetomorpha* spp., *Fucus* spp., *Laminaria* spp., *Dictyota dichotoma*, *Corallina officinalis*, *Porphyra* spp. *Chondrus crispus*, *Mastocarpus stellatus*, *Delesseria sanguinea*, *Cryptopleura ramosa*, *Lomentaria articulata*, *Polysiphonia* spp., *Ceramium* spp. The typical invertebrate species of near shore Reef include the invertebrate species of poriferans (*Scypha ciliata, Grantia compressa, Halichondria panicea, Hymeniacidon perleve, Cliona stellata, Pachymatisma johnstonia, Dysidea fragilis*), cnidarians (*Nemertesia antennina, Halecium halecium, Anemonia viridis, Actinia equina, Sagartia elegans, Actinothoe sphyrodeta, Corynactis viridis, Alcyonium digitatum, Caryophyllia smithii, Metridium* spp.), polychaetes (*Sabellaria alveolata, Spirorbis* spp*. Pomatoceros triqueter*), crustaceans (*Balanus* spp*., Semibalanus balanoides, Carcinus maenas, Cancer pagurus, Necora puber, Pagurus bernhardus, Galathea* spp.), molluscans (*Gibbula* spp*., Littorina* spp*., Nucella lapillus, Patella* spp*., Calliostoma zizyphinum, Aplysia punctata, Mytilus edulis*), bryozoans (*Alcyonidium diaphanum*), echinoderms (*Antedon bifida, Echinus esculentus, Marthasterias glacialis, Holothuria forskali, Aslia lefevrei, Pawsonia saxicola*), and tunicates (*Botryllus schlosseri, Ascidia mentula, Dendrodoa grossularia*). A range of fish species are also associated with this habitat including *Pholis gunnellus*, *Lotidae* spp., *Nerophis lumbriciformis, Pollachius* spp., *Conger conger, Labridae* spp.). Deepwater Reefs exhibit a range of species including scleractinian corals (*Lophelia pertusa, Madrepora oculata, Solenosmilia variabilis, Flabellum* spp. *Desmophyllum dianthus*), antipatharian black corals (*Cirrhipathes* sp., *Leiopathes* sp., *Parantipathes* sp., *Stichopathes gravieri*), soft corals (*Anthomastus grandiflorus, Paragorgia arborea, Paramuricea* spp., *Anthothela* spp. and isididaen bamboo corals), sea pens (*Pennatula phosphorea*, *Kophobelemnon* spp.), anemones (*Bolocera* spp.), sponges (*Aphrocallistes* spp., *Hexactinellid* spp., *Pheronema* spp.), echinoderms (*Brisingella coronata*, *Pseudarchaster* spp*., Psolus squamatus, Cidaris cidaris, Koehlermetra porrecta*), crustaceans (*Bathynectes* spp*., Chirostylus* spp., *Chaecon* spp., *Neolithoides* spp.) and fish (*Chimaera monstrosa, Lepidion eques, Synaphobranchus* spp*., Neocyttus helgae, Coryphaenoides rupestris*).

6.8 Additional information *Optional*	618km^2 of inshore reef habitat within twelve Special Areas of Conservation (SACs) around the coast of Ireland were surveyed to assess Structure and functions during the current reporting period (Scally *et al.*, in prep.). The offshore surveys of 2017 (Ross *et al.,* 2018) and 2018 (Ross *et al*., in prep.) delivered a lot of information on extent and species composition of both biogenic and geogenic reef encountered. While considerable work remains to be done to assess the condition of the reef surveyed in the 102 dives undertaken covering 277km of the seafloor, the greater proportion of the sites showed no evidence of fishing pressure. Therefore, Structure and functions were assessed as Unfavourable-Inadequate using expert judgement. Inshore subtidal reef surveys were conducted by surveying three stations within each MCT documented and mapped for a site. Surveys were carried out by dropdown video using a 4K dropdown video camera combined with spatial encoding. Video surveys were supplemented by diver surveys. Dive surveys were carried out at a single station within each MCT. The video surveys thereby resulted in a permanent georeferenced record of the physical characteristics and typical species for each site surveyed. Kelp height and density was assessed at three stations where a kelp community occurred at the site. This was achieved using a spatially referenced acoustic echosounder mapping system. This system provided spatially referenced acoustic data on the height and density of kelp. Habitat maps derived from these data were then created to obtain an overview of the characteristics of the kelp canopy, thereby creating a permanent record of the kelp structure at each site surveyed. Intertidal reef surveys were carried out using the methods described in the Water Framework Directive (WFD) rocky shore macroalgal species richness tool. This system provides a method for recording a range of physical characteristics for a given area of intertidal reef and assessing the range of macroalgal species within that area against the diversity of the physical features recorded. The resulting score is taken as a proxy for the ecological status of the reef. At a number of SACs, data derived from the WFD rocky shore monitoring programme was available against which the current survey data could be assessed and change, should it have occurred, be measured. Intertidal biogenic reef (*Sabellaria spinulosa* and *Mytilus edulis*) was surveyed by conducting walkover surveys of areas where these reef types had been described and mapped for a site. Species abundance of the main reef-forming species and any noted pressures were recorded. Offshore reef surveys (Ross *et al.,* 2018; Ross *et al*., in prep) utilised a remotely operated submersible vessel deployed from a research vessel. Video and stills imagery was collected upon defined transect routes and where possible species were logged and georeferenced. A total of 100 dive sites were visited during the reporting period. The majority of the data from these surveys is still to be analysed.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**G01** Marine fishing and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (H) **G03** Marine fish and shellfish harvesting (professional, recreational) activities causing physical loss and disturbance of seafloor habitats (H)	**G01** Marine fishing and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (H) **G03** Marine fish and shellfish harvesting (professional, recreational) activities causing physical loss and disturbance of seafloor habitats (H)

7.2 Sources of information *Optional*	Pressures were recorded during field surveys between 2016 and 2018 (Scally *et al.,* in prep.). Threats were selected based on best expert judgement and a review of the pressures observed.
7.3 Additional information *Optional*	The invasive alien species *Sargassum muticum* has been noted as an increased pressure on intertidal reef areas where it has become established in rock pools within this habitat. The collection of marine algae, particularly *Ascophyllum nodosum*, on a commercial scale has been carried out on intertidal reefs within Irish SACs for many years and continues to have a medium impact on this habitat. The mechanical harvesting of subtidal kelp beds is now identified as a potential future threat. The use of nets for the capture of commercial species has been identified as a significant threat to subtidal reef habitat (Scally *et al.,* in prep.). The use of towed and static gear on reef habitats for the capture of fish and crustaceans is common throughout the majority of reef habitat. Offshore reef is particularly vulnerable to bottom towed gear which will result in what must be considered as permanent loss to the keystone communities there, given the extremely slow-growing nature of these ecosystems.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type** or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* a) Short-term results (within the current reporting period, 2013-2018) or *b) Medium-term results (within the next two reporting periods, 2019-2030) or* ***c) Long-term results (after 2030)***
8.5 List of main conservation measures	**CG01** Management of professional/commercial fishing (including shellfish and seaweed harvesting)
8.6 Additional information *Optional*	Regulation (EU) 2016/2336 which proscribes the use of bottom trawls below 800m is a positive action in conserving the offshore reef habitat.

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	***Good** / Poor / Bad / Unknown*
	b) Area	***Good** / Poor / Bad / Unknown*
	c) Structure and functions	*Good / **Poor** / Bad / Unknown*

9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as stable. Current range is equal to Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as stable, as no change in range is expected as the physical and geological nature of the habitat makes a change in range unrealistic. Future prospects of Range are therefore good. Short-term trend direction of Area is assessed as stable. The potential for a significant change (increase or decrease) in the area is considered highly unlikely in the medium term. Conservation status of Area is therefore Favourable. Future trend of Area is assessed as stable, as no change in area is expected based on the current threats, conservation measures and the physical structure of the habitat. Future prospects of Area are therefore good. Short-term trend direction of Structure and functions is stable. Conservation status of Structure and functions has been assessed as Unfavourable-Inadequate. Although bottom trawling below 800m has been banned it will take a long time for impacted reefs to recover. Future trend of Structure and functions is stable. Future prospects of Structure and functions are therefore poor.

10 Conclusions

Assessment of conservation status at end of reporting period

10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	***YES****/NO*	***YES****/NO*

	b) yes, due to genuine change	***YES**/NO*	***YES**/NO*
	c) yes, due to improved knowledge/more accurate	***YES**/NO*	***YES**/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/**NO***	*YES/**NO***
	e) yes, but there is no information on nature of change	*YES/**NO***	*YES/**NO***
	The change is mainly due to (select one of the reasons above):	*genuine change / **improved knowledge or more accurate data** / the use of a different method*	*genuine change / **improved knowledge or more accurate data** / the use of a different method*
10.8 Additional information *Optional*	The 2017 and 2018 offshore surveys (Ross *et al.,* 2018; Ross *et al*., in prep.) increased knowledge of the extent of both biogenic and geogenic reef in this area. It increased our knowledge of the typical species and new community aggregations. It also revealed that, while some areas still appeared to be devoid of anthropogenic pressure, there was also evidence of pressure, the degree and extent of which remains to be analysed. Regulation (EU) 2016/2336, which proscribes the use of bottom trawls below 800m, is a positive action in conserving the offshore reef. However, due the difficulty in policing the vast area in which this vulnerable habitat occurs, and due to the fact that a single trawling event will result in permanent destruction of the habitat, Future prospects continue to be assessed as Unfavourable-Inadequate.		

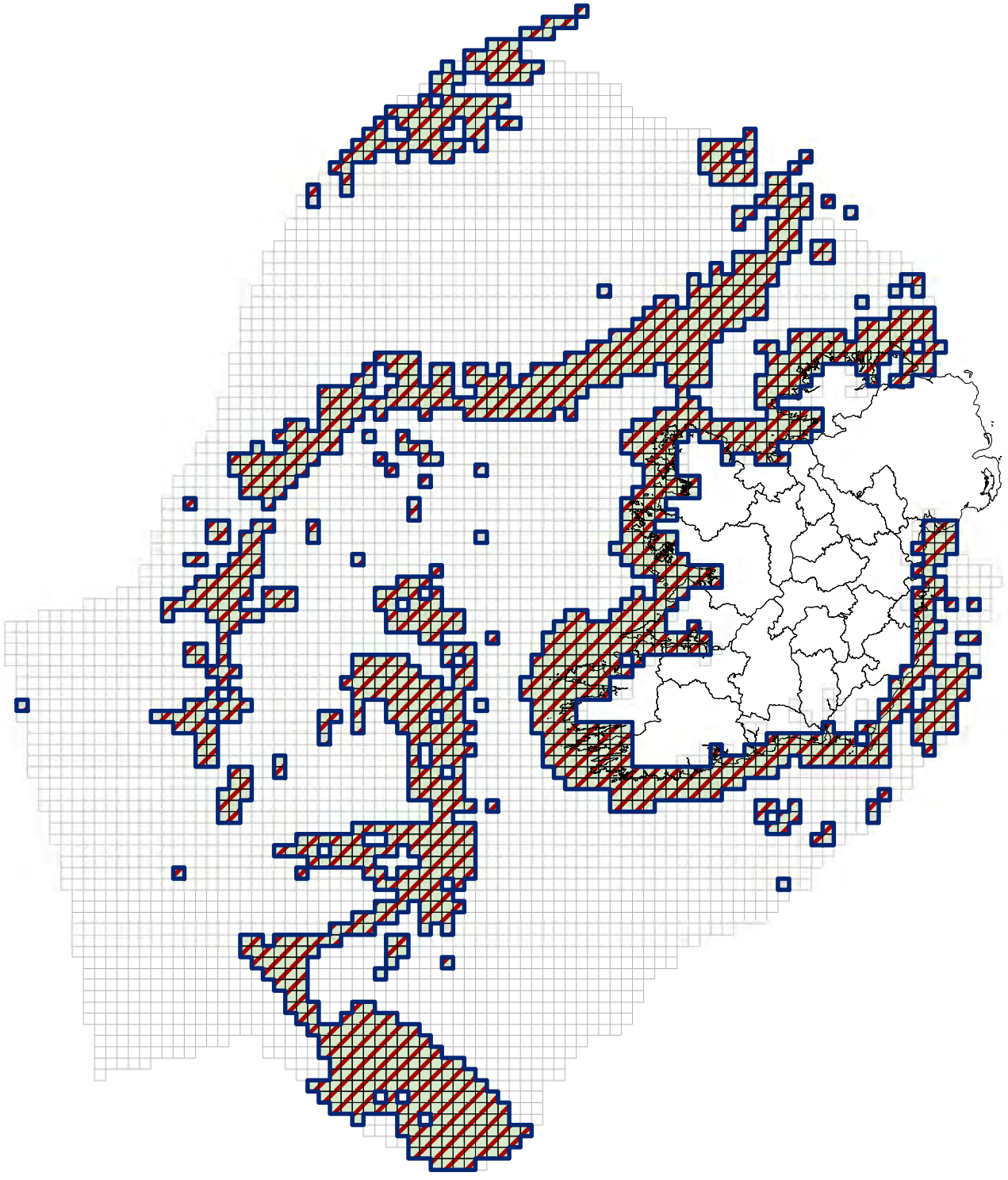
11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***2,204 km²***
11.2 Type of estimate	***Best estimate** / 95% confidence interval / minimum*	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

11.4 Short-term trend of habitat area in good condition within the network **Direction**	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable*** */ increasing / decreasing / uncertain/ unknown*
11.5 Short-term trend of habitat area in good condition within network **Method used**	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
11.6 Additional information *Optional*	Given the ban on fishing below 800m, it is deemed that the trend for habitat area in good condition is stable.

12 Complementary information

Reefs (1170)
Article 17 (2013 - 2018) Assessment



Current Distribution (1,439 cells)
Current Range (1,439 cells)
Favourable Reference Range (1,439 cells)

An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 25 50 100 km

N

Ma arscáil
V 2.0
Dáta
June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Habitat code / name	**1180 Submarine structures made by leaking gases**
1.2i Habitat short name	**Submarine structures made by leaking gases**
1.3i Habitat description	This marine habitat feature has been defined by European Commission guidance (2007) as submarine structures consisting of sandstone slabs, pavements, and pillars up to 4 m high, formed by the aggregation of carbonate cement resulting from microbial oxidation of gas emissions, mainly methane. The formations are interspersed with gas vents that intermittently release gas. The methane most likely originates from the microbial decomposition of fossil plant materials. Two sub-types are described in the EC guidance, namely "bubbling reefs" and carbonate structures within pockmarks (depressions in soft sediment seabed areas, up to 45 m deep and a few hundred meters wide). These formations support a zonation of diverse benthic communities consisting of invertebrate specialists (in deeper water) of hard marine substrates different from that of the surrounding habitat. Animals seeking shelter in the numerous caves further enhance the biodiversity. A variety of sublittoral topographic features are included in this habitat such as overhangs, vertical pillars and stratified leaf-like structures with numerous caves. Surveys on this habitat feature noted that on the large rocks and boulders, dense clusters of the anemone *Metridium senile* occur. Dense beds of hydroids, including *Nemertesia*, *Hydrallmania falcata* and *Tubularia indivisa*, are widely recorded, particularly along the edge of features. A wide variety of anemones occur; these include the cerianthid *Cerianthus lloydii* on soft overlying sediment, and among others, *Alcyonium digitatum*, *Sagartia elegans*, *Urticina felina*, and *Actinothoe sphyrodeta* on harder ground, principally on pavement areas. In the crevices, overhangs and between rocks the edible crab, *Cancer pagurus* is very abundant, while squat lobsters, *Munida* sp. and lobsters *Homarus gammarus* also occur. A variety of sponges, including the boring sponge *Cliona celata* and the lace sponge *Clathrina coriacea* are present, as is the bryozoan *Flustra foliacea*. The feather star *Antedon bifida* is commonly seen in crevices and under overhangs. The fish species recorded included *Trisopterus luscus* (Bib) and *Chirolophis ascanii* (Yarrell's blenny). None of these species would typically occur in the surrounding habitat of mobile sand.

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***2007-2018***
2.2 Distribution map	Submitted

2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	This habitat was not reported previously. The data have been collected through extensive seabed surveys to identify gas reserves. The habitat forms from a chemical reaction from the gas leaking into sea water and precipitating carbonate and forming mounds which become colonised by benthic fauna. A biological survey was undertaken to assess the presence of those habitats in the Kish and Codling Fault Zones.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
3.2 Sources of information	Croker, P.F., Kozachenko, M. & Wheeler, A.J. (2005) Gas-related seabed structures in the Western Irish Sea (IRL-SEA6). SEA6 Technical Report. European Commission DG Environment (2007) Interpretation manual of European Union habitats (version EUR27). European Commission DG Environment, Brussels. Leahy, Y. (2013) RV Celtic Explorer CE13_016 Cruise Report. Report 9th February to 12th February, 2013. O'Reilly, S., Szpak, M., Monteys, X. & Kelleher, B. P. (2010) RV Celtic Voyager CV10_28 Cruise. Report 2nd June – 7th June 2010.
3.2i Additional information	

4 Range

Range within the biogeographical/marine region concerned

4.1 Surface area	***400 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend	**a) Minimum**	

Magnitude *Optional*	**b) Maximum**	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 400 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable Reference Range has been set as the current range as there is no evidence of decline since the Directive came into force. This range is likely to encompass all geographical, geological and ecological variation of the habitat.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods? YES/**NO*** *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/NO*
	b) yes, due to improved knowledge/more accurate data	*YES/NO*
	c) yes, due to the use of different method	*YES/NO*
	d) yes, but there is no information on the nature of change	*YES/NO*
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data / the use of a different method*	

4.12 Additional information *Optional*	Range was estimated based on partial data with some extrapolation and/or modelling. There is no evidence of any change to the range of this habitat feature in Ireland. FRR was considered to be the same as the current range as there is no evidence of decline since the Directive came into force. Due to the physical nature of this habitat, change in range is considered highly unlikely. Please note that this is the first assessment of this habitat type, therefore there is no comparison with the previous reporting period; however it is unlikely that there have been any changes.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2007-2018***	
5.2 Surface area *(in km²)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***25 km²***
5.3 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994-2018***	

5.10 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	***a) 25 km²***	
	b) Indicate if operators were used (≈, >, >>, <) or	
	c) favourable reference area is unknown	
	d) Indicate method used to set reference value if other than operators Favourable Reference Area has been set as the current area as there is no evidence of a decline since the Directive came into force and this area is considered sufficient for the long-term viability of the habitat.	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods? YES/**NO*** *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/NO*
	b) yes, due to improved knowledge/more accurate data	*YES/NO*
	c) yes, due to the use of different method	*YES/NO*
	d) yes, but there is no information on the nature of change	*YES/NO*
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data / the use of a different method*	
5.15 Additional information *Optional*	Short-term and long-term trends were estimated based on best expert judgement. It is considered highly unlikely that the area of this habitat will change significantly due to the physical and geological nature of the habitat. Please note that this is the first assessment of this habitat type, therefore there is no comparison with the previous reporting period; however it is unlikely that there have been any changes.	

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***25 km²***
		Maximum	***25 km²***
	b) Area in not-good condition	**Minimum**	***0 km²***
		Maximum	***0 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period?* ***YES****/NO*		
6.7 Typical species Method used *Optional*	This is the first list of typical species for this habitat as it was not assessed previously. There is no method to assess Typical species at present.		
6.8 Additional information *Optional*	The condition of the habitat was assessed by using a seabed survey. Although there is indication of ghost fishing gear in proximity to the habitat features, there is evidence that the habitat itself is actively avoided by fishermen due to the risk of snagging or losing fishing gear. The habitat appeared to be in good condition but vulnerable to damage from fishing activity. Typical species observed during the survey of the Codling Fault Zone included *Metridium senile, Nemertesia* sp., *Hydrallmania falcata, Tubularia indivisa*, *Cerianthus lloydii, Alcyonium digitatum*, *Sagartia elegans*, *Urticina felina*, *Actinothoe sphyrodeta*, *Cancer pagurus*, *Munida* sp., *Homarus gammarus*, *Cliona celata*, *Clathrina coriacea, Flustra foliacea*, *Antedon bifida, Trisopterus luscus* and *Chirolophis ascanii*.		

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**Xxp** No pressures	**Xxt** No threats
7.2 Sources of information *Optional*		
7.3 Additional information *Optional*	The use of pots on reef habitats for the capture of crustaceans is common throughout the majority of reef habitat, however no significant impacts resulting from this practice have been noted over these leaking gas structures. It is likely that similar pressures are operating around these habitats but there is no evidence of that activity presently.	

8 Conservation measures

8.1 Status of measures	*Are measures needed? (YES/**NO**)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* *b) Measures identified and taken or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*

8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	None taken
8.6 Additional information *Optional*	

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	***Good*** */ Poor / Bad / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as stable. Current range is equal to Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as stable, as no change in range is expected as the physical and geological nature of the habitat makes a change in range unrealistic. Future prospects of Range are therefore good. Short-term trend direction of Area is assessed as stable. The potential for a significant change (increase or decrease) in the area is considered highly unlikely in the medium term. Conservation status of Area is therefore Favourable. Future trend of Area is assessed as stable, as no change in area is expected based on the current threats, conservation measures and the physical structure of the habitat. Future prospects of Area are therefore good. Short-term trend direction of Structure and functions is stable. Conservation status of Structure and functions is therefore Favourable. Future prospects of Structure and functions are therefore good.	

10 Conclusions	
Assessment of conservation status at end of reporting period	
10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*

10.3 Specific structure and functions (incl. typical species)	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/****NO***	*YES/****NO***
	b) yes, due to genuine change	*YES/NO*	*YES/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	*YES/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	The reporting of this habitat type is being undertaken for the first time during this round. The Overall trend is assumed to be stable. Surveys over the area containing the habitat identified a potential risk of habitat destruction but there was no evidence that any damage was done.		

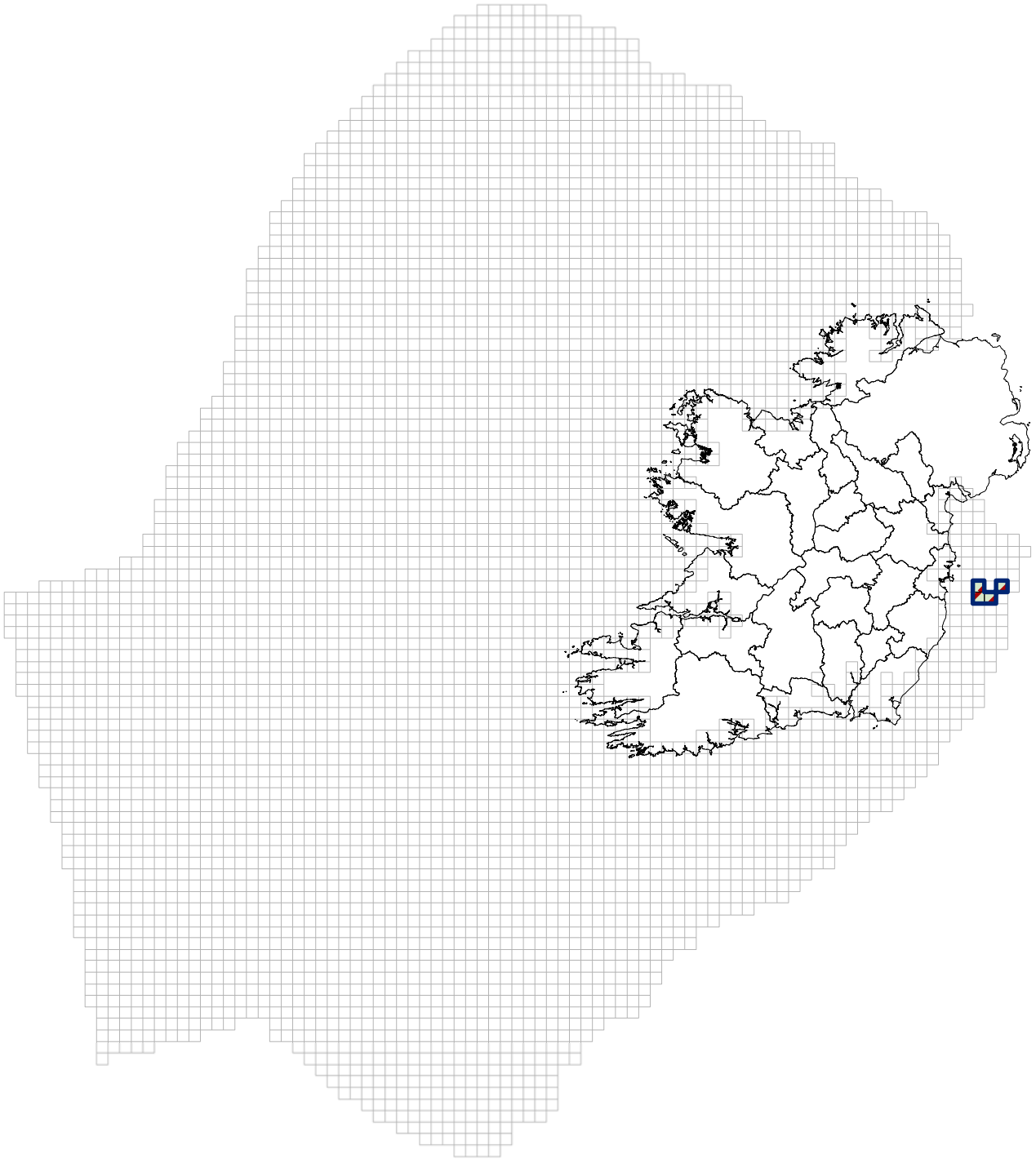
11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and	**a) Minimum**	
	b) Maximum	

SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**c) Best single value**	***17 km²***
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
11.3 Surface area of the habitat type inside the network **Method used**	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network **Direction**	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable*** */ increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network **Method used**	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.6 Additional information *Optional*	The majority of the national resource is contained within the Codling Fault Zone SAC (003015). Surveys over the area indicate it was in good condition.	

12 Complementary information

Submarine structures made by leaking gases (1180) Article 17 (2013 - 2018) Assessment



Current Distribution (4 cells)
Current Range (4 cells)
Favourable Reference Range (4 cells)

An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 25 50 100 km

N

Ma arscáil V 2.0
Dáta
June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**1210 Annual vegetation of drift lines**
1.2i Habitat short name	**Drift lines**
1.3i Habitat description	1210 Annual vegetation of drift lines occurs on sandy or shingle substrate at the upper part of the strand, around the high tide mark. Water-borne material including organic matter is deposited on the shore and provides nutrients and a seed source for vegetation. The vegetation predominantly consists of annual species, such as *Atriplex* species, *Cakile maritima* and *Salsola kali*, which are highly specialised to deal with the harsh conditions of high salinity, wind exposure and drought. This habitat is generally very species-poor, fragmented and tends not to occupy large areas due to its narrow, linear nature. It exists in a state of instability and may be absent in some years due to natural and/or anthropogenic causes. In Ireland, the habitat includes drift line vegetation on sandy substrates as well as drift line vegetation on shingle.

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***1996-2017***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was compiled using 1210 polygons mapped by Martin *et al.* (2017), Devaney *et al.* (2014), Delaney *et al.* (2013), NPWS (2012), Ó Riain (2007), Ryle *et al.* (2009), Wicklow County Council (2004), and Crawford *et al.* (1996). With the exception of Martin *et al.* (2017) and Devaney *et al.* (2014) the datasets were also used to compile the distribution map presented during the last round of reporting (NPWS, 2013). The distribution also utilised 1210 points mapped by Moore and Wilson (1999) and NPWS (2007), and distribution records for *Cakile maritima* from Preston *et al.* (2002) were used as an indicator of areas that might support the habitat (NPWS, 2013). Although this point information was used to inform the distribution, as no area data were available for each point it was not used when calculating the area of the 1210 habitat. All references are detailed below in Section 3.2.

	The two new data sources, added since the last round of reporting (NPWS, 2013), Martin *et al*. (2017) and Devaney *et al*. (2014), were both judged to be good quality data (high certainty=3). Delaney *et al*. (2013) and Ó Riain (2007) were also assigned a certainty of 3, following the judgement made during the last round of reporting. Ryle *et al*. (2009), Wicklow County Council (2004), and Crawford *et al*. (1996) were all assigned a certainty of 2. Although these three datasets were based on a field survey and had been assigned a certainty of 3 during the last round of reporting they are now over 10 years old, increasing the uncertainty in the data for dynamic sand dune habitats, such as 1210. The NPWS (2012) 1210 polygons that had not been superseded by better quality data, such as Martin *et al*. (2017), were generally retained as low certainty of 1. All polygons with certainty of 1 to 3 were used to map the distribution for the 1210 habitat. Following a review of the certainty=1 polygons using remote imagery, two polygons were moved to certainty 2 and six polygons were deleted due to the fact that the spatial data had been superseded by data collected during field surveys (Ryle *et al.* 2009; Delaney *et al.* 2013; Martin *et al.* 2017).

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned	
3 Biogeographical and marine regions	
3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Crawford, I., Bleasdale, A. and Conaghan, J. (1996) Biomar Survey of Irish machair. A report to the National Parks and Wildlife Service, Dublin. Delaney, A., Devaney, F.M., and Barron, S.J. (2013) Monitoring survey of Annex I sand dune habitats in Ireland. *Irish Wildlife Manuals* No. 75. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. Devaney, F., Barron, S. and Delaney, A. (2014) Survey of sand dune habitats at Portrane, Co. Dublin. Unpublished report by BEC Consultants Ltd., Dublin. Gaynor, K. (2008) The phytosociology and conservation value of Irish sand dunes. Ph.D. Thesis, University College Dublin. Martin, J.R. (2018) Backing document for assessment of pressures and threats SDMN17_AR1719_pressures_assessment. Unpublished report submitted to National Parks and Wildlife Service, Dublin. Martin, J.R., Daly, O.H. and Devaney F.M. (2017) Survey and assessment of vegetated shingle and associated habitats at 30 coastal sites. Volume 1: Main report. *Irish Wildlife Manuals* No. 98. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin.

	Moore, D. and Wilson, F. (1999) National Shingle Beach Survey of Ireland 1999. Unpublished report submitted to National Parks and Wildlife Service, Dublin. NPWS (2007) Habitat assignment project. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. NPWS (2012) Management Planning Support Unit Maps 2405_imap95. CPU_Habitats_March_2012.shp NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.1. Unpublished Report, National Parks and Wildlife Service, Department of Arts, Heritage, and the Gaeltacht, Dublin. Ó Riain, G. (2007) Final Report - Survey & Mapping of Habitats in the Carrigaline Electoral Area. Report prepared for Cork County Council, County Cork Heritage Forum, and The Heritage Council. pp. 42, Kilkenny. Preston, C.D., Pearman, D.A. and Dines, T.D. (2002). Atlas of the British and Irish flora. Oxford University Press, Oxford. Ryle, T., Connolly, K., Murray, A. and Swann, M. (2009). Coastal monitoring Project (2004-06). Unpublished report submitted to National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Wicklow County Council (2004) Coastal shapefile. coastal_ver_1.shp Scott, G.A.M. (1963) The ecology of shingle beaches. *Journal of Ecology* 51: 517-527.
3.2i Additional information	

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***18,800 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period	***1994–2018***	

Optional		
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 18,800 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable reference range has been increased since the last reporting period (NPWS, 2013) to reflect the improved level of knowledge. There is no evidence of loss of range since the Directive came into force and the geographic spread is considered sufficient for the long term survival of the habitat.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	*YES/****NO***
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data /* ***the use of a different method***	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 1210 habitat. A maximum gap distance of two 10 km grid cells was used when running the range tool. Thirteen 10 km grid cells generated by the range tool that had no coastline were removed. Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013). None of the area losses recorded during these two reporting periods led to a contraction in the range.	

	The number of 10 km squares in the range (188) is six squares higher than the last monitoring period (NPWS, 2013). These changes are due to the use of a slightly different methodology with all 10 km grid cells with a coastline retained within the range within the current reporting period. The Favourable reference range has been increased since the last reporting period (NPWS, 2013) due to the use of a different methodology.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***1996-2017***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***0.55 km^2***
5.3 Type of estimate	*Best estimate / 95% confidence interval / **minimum***	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	*stable / increasing / **decreasing** / uncertain / unknown*	

5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator > (greater than) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	***YES****/NO*
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 1996 (Crawford *et al*., 1996) when the first baseline survey was carried out and incorporates updates made by surveys carried out between 1996 and 2016 that are listed in Section 3.2. Favourable Reference Area (FRA) was not determined exactly, but is estimated to be <10% more than the current area. FRA is deemed to be greater than the current area, given that some anthropogenic losses have occurred since the Directive came into force and there have also been losses due to natural processes. During the current reporting period seven 1210 sites were visited, six by Martin *et al.* (2017) and one by Devaney *et al.* (2014). This represents only a small proportion of the 19 sites surveyed by Delaney *et al.* (2013) and the 71 sites with 1210 habitat that were surveyed by Ryle *et al.* (2009) and any conclusions that can be made based on this small sample are limited. In this reporting period the polygons utilised for the 1210 distribution map (sources listed in Section 2.5) were also used to calculate the habitat area, with the exception of seven polygons with a certainty of	

	only 1 that were judged to be too inaccurate to contribute to area calculations. Short-term trend in Area was deemed to be decreasing due to the loss of 0.09 ha due to anthropogenic impacts reported during the last reporting period (NPWS, 2013). The magnitude of the known loss is approximately -0.027% per annum, measured over a period of 12 years (2007-2018). This figure is calculated by expressing the 0.09 ha area that was lost as a per-annum percentage of the 28.19 ha area surveyed in the last two reporting periods. The long-term trend in Area was estimated as decreasing based on the fact that in the last round of reporting an area of 0.09 ha of 1210 was reported to be lost due to anthropogenic activities (NPWS, 2013). There was a net loss of 4.6 ha across the seven 1210 sites surveyed during the current reporting period, but all losses were considered to be due to the natural fluctuations in a dynamic habitat. Martin *et al*. (2017) reported a reduction in the area of the 1210 habitat at two west of Ireland sites, with 7.7 ha of the habitat lost from the Magharees Peninsula due to winter storm activity. Martin *et al*. (2017) reported a net increase in the area of the 1210 habitat at the two east coast sites where it was recorded. The difference in habitat extent between the area of 0.55 km^2 reported during this reporting period and the figure of 1.0 km^2 reported during the previous reporting period (NPWS, 2013) is in small part due to a net loss in the area of the 1210 habitat due to storm activity on the west coast of Ireland but mostly due to improved knowledge and more accurate data. A review of all 1210 polygons mapped during NPWS (2013), using remote imagery, showed that the majority of certainty 1 polygons were inaccurate with only small areas that could potentially include the 1210 habitat. One large, certainty=1, 1210 polygon of 104.9 ha, that was used to calculate the habitat area during the last reporting period (NPWS (2013), was deleted from the shapefile as the polygon was inaccurate and the data had been superseded by the 1210 area mapped by Martin *et al*., (2017) at Ballyteige Burrow SAC Co. Wexford (site code 000696). Five other, certainty=1, 1210 polygons were also deleted due to the fact that the data had been superseded by data collected during recent field surveys (Ryle *et al.* 2009; Delaney *et al.* 2013; Martin *et al.* 2017).

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***0.52 km²***
		Maximum	***0.52 km²***
	b) Area in not-good condition	**Minimum**	***0.03 km²***
		Maximum	***0.03 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***

6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b)* ***Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c)* ***Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/****NO***
6.7 Typical species Method used *Optional*	The list of typical species is the same as the last reporting period (NPWS, 2013) and was devised by Delaney *et al.* (2013). The Structure and functions criteria, including typical species, used to assess the 1210 habitat are listed in Appendix I of Delaney *et al.* (2013).
6.8 Additional information *Optional*	During the current reporting period seven 1210 sites were visited, six by Martin *et al.* (2017) and one by Devaney *et al.* (2014). This represents a smaller proportion of the total habitat area than the 19 sites that were surveyed by Delaney *et al.* (2013) and the 71 sites with 1210 habitat that were surveyed by Ryle *et al.* (2009) and any conclusions that can be made based on this small sample are limited. During the current reporting period data were only available to assess the Structure and functions at four 1210 sites surveyed by Martin *et al.* (2017) and at all four sites the Structure and functions was assessed as Favourable with all six assessment criteria passing at every site. Although based on a smaller sample size this result does not deviate significantly from the findings of the previous reporting period (NPWS, 2013) presented below. During the last reporting period 95% of the 1210 was assessed as Favourable (NPWS, 2013). The most frequent criteria to fail the assessment were 'interference with sediment dynamics' and 'damage due to disturbance'. Based on expert judgement 95% was utilised when calculating the current area of 1210 habitat in good condition (Section 6.1), as the figure is based on a larger sample and considered to be more accurate than the figure of 100% calculated during the current reporting period. Although during the current reporting period Structure and functions were assessed at only four sites the short-term trend of habitat area

	in good condition is taken to be stable based mainly on expert opinion. Typical species: *Atriplex* spp*., Beta vulgaris* ssp*. maritima, Cakile maritima, Galium aparine, Honckenya peploides, Polygonum oxyspermum, Salsola kali, Tripleurospermum maritimum.*

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**F08** Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defence or coast protection works and infrastructures (H) **C01** Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell) (M) **F01** Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions) (M) **F06** Development and maintenance of beach areas for tourism and recreation incl. beach nourishment and beach cleaning (M) **F07** Sports, tourism and leisure activities (M)	**F08** Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defence or coast protection works and infrastructures (H) **C01** Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell) (M) **F01** Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions) (M) **F06** Development and maintenance of beach areas for tourism and recreation incl. beach nourishment and beach cleaning (M) **F07** Sports, tourism and leisure activities (M)
7.2 Sources of information *Optional*	Pressures and threats were selected and ranked from the following data: Devaney, F.M., Barron, S.J. and Delaney, A. (2014) Survey of sand dune habitats at Portrane, Co. Dublin. Unpublished report by BEC Consultants Ltd., Dublin. Martin, J.R., Daly, O.H. and Devaney, F.M. (2017) Survey and Assessment of Vegetated Shingle and Associated Habitats at 30 Coastal Sites. Volume 1: Main report. *Irish Wildlife Manuals* No. 98. National Parks and Wildlife Service, Department of Arts,	

	Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. National Parks and Wildlife Service (NPWS) (2013). The Status of Protected EU Habitats and Species in Ireland. Overview Volume 1. Unpublished Report. National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin.
7.3 Additional information *Optional*	The pressures and threats presented in 7.1 were selected and ranked based on intensity (high, medium or low), frequency of occurrence, and area of impact. Data gathered from the sources listed in Section 7.2 are summarised in Martin (2018). For the current reporting period, data on pressures were available for six sites, five surveyed by Martin *et al.* (2017) and one by Devaney *et al.* (2014). As this represents only a small proportion of the data collected from 19 sites by Delaney *et al.* (2013) to inform NPWS (2013), the pressure and threats information presented in NPWS (2013) were also utilised to inform the current reporting period. All pressures presented in NPWS (2013) were considered for the current reporting period. For five of the pressures presented in NPWS (2013) there was additional evidence provided for their importance by the data collected during the current reporting period. Using the crosswalk referenced in Martin (2018) to transfer pressures to the current recording system, these five pressures crosswalked to F07 (recorded five times in the current reporting period), F09 (recorded twice during the current reporting period), and F06 (recorded once during the current reporting period). Although F09 was recorded twice under 'litter' during the current reporting period it is considered to be a low-importance pressure for the 1210 habitat, as it was in the previous reporting period (NPWS, 2013). During the current reporting period no evidence was provided for the high-importance pressure F08; however based on expert opinion sea defences and coastal protection works are considered to be a high-importance pressure on the 1210 habitat. Based on expert opinion the pressures C01 and F01, both listed during NPWS (2013), were retained as medium-importance pressures. The pressure 'Agricultural activities not referred to above' was listed as a medium-importance pressure in NPWS (2013) but based on expert opinion and the fact that agricultural activities have very little impact at the very front of dune systems it was not included in the medium-importance pressures listed above in Section 7.1. Pressures and threats noted less frequently and/or that impacted only small areas were deemed to be of low importance. Low-importance pressures listed in NPWS (2013) include C07 Dumping/depositing of dredged materials from marine extraction, F09 Deposition and treatment of waste/garbage from household/recreational facilities (in the form of litter) and H08 Other human intrusions and disturbance not mentioned above. Three low-importance pressures recorded during the current reporting period were I02 Other invasive alien species (other than species of Union concern), L01 Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization), and L02 Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices). Climate change has not been added as an impact of medium or high-

	importance but it is likely to affect the range of 1210 over the coming decades. The short-term predictability of the effect of climate change and in particular the resultant mean sea level rise and extreme weather events are unknown but the gradual long-term trend will see an increase in the mean sea level and extreme weather events (EPA, 2017) which will affect 1210. As the 1210 habitat occurs around the high tide mark a rise in mean sea levels will affect the habitat. Furthermore, the annual vegetation of drift lines habitat requires stability over the summer season to form (Scott, 1963); thus, frequent extreme weather events, particularly in the summer season, could affect the formation of this habitat. The five pressures presented in Section 7.1 are also considered to be the five main threats in the future.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* *b) Measures identified and taken or* ***c) Measures needed but cannot be identified***
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	None recorded.
8.6 Additional information	Other conservation measures that are not currently being

Optional	implemented, but whose implementation would improve the Structure and functions of the habitat, include CF10 Manage changes in hydrological and coastal systems and regimes for construction and development.

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	*Good /* ***Poor*** */ Bad / Unknown*
	c) Structure and functions	***Good*** */ Poor / Bad / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as Stable. Current Range is equal to the Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as Stable, as no change in Range is expected based on an assessment of the pressures and threats. Future prospects of Range are therefore Good. Short-term trend direction of Area is assessed as Decreasing as NPWS (2013) reported a loss in area of 0.09 ha due to anthropogenic impacts during the last reporting period. Current Area is <10% less than the Favourable Reference Area (FRA). Conservation status of Area is therefore Unfavourable-Inadequate. Future trend of Area is assessed as Stable, there is no evidence to suggest that the minor losses reported in the 2013 will continue. Future prospects of Area are therefore Poor. Short-term trend direction of Structure and functions is Stable for habitat that is in Good condition. Current Structure and functions are assessed as Favourable as >90% of the habitat is in Good condition. Conservation status of Structure and functions is therefore Favourable. Future trend of Structure and functions is assessed as Stable. Future prospects of Structure and functions are therefore Good.	

10 Conclusions	
Assessment of conservation status at end of reporting period	
10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.2 Area	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*
10.3 Specific structure and functions (incl. typical species)	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.4 Future prospects	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*
10.5 Overall assessment of Conservation Status	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*

<table>
<tr><td>10.6 Overall trend in Conservation Status</td><td colspan="3">Indicate the trend (qualifier) for FV, U1 and U2:

improving / <u>deteriorating</u> / stable / unknown</td></tr>
<tr><td rowspan="8">10.7 Change and reasons for change in conservation status and conservation status trend</td><td colspan="3">Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.</td></tr>
<tr><td></td><td>Overall assessment of conservation status (10.5)</td><td>Overall trend in conservation status (10.6)</td></tr>
<tr><td>a) no, there is no difference</td><td>YES/<u>NO</u></td><td>YES/<u>NO</u></td></tr>
<tr><td>b) yes, due to genuine change</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>c) yes, due to improved knowledge/more accurate</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>d) yes, due to the use of different methods (including use of different thresholds)</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>e) yes, but there is no information on nature of change</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>The change is mainly due to (select one of the reasons above):</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td></tr>
<tr><td>10.8 Additional information

Optional</td><td colspan="3">The Conservation Status of Range is Favourable in this reporting period, as it was in the previous reporting period.
The Conservation Status of Area and Future prospects are Unfavourable-Inadequate, as they were in the previous reporting period.
The Conservation Status of Structure and functions is assessed as Favourable during this reporting period, whilst it was assessed as Unfavourable-Inadequate in the previous reporting period. This was due to a change in methodology with Structure and functions now assessed as Favourable if >90% of the habitat area is in ‘Good’ condition, whereas previously >99% was required for ‘Good’ condition. During the last reporting period Structure and functions was reported to be declining due to a decrease from 99% to 95% of the 1210 area in good condition. Structure and functions are reported as stable during the current reporting period.
The Overall assessment of Conservation Status was assessed as Unfavourable-Inadequate, as it had been during the last reporting period. The status of Unfavourable-Inadequate during the current reporting period was due to area losses reported in the previous reporting period and the fact that the current area is still below the</td></tr>
</table>

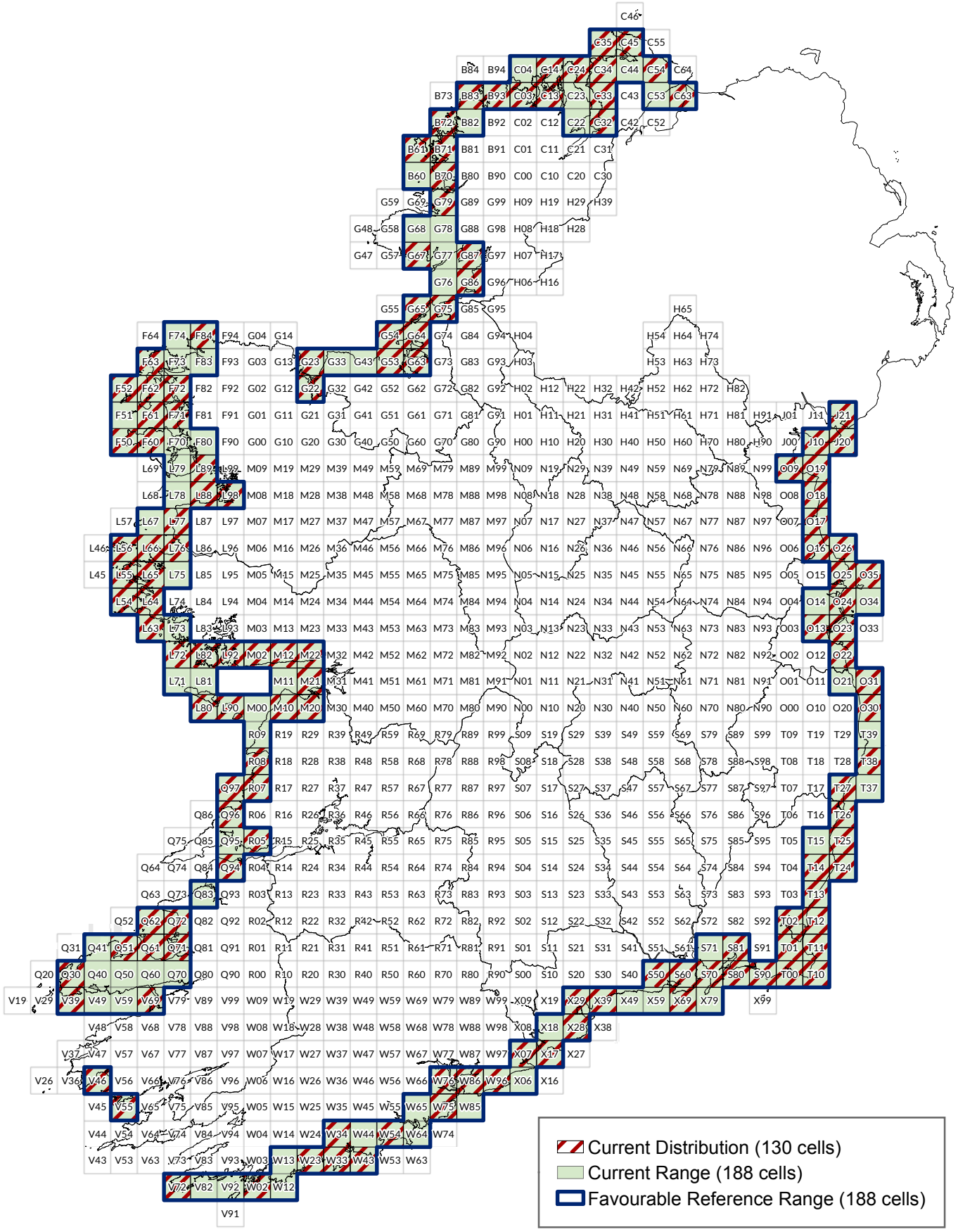
	favourable reference area. Trend in Overall assessment of Conservation Status was assessed as deteriorating, as it had been during the last reporting period. This assessment was due to the fact that 0.09 ha of 1210 habitat had been lost due to anthropogenic causes in the previous reporting period (NPWS, 2013).

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***0.45 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable** / increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing an intersect between the distribution shapefile and the SAC shapefile. The area given in section 11.1 is the total area of 1210 habitat in SACs in the country, including some SACs where 1210 is not listed as a qualifying interest (QI). The area of 1210 within the N2000 network where it is listed as a QI is 0.26 km^2. There were no inconsistencies between the Natura 2000 sites where the 1210 habitat is listed as a QI and the current distribution for the habitat. The short-term trend of the habitat area in good condition within the SAC network is taken to be stable, with the same trend as the 1210 habitat nationally (see Section 6.4 and 6.8), as almost all areas of 1210 habitat surveyed during the last two reporting periods were within the SAC network. The surface area of 1210 habitat within Natura 2000 sites has	

	increased from the previous reporting period, in part due to improved knowledge, but largely due to a change in methodology. In this reporting period an intersect between the current 1210 distribution (sources listed in Section 2.5) and the SAC shapefile was used, with the exception of seven polygons with a certainty of only 1 that were judged to be too inaccurate to contribute to area calculations. In the last reporting period an intersect between only the Ryle *et al.* (2009) and Delaney *et al.* (2013) 1210 shapefiles and the SAC shapefile was carried out (NPWS, 2013).

12 Complementary information

Drift lines (1210)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**1220 Perennial vegetation of stony banks**
1.2i Habitat short name	**Perennial vegetation of stony banks**
1.3i Habitat description	1220 Perennial vegetation of stony banks occurs along the coast where shingle (cobbles, pebbles, and gravel ≥ 2 mm wide) has accumulated to form elevated ridges or banks above the high tide mark. On the upper beach the pioneer community of this vegetation type can be characterised by perennial species such as *Beta vulgaris* subsp. *maritima, Crambe maritima, Crithmum maritimum, Glaucium flavum, Raphanus raphanistrum* subsp. *maritimus, Silene uniflora,* and *Tripleurospermum maritimum*. The majority of the area within this pioneer community is usually bare shingle. At the top of the beach, and moving inland, a wider range of vegetation types can be found at larger shingle sites including a lichen-rich community and coastal forms of grassland, heath and scrub. The grassland community can be characterised by grass species such as *Agrostis capillaris, Agrostis stolonifera, Arrhenatherum elatius, Dactylis glomerata, Poa humilis, Elytrigia repens, Festuca rubra, Holcus lanatus,* and broadleaf herbs such as *Achillea millefolium, Armeria maritima, Cerastium fontanum, Daucus carota, Leontodon autumnalis, Lotus corniculatus, Plantago coronopus, Plantago lanceolata, Potentilla anserina, Taraxacum officinale* agg., *Galium verum,* and *Trifolium repens.* The scrub community can be characterised by the woody species *Lonicera periclymenum, Prunus spinosa, Rubus fruticosus* agg., *Ulex europaeus* and the climber *Calystegia sepium*. These more inland communities have less bare shingle and vegetative cover usually dominates. The majority of the grassland and scrub communities are rooted within soil, whereas the pioneer community is usually rooted in gravel, sand or organic matter (e.g., decomposing seaweed and other plant material).

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***1995-2016***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) **Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted

2.5i	The distribution map was compiled using 1220 polygons mapped by Martin *et al.* (2017), Devaney *et al.* (2014), Delaney *et al.* (2013), Foss *et al*. (2012) and Ryle *et al.* (2009). The distribution also utilised 1220 points mapped by Martin *et al.* (2017), Delaney *et al.* (2013), Ryle *et al.* (2009), NPWS (2007a), Moore and Wilson (1999), and points supplied by the NPWS coastal expert Dr. Karen Gaynor in 2012. All references are detailed below in Section 3.2. All of the aforementioned datasets published prior to 2014 were also used to compile the distribution map for the last reporting period (NPWS, 2013). A certainty rating system was applied to all data that informed the distribution map. This system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1, the lowest. The new data sources added since the last round of reporting (NPWS, 2013) that were based on a field survey, Martin *et al.* (2017) and Devaney *et al.* (2014), were judged to be good quality data (high certainty=3), Martin *et al.* (2017) polygons that were not subject to a full walkover survey in the field were given a certainty of 2. Delaney *et al.* (2013) was assigned a high certainty of 3, following the judgement made during the last round of reporting. Ryle *et al.* (2009) and Moore and Wilson (1999) were both assigned a certainty of 2. Although these two datasets were based on a field survey and had been assigned a certainty of 3 during the last round of reporting they are now over 10 years old, increasing the uncertainty in the data. Foss *et al.* (2012) and the points supplied by the NPWS coastal expert in 2012 were retained as a certainty of 2. The NPWS Habitat Assignment Project points that had not been superseded by better quality data, such as Martin *et al.* (2017), were retained as a low certainty of 1, following the judgement made during the last round of reporting. All polygons and points with certainty 1 to 3 were used to map the distribution for the 1220 habitat. Following a review of the certainty=1 polygons using remote imagery, five polygons were deleted due to the fact that the spatial data had been superseded by data collected during Martin *et al.* (2017).

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Delaney, A., Devaney, F.M., and Barron, S.J. (2013) Monitoring survey of Annex I sand dune habitats in Ireland. *Irish Wildlife Manuals* No. 75. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. Devaney, F., Barron, S. and Delaney, A. (2014) Survey of sand dune habitats at Portrane, Co. Dublin. Unpublished report by BEC

	Consultants Ltd., Dublin. EPA (2017) A Summary of the State of Knowledge on Climate Change Impacts for Ireland: Report 11 (2010-2016). Prepared for the Environmental Protection Agency by MaREI Centre, Environmental Research Institute, University College Cork. M. Desmond, P. O'Brien and F. McGovern. EPA, Wexford. Foss, P.J., Crushell, P., O'Loughlin, B. and Wilson, F. (2012) Louth Wetland Survey II. Part 1: Main Report. Report prepared for Louth County Council and The Heritage Council, Kilkenny. JNCC (2004) Common Standards Monitoring Guidance for Vegetated Coastal Shingle Habitats. Joint Nature Conservation Council, Peterborough, UK. Martin, J.R. (2018) Backing document for assessment of pressures and threats SDMN17_AR1719_pressures_assessment. Unpublished report submitted to National Parks and Wildlife Service, Dublin. Martin, J.R., Daly, O.H. and Devaney F.M. (2017) Survey and assessment of vegetated shingle and associated habitats at 30 coastal sites. Volume 1: Main report. *Irish Wildlife Manuals* No. 98. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. Moore, D. and Wilson, F. (1999) National Shingle Beach Survey of Ireland 1999. Unpublished report submitted to National Parks and Wildlife Service, Dublin. NPWS (2007a) Habitat assignment project. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. NPWS (2007b) The Status of EU Protected Habitats and Species in Ireland. Volume 1. Unpublished Report, National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.1. Unpublished Report, National Parks and Wildlife Service, Department of Arts, Heritage, and the Gaeltacht, Dublin. Ryle, T., Connolly, K., Murray, A. and Swann, M. (2009) Coastal monitoring Project (2004-06). Unpublished report submitted to National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Scott, G.A.M. (1963) The ecology of shingle beach plants. *Journal of Ecology* 51: 517-527.
3.2i Additional information	

4 Range	
Range within the biogeographical/marine region concerned	
4.1 Surface area	***17,300 km^2***

4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 17,300 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators There is no evidence of loss of range since the Directive came into force and the geographic spread is considered sufficient for the long term survival of the habitat, therefore the Favourable reference range is set as the current range. The Favourable reference range has been increased since the last reporting period (NPWS, 2013) to reflect the improved level of knowledge and the use of a different method.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***

	b) yes, due to improved knowledge/more accurate data	***YES**/NO*
	c) yes, due to the use of different method	***YES**/NO*
	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 1220 habitat. A maximum gap distance of two 10 km grid cells was used when running the range tool. Thirteen 10 km grid cells generated by the range tool that had no coastline were removed. Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013). None of the area losses recorded during the current reporting period led to a contraction in the range. The short-term trend is stable. The number of 10 km squares in the range (173) is five squares higher than the last monitoring period (NPWS, 2013), with the additional squares found throughout the range. Three of the additional squares are due to improved knowledge and more accurate data. Two of the additional squares are due to the use of a slightly different methodology, with all 10 km grid cells with a coastline retained within the range within the current reporting period. The Favourable reference range has been increased since the last reporting period (NPWS, 2013) to reflect the improved level of knowledge and the use of a different method. The Favourable reference range is the current range, reported in 4.1.	

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***1995-2016***	
5.2 Surface area *(in km²)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***1.29 km²***
5.3 Type of estimate	*Best estimate / 95% confidence interval / **minimum***	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator > (greater than) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	***YES****/NO*
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***

	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 1995 (Foss *et al.,* 2012), followed by data from 1999 during which the first national baseline survey for 1220 was conducted (Moore and Wilson, 1999) and incorporates updates made by surveys carried out between 2004 and 2016 that are listed in Section 3.2. Favourable Reference Area (FRA) was not determined exactly, but is estimated to be <10% more than the current area. FRA is deemed to be greater than the current area, given that some anthropogenic losses have occurred since the Directive came into force. During the current reporting period thirty 1220 sites were visited by Martin *et al.* (2017). The Annex I habitat was located at 27 of the 30 sites visited. During this survey 0.65 km^2 of 1220 was mapped and assessed. This represents 50% of the total area of 1220 habitat recorded within Ireland and is considered to be a representative sample. With regard to short-term trend in Area, the subset of nine 1220 sites assessed by Delaney *et al.* (2013) were different from the twenty-seven 1220 sites assessed by Martin *et al.* (2017) with no overlaps for comparative purposes. The short-term trend was deemed to be Stable as none of the anthropogenic losses recorded by Martin *et al.* (2017) were considered recent in origin (i.e. they could not be attributed directly to the 2007-2018 time period). No anthropogenic losses were reported during the previous reporting period of 2007-2012 (NPWS, 2013). Long-term trend in Area was deemed to be Decreasing. Martin *et al.* (2017) reported anthropogenic loss of 0.3 ha attributed to shingle extraction and recreational activities from two 1220 sites previously surveyed in 2004 and 2005 by Ryle *et al*. (2009). The magnitude of the known loss equates to -0.03% per annum in the 12 year period over which this loss is measured. The magnitude of the loss was calculated by expressing the area lost as a per-annum percentage of the area assessed. Anthropogenic loss of 1220 was also reported during the 2000-2006 reporting period (NPWS, 2007b). The difference in habitat extent between the area of 1.29 km^2 reported during this reporting period and the figure of 1.97 km^2 reported during the previous reporting period (NPWS, 2013) is due to a number of factors including the use of different methodology, improved knowledge/more accurate data, and genuine change due to natural fluctuations in this dynamic habitat. The surface area of 1.97 km^2 reported during the 2007-2012 reporting period (NPWS, 2013) was in keeping with an extrapolated estimate made during the 2000-2006 reporting period (NPWS, 2007b). Due to improved knowledge/more accurate data following the recent 1220 survey by Martin *et al.* (2017), the area for the current reporting period was extracted directly from the distribution shapefiles. The 1220 polygons and points mapped during NPWS (2013) were updated/superseded by the data collected during this

	reporting period. Five certainty=1 polygons totalling 1.1 km^2 at Ballyteige (Co. Wexford) were removed from the NPWS (2013) dataset following the absence of 1220 during a site visit by Martin *et al*. (2017). This accounts for most of the difference between the 1.97 km^2 reported during the previous reporting period and the 1.29 km^2 reported during this reporting period. There was a net gain of 4.75 ha across nine of the sites surveyed by Martin *et al*. (2017). All gains were attributed to natural fluctuations in this dynamic habitat. To allow point files, such as those extracted from Moore and Wilson (1999), to contribute to the total area of 1220 calculated for the current reporting period, a review of the datasets was carried out using remote imagery and following this review a mean value of 0.35 ha was assigned to each point. Only points with a certainty value of 2 or higher were assigned an area. The exception to this was the four certainty=2 points mapped by the NPWS coastal expert in 2012; no areas were assigned to these points as they represented hectad centroids rather than specific areas of habitat.

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***1.06 km²***
		Maximum	***1.06 km²***
	b) Area in not-good condition	**Minimum**	***0.23 km²***
		Maximum	***0.23 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*		

6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? **YES**/NO* A new typical plant species list for the 1220 habitat has been added to Section 6.8.
6.7 Typical species Method used *Optional*	The list of typical species for the current reporting period was derived from Martin *et al.* (2017). Only typical species within the three main 1220 communities comprising the pioneer community, grassland community and scrub community are presented. Martin *et al.* (2017) only recorded one monitoring plot each within the lichen-rich and heath 1220 communities; therefore, a typical species list for these 1220 communities is currently not available. The Structure and functions criteria, including typical species, used to assess the 1220 habitat are listed in Appendix I of Martin *et al.* (2017).
6.8 Additional information *Optional*	During the current reporting period thirty 1220 sites were visited and 27 of these sites were assessed for Structure and functions by Martin *et al.* (2017). This represents 0.65 km^2 (50%) of the total area of 1220 habitat recorded within Ireland and is considered to be a representative sample. Of the 27 sites assessed for Structure and functions twelve sites were Favourable, twelve sites were Unfavourable-Inadequate and three were Unfavourable-Bad. The three Unfavourable-Bad sites had previously been assessed as Unfavourable-Inadequate by Martin *et al.* (2017) but were reassessed as Unfavourable-Bad based on expert opinion (i.e. these sites had a coastal protection structures that impacted ≥50% of the 1220 habitat). In total, 82% of the 0.65 km^2 of 1220 habitat that was surveyed during the current reporting period was in Good condition (favourable) and 18% was not in Good condition (unfavourable). The approach used to estimate the percentage of the 1220 habitat in unfavourable condition at each site was as follows: If none of the assessment criteria failed at the site level then none of the 1220 area was classified as unfavourable and the whole area of 1220 at the site was assigned as being in Good condition; if 1 to 2 criteria failed at the site level this resulted in 25% of the 1220 area being classified as having unfavourable Structure and functions. During the current reporting period there were no 1220 sites where more than two assessment criteria failed. However, as stated above, at three sites the impact of coastal protection structures were considered to be negatively impacting large areas of the 1220 habitat. For Cromane Point (Co. Kerry) the impact of coastal structures resulted in expert opinion assessing 75% of the 1220 habitat to have unfavourable Structure and functions and at the two Louth sites, Annagassan Pier to Ardsallagh and River Foot, 50% of the 1220 habitat was assessed to have unfavourable Structure and functions. During the last reporting period 93% of the 1220 habitat was assessed as Favourable and the most frequent criteria to fail the assessment were 'interference with sediment dynamics' and 'damage due to disturbance' (NPWS, 2013). During the current reporting period 'interference with sediment dynamics' and 'negative indicator species' were the most frequent to fail the

	assessment. There is a difference between how sites were sampled during the current and previous round of reporting. During the previous reporting period the 1220 Structure and functions assessment was derived from a smaller subsample of nine sites totalling 2.48 ha (NPWS, 2013). Also these sites surveyed by Delaney *et al*. (2013) were not fully representative of 1220 habitat, as the survey was restricted to sand dune systems and more extensive shingle banks that are independent of large sand dune systems were not within the remit of the survey. The survey by Martin *et al.* (2017) during the current reporting period was a more representative subsample of 27 sites covering 65 ha. Therefore the data collected by Martin *et al.* (2017) is considered to more accurately represent the status of the Structure and functions of the 1220 habitat. Based on expert opinion the short-term trend of the habitat area in Good condition is taken to be Stable and the difference between the reporting periods is due to different subsampling methods. The new typical plant species list for the pioneer community of the 1220 habitat is: *Beta vulgaris* subsp. *maritima, Crambe maritima, Crithmum maritimum, Galium aparine, Glaucium flavum, Lathyrus japonicus, Raphanus raphanistrum* subsp*. maritimus, Rumex crispus, Silene uniflora, Sonchus arvensis* and *Tripleurospermum maritimum.* The new typical plant species list for the grassland community of the 1220 habitat is: *Achillea millefolium, Agrostis capillaris, Agrostis stolonifera, Armeria maritima, Arrhenatherum elatius, Cerastium fontanum, Dactylis glomerata, Daucus carota, Elytrigia repens, Festuca rubra, Galium verum, Holcus lanatus, Koeleria macrantha, Leontodon autumnalis, Lotus corniculatus, Luzula campestris, Plantago coronopus, Plantago lanceolata, Poa humilis, Potentilla anserina, Rumex acetosa, Taraxacum officinale* agg., *Trifolium pratense* and *Trifolium repens.* The new typical plant species list for the scrub community of the 1220 habitat is: *Calystegia sepium, Lonicera periclymenum, Prunus spinosa, Rubus fruticosus* agg. and *Ulex europaeus.*

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**

List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**F08** Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defence or coast protection works and infrastructures) (H) **C01** Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell) (M) **E01** Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (M) **F07** Sports, tourism and leisure activities (M) **F09** Deposition and treatment of waste/garbage from household/recreational facilities (M) **I02** Other invasive alien species (other than species of Union concern) (M)	**F08** Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defence or coast protection works and infrastructures) (H) **C01** Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell) (M) **E01** Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (M) **F07** Sports, tourism and leisure activities (M) **F09** Deposition and treatment of waste/garbage from household/recreational facilities (M) **I02** Other invasive alien species (other than species of Union concern) (M)
7.2 Sources of information *Optional*	Pressures and threats were selected and ranked from the following data: Devaney, F.M., Barron, S.J. and Delaney, A. (2014) Survey of sand dune habitats at Portrane, Co. Dublin. Unpublished report by BEC Consultants Ltd., Dublin. Martin, J.R., Daly, O.H. and Devaney, F.M. (2017) Survey and Assessment of Vegetated Shingle and Associated Habitats at 30 Coastal Sites. Volume 1: Main report. Irish Wildlife Manuals, No. 98. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin.	
7.3 Additional information *Optional*	The pressures and threats presented in Section 7.1 were selected and ranked based on intensity (high, medium or low), frequency of occurrence, and area of impact. Data gathered from the sources listed in Section 7.2 are summarised in Martin (2018). For the current reporting period, data on pressures were available for twenty-eight 1220 sites, 27 surveyed by Martin *et al.* (2017) and one by Devaney *et al.* (2014). All pressures recorded during the current reporting period were converted from the old recording system to the new, using the crosswalk referenced in Martin (2018). Only six pressures were recorded on more than two occasions. F07 was the most commonly recorded pressure noted 25 times (seven as a neutral impact) under the impacts 'storage of boats and fishing equipment', 'horse riding, walking', 'trampling', 'off-road driving' and 'camping'. The other five most frequently recorded pressures were F09 recorded 22 times, F08 recorded 19 times (nine as a neutral impact), I02 recorded 11 times, C01 recorded six times and E01 recorded four times. Although F08	

	was not the most frequently recorded pressure it did impact large areas of the 1220 habitat and was often a high-intensity pressure and for these reasons 'sea defences and coastal protection works' were considered to be the one high-importance pressure for the 1220 habitat. The other five frequently recorded pressures were judged to be of medium importance. There were two medium-importance pressures recorded during the current reporting period which were not recorded in the previous recording period (NPWS, 2013); these were E01 Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) in the form of tracks and paved roads, and I02 Other invasive alien species (other than species of Union concern). All medium/high-importance pressures recorded during the previous reporting period (NPWS, 2013) were recorded during the current reporting period. Pressures and threats noted less frequently and/or that impacted only small areas were deemed to be of low importance. Low-importance impacts recorded during the current reporting period included A36 Agriculture activities not referred to above in the form of fences, C06 Dumping/depositing of inert materials from terrestrial extraction, F01 Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions) in the form of a carpark, and I04 Problematic native species. Impacts of low importance recorded during the previous reporting period (NPWS, 2013) which were not recorded during the current reporting period included D07 Oil and gas pipelines (recorded under the impact 'pipelines') and F10 Deposition and treatment of waste/garbage from commercial and industrial facilities (recorded under the impact 'disposal of inert material). It should be noted that it was not possible to crosswalk the NPWS (2013) recorded impact H07 Other forms of pollution to the new 2017 pressure codes as there was no matching code. Climate change has not been added as an impact but it is likely to affect the range of 1220 over the coming decades. The short-term predictability of the effect of climate change and in particular the resultant mean sea level rise and extreme weather events is unknown but the gradual long-term trend will see an increase in mean sea level and extreme weather (EPA, 2017) which will affect the 1220 habitat. JNCC (2004) states that the shingle structures that support the 1220 habitat develop from the high tide limit to more permanent structures created by storm waves which form high up the beach, thus a rise in mean sea levels will affect the habitat, particularly where it forms at the high tide limit. Furthermore, 1220 requires at least three years' stability to form (Scott, 1963); thus, frequent extreme weather events could affect the formation of this habitat. The six pressures presented in Section 7.1 are also considered to be the six main threats in the future.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type** or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* ***a) Short-term results (within the current reporting period, 2013-2018)** or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	**CA03** Maintain existing extensive agricultural practices and agricultural landscape features
8.6 Additional information *Optional*	Conservation measures were selected and ranked based on the frequency of occurrence, using the data gathered during the current reporting period. These data were obtained from 28 sites, comprising 27 sites from the Vegetated Shingle Monitoring (VSM) survey (Martin *et al*., 2017), and one site recorded by Devaney *et al*. (2014). The maintenance of extensive grazing (recorded under code CA03) is the most frequent conservation measure applied to the habitat. In some cases the maintenance of extensive cattle grazing is undertaken through the Department of Agriculture's Green, Low-Carbon, Agri-Environment Scheme (GLAS). The maintenance of grazing by non-domestic grazers including hares and rabbits (recorded under code CG02) was frequently recorded during the current reporting period, with these species controlled by a combination of human hunting and natural predation. As there is no evidence that hare or rabbit populations are managed for the conservation of the 1220 habitat, CG02 was not recorded as a

	conservation measure in Section 8.5. Other conservation measures that are not currently being implemented, but whose implementation would improve the Structure and functions of the habitat, include the control or removal of non-native species such as Montbretia (*Crocosmia × crocosmiiflora*).

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	*Good /* ***Poor*** */ Bad / Unknown*
	c) Structure and functions	*Good /* ***Poor*** */ Bad / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as Stable. Current Range is equal to the Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as Stable, as no change in Range is expected based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Range are therefore Good. Short-term trend direction of Area is assessed as Stable. Current Area is <10% less than the Favourable Reference Area. Conservation status of Area is therefore Unfavourable-Inadequate. Future trend of Area is assessed as Stable as there is no evidence to suggest that losses are ongoing. Future prospects of Area are therefore Poor. Short-term trend direction of Structure and functions is Stable for habitat that is in Good condition. Current Structure and functions are assessed as Unfavourable-Inadequate as >75% but <90% of the habitat is in Good condition. Conservation status of Structure and functions is therefore Unfavourable-Inadequate. The difference in area of 1220 habitat in Good condition between the current (81.7%) and the previous reporting period (93%) is due to a change in the sampling strategy rather than any actual change, with the current reporting period figure considered more representative. Future trend of Structure and functions is assessed as Stable. Future prospects of Structure and functions are therefore Poor.	

10 Conclusions	
Assessment of conservation status at end of reporting period	
10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.2 Area	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*

<table>
<tr><td>10.3 Specific structure and functions (incl. typical species)</td><td colspan="3">Favourable (FV) / <u>Inadequate (U1)</u> / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>10.4 Future prospects</td><td colspan="3">Favourable (FV) / <u>Inadequate (U1)</u> / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>10.5 Overall assessment of Conservation Status</td><td colspan="3">Favourable (FV) / <u>Inadequate (U1)</u> / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>10.6 Overall trend in Conservation Status</td><td colspan="3">Indicate the trend (qualifier) for FV, U1 and U2:

improving / deteriorating / <u>stable</u> / unknown</td></tr>
<tr><td rowspan="8">10.7 Change and reasons for change in conservation status and conservation status trend</td><td colspan="3">Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.</td></tr>
<tr><td></td><td>Overall assessment of conservation status (10.5)</td><td>Overall trend in conservation status (10.6)</td></tr>
<tr><td>a) no, there is no difference</td><td>YES/<u>NO</u></td><td>YES/<u>NO</u></td></tr>
<tr><td>b) yes, due to genuine change</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>c) yes, due to improved knowledge/more accurate</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>d) yes, due to the use of different methods (including use of different thresholds)</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>e) yes, but there is no information on nature of change</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>The change is mainly due to (select one of the reasons above):</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td></tr>
<tr><td>10.8 Additional information

Optional</td><td colspan="3">The Conservation Status of Range is Favourable in this reporting period, as it was in the previous reporting period.
The Conservation Status of Area, Structure and functions, and Future prospects are Unfavourable-Inadequate, as they were in the previous reporting period.
The Overall assessment of Conservation Status was assessed as Unfavourable-Inadequate. This is the same as the previous reporting period. The status of Unfavourable-Inadequate is due to the current area being lower than the Favourable Reference Area, 18% of the 1220 habitat not being in good condition, and anthropogenic losses of 1220 as outlined in Section 5.15.
Trend in Overall assessment of Conservation Status was assessed as</td></tr>
</table>

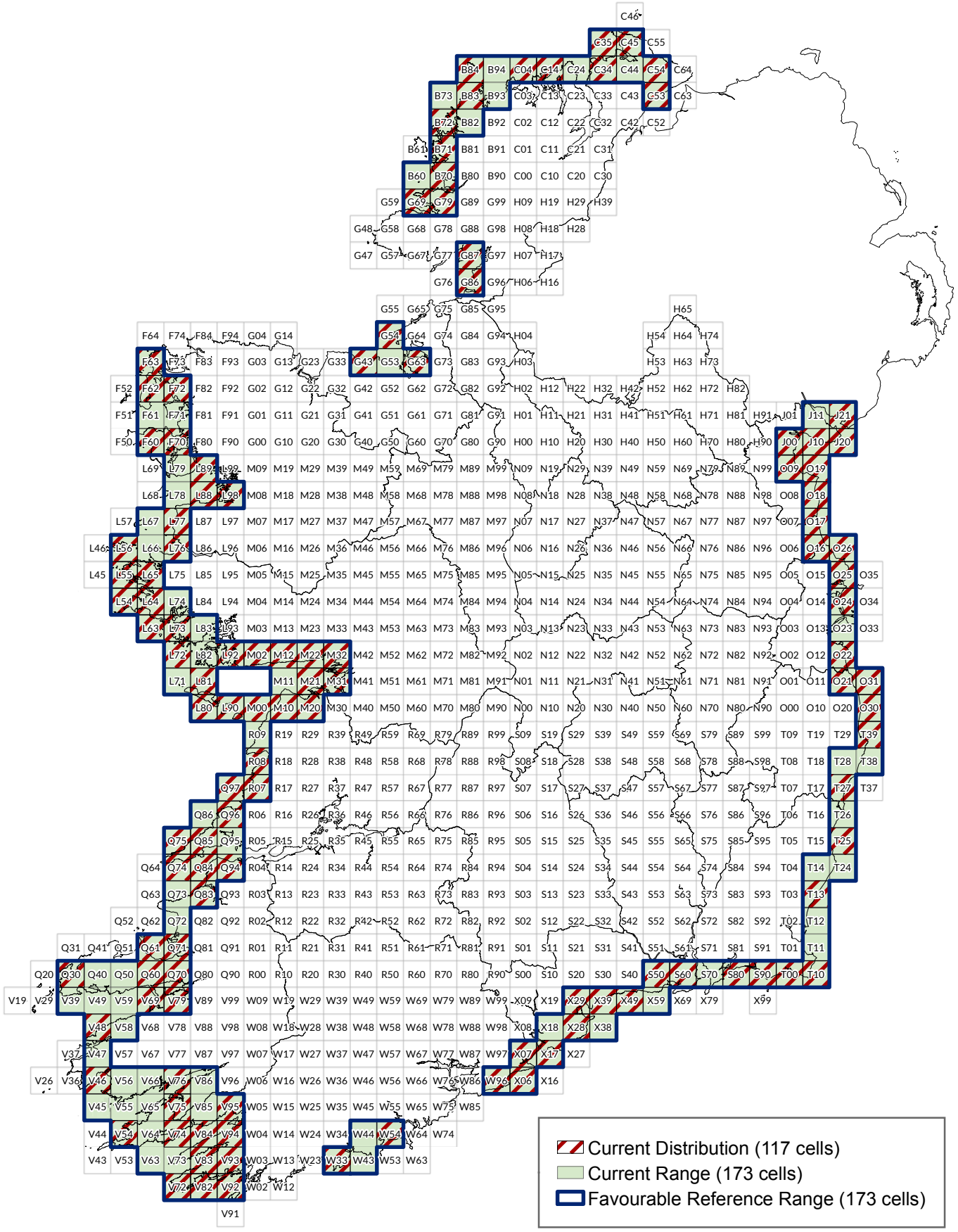
	stable. This is the same as the previous reporting period.

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***1.04 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable** / increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing an intersect between the distribution shapefiles and the SAC shapefile. The area given in section 11.1 is the total area of 1220 habitat in SACs in the country, including some SACs where 1220 is not listed as a qualifying interest (QI). The area of 1220 within the N2000 network where it is listed as a QI is 0.94 km^2. There was one inconsistency between the Natura 2000 sites where the 1220 habitat is listed as a QI and the current distribution for the habitat. The habitat 1220 is listed as a QI, representativity C, for Streedagh Point Dunes SAC (site code 001680) but there is no evidence for the habitat being present within this site and it was not located when the site was surveyed by Ryle *et al.* (2009) or Martin *et al.* (2017). The short-term trend of the habitat area in good condition within the SAC network is taken to be Stable, with the same trend as the 1220 habitat nationally (see Section 6.4 and 6.8), as almost all areas of 1220 habitat surveyed during the last two reporting periods were within the SAC network. The surface area of 1220 habitat within Natura 2000 sites is larger than the minimum figure from the previous reporting period. This is	

	in part due to improved knowledge, but largely due to a change in methodology. In this reporting period an intersect between the current 1220 distribution (sources listed in Section 2.5) and the SAC shapefile was used, whereas in the last reporting period an intersect between only the Ryle *et al.* (2009) and Delaney *et al.* (2013) 1220 shapefiles and the SAC shapefile was carried out (NPWS, 2013). NPWS (2013) also reported a maximum figure for the surface area of the 1220 habitat within Natura 2000 sites and this is greater than the figure presented in 11.1c in proportion to the larger overall area reported in 2013 (see Section 5.15).

12 Complementary information

Perennial vegetation of stony banks (1220) Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**1230 Vegetated sea cliffs of the Atlantic and Baltic coasts**
1.2i Habitat short name	**Sea cliffs**
1.3i Habitat description	All sea cliffs on the Irish coast can be considered to correspond to the EU Annex I habitat Vegetated sea cliffs of the Atlantic and Baltic coasts (1230). A sea cliff is a steep or vertical slope located on the coast, the base of which is in either the intertidal (littoral) or subtidal (sublittoral) zone. The cliff may be composed of hard rock, such as basalt, or of softer substrates, such as shale or boulder clay. Hard cliffs are at least 5 m high while soft cliffs are at least 3 m high. Sea cliff habitat covers approximately 20% of the coastline of Ireland and the habitat is primarily distributed along the southern, western and north-western seaboards. The top of a cliff is generally defined by an obvious reduction in gradient. In some cases, the cliff may grade into the slope of a hillside located close to the coast. In these cases, the cliff is defined as that part of the slope which was formed by processes of coastal erosion, while the cliff top is where the slope was formed by the different geomorphic processes which formed the hill. Both the cliff and the cliff top may be subject to maritime influence in the form of salt spray and exposure to coastal winds. The cliff base may be marked by a change in gradient and where the base is exposed it can be characterised by substrates such as scree, boulders, a wave-cut platform, or sand. Vegetated sea cliff may support a range of plant communities including scrub, heath, grassland, and maritime therophyte vegetation (Rodwell, 2000).

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***2005-2011***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	Barron *et al*. (2011) and Browne (2005) were used as the basis for the distribution map for 1230 vegetated sea cliffs. Oblique photographs, derived from video imagery captured in 2003, were examined by Barron *et al*. (2011) to draw up a list of 'potential sea cliffs'. Physical characteristics were further assessed using aerial

	photographs (2005 series) and OSI Discovery Series maps, information on soils from Teagasc soil and parent material maps, and information on bedrock from the Geological Survey of Ireland bedrock maps. The resulting sea cliff locations were transferred to the County boundary line developed from OSI six-inch maps of Ireland. A further 10 cliffs identified by Browne (2005), for which no remote imagery was available, are included in the distribution. These are referred to as 'undocumented sites'.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
3.2 Sources of information	ARUP (2016) Indaver Resource Recovery Centre, Ringaskiddy, Co. Cork. Coastal erosion report. Appendix 13.3 of the Environmental Impact Statement. http://www.ringaskiddyrrc.ie/pdfs/Environmental_Impact_Statement/EIS_Vol_4_Appendices/EIS_Appendix_13.3_Coastal_Study_2015_by_Arup_Issue_1.pdf [Accessed January 2019]. Barron, S.J., Delaney, A., Perrin, P.M., Martin, J.R. and O'Neill, F.H. (2011) National survey and assessment of the conservation status of Irish sea cliffs. *Irish Wildlife Manuals*, No. 53. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin. Browne, A. (2000) National inventory of sea cliffs and coastal heaths. Report for the National Parks and Wildlife Service, Dublin. EPA (2017) A Summary of the State of Knowledge on Climate Change Impacts for Ireland: Report 11 (2010-2016). Prepared for the Environmental Protection Agency by MaREI Centre, Environmental Research Institute, University College Cork. M. Desmond, P. O'Brien and F. McGovern. EPA, Wexford. Leake, J., Wolf, J., Lowe, J., Stansby, P., Jacoub, G., Nicholls, R., Mokrach, M., Nicholson-Cole, S., Walkden, M., Watkinson, A. and Hanson, S. (2008) Predicted wave climate for the UK: towards an integrated model of coastal impacts of climate change. In: *Proceedings of the 10th conference on Estuarine and Coastal Modelling, Newport, Rhode Island, Nov 5-7 2007*. Virginia, US, American Society of Civil Engineers, 393-406. Martin, J.R. (2019) Vegetated sea cliffs (1230) backing document. Unpublished report submitted to the National Parks and Wildlife Service, Dublin. Mangan, C., Kennedy, E. and Lizondo, S. (2016) Resilient infrastructure: Tools to assess infrastructure performance in the face of coastal erosion and flooding. Presentation to Engineers Ireland March 2016. https://www.engineersireland.ie/EngineersIreland/media/SiteMe

	dia/groups/societies/water-enviro/21-March-presentation.pdf?ext=.pdf [Accessed January 2019]. MERC/EIRECO (2009) Survey plan to assess the conservation status of Irish sea cliffs. Unpublished report submitted to the National Parks and Wildlife Service, Dublin. Ní Dhúill, E. and Smyth, N. (2018) Invasive species mapping, Howth, Co. Dublin. Report submitted to Fingal County Council. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.1. Unpublished Report, National Parks and Wildlife Service, Department of Arts, Heritage, and the Gaeltacht, Dublin. Rodwell, J. S. (ed.) (2000) *British Plant Communities Volume 5: Maritime communities and vegetation of open habitats.* Cambridge Community Press, Cambridge. Smyth, N., Armstrong, C., Jebb, M. and Booth, A. (2013) Implementing target 10 of the Global Strategy for Plant Conservation at the National Botanic Gardens of Ireland: Managing two invasive non-native species for plant diversity in Ireland. *Sibbaldia* 11: 125-141.
3.2i Additional information	

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***24,000 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend	**a) Minimum**	

Magnitude *Optional*	**b) Maximum**	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 24,000 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable Reference Range is set as the current range. There is no evidence of any losses since the Directive came into force and the range encompasses all geographical and ecological variation and is sufficient to ensure the long-term survival of the species.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods? YES/**NO***	
	a) yes, due to genuine change	*YES/NO*
	b) yes, due to improved knowledge/more accurate data	*YES/NO*
	c) yes, due to the use of different method	*YES/NO*
	d) yes, but there is no information on the nature of change	*YES/NO*
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data / the use of a different method*	
4.12 Additional information *Optional*	The 10km distribution file was run through the Range Tool and the resulting single-part Range file was intersected with the 10km Grid file for Ireland in order to produce the final multi-part polygon shapefile (256 x 10km cells). A further selection was made in order to only select cells that intersected the coast of Ireland. This identified 18 cells which did not intersect the coast. All 18 cells were inspected individually and were found not to have any areas that might contain the habitat, so all 18 cells were deleted. Two Range cells from the last assessment (L59 and V28) which had not been included in this running of the Range Tool were deemed to contain possible suitable areas for the habitat and were added. This gives a total of 240 x 10km cells for the range. Use of the Range Tool with a grid covering the terrestrial area of the Republic of Ireland has led to a geographical difference of two cells in the Range from the last round of reporting. One cell (S40) was lost from the Range and one cell (O30) was added, so the net Range and Favourable Reference Range figures remain the same.	

5 Area covered by habitat		
Area covered by the habitat type within the range in the biogeographical/marine region concerned		
5.1 Year or period	***2005-2011***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***54.83 km^2***
5.3 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	*1994–2018*	
5.10 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	

5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator ≈ (approximately equal to) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/**NO***
	b) yes, due to improved knowledge/more accurate data	*YES/**NO***
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data /* ***the use of a different method***	
5.15 Additional information *Optional*	The total length of vegetated sea cliffs has been calculated to be 2,159 km. This includes: sites fully reviewed (1,522 km); those identified in a previous study (Browne, 2005) for which no remote imagery was available and hence have not been fully reviewed (43 km); and sites provisionally identified by Barron *et al*. (2011) which have not, to date, been fully reviewed (186 km). It should be noted that, although the best available data were used in determining the length of cliffs, a comparison was made in Barron *et al*. (2011) to determine the accuracy of the County boundary line when compared to the line digitised from the 2005 orthorectified aerial photographs. Two sections of coast were investigated. For the south Wexford coast the two datasets (the County boundary line and the digitised line) were relatively consistent, being within 8% of each other. The discrepancy between the datasets for the Dingle Peninsula was, however, 28%, reflecting the more indented structure of this section of coastline. These discrepancies reflect the indentations on the coast which the County boundary line is simply not accurate enough to depict. A third of the country represents a less indented coastline and two-thirds a more indented coastline, therefore the length estimate has been adjusted to 2,159 km to accommodate these differences. An approximate area for the vegetated sea cliff habitat can then be calculated from the median slope distance of sites (i.e. cliff face) surveyed (0.0254 km) and the total length of cliffs (2,159 km) as 53.83 km². The figure presented for the surface area of the vegetated sea cliff	

	habitat in NPWS (2013) was an estimate for the total length of the habitat and not the surface area. During the last reporting period, minor losses in extent were recorded, but these losses were considered by NPWS (2013) as negligible, as the rate of loss was approximately -0.03% per annum. Therefore short-term trend in surface area was considered to be stable.

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***48.55 km²***
		Maximum	***48.55 km²***
	b) Area in not-good condition	**Minimum**	***6.28 km²***
		Maximum	***6.28 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***		
6.7 Typical species Method used *Optional*	The list of typical species is the same as the last reporting period (NPWS, 2013) and was devised by Barron *et al*. (2011). The positive and negative indicator species, including typical species, used to assess the 1230 habitat are listed in Appendix III of Barron *et al*. (2011).		
6.8 Additional information *Optional*	62 sections of vegetated sea cliffs at 32 sites were surveyed in the field and assessed using criteria developed by Barron *et al*. (2011). Eighteen sites were assessed as Favourable, ten as Unfavourable-		

	Inadequate and four as Unfavourable-Bad. In NPWS (2013) the proportion of cliff surveyed considered to be in poor condition was given as "approximately 11%"; this was based on the percentage of monitoring stops that failed the assessment (30 out of 232) and was calculated more precisely for the current monitoring period as 11.45% (Barron *et al*., unpublished data).In the absence of any more recent data this figure of 11.45% was applied to the current area of vegetated sea cliff habitat to calculate that 6.28 km^2 of the 1230 habitat is not in good condition. It follows that 48.55 km^2 of the habitat is in good condition. No data on the structure and functions of sea cliffs were recorded within the current reporting period and therefore the short-term trend of stable was based on a recent assessment of current pressures and conservation measures (Martin, 2019) and expert opinion. The list of typical species is the same as the list presented during the last reporting period (NPWS 2013): *Agrostis stolonifera, Anthyllis vulneraria, Armeria maritima, Caloplaca* spp*., Calluna vulgaris, Crithmum maritimum, Daucus carota, Equisetum* spp. *Festuca rubra, Lonicera periclymenum, Plantago maritima, Ramalina* spp*., Silene uniflora, Tussilago farfara, Verrucaria maura, Xanthoria* spp.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**C01** Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell) (M) **E01** Roads, paths railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (M) **F07** Sports, tourism and leisure activities (M) **F08** Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defence or coast protection works and infrastructures) (M)	**C01** Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell) (M) **E01** Roads, paths railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (M) **F07** Sports, tourism and leisure activities (M) **F08** Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defence or coast protection works and infrastructures) (M)

	I02 Other invasive alien species (other than species of Union concern) (M) **N03** Increases or changes in precipitation due to climate change (M) **N04** Sea-level and wave exposure changes due to climate change (M)	**I02** Other invasive alien species (other than species of Union concern) (M) **N03** Increases or changes in precipitation due to climate change (M) **N04** Sea-level and wave exposure changes due to climate change (M)
7.2 Sources of information *Optional*	Pressures were sourced from the following reports and accompanying data: ARUP (2016) Indaver Resource Recovery Centre, Ringaskiddy, Co. Cork. Coastal erosion report. Appendix 13.3 of the Environmental Impact Statement. http://www.ringaskiddyrrc.ie/pdfs/Environmental_Impact_Statement/EIS_Vol_4_Appendices/EIS_Appendix_13.3_Coastal_Study_2015_by_Arup_Issue_1.pdf [Accessed January 2019] Barron, S.J., Delaney, A., Perrin, P.M., Martin, J.R. and O'Neill, F.H. (2011) National survey and assessment of the conservation status of Irish sea cliffs. *Irish Wildlife Manuals*, No. 53. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin. EPA (2017) A Summary of the State of Knowledge on Climate Change Impacts for Ireland: Report 11 (2010-2016). Prepared for the Environmental Protection Agency by MaREI Centre, Environmental Research Institute, University College Cork. M. Desmond, P. O'Brien and F. McGovern. EPA, Wexford. Leake, J., Wolf, J., Lowe, J., Stansby, P., Jacoub, G., Nicholls, R., Mokrach, M., Nicholson-Cole, S., Walkden, M., Watkinson, A. and Hanson, S. (2008) Predicted wave climate for the UK: towards an integrated model of coastal impacts of climate change. In: *Proceedings of the 10th conference on Estuarine and Coastal Modelling, Newport, Rhode Island, Nov 5-7 2007*. Virginia, US, American Society of Civil Engineers, 393-406. Mangan, C., Kennedy, E. and Lizondo, S. (2016) Resilient infrastructure: Tools to assess infrastructure performance in the face of coastal erosion and flooding. Presentation to Engineers Ireland March 2016. https://www.engineersireland.ie/EngineersIreland/media/SiteMedia/groups/societies/water-enviro/21-March-presentation.pdf?ext=.pdf [Accessed January 2019] Martin, J.R. (2019) Vegetated sea cliffs (1230) backing document. Unpublished report submitted to the National Parks and Wildlife Service, Dublin. Ní Dhúill, E. and Smyth, N. (2018) Invasive species mapping, Howth, Co. Dublin. Report submitted to Fingal County Council. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.1. Unpublished Report, National Parks and Wildlife Service, Department of Arts, Heritage, and the Gaeltacht, Dublin. Smyth, N., Armstrong, C., Jebb, M. and Booth, A. (2013)	

	Implementing target 10 of the Global Strategy for Plant Conservation at the National Botanic Gardens of Ireland: Managing two invasive non-native species for plant diversity in Ireland. *Sibbaldia* 11: 125-141.
7.3 Additional information *Optional*	Pressures and threats were selected and ranked based on intensity (high, medium or low), frequency of occurrence, and area of impact, using the data gathered from the sources listed in Section 7.2; these data are summarised in the backing document (Martin, 2019). For the current reporting period, data on pressures were available for nine 1230 sites: Allihies, Bray Head, Clare Island, Cliffs of Moher, Great Blaskets, Greystones, Howth Head, Moveen to Bridge of Ross, and Ringaskiddy. Within the 1230 habitat no pressures were identified as being of high importance. Seven pressures are listed as medium importance, with five of these retained from NPWS (2013). Based on evidence from the Cliffs of Moher, Allihies, Howth Head, Great Blaskets and expert opinion, F07 has been included as a medium-importance pressure. Based on evidence from ARUP (2016) and EPA (2017), N04 has also been included as a medium-importance pressure. Based on expert opinion and the fact that landslides are a natural process rather than anthropogenic pressure, M05 (Collapse of terrain, landslide), which was listed as a medium-importance pressure in NPWS (2013), has now been listed as a neutral pressure. The seven pressures presented in section 7.1 are also considered to be the seven main threats in the future.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* ***d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')***
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*

8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* ***b) Medium-term results (within the next two reporting periods, 2019-2030)*** *or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	**CI03** Management, control or eradication of other alien species
8.6 Additional information *Optional*	Conservation measures were selected and ranked based on their frequency of occurrence, using the data gathered during the current reporting period. These sources are listed in section 7.2 and these data are summarised in the backing document (Martin, 2019). There is evidence for CI03 (Management, control or eradication of other alien species). Although these actions were initiated between 2010 and 2012, before the current reporting period, invasive species monitoring and management plans are still ongoing for the Howth Head cliffs (Ní Dhúill and Smyth, 2018). The control programme for *Carpobrotus edulis* (Hottentot-fig) on the Howth Head cliffs using herbicide was started in 2010. The herbicide treatment has successfully reduced the areas of the invasive species by up to 95% and 50% of all treated sites are reported to have revegetated with native species such as *Inula crithmoides* and *Crithmum maritimum* (Smyth *et al*., 2013). On Clare Island cliffs the majority of *Gunnera tinctoria* (Giant rhubarb) plants within eight locations that covered a 19 ha area were treated with herbicide in August 2011 and July 2012 and initial mortality rates of 95% have been reported. No data have been presented on the revegetation of the Clare Island cliffs by native species (Smyth *et al.,* 2013).

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	*Good /* ***Poor*** */ Bad / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as stable. Current range is equal to the Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as stable, as no change in range is expected in the next two reporting periods. Future prospects of Range are therefore good. Short-term trend direction of Area is assessed as stable, as there have only been negligible anthropogenic losses within the last two reporting periods. Current area is equal to the Favourable Reference Area. Conservation status of Area is therefore Favourable.	

	Future trend of Area is assessed as stable, as no change in area is expected on the basis of the threats identified. Future prospects of Area are therefore good. Short-term trend direction of Structure and functions is stable (for habitat that is in good condition). Current Structure and functions are assessed as Unfavourable-Inadequate as >75% but <90% of the habitat is in good condition. Future trend of Structure and functions is assessed as stable, with no change expected in the proportion of habitat in good condition over the next two reporting periods, based on the threats and conservation measures identified within the habitat. Future prospects of Structure and functions are poor because of the Inadequate assessment of the parameter in this reporting period.

10 Conclusions

Assessment of conservation status at end of reporting period

10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/****NO***	*YES/****NO***
	b) yes, due to genuine change	*YES/NO*	*YES/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	*YES/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/NO*

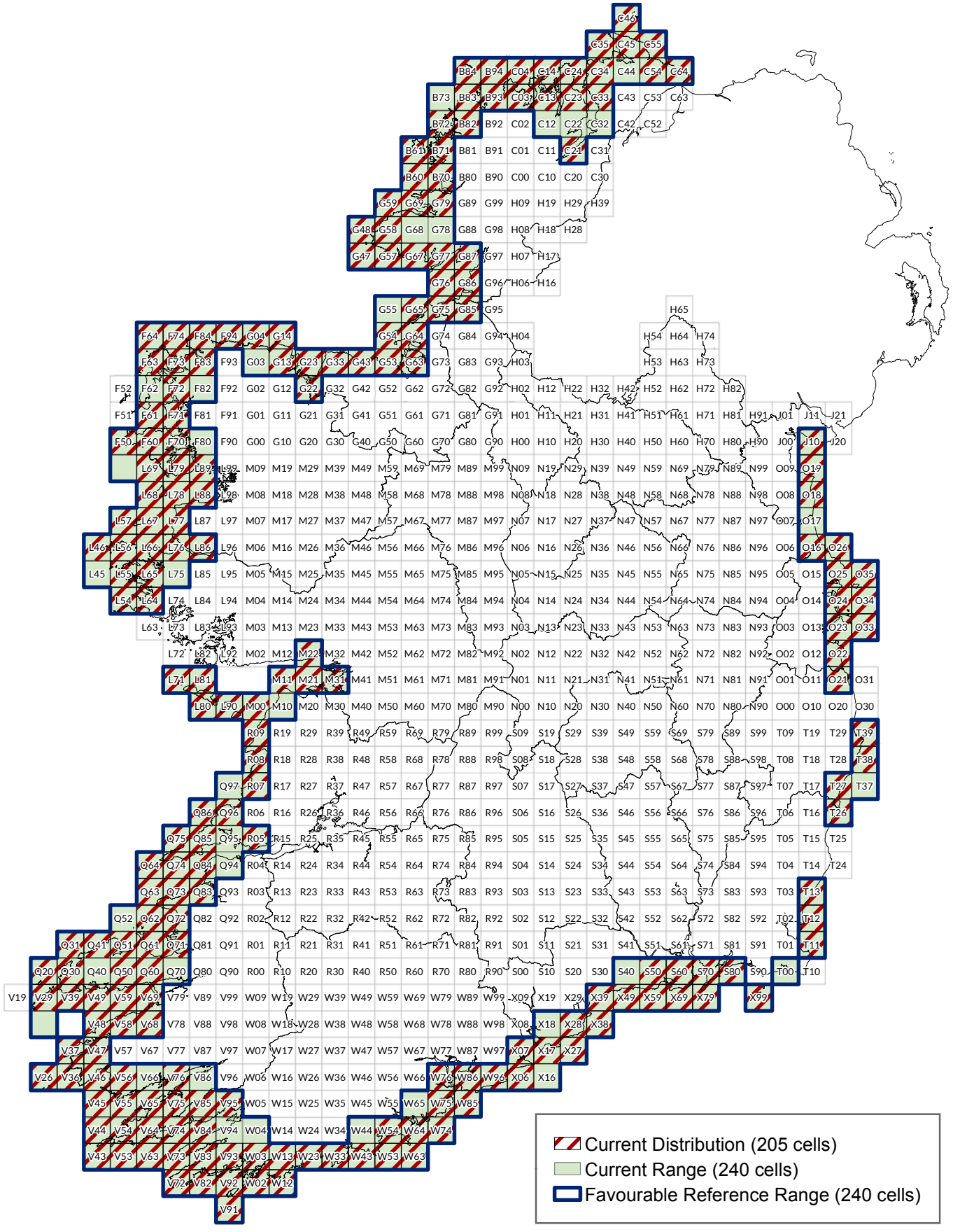
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	There have been no significant losses in habitat area since the Directive came into force. Pressures relating to infrastructure, invasive alien species and climate change are in operation but do not appear to be escalating. However, closer monitoring of the potential impacts from climate change should be undertaken for this vulnerable habitat. All parameters are unchanged since the previous reporting period. The overall trend in conservation status is also unchanged.		

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***27.19 km²***
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable*** */ increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

11.6 Additional information *Optional*	Area within the SAC network and associated trend were estimated by performing an intersect between the distribution shapefile and the SAC shapefile. The area given in section 11.1 is the total area of 1230 habitat in SACs in the country, including some SACs where the habitat is not listed as a qualifying interest (QI). The area within the SAC network where it is listed as a QI is 18.97 km^2.

12 Complementary information

Vegetated sea cliffs (1230)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Mapáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**1310 *Salicornia* and other annuals colonising mud and sand**
1.2i Habitat short name	***Salicornia* mud**
1.3i Habitat description	*Salicornia* and other annuals colonising mud and sand (1310) is a pioneer saltmarsh community that may occur on muddy sediment seaward of established saltmarsh, or form patches within other saltmarsh communities where the elevation is suitable and there is regular tidal inundation. The Interpretation Manual of EU Habitats (European Commission, 2013) defines habitat 1310 as annuals belonging mainly to the genus *Salicornia* that colonise periodically inundated muds and sands of marine or interior salt marshes and belong to the phytosociological classes *Thero-Salicornietea*, *Frankenietea pulverulentae* and *Saginetea maritimae*. Only vegetation from the first and third class is known in Ireland. There are several sub-types listed and four British National Vegetation Classification plant communities (Rodwell, 2000) are listed: "SM7 *Arthrocnemum perenne* stands", "SM8 Annual *Salicornia* saltmarsh", "SM9 *Suaeda maritima* saltmarsh" and "SM27 Ephemeral saltmarsh vegetation with *Sagina maritima*". In Ireland, three sub-types are recognised: (1) *Salicornia* type (2) *Suaeda* type and (3) the much rarer *Sagina* type. Mono-specific swards of *Salicornia* spp. growing on muddy sediments are the most common plant community belonging to this Annex I habitat type found in Ireland. According to the Irish Vegetation Classification (IVC) (Perrin, 2018a), the habitat equates to the community SM1A *Salicornia* agg. saltmarsh. The plant community "SM7 *Arthrocnemum perenne* stands" is characteristic of a different Annex I saltmarsh community: Mediterranean and thermo-Atlantic Halophilous scrubs (1420). This habitat has a very restricted distribution and area, and is not considered part of the 1310 *Salicornia* flats habitat. As this habitat is dominated by annuals it can be ephemeral or transient in nature and is highly susceptible to erosion. Its distribution can vary considerably from year to year and it can move in response to changing conditions, e.g. in estuaries with shifting river channels.

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***1982-2018***
2.2 Distribution map	Submitted

2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was compiled using polygons containing 1310 habitat mapped by Brophy *et al.* (in prep.) and the SAMFHIRES project (Perrin, 2018a) in 2017-2018, and the Saltmarsh Monitoring Project (SMP) 2006-2008 (McCorry, 2007; McCorry and Ryle, 2009). To allow for the inclusion of the Wymer (1984) dataset, the point data comprised plots from 1982 onwards from the National Vegetation Database that were identified as saltmarsh communities attributable to 1310 habitat through the Irish Vegetation Classification Project (IVC) (Perrin, 2016). Additional cells were added where 10km^2 records of *Salicornia* agg. from Preston *et al*. (2002) overlapped with the presence of saltmarsh within a 10km^2 square. All references and sources are detailed in section 3.2. The aforementioned datasets by McCorry and Ryle (2009), Ryle *et al*. (2009) and McCorry (2007) were also used to compile the distribution map for the last reporting period, along with plot data from Wymer (1984) (which now forms part of the National Vegetation Database) and records of *Salicornia* spp. from Preston *et al*. (2002) (NPWS, 2013). A certainty rating system was applied to all data that informed the distribution map. This system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1, the lowest. The new data sources added since the last round of reporting (NPWS, 2013), Brophy *et al.* (in prep.) and Perrin (2018b), were judged to be a high certainty of 3. McCorry (2007) and McCorry and Ryle (2009) were both assigned a certainty of 2. While these two datasets were based on a detailed field survey, the certainty has been dropped to 2 due to the often transient nature of the 1310 habitat, which can be lost through natural processes such as succession, erosion and changes in siltation patterns. Point data derived from analysis of plots from the National Vegetation Database, and included in the distribution, cover a date range of 1982-2009. Plots from 2001-2009 (which included the SMP plots) were assigned a certainty of 2, while earlier data (1982-2000) were assigned a certainty of 1. All data with certainty 1 to 3 were used to map the distribution for the 1310 habitat. Following a comparison with the distribution from the previous reporting round (NPWS, 2013), a total of five cells were added and 21 deleted. This resulted in the distribution decreasing from 119 cells to 103. While a small area of 1310 has been lost to anthropogenic activities, the apparent reduction in range is not thought to represent a genuine loss of distribution between reporting periods, but rather reflect a change in methods and natural variation and ecological change typical of this pioneer habitat.

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned	
3 Biogeographical and marine regions	
3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Brophy, J.T. et al., (in prep.) Saltmarsh Monitoring Project 2017-2018: Final Report. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin. Curtis, T.G.F. and Sheehy Skeffington, M. (1998) The saltmarshes of Ireland: an inventory and account of their geographical variation. *Biology and Environment, Proceedings of the Royal Irish Academy* 98B: 87-104. Devaney, F.M. and Perrin, P.P. (2015) Saltmarsh Angiosperm Assessment Tool for Ireland (SMAATIE). End of Project Report. Prepared for the Environmental Protection Agency by BEC Consultants Ltd. 2013-W-DS-10. Desmond, M., O'Brien, P. and McGovern, F. (2017) A Summary of the State of Knowledge on Climate Change Impacts for Ireland: Report 11 (2010-2016). Prepared for the Environmental Protection Agency by MaREI Centre, Environmental Research Institute, University College Cork. EPA, Wexford. European Commission (2013) Interpretation Manual of European Union Habitats. EUR28. DG Environment, Brussels. Horton, B.P., Shennan, I., Bradley, S.L., Cahill, N., Kirwan, M., Kopp, R.E. and Shaw, T.A. (2018) Predicting marsh vulnerability to sea-level rise using Holocene relative sea-level data. *Nature Communications* 9: 2687-2690. Image, M. and Forster Brown, C. (2018) Baseline Analysis of Actions under GLAS: Full Report. Report for the Department of Agriculture, Food and the Marine. JNCC (2004) Common Standards Monitoring Guidance for saltmarsh habitat. Joint Nature Conservation Committee, Peterborough. McCorry, M. (2007) Saltmarsh Monitoring Project 2006 – Summary Report. Unpublished report for the National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. McCorry, M.J. and Ryle, T. (2009) Saltmarsh Monitoring Project 2007-2008: Final report. Unpublished report for the National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. National Vegetation Database. National Biodiversity Data Centre. Available at http://www.biodiversityireland.ie/projects/national-vegetation-database/ NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.1. Unpublished Report, National Parks and Wildlife Service, Department of Arts,

	Heritage, and the Gaeltacht, Dublin. NPWS (2016) Conservation Objectives: Lackan Saltmarsh and Kilcummin Head SAC 000516. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. NPWS (2017) Conservation Objectives: Akeragh, Banna and Barrow Harbour SAC 000332. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. Perrin, P. (2016) Irish Vegetation Classification Technical Progress Report No. 2. Unpublished report by BEC Consultants for the National Biodiversity Data Centre. http://www.biodiversityireland.ie/wordpress/wp-content/uploads/IVC_Technical-Progress-Report-No.2.pdf. 34pp. Perrin, P.M. (2018a) Irish Vegetation Classification. Accessed at http://www.biodiversityireland.ie/projects/national-vegetation-database/irish-vegetation-classification/ on 28/09/2018. Perrin, P.M. (2018b) SAMFHIRES (Saltmarsh Function and Human Impacts in Relation to Ecological Status) unpublished field survey data. EPA-funded collaboration between BEC Consultants Ltd and Trinity College Dublin. Preston, C.D., Pearman, D.A. and Dines, T.D. (2002) New Atlas of the British and Irish Flora. Oxford University Press. Ryle, T., Connelly, K., Murray, A. and Swann, M. (2009) Coastal Monitoring Project. A report to the National Parks and Wildlife Service, Department of Environment, Heritage and Local Government. Wymer, E.D. (1984) The phytosociology of Irish saltmarsh vegetation. M.Sc. Thesis, National University of Ireland, Dublin.
3.2i Additional information	

4 Range

Range within the biogeographical/marine region concerned

4.1 Surface area	***15,200 km^2***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	

4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 15,200km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable reference range has been decreased since the last reporting period (NPWS, 2013) due to the use of a different method. The distribution on which the Favourable reference range was based has changed. There is no evidence of loss of range since the Directive came into force and the geographic spread is considered sufficient for the long term survival of the habitat.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	*YES/****NO***
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data /* ***the use of a different method***	

4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 1310 habitat. A maximum gap distance of two 10km grid cells was used when running the range tool. Eleven 10km grid cells generated by the range tool that had no coastline or suitable estuarine habitat were removed. Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013). None of the anthropogenic area losses recorded during these two reporting periods led to a contraction in the range. The short-term trend is assessed as stable. The number of 10km squares in the range (163) is 14 squares lower than the last monitoring period (NPWS, 2013). This change is likely due to the use of a slightly different methodology for the derivation of the distribution of 1310 on which the range was based and a change to the field survey method. The Favourable Reference Range (FRR) has decreased since the last reporting period (NPWS, 2013) due to the use of a different method. The FRR is the current range, reported in 4.1.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2006-2018***	
5.2 Surface area *(in km²)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***1.16 km²***
5.3 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

5.8 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a****) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) km²*	
	b) Operator ≈ (approximately equal to)	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	***YES****/NO*
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data /* ***the use of a different method***	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 2006 (McCorry, 2007) when the pilot baseline survey was carried out, and incorporates updates made by surveys carried out between 2006 and 2018, the details of which are listed in section 3.2, namely McCorry and Ryle (2009), Brophy *et al*. (in prep.) and Perrin (2018b).	

	During the current reporting period, 53 sites containing 1310 were visited and assessed for Area, 48 by Brophy *et al.* (in prep.) and five by Perrin (2018b). The 53 sites assessed for Area represent 0.6km^2 (52%) of the total area of 1310 habitat recorded in Ireland. This represents a significant proportion of the total area of 1310, covering all coasts, and therefore it is considered that the conclusions drawn for the surveyed areas can be applied to the country as a whole. There are still likely to be areas of unmapped 1310 habitat in the country, often in the form of small patches that have developed in areas of disturbance, such as vehicle tracks or where the settling and displacement of algal mats have resulted in bare ground suitable for colonisation by this pioneer habitat. Such areas were recorded during the 2017-18 survey, and therefore it is likely other examples exist outside the surveyed area. For this reason, the figure for surface area is considered to represent the minimum area for this habitat. The difference in habitat extent between the area of 1.16km^2 calculated for this reporting period and the figure of 1.83km^2 reported during the previous reporting period is due to a number of factors including changes caused by natural variation and other ecological processes, a small amount of anthropogenic loss, but particularly a change in survey methodology and a change in how the area of 1310 was calculated. Where entire polygons were previously often assigned to the dominant habitat in the field, with mosaics recorded in some cases, the 2017-18 survey (Brophy *et al*., in prep.) assigned percentages to the various habitats within any given polygon, allowing greater resolution of habitat area. Furthermore, the methodology used in the previous reporting period calculated the 1310 area by relating the area of 1310 habitat recorded by the SMP to the area of 1330 habitat recorded (NPWS, 2013). This method was not used for the current assessment, as there is no reason to believe that the area of 1310 has a quantifiable relationship to 1330. The apparent change in 1310, therefore, is likely to represent a mixture of genuine change, natural variation and changes to methodology. Favourable Reference Area (FRA) was determined to be approximately equal to the current surface area (1.16km^2). The FRA from the previous reporting period (1.83km^2) was set as the same as the then current habitat extent based on extrapolation and/or modelling using partial data (NPWS, 2013), as noted above. For this reason, the FRA is set as approximately equal to the Area calculated for this reporting period. While some loss is acknowledged, it is considered to be negligible over the period in question in light of the naturally dynamic nature of this habitat. Short-term trend in Area was deemed to be stable. Loss due to anthropogenic activities during the current reporting period was calculated to be 25m^2, which represents 0.005% of the area surveyed in the period 2017-2018. This loss was due to works carried out to repair an adjacent embankment. In light of the dynamic nature of this habitat, this loss was deemed to be negligible. In the previous reporting period, expert judgement was used to assess the short-term trend as stable. The long-term trend in Area was deemed to be stable based on the fact that the previous reporting period assessed the short-term trend as stable (NPWS, 2013), and there has been no change in direction of

	the trend for the current reporting period.

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***1.04 km²***
		Maximum	***1.04 km²***
	b) Area in not-good condition	**Minimum**	***0.12 km²***
		Maximum	***0.12 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***		
6.7 Typical species Method used *Optional*	The list of typical species has not changed since the last reporting period (NPWS, 2013). Where sites surveyed in 2017-18 were previously surveyed by McCorry (2007) and McCorry and Ryle (2009), plots were repeated in the same locations, where possible. New plot locations were chosen where it was not possible to repeat an existing plot and at sites not previously surveyed. Plots were 2m x 2m and all species within the plots were recorded. Of the species listed in section 6.8, only *Salicornia* spp., *Suaeda maritima* and *Sagina maritima* count towards the species density criterion used in the 2017-18 monitoring survey (Brophy *et al*., in prep.).		
6.8 Additional information *Optional*	The typical species for the 1310 habitat are: *Puccinellia maritima*, *Salicornia europaea* agg., *Salicornia pusilla*, *Parapholis strigosa*, *Plantago coronopus*, *Sagina maritima*, *Sagina nodosa* and *Suaeda*		

	maritima. During the current reporting period, 53 sites containing 1310 were visited and all 53 were assessed for Structure and functions; 48 by Brophy *et al.* (in prep.) and five from data collected by the SAMFHIRES project (Perrin, 2018b). The 53 sites assessed for Structure and functions represent 0.6km^2 (52%) of the total area of 1310 habitat recorded in Ireland. This represents a significant proportion of the total area of 1310, covering all coasts, and therefore it is considered that the conclusions drawn for the surveyed areas can be applied to the country as a whole. Of the 53 sites assessed for Structure and functions in this reporting period, 90% (0.54km^2) of the area was assessed as Favourable and 10% (0.06km^2) was assessed as Unfavourable. This result does not deviate significantly from the findings of NPWS (2013) presented below. The approach used to estimate the percentage of the 1310 habitat in Unfavourable condition at each site was as follows: If none of the assessment criteria failed at the site level then none of the 1310 area was classified as Unfavourable and the whole area of 1310 at the site was assigned as being in good condition; if 1 to 2 criteria failed at the site level this resulted in 25% of the 1310 area being classified as having Unfavourable Structure and functions; if 3 assessment criteria failed this resulted in 75% of the 1310 area at the site being classified with Unfavourable Structure and functions; if 4 or more criteria failed at the site level this resulted in 100% of the 1310 area at the site being classified as Unfavourable. Due to the particular threat posed to 1310 by the expansion of *Spartina anglica*, which competes for the same pioneer habitat, where the failed criterion was "Vegetation composition: negative species" at a stop level, the site cannot be assessed as more than 50% good condition. The most frequent criterion to fail was "Vegetation composition: negative species", due to an increase in the cover of *Spartina anglica* in the vicinity of the monitoring stop. During the last reporting period, 90.6-99.5% of the 1310 habitat was assessed as Favourable (NPWS, 2013). Due to the fact that the percentage of 1310 habitat assessed as Favourable in the current reporting period (90%) is within the previously reported range, the short-term trend of habitat area in good condition is taken to be stable.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**

List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**I02** Other invasive alien species (other than species of Union concern) (M) **A09** Intensive grazing or overgrazing by livestock (M)	**I02** Other invasive alien species (other than species of Union concern) (M) **A09** Intensive grazing or overgrazing by livestock (M)
7.2 Sources of information *Optional*	Pressures and threats were selected and ranked from the following data: Brophy, J.T. *et al*., (in prep.) Saltmarsh Monitoring Project 2017-2018: Final Report. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin. McCorry, M.J. and Ryle, T. (2009) Saltmarsh Monitoring Project 2007-2008: Final report. Unpublished report for the National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Muyllaert, M., Fitzgibbon, B., Duggan, O. and Collins, K. (2014) River Suir Heritage Audit 2014. Draft Final Report: Vol. 2. Unpublished report for Waterford City and County Councils. National Parks and Wildlife Service (2013). The Status of Protected EU Habitats and Species in Ireland. Overview Volume 1. Unpublished Report. National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin. O'Neill, F.H., Brophy, J.T., Devaney, F.M., Nash, R. and Barron, S.J. (2014) Assessment of the Conservation Status of the Great Island Channel SAC (001058). Unpublished report for Cork County Council.	
7.3 Additional information *Optional*	Pressures and threats in section 7.1 were selected and ranked based on intensity (high, medium or low), frequency of occurrence, and area of impact, using the data gathered during the 2017-18 SMP and presented in Brophy *et al*. (in prep.), as well as reviewing other sources of information. All pressures presented in NPWS (2013) were considered for the current reporting period. Of the 10 high or medium-ranked pressures in NPWS (2013), only two of the high-importance pressures were retained for the current monitoring period and both were reduced to medium importance. Invasive non-native species (previously I01, cross-walked to I02 in the current impact recording scheme) relates to *Spartina anglica*. As noted in NPWS (2013), *Spartina anglica* poses a threat to stands of *Salicornia* spp. through direct competition for pioneer habitat and it was recorded as a pressure at 25 sites in the current survey. However, there is no evidence to suggest that this species is expanding at the national level and therefore the pressure is considered to be of Medium importance. Intensive cattle grazing (A04.01.01) was previously ranked as being of high importance; however *A09 Intensive grazing or overgrazing by livestock* in the new scheme was ranked as medium importance. This pressure was recorded at three sites, with high or medium intensity, and affected 50-100% of the habitat. Of the other pressures recorded in the previous reporting period, *species composition change (succession)* (K02.01) was occasionally recorded as *L02 Natural succession resulting in species composition change (other than by direct changes*	

	of agricultural or forestry practices) in the 2017-18 survey where 1310 had become 1330, but this was not assessed as it is considered a natural process. Similarly, *Erosion* (previously K01.01, now under L01) was considered a natural process and so was not assessed. The remaining pressures recorded in the previous reporting period were not noted during the 2017-18 survey. For some, this may be that they were not occurring at the sites surveyed, while others are difficult to define and assess, such as *silting up* (K01.02) or *diffuse household pollution* (H01.08). Climate change has not been added as an impact of medium or high importance, but it is likely to affect the range of 1310 over the coming decades. The long-term trend will see an increase in mean sea level and extreme weather events (Desmond *et al*., 2017), which will impact the formation and stabilisation of the 1310 habitat. The two pressures presented in section 7.1 are also considered to be the two main threats into the future.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* ***c) Increase the surface area of the habitat type (related to 'Area covered by habitat')** or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* ***a) Short-term results (within the current reporting period, 2013-2018)** or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*

8.5 List of main conservation measures	**CA15** Manage drainage and irrigation operations and infrastructures in agriculture **CF02** Habitat restoration of areas impacted by residential, commercial, industrial and recreational infrastructures, operations and activities
8.6 Additional information *Optional*	No existing conservation measures were identified at the sites surveyed in the course of the current project (Brophy *et al.*, in prep.). However, two managed realignment projects were identified in the course of the SAMFHIRES project (P. Perrin, pers. comm.), one at Turvey, Rogerstown Estuary, Co. Dublin, and another at Kilmacleague, Tramore, Co. Waterford. At Turvey, Rogerstown Estuary, Co. Dublin, a 1.4km long, 1.5m high levee was removed by Fingal County Council in 2015 to allow complete access to tidal waters across an area of 24ha (CA15). This area is part of a council nature reserve and already supported some saltmarsh vegetation due to a gap in the levee, but the removal of the levee will improve the hydrological connectivity and encourage the creation of additional saltmarsh habitat. This area is within the Rogerstown Estuary SAC (site code 000208). Saltmarsh habitat at Kilmacleague, Tramore, Co. Waterford had been lost during the construction of a landfill site. Following a European Court of Justice case (C 494/01), Ireland was required to provide compensatory habitat (CF02). A project to create 5ha of mudflat and 2.5ha of saltmarsh was initiated and involved the breaching of an existing embankment to allow previously enclosed agricultural land to flood through part of the tidal cycle. The project has seen the development of 1310 and 1330 habitat since the embankment was breached in 2013. This site is outside, but adjacent to, the Tramore Dunes and Backstrand SAC (site code 000671). Saltmarsh habitats are not the target of any of the actions listed for the GLAS agri-environment scheme (Image and Forster Brown, 2018). Conservation measures that are not currently being implemented, but whose implementation would improve the Structure and functions of the habitat, include CA05 Adapt mowing, grazing and other equivalent agricultural activities. CI03 Management, control or eradication of other invasive alien species could be considered for *Spartina anglica*, but given the complexity of the issue this would need to be subject to a comprehensive assessment. From a long-term standpoint, CN02 Implement climate change adaptation measures is likely to be required to address the issue of climate change. Sea level rise is likely to impact negatively on 1310 area (Horton *et al*., 2018) and measures such as managed retreat may be required to maintain 1310 area and Structure and functions.

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	***Good*** */ Poor / Bad / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as Stable. Current range is equal to the Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as Stable, as no change in Range is expected beyond those associated with the natural changes to this dynamic habitat. Future prospects of Range are therefore Good. Short-term trend direction of Area is assessed as Stable, as there have only been negligible anthropogenic losses within the last two reporting periods. Current area is not smaller than the Favourable Reference Area. Conservation status of Area is therefore Favourable. Future trend of Area is assessed as Stable, as no change in Area is expected based on the threats and pressures identified. Future prospects of Area are therefore Good. Short-term trend direction of Structure and functions is Stable for habitat that is in Good condition. Current Structure and functions is assessed as Favourable as 90% of the habitat is in Good condition. Conservation status of Structure and functions is therefore Favourable. Future trend of Structure and functions is assessed as stable although the extent of *Spartina* should continue to be monitored closely. Future prospects of Structure and functions are therefore Good.	

10 Conclusions	
Assessment of conservation status at end of reporting period	
10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.3 Specific structure and functions (incl. typical species)	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*

<table>
<tr><td rowspan="8">10.7 Change and reasons for change in conservation status and conservation status trend</td><td colspan="3">Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.</td></tr>
<tr><td></td><td>Overall assessment of conservation status (10.5)</td><td>Overall trend in conservation status (10.6)</td></tr>
<tr><td>a) no, there is no difference</td><td><u>YES</u>/NO</td><td><u>YES</u>/NO</td></tr>
<tr><td>b) yes, due to genuine change</td><td>YES/<u>NO</u></td><td>YES/<u>NO</u></td></tr>
<tr><td>c) yes, due to improved knowledge/more accurate</td><td>YES/<u>NO</u></td><td><u>YES</u>/NO</td></tr>
<tr><td>d) yes, due to the use of different methods (including use of different thresholds)</td><td><u>YES</u>/NO</td><td>YES/<u>NO</u></td></tr>
<tr><td>e) yes, but there is no information on nature of change</td><td>YES/<u>NO</u></td><td>YES/<u>NO</u></td></tr>
<tr><td>The change is mainly due to (select one of the reasons above):</td><td>genuine change / improved knowledge or more accurate data / <u>the use of a different method</u></td><td>genuine change / <u>improved knowledge or more accurate data</u> / the use of a different method</td></tr>
<tr><td>10.8 Additional information

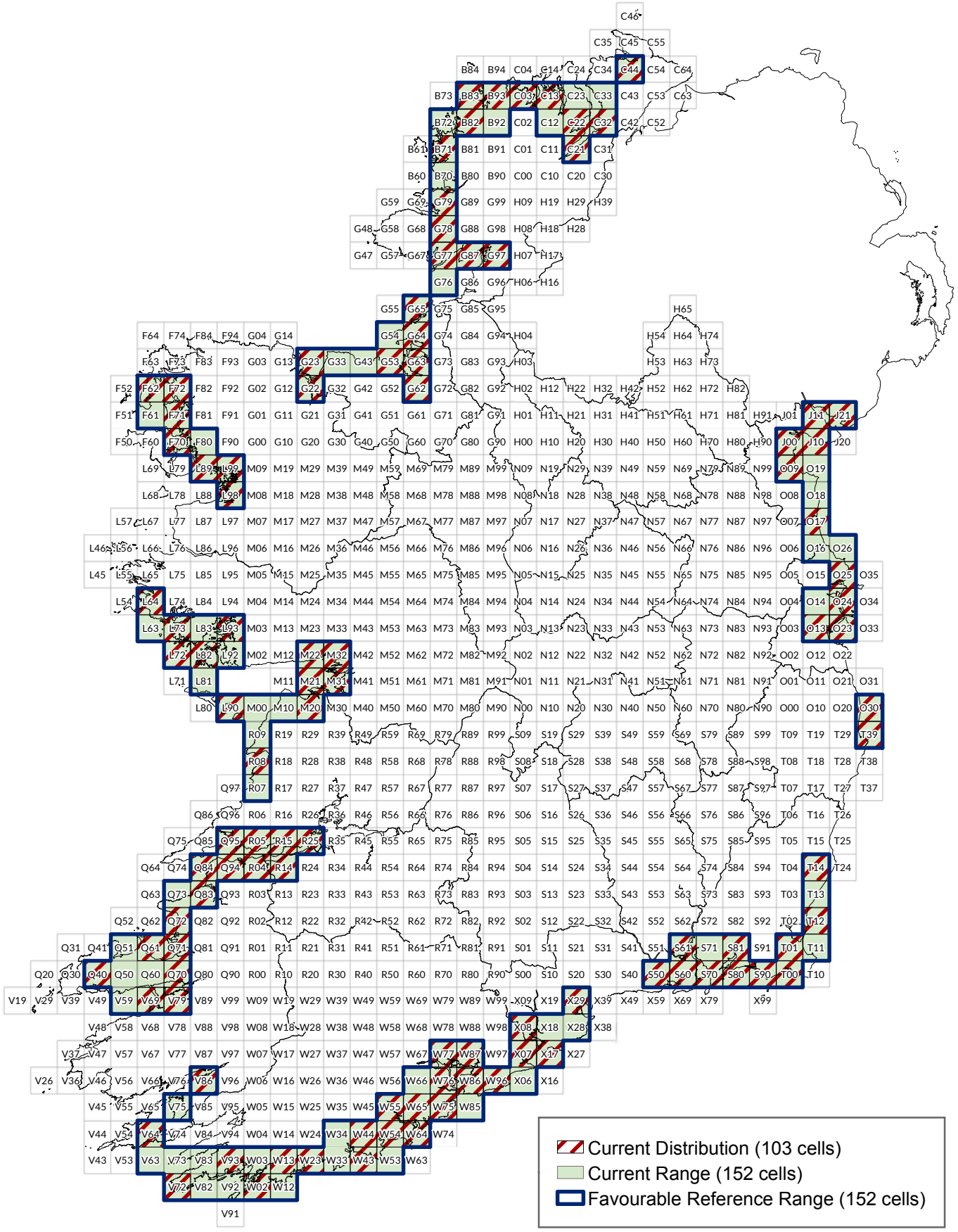
Optional</td><td colspan="3">The Conservation Status of Area and Range are Favourable in this reporting period, as they were in the previous reporting period.
The Conservation Status of Structure and functions and Future prospects are assessed as Favourable during this reporting period, whilst they were assessed as Unfavourable-Inadequate in the previous reporting period. This apparent improvement is due to a change in methodology and the result for the previous reporting period would have been Favourable using the updated thresholds in the guidelines.
The Overall Conservation Status is Favourable and the Overall Trend in Conservation Status is assessed as stable as there is no evidence to suggest that Spartina anglica cover has increased nationally. This stable trend differs from the deteriorating trend of the previous reporting period, which was assigned on the basis of a threat (i.e. the on-going spread of Spartina anglica) that could not adequately be quantified because previous data were not available for comparison. However, there is no evidence to suggest that this species is expanding at the national level. Nevertheless, Spartina anglica and the potential effects of climate change should be monitored closely.</td></tr>
</table>

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***1.15 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable** / increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing a union between the distribution polygon shapefile and the SAC shapefile. The area given in section 11.1 is the total area of 1310 habitat in SACs in the country, including some SACs where 1310 is not listed as a qualifying interest (QI). The area of 1310 within the Natura 2000 network where it is listed as a QI is 1.07km^2. No evidence of anthropogenic loss of 1310 habitat within SACs was reported for the previous reporting period, though losses to natural processes were recorded (NPWS, 2013). In the current reporting period, 100% of the 0.003ha of the 1310 habitat lost due to anthropogenic activities was from within SACs. Of this 0.003ha, 100% was from a single SAC that listed 1310 as a QI. There were two inconsistencies between the Natura 2000 sites where the 1310 habitat is listed as a QI and the current distribution for the habitat. No 1310 habitat was mapped for the Akeragh, Banna and Barrow Harbour SAC (site code 000332) or the Lackan Saltmarsh and Kilcummin Head SAC (site code 000516). Neither of these sites was surveyed as part of the 2017-18 survey. The Conservation Objectives reports note that no 1310 was recorded in the Akeragh, Banna and Barrow Harbour SAC by the SMP (NPWS, 2017), while 0.001ha was recorded in the Lackan Saltmarsh and Kilcummin Head SAC, but it was considered too small an area to map (NPWS, 2016). The habitat may be present in unsurveyed areas of the SACs (NPWS, 2016, 2017). Due to the pioneer nature of this habitat, it is often	

	ephemeral and its presence will vary over a short timeframe as natural processes operate to create and destroy the conditions required for its presence. In the absence of evidence of anthropogenic activities leading to the loss, its absence from a site during any given survey is not of high concern. The short-term trend of the habitat area in good condition within the SAC network is taken to be stable, with the same trend as the 1310 habitat nationally (see section 6.4 and 6.8), as the majority of 1310 habitat surveyed during the last two reporting periods was within the SAC network. The minimum surface area of 1310 habitat within the N2000 network has increased slightly from the previous reporting period. This is likely to be mainly due to a change in survey methodology. In the SMP, only areas of 1310 large enough to map were recorded, while in the 2017-18 survey, the percentage cover of the habitat in any given polygon was recorded, allowing smaller patches to be accounted for and area calculated.

12 Complementary information

Salicornia and other annuals colonizing mud and sand (1310) Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)**
1.2i Habitat short name	**Atlantic salt meadows**
1.3i Habitat description	Atlantic salt meadows generally occupy the widest part of the saltmarsh gradient. They also contain a distinctive topography with an intricate network of creeks and salt pans occurring on the medium to large-sized saltmarshes. Atlantic salt meadows contain several distinctive zones that are related to elevation and submergence frequency. The lowest part along the tidal zone is generally dominated by common saltmarsh-grass (*Puccinellia maritima*) with species like glassworts (*Salicornia* spp.), annual sea-blite (*Suaeda maritima*) and lax-flowered sea-lavender (*Limonium humile*) also important. The invasive common cordgrass (*Spartina anglica*) can be locally abundant in this habitat. The mid-marsh zones are generally characterised by thrift (*Armeria maritima*) and/or sea plantain (*Plantago maritima*). This zone is generally transitional to an upper marsh herbaceous community with red fescue (*Festuca rubra*), saltmarsh rush (*Juncus gerardii*) and creeping bent (*Agrostis stolonifera*). This habitat is also important for other wildlife including wintering waders and wildfowl. Atlantic salt meadows are distributed around most of the coastline of Ireland. The intricate topography of the Irish coastline with many inlets has created an abundance of sites that are sheltered and allow muddy sediments to accumulate, leading to the development of saltmarsh. Atlantic salt meadows can comprise a number of plant communities, including communities from the following groups from the Irish Vegetation Classification: SM2, SM3, SM4, SM6 (Perrin, 2018a).

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***1982-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was compiled using polygons containing 1330 habitat mapped by Brophy *et al.* (in prep.) and the SAMFHIRES project (Perrin, 2018b) in 2017-2018, and McCorry and Ryle (2009)

	and McCorry (2007) (Saltmarsh Monitoring Project (SMP)) in the period 2006-2008. The shapefile also included potential 1330 habitat identified through a desk study by McCorry and Ryle (2009), which included some data from the Coastal Monitoring Project (CMP) (Ryle *et al*., 2009). Point data comprised plots from 1982 onwards from the National Vegetation Database identified as saltmarsh communities attributable to 1330 habitat through the Irish Vegetation Classification Project (IVC) (Perrin, 2016) to allow for the inclusion of the Wymer (1984) dataset. All references and sources are detailed in section 3.2. The aforementioned datasets by McCorry and Ryle (2009), Ryle *et al*. (2009) and McCorry (2007) were also used to compile the distribution map for the last reporting period, along with plot data from Wymer (1984) (which now forms part of the National Vegetation Database) (NPWS, 2013). A certainty rating system was applied to all data that informed the distribution map. This system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1, the lowest. The new data sources added since the last round of reporting (NPWS, 2013), Brophy *et al.* (in prep.) and Perrin (2018b), were judged to be a high certainty of 3. McCorry (2007) and McCorry and Ryle (2009) were both assigned a certainty of 3. These two datasets were based on a detailed field survey and a high certainty of 3 is justified due to the generally stable nature of 1330 and based on the re-survey of a significant proportion of these areas conducted by Brophy *et al.* (in prep.). Saltmarsh habitat identified via a desk study and aerial photograph analysis as part of the SMP was included in the SMP GIS shapefile. Where the areas identified during the desktop study were not visited in the 2017-2018 survey, they were assigned a certainty of 2. This is based on experience visiting desk study polygons, where saltmarsh was often present, but on occasion there was no saltmarsh, or the type of saltmarsh was incorrectly identified. Point data derived from analysis of plots from the National Vegetation Database, and included in the distribution, cover a date range of 1982-2009. Plots from 2001-2009 (which included the SMP plots) were assigned a certainty of 3, while earlier data (1982-2000) were assigned a certainty of 2. All data with certainty 2 or 3 were used to map the distribution for the 1330 habitat. Following a comparison with the distribution from the previous reporting round (NPWS, 2013), a total of three cells were added and nine deleted. This resulted in the distribution dropping from 208 cells to 202. This is not thought to represent a genuine change in the distribution between reporting periods, but rather reflects better and more recent data.

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned	
3 Biogeographical and marine regions	
3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Brophy, J.T. *et al.* (in prep.) Saltmarsh Monitoring Project 2017-2018: Final Report. Irish Wildlife Manuals, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin. Curtis, T.G.F. and Sheehy Skeffington, M. (1998) The saltmarshes of Ireland: an inventory and account of their geographical variation. *Biology and Environment, Proceedings of the Royal Irish Academy* 98B: 87-104. Desmond, M., O'Brien, P. and McGovern, F. (2017) A Summary of the State of Knowledge on Climate Change Impacts for Ireland: Report 11 (2010-2016). Prepared for the Environmental Protection Agency by MaREI Centre, Environmental Research Institute, University College Cork. EPA, Wexford. Devaney, F.M. and Perrin, P.M. (2015) Saltmarsh Angiosperm Assessment Tool for Ireland (SMAATIE). End of Project Report. Prepared for the Environmental Protection Agency by BEC Consultants Ltd. 2013-W-DS-10. Horton, B.P., Shennan, I., Bradley, S.L., Cahill, N., Kirwan, M., Kopp, R.E. and Shaw, T.A. (2018) Predicting marsh vulnerability to sea-level rise using Holocene relative sea-level data. *Nature Communications* 9: 2687-2690. Image, M. and Forster Brown, C. (2018) Baseline Analysis of Actions under GLAS: Full Report. Report for the Department of Agriculture, Food and the Marine. JNCC (2004) Common Standards Monitoring Guidance for saltmarsh habitat. Joint Nature Conservation Committee, Peterborough. McCorry, M. (2007) Saltmarsh Monitoring Project 2006 – Summary Report. Unpublished report for the National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. McCorry, M.J. and Ryle, T. (2009) Saltmarsh Monitoring Project 2007-2008: Final report. Unpublished report for the National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. National Vegetation Database. National Biodiversity Data Centre. Available at http://www.biodiversityireland.ie/projects/national-vegetation-database/ NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.1. Unpublished Report, National Parks and Wildlife Service, Department of Arts, Heritage, and the Gaeltacht, Dublin. Perrin, P.M. (2016) Irish Vegetation Classification Technical Progress Report No. 2. Unpublished report by BEC Consultants for the National Biodiversity Data Centre. http://www.biodiversityireland.ie/wordpress/wp-

	content/uploads/IVC_Technical-Progress-Report-No.2.pdf. 34pp. Perrin, P.M. (2018a) Irish Vegetation Classification. Accessed at http://www.biodiversityireland.ie/projects/national-vegetation-database/irish-vegetation-classification/ on 28/09/2018. Perrin, P.M. (2018b) SAMFHIRES (Saltmarsh Function and Human Impacts in Relation to Ecological Status) unpublished field survey data. EPA-Funded collaboration between BEC Consultants Ltd and Trinity College Dublin. Ryle, T., Connelly, K., Murray, A. and Swann, M. (2009) Coastal Monitoring Project. A report to the National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Wymer, E.D. (1984) The phytosociology of Irish saltmarsh vegetation. M.Sc. Thesis, National University of Ireland, Dublin.
3.2i Additional information	

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***25,900 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	

<table>
<tr><td>4.9 Long-term trend
Method used

Optional</td><td colspan="2">Select one of the following methods:

<u>a) Complete survey or a statistically robust estimate</u>
b) Based mainly on extrapolation from a limited amount of data
c) Based mainly on expert opinion with very limited data
d) Insufficient or no data available</td></tr>
<tr><td rowspan="4">4.10 Favourable reference range</td><td colspan="2">a) 25,900 km^2</td></tr>
<tr><td colspan="2">b) Indicate if operators were used (using symbols ≈, >, >>) or</td></tr>
<tr><td colspan="2">c) If favourable reference range is unknown, indicate by using ‘x’</td></tr>
<tr><td colspan="2">d) Indicate method used to set reference value if other than operators
The Favourable reference range has been decreased since the last reporting period (NPWS, 2013) due to the use of a different method. The distribution on which the Favourable reference range was based has changed. There is no evidence of loss of range since the Directive came into force and the geographic spread is considered sufficient for the long term survival of the habitat.</td></tr>
<tr><td rowspan="6">4.11 Change and reason for change in surface area of range</td><td colspan="2">Is there a change between reporting periods? <u>YES</u>/NO

If yes, provide the nature of that change. More than one option (a to d) can be chosen</td></tr>
<tr><td>a) yes, due to genuine change</td><td>YES/<u>NO</u></td></tr>
<tr><td>b) yes, due to improved knowledge/more accurate data</td><td>YES/<u>NO</u></td></tr>
<tr><td><u>c) yes, due to the use of different method</u></td><td><u>YES</u>/NO</td></tr>
<tr><td>d) yes, but there is no information on the nature of change</td><td>YES/<u>NO</u></td></tr>
<tr><td colspan="2">The change is mainly due to (select one of the reasons above):

genuine change / improved knowledge or more accurate data / <u>the use of a different method</u></td></tr>
<tr><td>4.12 Additional information

Optional</td><td colspan="2">Range was calculated using the range tool, based on the current known distribution of the 1330 habitat. A maximum gap distance of two 10km grid cells was used when running the range tool. Thirty-nine 10km grid cells generated by the range tool that had no coastline or suitable estuarine habitat were removed.
Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013). None of the area losses recorded during these two reporting periods led to a contraction in the range. The short-term trend is assessed as stable.
The number of 10km squares in the range (259) is 10 squares lower than the last monitoring period (NPWS, 2013). This change is due to the use of a slightly different methodology for the derivation of the distribution of 1330 on which the range was based.
The Favourable Reference Range (FRR) has decreased since the last reporting period (NPWS, 2013) due to the use of a different method. The FRR is the current range, reported in 4.1.</td></tr>
</table>

5 Area covered by habitat		
Area covered by the habitat type within the range in the biogeographical/marine region concerned		
5.1 Year or period	***2006-2018***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***27.19 km^2***
5.3 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data*	

	d) Insufficient or no data available	
5.13 Favourable reference area	*a) In km^2 or*	
	b) Operator > (greater than) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	***YES****/NO*
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data /* ***the use of a different method***	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 2006 (McCorry, 2007) when the pilot baseline survey was carried out, and incorporates updates made by surveys carried out between 2006 and 2018, the details of which are listed in section 3.2, namely McCorry and Ryle (2009), Brophy *et al*. (in prep.) and Perrin (2018b). There are still areas of unmapped 1330 habitat in the country, mostly in the form of narrow fringes along the shoreline in places. Some such areas were recorded during the 2017-18 survey; however, all significant saltmarsh areas have been covered by McCorry (2007), McCorry and Ryle (2009) and Brophy *et al.* (in prep.), either via field survey or desk study. Favourable Reference Area (FRA) was not determined exactly, but is estimated to be <10% more than the current area. FRA is deemed to be greater than the current area, given that some anthropogenic losses have occurred since the Directive came into force and there have also been losses due to natural processes. In NPWS (2013), the FRA was set as the area calculated for that reporting period (25.9km^2). While some loss was acknowledged, it was considered to be negligible over the period in question. During the current reporting period 89 sites containing 1330 were visited and assessed for Area, 84 by Brophy *et al.* (in prep.) and five by Perrin (2018b). The 89 sites assessed for Area represent 13.99km^2 (51%) of the total area of 1330 habitat recorded in Ireland. This represents a significant proportion of the total area of 1330, covering all coasts, and therefore it is considered that the conclusions drawn for the surveyed areas can be applied to the country as a whole. Short-term trend in Area was deemed to be decreasing due to a loss of 5.15ha to anthropogenic activities since the previous reporting period, which represents 0.4% of the area surveyed in the period	

	2017-2018. The recorded losses occurred across 29 of the sites surveyed. The losses mostly related to: infilling/reclamation for a range of uses including agriculture, roads, and buildings; extraction of saltmarsh material for use in embankment repairs; and erosion instigated by over-grazing or the operation of vehicles. The long-term trend in Area was deemed to be decreasing based on the fact that a 0.4-0.5% loss of 1330 habitat due to anthropogenic activities was reported in NPWS (2013), with no change in direction of the trend for the current reporting period. The difference in habitat extent between the area of 27.19km^2 reported for this reporting period and the figure of 25.9km^2 reported during the previous reporting period is largely due to the change in methodology. Where entire polygons were previously often assigned to the dominant habitat, with mosaics recorded in some cases, the current survey (Brophy *et al.*, in prep.) assigned percentages to the various habitats within any given polygon, allowing greater resolution of habitat area. The apparent increase in 1330 does not represent genuine increase, and masks some genuine loss of 1330 to anthropogenic activities and natural processes, such as erosion and succession.

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***20.85 km²***
		Maximum	***20.85 km²***
	b) Area in not-good condition	**Minimum**	***6.34 km²***
		Maximum	***6.34 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data*		

	d) Insufficient or no data available
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? **YES**/NO* Updated list is provided as an additional spreadsheet. See section 6.7 for outline of changes. More details are provided in section 6.8.
6.7 Typical species Method used *Optional*	The list of typical species is similar to that in the last reporting period (NPWS, 2013), with some changes made following on from work on the IVC (Perrin, 2018a), SMAATIE (Devaney and Perrin, 2015) and the 2017-18 monitoring survey (Brophy *et al*., in prep.). Where sites surveyed in 2017-18 were previously surveyed by McCorry (2007) and McCorry and Ryle (2009), where possible, plots were repeated in the same locations. New plot locations were chosen where it was not possible to repeat an existing plot and at sites not previously surveyed. Plots measured 2m x 2m and all species within the plots were recorded. The species listed in section 6.8 were assessed as part of the site assessment criteria. For further details, see Brophy *et al*. (in prep.).
6.8 Additional information *Optional*	The typical species used in assessing the 1330 habitat are: *Agrostis stolonifera, Armeria maritima, Aster tripolium, Atriplex littoralis, Atriplex portulacoides, Atriplex prostrata, Beta vulgaris, Carex extensa, Cochlearia* spp*. (Cochlearia anglica* and *Cochlearia officinalis), Elytrigia atherica, Elytrigia repens, Festuca rubra, Glaux maritima, Juncus gerardii, Limonium humile, Plantago maritima, Puccinellia maritima, Salicornia* agg*., Spergularia marina, Spergularia media, Suaeda maritima, Triglochin maritimum, Tripleurospermum maritimum.* During the current reporting period, 91 sites containing 1330 were visited and 89 of these were assessed for Structure and functions: 84 by Brophy *et al*. (in prep.) and five from data collected by the SAMFHIRES project (Perrin, 2018b). The 89 sites assessed for Structure and functions represent 13.99km^2 (52%) of the total area of 1330 habitat recorded in Ireland. This represents a significant proportion of the total area of 1330, covering all coasts, and therefore it is considered that the conclusions drawn for the surveyed areas can be applied to the country as a whole. Of the 89 sites assessed for Structure and functions in this reporting period, 76.7% (10.73km^2) of the area was assessed as Favourable and 23.3% (3.26km^2) was assessed as Unfavourable. Given that the assessed area represents a significant proportion of the 1330 recorded in Ireland, these percentages can be applied to the total area of the habitat to give 20.85km^2 in Favourable condition, and 6.34km^2 in Unfavourable condition. This result falls within the range found by NPWS (2013) presented below. The approach used to estimate the percentage of the 1330 habitat in Unfavourable condition at each site was as follows: If none of the assessment criteria failed at the site level then none of the 1330 area was classified as Unfavourable and the whole area of 1330 at the site was assigned as being in good condition; if 1 to 2 criteria failed at the site level this resulted in 25% of the 1330 area being classified as having Unfavourable Structure and functions; if 3

	assessment criteria failed this resulted in 75% of the 1330 area at the site being classified with Unfavourable Structure and functions; if 4 or more criteria failed at the site level this resulted in 100% of the 1330 area at the site being classified as Unfavourable. The two most frequent criteria to fail were "Typical species (habitat level)" and "Disturbed ground (stop level)". During the last reporting period, 74-96% of the 1330 habitat was assessed as Favourable (NPWS, 2013). Due to the fact that the percentage of 1330 habitat assessed as Favourable in the current reporting period (76.7%) falls within the previous range, and is based on a field survey of a significant proportion of the national resource, the value of 76.7% was used when calculating the current area of 1330 habitat in good condition. Due to the fact that the percentage of 1330 habitat assessed as Favourable in the current reporting period (76.7%) falls within the previously reported range, the short-term trend of habitat area in good condition is taken to be stable.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A09** Intensive grazing or overgrazing by livestock (H) **F07** Sports, tourism and leisure activities (H) **A33** Modification of hydrological flow or physical alternation of water bodies for agriculture (excluding development and operation of dams) (M) **A36** Agriculture activities not referred to above (M) **F08** Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defence or coast protection works and infrastructures) (M) **I02** Other invasive alien species (other than species of Union	**A09** Intensive grazing or overgrazing by livestock (H) **F07** Sports, tourism and leisure activities (H) **A33** Modification of hydrological flow or physical alternation of water bodies for agriculture (excluding development and operation of dams) (M) **A36** Agriculture activities not referred to above (M) **F08** Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defence or coast protection works and infrastructures) (M) **I02** Other invasive alien species (other than species of Union

	concern) (M)	concern) (M)
7.2 Sources of information *Optional*	Pressures and threats were selected and ranked from the following data: Brophy, J.T. *et al*. (in prep.) Saltmarsh Monitoring Project 2017-2018: Final Report. Irish Wildlife Manuals, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin. McCorry, M.J. and Ryle, T. (2009) Saltmarsh Monitoring Project 2007-2008: Final report. Unpublished report for the National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Muyllaert, M., Fitzgibbon, B., Duggan, O. and Collins, K. (2014) River Suir Heritage Audit 2014. Draft Final Report: Vol. 2. Unpublished report for Waterford City and County Councils. National Parks and Wildlife Service (2013). The Status of Protected EU Habitats and Species in Ireland. Overview Volume 1. Unpublished Report. National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin. O'Neill, F.H., Brophy, J.T., Devaney, F.M., Nash, R. and Barron, S.J. (2014) Assessment of the Conservation Status of the Great Island Channel SAC (001058). Unpublished report for Cork County Council.	
7.3 Additional information *Optional*	Pressures and threats in section 7.1 were selected and ranked based on intensity (high, medium or low), frequency of occurrence, and area of impact, using the data gathered during the 2017-18 SMP and presented in Brophy *et al*. (in prep.), as well as reviewing other sources of information. All pressures presented in NPWS (2013) were considered for the current reporting period. Of the five high or medium-ranked pressures in NPWS (2013), all were retained as high or medium ranking for the current monitoring period, with the exception of Erosion (K01.01), which crosswalks to L01 in the 2017 impact recording scheme. This was not included in the current ranking, as it was deemed a natural process. While previously, intensive cattle and sheep grazing were ranked separately as being of high and medium importance respectively, the new scheme combines all livestock grazing under A09 and so this was ranked as high importance. Intensive livestock grazing (A09) is the most frequently recorded pressure, being noted at 78% of sites, and was classed as high intensity on 40 occasions. The impact Paths, tracks, cycling tracks (D01.01) was considered to include paths created by recreational activities, such as walking and use of off-road bikes, and so falls under F07, and continues to be high intensity. Invasive non-native species (previously I01, cross-walked to I02 in the current scheme) continues to be ranked as medium importance and relates to *Spartina anglica*. D01.01 recorded in NPWS (2013) may also comprise tracks created by the operation of agricultural vehicles, which were included in the current assessment as A36 and was ranked as medium importance. A33 (recorded eight times in the current survey) and F08 (recorded 12 times in the current survey) relate to infilling, reclamation, embankments, *etc*., for agriculture or	

	other reasons. Climate change has not been added as an impact of medium or high importance, but it is likely to affect the range of 1330 over the coming decades. The long-term trend will see an increase in mean sea level and extreme weather events (Desmond *et al*., 2017), which will impact the formation, stabilisation and vegetation communities of the 1330 habitat. One clear case of saltmarsh habitat loss due to storm action was recorded in the 2017-18 survey. At Rinevella Bay, Co. Clare (SMP site 0087), large amounts of shingle had been thrown onto the saltmarsh, leading to a loss of 1330 and 1410 habitat directly. An apparently related change to the hydrology of the site has resulted in further loss of 1330 through the expansion of swamp habitat. The six pressures presented in section 7.1 are also considered to be the six main threats into the future.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* ***c) Increase the surface area of the habitat type (related to 'Area covered by habitat')** or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* ***a) Short-term results (within the current reporting period, 2013-2018)** or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*

8.5 List of main conservation measures	**CA15** Manage drainage and irrigation operations and infrastructures in agriculture **CF02** Habitat restoration of areas impacted by residential, commercial, industrial and recreational infrastructures, operations and activities
8.6 Additional information *Optional*	No existing conservation measures were identified at the sites surveyed in the course of the current project (Brophy *et al.*, in prep.). Two managed realignment projects were identified in the course of the SAMFHIRES project (P. Perrin, pers. comm.): one at Turvey, Rogerstown Estuary, Co. Dublin and the other at Kilmacleague, Tramore, Co. Waterford. At Turvey, Rogerstown Estuary, Co. Dublin, a 1.4km long, 1.5m high levee was removed by Fingal County Council in 2015 to allow complete access to tidal waters across an area of 24ha (CA15). This area is part of a council nature reserve and already supported some saltmarsh vegetation due to a gap in the levee, but the removal of the levee will improve the hydrological connectivity and encourage the creation of additional saltmarsh habitat. This area is within the Rogerstown Estuary SAC (site code 000208). Saltmarsh habitat at Kilmacleague, Tramore, Co. Waterford had been lost during the construction of a landfill site. Following a European Court of Justice case (C 494/01), Ireland was required to provide compensatory habitat (CF02). A project to create 5ha of mudflat and 2.5ha of saltmarsh was initiated and involved the breaching of an existing embankment to allow previously enclosed agricultural land to flood through part of the tidal cycle. The project has seen the development of 1310 and 1330 habitat since the embankment was breached in 2013. This site is outside, but adjacent to, the Tramore Dunes and Backstrand SAC (site code 000671). Saltmarsh habitats are not the target of any of the actions listed for the GLAS agri-environment scheme (Image and Forster Brown, 2018). Conservation measures that are not currently being implemented, but whose implementation would improve the Structure and functions of the habitat, include CA01 *Prevent conversion of natural and semi-natural habitats, and habitats of species into agricultural land*, CA05 *Adapt mowing, grazing and other equivalent agricultural activities*, CA15 *Manage drainage and irrigation operations and infrastructures in agriculture*, CA16 *Other measures related to agricultural practices* and CF10 *Manage changes in hydrological and coastal systems and regimes for construction and development*. CI03 *Management, control or eradication of other invasive alien species* could be considered for *Spartina anglica*, but given the complexity of the issue this would need to be subject to a comprehensive assessment. From a long-term standpoint, CN02 *Implement climate change adaptation measures* is likely to be required to address the issue of climate change. Sea level rise will impact negatively on 1330 area (Horton *et al*., 2018) and measures such as managed retreat may be required to maintain 1330 area and Structure and functions.

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	*Good /* ***Poor*** */ Bad / Unknown*
	c) Structure and functions	*Good /* ***Poor*** */ Bad / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as Stable. Current range is equal to the Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as Stable, as no change in range is expected based on the threats that are currently in place. Future prospects of Range are therefore Good. Short-term trend direction of Area is assessed as Decreasing, as NPWS (2013) reported a loss in area of 0.4-0.5% due to anthropogenic impacts during the last reporting period, while for the current reporting period a loss of 0.4% of the total surveyed area was recorded. Current area is <10% less than the Favourable Reference Area. Conservation status of Area is therefore Unfavourable-Inadequate. Future trend of Area is assessed as Negative as no conservation measures have been identified to counteract the listed pressures and return the habitat to the FRA. Future prospects of Area are therefore Poor. Short-term trend direction of Structure and functions is Stable for habitat that is in Good condition Current Structure and functions is assessed as 77% of the habitat in Good condition, which is above the 75% threshold for Unfavourable-Bad. Conservation status of Structure and functions is therefore Unfavourable-Inadequate. Future trend of Structure and functions is assessed as Stable, as the percentage of 1330 habitat in Good condition has remained within the range stated for the previous reporting period. Future prospects of Structure and functions are therefore Poor.	

10 Conclusions	
Assessment of conservation status at end of reporting period	
10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.2 Area	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*
10.4 Future prospects	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*
10.5 Overall assessment of Conservation Status	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*

<table>
<tr><td>10.6 Overall trend in Conservation Status</td><td colspan="3">Indicate the trend (qualifier) for FV, U1 and U2:

improving / <u>deteriorating</u> / stable / unknown</td></tr>
<tr><td rowspan="8">10.7 Change and reasons for change in conservation status and conservation status trend</td><td colspan="3">Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.</td></tr>
<tr><td></td><td>Overall assessment of conservation status (10.5)</td><td>Overall trend in conservation status (10.6)</td></tr>
<tr><td>a) no, there is no difference</td><td>YES/<u>NO</u></td><td><u>YES</u>/NO</td></tr>
<tr><td>b) yes, due to genuine change</td><td>YES/NO</td><td><u>YES</u>/NO</td></tr>
<tr><td>c) yes, due to improved knowledge/more accurate</td><td>YES/NO</td><td><u>YES</u>/NO</td></tr>
<tr><td>d) yes, due to the use of different methods (including use of different thresholds)</td><td>YES/NO</td><td><u>YES</u>/NO</td></tr>
<tr><td>e) yes, but there is no information on nature of change</td><td>YES/NO</td><td>YES/<u>NO</u></td></tr>
<tr><td>The change is mainly due to (select one of the reasons above):</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td><td>genuine change / improved knowledge or more accurate data / <u>the use of a different method</u></td></tr>
<tr><td>10.8 Additional information

Optional</td><td colspan="3">The Conservation Status of Range is Favourable in this reporting period, as it was in the previous reporting period.
The Conservation Status of Area is Unfavourable-Inadequate, which has changed from Favourable in the previous reporting period. This is mainly due to “genuine change” in light of the fact that there has been anthropogenic loss of area in the current reporting period, at a rate consistent with the previous reporting period. While previously such loss was considered negligible, expert opinion has been applied and the threshold of what is considered significant loss has changed.
The Conservation Status of Structure and functions and Future prospects are assessed as Unfavourable-Inadequate during this reporting period, as they were in the previous reporting period.
The Overall Conservation Status was assessed as Unfavourable-Inadequate, as it was during the last reporting period. The assessment of Unfavourable-Inadequate during the current reporting period was due to the current area being below the Favourable Reference Area and the area of the habitat decreasing, as well as Structure and functions and Future prospects remaining Unfavourable-Inadequate.</td></tr>
</table>

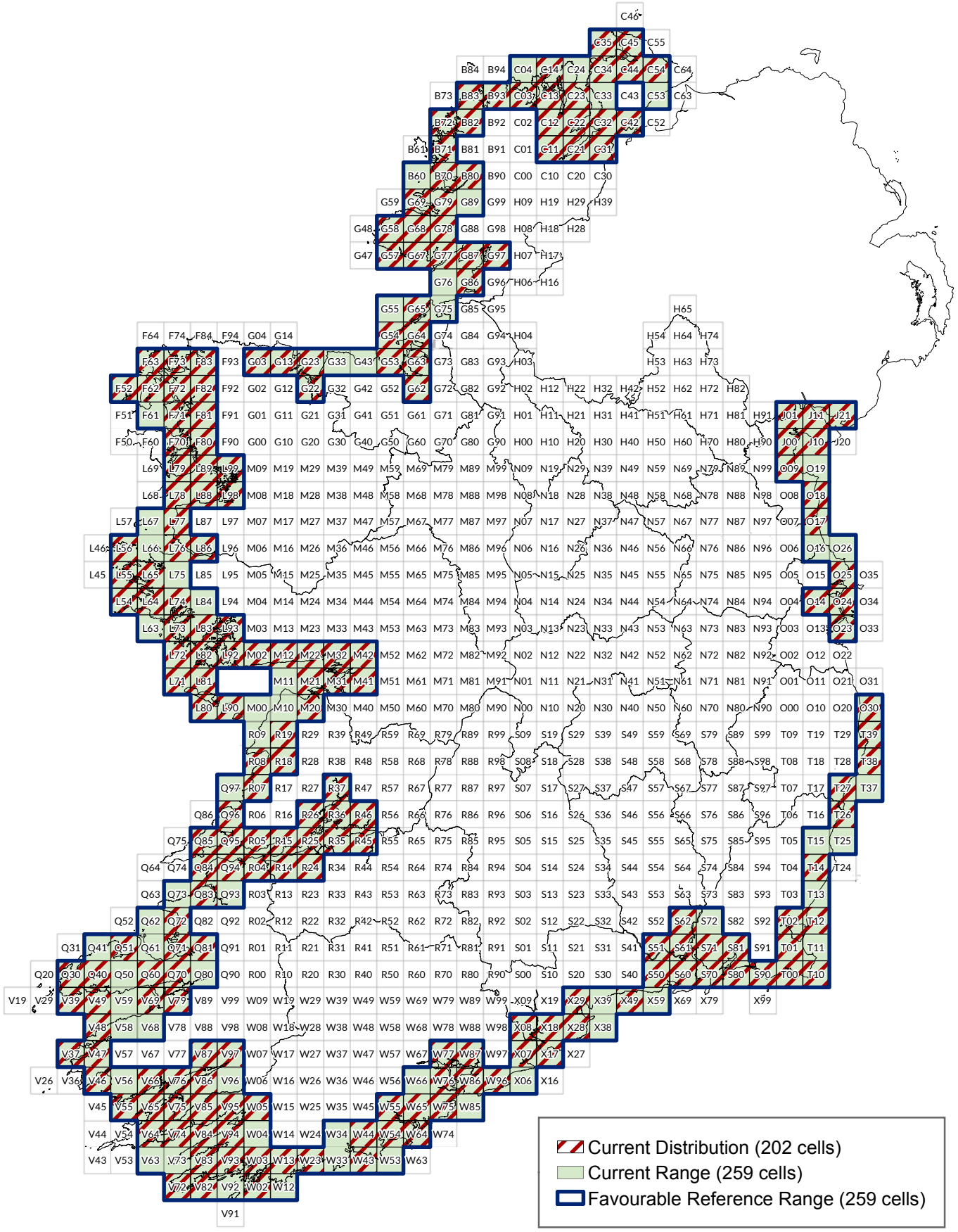
	Overall Trend in Conservation Status was assessed as deteriorating due to the fact that 5.15ha of 1330 habitat had been lost due to anthropogenic causes in the current reporting period (0.4% of surveyed area), in addition to losses of 0.4-0.5% reported in NPWS (2013). In NPWS (2013), the Overall Trend in Conservation Status was assessed as stable, as this loss in area was not deemed significant for the future trend in Area. Based on current expert opinion, and in light of the fact that loss in area has continued into this reporting period, the level of anthropogenic loss is now considered significant and therefore the Overall Trend in Conservation Status is assessed as deteriorating.

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***23.52 km²***
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval /* minimum	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable*** */ increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing a union between the distribution polygon shapefile and the SAC shapefile. The area given in section 11.1 is the total area of 1330 habitat in SACs in the country, including some SACs where 1330 is not listed as a qualifying interest (QI). The area of 1330 within the Natura 2000 network where it is listed as a QI is 20.46km^2. No evidence of anthropogenic loss of 1330 habitat within SACs was reported for the previous reporting period (NPWS, 2013). In the current reporting period, 53% of the 5.15ha of the 1330 habitat lost due to anthropogenic activities was from within SACs. Of this 2.74ha, 97% was from 12 SACs that listed 1330 as a QI, while the remaining	

	3% was from two SACS that did not list the habitat as a QI. There were no inconsistencies between the current distribution for the habitat and the Natura 2000 sites where 1330 is listed as a QI. The short-term trend of the habitat area in good condition within the SAC network is taken to be stable, with the same trend as the 1330 habitat nationally (see section 6.4 and 6.8), as the majority of 1330 habitat surveyed during the last two reporting periods was within the SAC network. The surface area of 1330 habitat within the N2000 network has increased from the previous reporting period; this is in part due to improved knowledge, but largely due to a change in methodology. In this reporting period, a union between the current 1330 distribution, including desk study polygons, and the SAC shapefile was undertaken, whereas in the last reporting period, an intersect between the known and confirmed 1330 polygons from the SMP (McCorry, 2007; McCorry and Ryle, 2009) and the SAC shapefile was carried out (NPWS, 2013).

12 Complementary information

Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**1410 Mediterranean salt meadows (*Juncetalia maritimi*)**
1.2i Habitat short name	**Mediterranean salt meadows**
1.3i Habitat description	Mediterranean salt meadows occupy the upper zone of saltmarshes and usually occur adjacent to the boundary with terrestrial habitats. They are widespread on the Irish coastline; however, they are not as extensive as Atlantic salt meadows (1330). The habitat is distinguished from Atlantic salt meadows by the presence of rushes such as sea rush (*Juncus maritimus*) and/or sharp rush (*Juncus acutus*), along with a range of species typically found in Atlantic salt meadows, including sea aster (*Aster tripolium*), sea purslane (*Atriplex portulacoides*), sea-milkwort (*Glaux maritima*), saltmarsh rush (*Juncus gerardii*), parsley water-dropwort (*Oenanthe lachenalii*), sea plantain (*Plantago maritima*) and common saltmarsh grass (*Puccinellia maritima*). Mediterranean salt meadows can comprise plant communities SM5A *Juncus maritimus-Festuca rubra* saltmarsh and SM5B *Juncus maritimus-Plantago maritima* saltmarsh in the Irish Vegetation Classification (IVC) (Perrin 2018a).

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***1982-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) **Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was compiled using polygons containing 1410 habitat mapped by Brophy *et al.* (in prep.) and the SAMFHIRES project (Perrin, 2018a) in 2017-2018, and the Saltmarsh Monitoring Project (SMP) 2006-2008 (McCorry, 2007; McCorry and Ryle, 2009). The polygon shapefile on which the current distribution map is based also included potential 1410 habitat identified through a desk study by McCorry and Ryle (2009), which included some data from the Coastal Monitoring Project (CMP) (Ryle *et al*. 2009). To allow for the inclusion of the Wymer (1984) dataset the point data comprised plots from 1982 onwards from the National Vegetation Database that were identified as saltmarsh communities attributable to 1410

	habitat through the Irish Vegetation Classification Project (IVC) (Perrin, 2016). Following the methodology of NPWS (2013) additional cells were added where 10km^2 records of *Juncus maritimus* and *Juncus acutus* from Preston *et al*. (2002) overlapped with the presence of saltmarsh within a 10km^2 square. All references and sources are detailed in section 3.2. The aforementioned datasets by McCorry and Ryle (2009), Ryle *et al*. (2009) and McCorry (2007) were also used to compile the distribution map for the last reporting period, along with plot data from Wymer (1984) (which now forms part of the National Vegetation Database) and records of *Juncus maritimus* or *Juncus acutus* from Preston *et al*. (2002) (NPWS, 2013). A certainty rating system was applied to all data that informed the distribution map. This system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1, the lowest. The new data sources added since the last round of reporting (NPWS, 2013), Brophy *et al.* (in prep.) and Perrin (2018b), were judged to be a high certainty of 3. McCorry (2007) and McCorry and Ryle (2009) were both assigned a certainty of 3. These two datasets were based on a detailed field survey and a high certainty of 3 is justified due to the generally stable nature of 1410 and based on the re-survey of a significant proportion of these areas conducted by Brophy *et al.* (in prep.). Saltmarsh habitat identified via a desk study and aerial photograph analysis as part of the SMP was included in the SMP GIS shapefile. Where the areas identified during the desktop study were not visited in the 2017-2018 survey, they were assigned a certainty of 2. This is based on experience visiting desk study polygons, where saltmarsh was often present, but on occasion there was no saltmarsh, or the type of saltmarsh was incorrectly identified. Point data derived from analysis of plots from the National Vegetation Database, and included in the distribution, cover a date range of 1982-2009. Plots from 2001-2009 (which included the SMP plots) were assigned a certainty of 3, while earlier data (1982-2000) were assigned a certainty of 2. All data with certainty 2 or 3 were used to map the distribution for the 1410 habitat. Following a comparison with the distribution from the previous reporting round (NPWS 2013), a total of 17 cells were added and 9 deleted. This resulted in the distribution increasing from 176 cells to 184. This is not thought to represent a genuine change in the distribution between reporting periods, but rather reflects better and more recent data.

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned	
3 Biogeographical and marine regions	
3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Brophy, J.T. *et al*. (in prep.) Saltmarsh Monitoring Project 2017-2018: Final Report. Irish Wildlife Manuals, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin. Curtis, T.G.F. and Sheehy Skeffington, M. (1998) The saltmarshes of Ireland: an inventory and account of their geographical variation. *Biology and Environment, Proceedings of the Royal Irish Academy* 98B: 87-104. Desmond, M., O'Brien, P. and McGovern, F. (2017) A Summary of the State of Knowledge on Climate Change Impacts for Ireland: Report 11 (2010-2016). Prepared for the Environmental Protection Agency by MaREI Centre, Environmental Research Institute, University College Cork. EPA, Wexford. Devaney, F.M. and Perrin, P.M. (2015) Saltmarsh Angiosperm Assessment Tool for Ireland (SMAATIE). End of Project Report. Prepared for the Environmental Protection Agency by BEC Consultants Ltd. 2013-W-DS-10. Horton, B.P., Shennan, I., Bradley, S.L., Cahill, N., Kirwan, M., Kopp, R.E. and Shaw, T.A. (2018) Predicting marsh vulnerability to sea-level rise using Holocene relative sea-level data. *Nature Communications* 9: 2687-2690. Image, M. and Forster Brown, C. (2018) Baseline Analysis of Actions under GLAS: Full Report. Report for the Department of Agriculture, Food and the Marine. JNCC (2004) Common Standards Monitoring Guidance for saltmarsh habitat. Joint Nature Conservation Committee, Peterborough. McCorry, M. (2007) Saltmarsh Monitoring Project 2006 – Summary Report. Unpublished report for the National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. McCorry, M.J. and Ryle, T. (2009) Saltmarsh Monitoring Project 2007-2008: Final report. Unpublished report for the National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. National Vegetation Database. National Biodiversity Data Centre. Available at http://www.biodiversityireland.ie/projects/national-vegetation-database/ NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.1. Unpublished Report, National Parks and Wildlife Service, Department of Arts, Heritage, and the Gaeltacht, Dublin. NPWS (2017) Conservation Objectives: Lower River Suir SAC 002137. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. Perrin, P. (2016) Irish Vegetation Classification Technical Progress

	Report No. 2. Unpublished report by BEC Consultants for the National Biodiversity Data Centre. http://www.biodiversityireland.ie/wordpress/wp-content/uploads/IVC_Technical-Progress-Report-No.2.pdf. 34pp. Perrin, P.M. (2018a) Irish Vegetation Classification. Accessed at http://www.biodiversityireland.ie/projects/national-vegetation-database/irish-vegetation-classification/ on 28/09/2018. Perrin, P.M. (2018b) SAMFHIRES (Saltmarsh Function and Human Impacts in Relation to Ecological Status) unpublished field survey data. EPA-Funded collaboration between BEC Consultants Ltd and Trinity College Dublin. Preston, C.D., Pearman, D.A. and Dines, T.D. (2002) *New Atlas of the British and Irish Flora*. Oxford University Press. Ryle, T., Connelly, K., Murray, A. and Swann, M. (2009) Coastal Monitoring Project. A report to the National Parks and Wildlife Service, Department of Environment, Heritage and Local Government. Wymer, E.D. (1984) The phytosociology of Irish saltmarsh vegetation. M.Sc. Thesis, National University of Ireland, Dublin.
3.2i Additional information	

4 Range

Range within the biogeographical/marine region concerned

4.1 Surface area	***23,800 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	

4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
4.10 Favourable reference range	***a) 23,800 km²***
	b) Indicate if operators were used (using symbols ≈, >, >>) or
	c) If favourable reference range is unknown, indicate by using 'x'
	d) Indicate method used to set reference value if other than operators The Favourable reference range has been increased since the last reporting period (NPWS, 2013) due to the use of a different method. The distribution on which the Favourable Reference Range was based has changed. There is no evidence of loss of range since the Directive came into force and the geographic spread is considered sufficient for the long term survival of the habitat.
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*
	a) yes, due to genuine change — *YES/**NO***
	b) yes, due to improved knowledge/more accurate data — *YES/**NO***
	c) yes, due to the use of different method — ***YES****/NO*
	d) yes, but there is no information on the nature of change — *YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data /* ***the use of a different method***
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 1410 habitat. A maximum gap distance of two 10km grid cells was used when running the range tool. Thirty-three 10km grid cells generated by the range tool that had no coastline or suitable estuarine habitat were removed. Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013). None of the area losses recorded during these two reporting periods led to a contraction in the range. The short-term trend is assessed as stable. The number of 10km squares in the range (238) is 17 squares higher than the last monitoring period (NPWS, 2013). This change is likely due to the use of a slightly different methodology for the derivation of the distribution of 1410 on which the range was based and a change to the field survey method. The Favourable Reference Range (FRR) has increased since the last reporting period (NPWS, 2013) due to the use of a different method.

	The FRR is the current range, reported in 4.1.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2006-2018***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***9.64km^2***
5.3 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km^2 or*	
	b) Operator > (greater than) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	***YES****/NO*
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* improved knowledge or more accurate data */* ***the use of a different method***	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 2006 (McCorry, 2007) when the pilot baseline survey was carried out, and incorporates updates made by surveys carried out between 2006 and 2018, the details of which are listed in section 3.2, namely McCorry and Ryle (2009), Brophy *et al*. (in prep.) and Perrin (2018b). There are still areas of unmapped 1410 habitat in the country, mostly in the form of narrow fringes along the shoreline in places. Some such areas were recorded during the 2017-18 survey; however, all significant saltmarsh areas have been covered by McCorry (2007), McCorry and Ryle (2009) and Brophy *et al.* (in prep.), either via field survey or desk study. Favourable Reference Area (FRA) was not determined exactly, but is estimated to be <10% more than the current area. FRA is deemed to be greater than the current area, given that some anthropogenic losses have occurred since the Directive came into force and there have also been losses due to natural processes. In NPWS (2013), the FRA was set as the area calculated for that reporting period (10km^2). While some loss was acknowledged, it was considered to be negligible over the period in question. During the current reporting period 81 sites containing 1410 were visited and assessed for Area, 76 by Brophy *et al.* (in prep.) and five by Perrin (2018b). The 81 sites assessed for Area represent 4.04km^2 (42%) of the total area of 1410 habitat recorded in Ireland. This	

	represents a significant proportion of the total area of 1410, covering all coasts, and therefore it is considered that the conclusions drawn for the surveyed areas can be applied to the country as a whole. Short-term trend in Area was deemed to be decreasing due to a loss of 15.46ha to anthropogenic activities since the previous reporting period. This represents 3.69% of the area surveyed in the period 2017-2018 and combined with losses that were considered negligible in the previous reporting period leads to the short-term trend of decreasing. The majority of the loss (73%; 11.3ha) was attributed to the spread of *Phragmites australis* swamp at the expense of 1410 at Castlebridge (SMP site number 0038), caused by a reduction in, or cessation of, grazing. The remaining loss of area occurred across seven sites and was almost entirely due to infilling and reclamation for a range of uses, including agriculture, roads, and buildings, and extraction of saltmarsh material for use in embankment repairs. The long-term trend in Area was deemed to be decreasing based on the fact that a 0.07% loss of 1410 habitat due to anthropogenic activities was noted for the 2007-2012 reporting period, which was considered negligible along with the minor loses noted for the 2002-2007 monitoring period NPWS (2013). These minor losses, along with the significant increase in losses during the current reporting period, leads to the long-term trend of decreasing. The difference in habitat extent between the area of 9.64km^2 reported for this reporting period and the figure of 10km^2 reported during the previous reporting period is largely due to the change in methodology and partly due to genuine change. Where entire polygons were previously often assigned to the dominant habitat, with mosaics recorded in some cases, the current survey (Brophy *et al*., in prep.) assigned percentages to the various habitats within any given polygon, allowing greater resolution of habitat area. The apparent decrease in 1410 also represents some genuine loss of 1410 to anthropogenic activities and natural processes, such as erosion and succession, while also incorporating some areas of increase where 1410 has spread into areas that were previously 1330-dominated.

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***8.77 km²***
		Maximum	***8.77 km²***
	b) Area in not-good condition	**Minimum**	***0.87 km²***
		Maximum	***0.87 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***

6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period?* ***YES****/NO* *Updated list is provided as an additional spreadsheet. See section 6.7 for outline of changes. More details are provided in section 6.8.*
6.7 Typical species Method used *Optional*	The list of typical species differs from that in the last reporting period (NPWS, 2013), due to changes made following on from work on the IVC (Perrin, 2018a), SMAATIE (Devaney and Perrin, 2015) and the 2017-18 monitoring survey (Brophy *et al*., in prep.). This species list differs from the last reporting period, as it is confined to the species that contribute to the assessment of Structure and functions. Where sites surveyed in 2017-18 were previously surveyed by McCorry (2007) and McCorry and Ryle (2009), plots were repeated in the same locations, where possible. New plot locations were chosen where it was not possible to repeat an existing plot and at sites not previously surveyed. Plots measured 2m x 2m and all species within the plots were recorded. The species listed in section 6.8 were assessed as part of the site assessment criteria. For further details, see Brophy *et al*. (in prep.).
6.8 Additional information *Optional*	The typical species used in assessing the 1410 habitat are: *Aster tripolium*, *Cochlearia* spp. (*Cochlearia anglica* and *Cochlearia officinalis*), *Glaux maritima*, *Juncus acutus*, *Juncus maritimus*, *Juncus gerardii*, *Leontodon autumnalis*, *Oenanthe lachenalii*, *Plantago maritima*, *Triglochin maritimum*. During the current reporting period, 81 sites containing 1410 were visited and all 81 were assessed for Structure and functions: 76 by Brophy *et al*. (in prep) and five from data collected by the SAMFHIRES project (Perrin, 2018b). The 81 sites assessed for Structure and functions represent 4.04km^2 (42%) of the total area of 1410 habitat recorded in Ireland. This represents a significant proportion of the total area of 1330, covering all coasts, and

	therefore it is considered that the conclusions drawn for the surveyed areas can be applied to the country as a whole. Of the 81 sites assessed for Structure and functions in this reporting period, 91% (8.77km^2) of the area was assessed as Favourable and 9% (0.87km^2) was assessed as Unfavourable. This result does not deviate significantly from the findings of NPWS (2013) presented below. The approach used to estimate the percentage of the 1410 habitat in Unfavourable condition at each site was as follows: If none of the assessment criteria failed at the site level then none of the 1410 area was classified as Unfavourable and the whole area of 1410 at the site was assigned as being in good condition; if 1 to 2 criteria failed at the site level this resulted in 25% of the 1410 area being classified as having Unfavourable Structure and functions; if 3 assessment criteria failed this resulted in 75% of the 1410 area at the site being classified with Unfavourable Structure and functions; if 4 or more criteria failed at the site level this resulted in 100% of the 1410 area at the site being classified as Unfavourable. The most frequent criterion to fail was "Disturbed ground (stop level)", which reflects the fact that 1410 was often intensively grazed. During the last reporting period, 85-98% of the 1410 habitat was assessed as Favourable (NPWS, 2013). Due to the fact that the percentage of 1410 habitat assessed as Favourable in the current reporting period (91%) falls in the centre of the previously reported range, the short-term trend of habitat area in good condition is taken to be stable.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A09** Intensive grazing or overgrazing by livestock (H) **A33** Modification of hydrological flow or physical alternation of water bodies for agriculture (excluding development and operation of dams) (M) **A36** Agriculture activities not referred to above (M) **A10** Extensive grazing or undergrazing by livestock (M)	**A09** Intensive grazing or overgrazing by livestock (H) **A33** Modification of hydrological flow or physical alternation of water bodies for agriculture (excluding development and operation of dams) (M) **A36** Agriculture activities not referred to above (M) **A10** Extensive grazing or undergrazing by livestock (M)

7.2 Sources of information *Optional*	Pressures and threats were selected and ranked from the following data: Brophy, J.T. *et al*., (in prep.) Saltmarsh Monitoring Project 2017-2018: Final Report. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin. McCorry, M.J. and Ryle, T. (2009) Saltmarsh Monitoring Project 2007-2008: Final report. An unpublished report for the National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Muyllaert, M., Fitzgibbon, B., Duggan, O. and Collins, K. (2014) River Suir Heritage Audit 2014. Draft Final Report: Vol. 2. Unpublished report for Waterford City and County Councils. National Parks and Wildlife Service [NPWS] (2013). The Status of Protected EU Habitats and Species in Ireland. Overview Volume 1. Unpublished Report. National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin. O'Neill, F.H., Brophy, J.T., Devaney, F.M., Nash, R. and Barron, S.J. (2014) Assessment of the Conservation Status of the Great Island Channel SAC (001058). Unpublished report for Cork County Council.
7.3 Additional information *Optional*	Pressures and threats in section 7.1 were selected and ranked based on intensity (high, medium or low), frequency of occurrence, and area of impact, using the data gathered during the 2017-18 SMP and presented in Brophy *et al*. (in prep.), as well as reviewing other sources of information. All pressures presented in NPWS (2013) were considered for the current reporting period. Of the two high or medium-ranked pressures in NPWS (2013), the high-ranking pressure of intensive grazing was retained for the current monitoring period, while the medium-ranked pressure of D01 Paths, tracks, cycling tracks was assessed as low importance and so was not included in section 7.1. Intensive cattle grazing (A04.01.01) was previously ranked in NPWS (2013) as being of high importance, and this cross-walked to A09 Intensive grazing or overgrazing by livestock in the new impact recording scheme and so continues to be ranked as high importance. This was the most frequently recorded pressure, being noted at 40 sites, usually at high or medium intensity, and affected on average >25% of the habitat. D01.01 cross-walked to the F07 Recreational activities code, and was ranked as low importance in the current survey. This pressure was recorded at three sites, usually with a high or medium intensity, but affected on average <1% of the habitat. D01.01 recorded in NPWS (2013) may also comprise tracks created by the operation of agricultural vehicles, which were included in the current assessment as A36 and was ranked as medium importance (recorded at six sites and almost always as high intensity). From this it can be assumed that the apparent change in impacts from the previous recording period to the current is likely be the result of a change in methodology rather than a change in the pressure acting on the habitat.

	A33 (recorded at three sites at high intensity in the current survey) relates to infilling, reclamation, construction and repair of embankments, *etc*., for agriculture. A10 Extensive grazing or undergrazing by livestock was assessed as being of medium importance despite only occurring at one site (Castlebridge SMP0038). This was due to the fact that it accounted for 73% (11.3ha) of the area loss of 1410 recorded. This area of 1410 has been transformed to *Phragmites australis* swamp due to a reduction in, or cessation of, grazing at the site. Climate change has not been added as an impact of medium or high importance, but it is likely to affect the range of 1410 over the coming decades. The long-term trend will see an increase in mean sea level and extreme weather events (Desmond *et al*., 2017), which will impact the formation of the 1410 habitat. The four pressures presented in section 7.1 are also considered to be the four main threats into the future.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* ***c) Increase the surface area of the habitat type (related to 'Area covered by habitat')** or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* ***b) Medium-term results (within the next two reporting periods, 2019-2030)** or* *c) Long-term results (after 2030)*

8.5 List of main conservation measures	**CA15** Manage drainage and irrigation operations and infrastructures in agriculture **CF02** Habitat restoration of areas impacted by residential, commercial, industrial and recreational infrastructures, operations and activities
8.6 Additional information *Optional*	No existing conservation measures were identified at the sites surveyed in the course of the current project (Brophy *et al.*, in prep.). Two managed realignment projects were identified in the course of the SAMFHIRES project (P. Perrin, pers. comm.), one at Turvey, Rogerstown Estuary, Co. Dublin and the other at Kilmacleague, Tramore, Co. Waterford. At Turvey, Rogerstown Estuary, Co. Dublin, a 1.4km long, 1.5m high levee was removed by Fingal County Council in 2015 to allow complete access to tidal waters across an area of 24ha (CA15). This area is part of a council nature reserve and already supported some saltmarsh vegetation due to a gap in the levee, but the removal of the levee will improve the hydrological connectivity and encourage the creation of additional saltmarsh habitat. This area is within the Rogerstown Estuary SAC (site code 000208). Saltmarsh habitat at Kilmacleague, Tramore, Co. Waterford had been lost during the construction of a landfill site. Following a European Court of Justice case (C 494/01), Ireland was required to provide compensatory habitat (CF02). A project to create 5ha of mudflat and 2.5ha of saltmarsh was initiated and involved the breaching of an existing embankment to allow previously enclosed agricultural land to flood through part of the tidal cycle. The project has seen the development of 1310 and 1330 habitat since the embankment was breached in 2013, and 1410 may develop later, as the habitat is recorded within the site. This site is outside, but adjacent to, the Tramore Dunes and Backstrand SAC (site code 000671). Saltmarsh habitats are not the target of any of the actions listed for the GLAS agri-environment scheme (Image and Forster Brown, 2018). Conservation measures that are not currently being implemented, but whose implementation would improve the Structure and functions of the habitat, include CA01 Prevent conversion of natural and semi-natural habitats, and habitats of species into agricultural land, CA05 Adapt mowing, grazing and other equivalent agricultural activities, CA15 Manage drainage and irrigation operations and infrastructures in agriculture, and CA16 Other measures related to agricultural practices. From a long-term standpoint, CN02 Implement climate change adaptation measures is likely to be required to address the issue of climate change. Sea level rise will impact negatively on 1410 area (Horton *et al*., 2018) and measures such as managed retreat may be required to maintain 1410 area and Structure and functions.

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	*Good /* ***Poor*** */ Bad / Unknown*
	c) Structure and functions	***Good*** */ Poor / Bad / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as Stable. Current Range is equal to the Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as Stable, as no change in Range is expected based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Range are therefore Good. Short-term trend direction of Area is assessed as Decreasing, a loss of 3.69% of the total surveyed area was recorded for the current reporting period, following a loss of 0.07% for the previous reporting period. Current area is <10% less than the Favourable Reference Area. Conservation status of Area is therefore Unfavourable-Inadequate. Future trend of Area is assessed as Negative as no conservation measures have been identified to counteract the listed pressures and return the habitat to the FRA. Future prospects of Area are therefore Poor. Short-term trend direction of Structure and functions is Stable for habitat that is in Good condition Current Structure and functions are assessed as 91% of the habitat in Good condition, which is above the 90% threshold for Favourable. Conservation status of Structure and functions is therefore Favourable. Future trend of Structure and functions is assessed as Stable. Future prospects of Structure and functions are therefore Good.	

10 Conclusions	
Assessment of conservation status at end of reporting period	
10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.2 Area	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*
10.3 Specific structure and functions (incl. typical species)	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.4 Future prospects	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*
10.5 Overall assessment of Conservation Status	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving /* ***deteriorating*** */ stable / unknown*

<table>
<tr><td rowspan="8">10.7 Change and reasons for change in conservation status and conservation status trend</td><td colspan="3">Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.</td></tr>
<tr><td></td><td>Overall assessment of conservation status (10.5)</td><td>Overall trend in conservation status (10.6)</td></tr>
<tr><td>a) no, there is no difference</td><td>YES/<u>NO</u></td><td><u>YES</u>/NO</td></tr>
<tr><td>b) yes, due to genuine change</td><td>YES/NO</td><td><u>YES</u>/NO</td></tr>
<tr><td>c) yes, due to improved knowledge/more accurate</td><td>YES/NO</td><td>YES/<u>NO</u></td></tr>
<tr><td>d) yes, due to the use of different methods (including use of different thresholds)</td><td>YES/NO</td><td><u>YES</u>/NO</td></tr>
<tr><td>e) yes, but there is no information on nature of change</td><td>YES/NO</td><td>YES/<u>NO</u></td></tr>
<tr><td>The change is mainly due to (select one of the reasons above):</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td><td><u>genuine change</u> / improved knowledge or more accurate data / the use of a different method</td></tr>
<tr><td>10.8 Additional information

Optional</td><td colspan="2">The Conservation Status of Range is Favourable in this reporting period, as it was in the previous reporting period.
The Conservation Status of Area is assessed as Unfavourable-Inadequate during this reporting period, while it was assessed as Favourable in the previous reporting period.
The Conservation Status of Structure and functions is Favourable, while it was assessed as Unfavourable-Inadequate in the previous reporting period.
The Conservation Status of Future prospects is Unfavourable-Inadequate, as is was in the previous reporting period.
The Overall Conservation Status was assessed as Unfavourable-Inadequate, as it was during the last reporting period. The status of Unfavourable-Inadequate during the current reporting period was due to the current area being below the Favourable Reference Area and due to the area of the habitat decreasing.
Overall Trend in Conservation Status was assessed as deteriorating due to the fact that 4.16ha of 1410 habitat had been lost due to anthropogenic causes in the current reporting period (1.02% of surveyed area). In NPWS (2013), the Overall Trend in Conservation Status was assessed as stable, as a loss in area, representing 0.07% of the surveyed area, was not deemed significant for the future</td></tr>
</table>

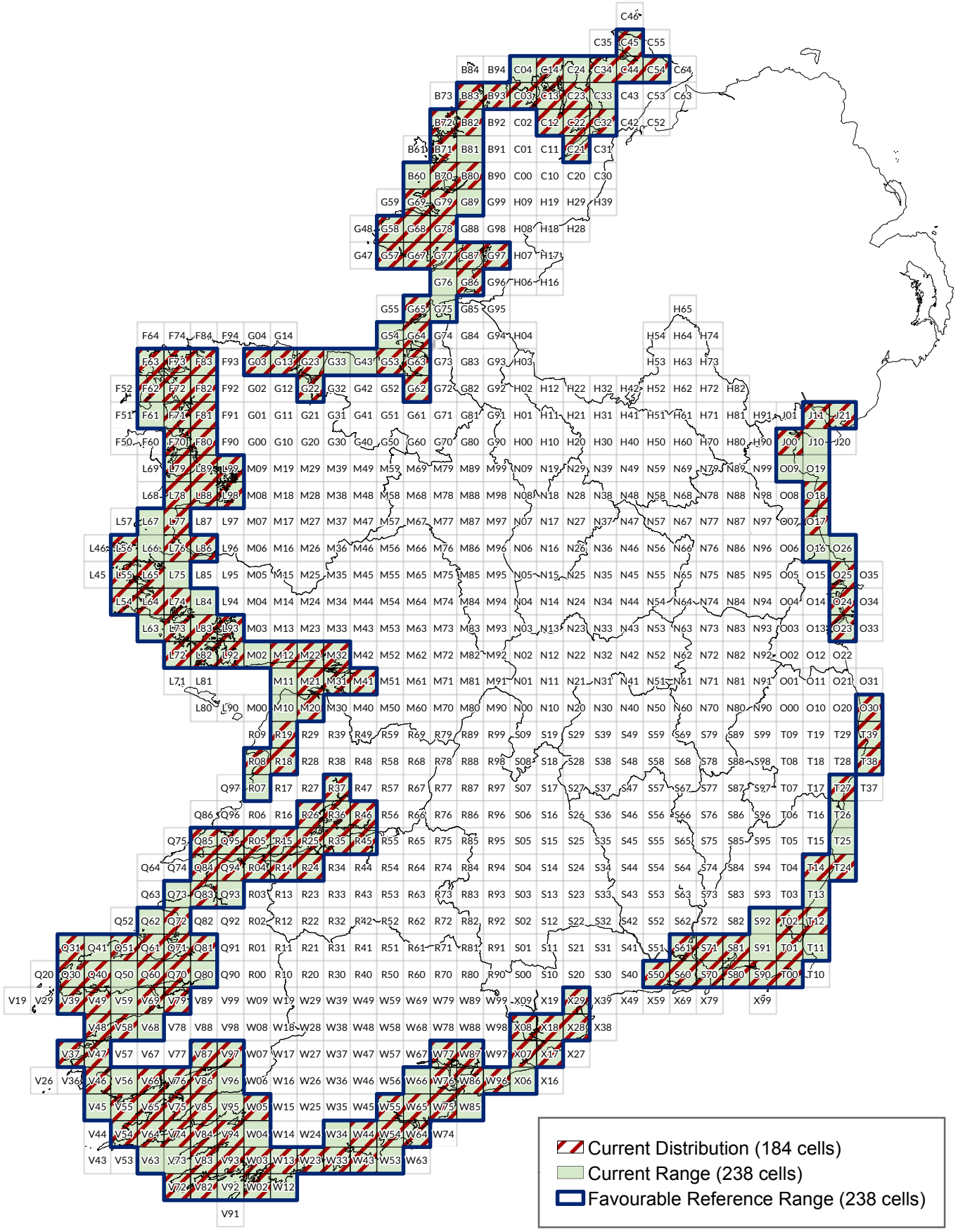
	trend in Area. Based on the increase in the rate of loss, and in light of the fact that loss of area has continued into the current reporting period, the level of anthropogenic loss is considered significant and therefore the Overall Trend in Conservation Status is assessed as deteriorating.

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***7.88km²***
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable*** */ increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing a union between the distribution polygon shapefile and the SAC shapefile. The area given in section 11.1 is the total area of 1410 habitat in SACs in the country, including some SACs where 1410 is not listed as a qualifying interest (QI). The area of 1410 within the Natura 2000 network where it is listed as a QI is 5.96km^2. No evidence of anthropogenic loss of 1410 habitat within SACs was reported for the previous reporting period (NPWS 2013). In the current reporting period, 90% of the 15.46ha of the 1410 habitat lost due to anthropogenic impacts was from within SACs. Of this 13.99ha, 98% was from five SACs that listed 1410 as a QI, while the remaining 2% was from one SAC that did not list the habitat as a QI. There was one inconsistency between the Natura 2000 sites where the 1410 habitat is listed as a QI and the current distribution for the habitat. No 1410 was recorded from the Lower River Suir SAC (site code 002137) in the current survey (Brophy *et al.*, in prep.) or in the	

	SMP (McCorry and Ryle, 2009). The Conservation Objectives report notes that the habitat was not recorded by the SMP, which covered the Little Island site in 2007 (which does not include the island itself), but may be present in unsurveyed areas of the SAC (NPWS, 2017). Much of the remaining unsurveyed potential saltmarsh habitat identified through a desk study as part of the SMP was covered by the 2017-18 survey; however, permission was not forthcoming to survey Little Island itself and so it is still possible that 1410 habitat is present at the site. The short-term trend of the habitat area in good condition within the SAC network is taken to be stable, with the same trend as the 1410 habitat nationally (see section 6.4 and 6.8), as the majority of 1410 habitat surveyed during the last two reporting periods was within the SAC network. The surface area of 1410 habitat within the N2000 network has increased from the previous reporting period; this is in part due to improved knowledge, but is largely due to a change in methodology. In this reporting period, a union between the current 1410 distribution, including desk study polygons and the SAC shapefile, was undertaken, whereas in the previous reporting period, an intersect between the known and confirmed 1410 polygons from the SMP (McCorry, 2007; McCorry and Ryle, 2009) and the SAC shapefile was carried out (NPWS, 2013).

12 Complementary information

Mediterranean salt meadows (*Juncetalia maritimi*) (1410) Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Habitat code / name	**1420 Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*)**
1.2i Habitat short name	**Halophilous scrub**
1.3i Habitat description	Halophilous scrubs are defined by the EU Habitats Interpretation Manual (Commission of the European Communities, 2007) as perennial vegetation of saline muds that belongs to the phytosociological class *Sarcocornetea fruticosi*. Three British NVC communities listed include the "SM21 *Suaeda vera-Limonium binervosum* saltmarsh community", "SM25 *Suaeda vera* saltmarsh community" and "SM7 *Arthrocnemum perenne* stands" (Rodwell, 2000). Irish vegetation corresponds somewhat with the community *Arthrocnemum perenne* stands (SM7). This habitat is characterized in Ireland by the presence of a single species, Perennial Glasswort (*Sarcocornia perennis*, previously known as *Arthrocnemum perenne*) on saltmarsh. This fleshy, slightly woody perennial can grow up to 30cm tall and often extends to form tussocks up to 1m in diameter. Davy *et al*. (2006) described the main habitat of *Sarcocornia perennis* as being gravelly or sandy foreshores and relatively well-drained sediments of coastal saltmarshes. This species is very rare in Ireland and is listed on the Flora Protection Order (Anon., 2015). It is also listed in the Vascular Plant Red List as 'Vulnerable' (Wyse Jackson *et al*., 2016). Consequently, this habitat is the rarest Annex I saltmarsh habitat found in Ireland and has been recorded from only seven saltmarsh sites in the south-east coast of Ireland. *Sarcocornia perennis* was only recorded quite recently in Ireland (Ferguson, 1962; 1964) and is considered to represent a South Atlantic element in the flora (Cross, 2006). Perennial glasswort is generally found in the mid-lower saltmarsh zone, often with common saltmarsh grass (*Puccinellia maritima*) and lax-flowered lavender (*Limonium humile*). It also occurs with glasswort species (*Salicornia* spp.) and amongst clumps of common cord-grass (*Spartina anglica*). The 1420 habitat does not constitute a distinct vegetation community within the Irish Vegetation Classification (IVC) (Perrin, 2018a), but is most likely to be included within the SM2 *Puccinellia maritima-Spergularia media* group.

2 Maps

Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***2006-2018***
2.2 Distribution map	Submitted

2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was compiled using polygons containing 1420 habitat mapped by Brophy *et al.* (in prep.) and the SAMFHIRES project (Perrin, 2018b) in 2017-2018; all sites known to support 1420 were surveyed. All references and sources are detailed in section 3.2. Datasets by McCorry and Ryle (2009), Ryle *et al*. (2009) and McCorry (2007) were used to compile the distribution map for the last reporting period, along with records of *Sarcocornia perennis* from Preston *et al*. (2002) (NPWS, 2013). A certainty rating system was applied to all data that informed the distribution map. This system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1, the lowest. The new data sources added since the last round of reporting (NPWS, 2013), Brophy *et al.* (in prep.) and Perrin (2018b), were judged to be a high certainty of 3. No other data were used in mapping the distribution of 1420. Following a comparison with the distribution from the previous reporting round (NPWS, 2013), one cell was deleted. This resulted in the distribution dropping from four cells to three. This loss represents a genuine change in the distribution between reporting periods, as the habitat was not recorded from the site Taulaght (SMP site code 0043), resulting in the loss of one 10km square.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
3.2 Sources of information	Anon. (2015) Flora Protection Order, 2015 (S.I. No. 356/2015). Government of Ireland. Brophy, J.T. *et al*., (in prep) Saltmarsh Monitoring Project 2017-2018: Final Report. *Irish Wildlife Manuals,* No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin. Commission of the European Communities (2007). Interpretation manual of European Union Habitats-EUR 27. DG Environment-Nature and Biodiversity. Brussels. Cross, J. (2006) The potential natural vegetation of Ireland. *Biology and Environment: Proceedings of the Royal Irish Academy* 106B:

65-106.

Curtis, T.G.F. and Sheehy Skeffington, M. (1998) The saltmarshes of Ireland: an inventory and account of their geographical variation. *Biology and Environment, Proceedings of the Royal Irish Academy* 98B: 87-104.

Davy, A.J., Bishop, G.F, Mossman, H., Redondo-Gómez, S., Castillo, J.M., Castellanos, E.M., Luque, T. and Figueroa, E.M. (2006) Biological Flora of the British Isles: Sarcocornia perennis (Miller) A.J. *Scott. Journal of Ecology* 94: 1035–1048.

Desmond, M., O'Brien, P. and McGovern, F. (2017) A Summary of the State of Knowledge on Climate Change Impacts for Ireland: Report 11 (2010-2016). Prepared for the Environmental Protection Agency by MaREI Centre, Environmental Research Institute, University College Cork. EPA, Wexford.

Ferguson, I.K. (1962) *Salicornia perennis* Mill. in Ireland. *Irish Naturalists' Journal* 14: 18-19.

Ferguson, I.K. (1964) A new station for *Salicornia perennis* Mill. in Ireland. *Irish Naturalists' Journal* 14: 215.

Horton, B.P., Shennan, I., Bradley, S.L., Cahill, N., Kirwan, M., Kopp, R.E. and Shaw, T.A. (2018) Predicting marsh vulnerability to sea-level rise using Holocene relative sea-level data. *Nature Communications* 9: 2687-2690.

Image, M. and Forster Brown, C. (2018) Baseline Analysis of Actions under GLAS: Full Report. Report for the Department of Agriculture, Food and the Marine.

JNCC (2004) Common Standards Monitoring Guidance for saltmarsh habitat. Joint Nature Conservation Committee, Peterborough.

McCorry, M. (2007) Saltmarsh Monitoring Project 2006 – Summary Report. An unpublished report for the National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin.

McCorry, M.J. and Ryle, T. (2009) Saltmarsh Monitoring Project 2007-2008: Final report. Unpublished report for the National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin.

National Vegetation Database. National Biodiversity Data Centre. Available at http://www.biodiversityireland.ie/projects/national-vegetation-database/

Nehring, S. and Hesse, K.-J. (2008) Invasive alien plants in marine protected areas: the *Spartina anglica* affair in the European Wadden Sea. *Biological Invasions* 10(6): 937–950. https://doi.org/10.1007/s10530-008-9244-z

NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.1. Unpublished Report, National Parks and Wildlife Service, Department of Arts, Heritage, and the Gaeltacht, Dublin.

Perrin, P.M. (2016) Irish Vegetation Classification Technical Progress Report No. 2. Unpublished report by BEC Consultants for the National Biodiversity Data Centre. http://www.biodiversityireland.ie/wordpress/wp-

	content/uploads/IVC_Technical-Progress-Report-No.2.pdf. 34pp. Perrin, P.M. (2018a) Irish Vegetation Classification. Accessed at http://www.biodiversityireland.ie/projects/national-vegetation-database/irish-vegetation-classification/ on 28/09/2018. Perrin, P.M. (2018b) SAMFHIRES (Saltmarsh Function and Human Impacts in Relation to Ecological Status) unpublished field survey data. EPA-funded collaboration between BEC Consultants Ltd and Trinity College Dublin. Preston, C.D., Pearman, D.A. and Dines, T.D. (2002) *New Atlas of the British and Irish Flora*. Oxford University Press. Rodwell, J.S. (ed.) (2000) *British Plant Communities, Volume 5: Maritime communities and vegetation of open habitats*. Cambridge University Press, Cambridge. Ryle, T., Connelly, K., Murray, A. and Swann, M. (2009) Coastal Monitoring Project. A report to the National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Wexford County Council (2011) Variation No. 1 of the County Wexford Development Plan 2007-2013. Made by the Members of Wexford County Council on 12 December 2011. https://www.wexfordcoco.ie/sites/default/files/content/Planning/ArchivePlans/CoDevelopmentPlan07-13/Variation1_CoDevelopmentPlan07-13.pdf 64pp. Wexford County Council (2017) Chief Executive's Report. July 2017. https://www.wexfordcoco.ie/sites/default/files/content/CouncilDemocracy/PlansPublications/ce_reports/Report%20to%20Council%20-%20July%202017.pdf 33pp. Wyse Jackson, M., FitzPatrick, Ú., Cole, E., Jebb, M., McFerran, D., Sheehy Skeffington, M. and Wright, M. (2016) *Ireland Red List No.10: Vascular Plants*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin.
3.2i Additional information	

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***300 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	

4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 400 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable Reference Range (FRR) has been left at the figure from the previous reporting period (NPWS, 2013). The distribution on which the FRR was based has changed due to a loss attributed to the deposition of algal mats, resulting from eutrophication of the associated waterbody. For this reason, the previous FRR is considered to remain valid, as such a loss is not necessarily permanent, but rather reflects the environmental conditions preceding the 2017 survey. It should be noted that a limited amount of *Sarcocornia perennis* is still present at this site, but not enough to form the 1420 habitat. There is evidence of loss of range since the Directive came into force, and the limited geographic range of the habitat means the contraction of the range is of concern.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	**YES***/NO*
	b) yes, due to improved knowledge/more accurate data	*YES/****NO***
	c) yes, due to the use of different method	**YES***/NO*

	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): ***genuine change** / improved knowledge or more accurate data / the use of a different method*	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 1420 habitat. A maximum gap distance of two 10km grid cells was used when running the range tool. All 10km grid cells generated by the range tool had coastline or suitable estuarine habitat. Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013). The area losses recorded during the current reporting period led to a contraction in the range. The short-term trend is assessed as decreasing. The number of 10km squares in the range (3) is one square lower than the last monitoring period (NPWS, 2013). This change is due to the loss of 1420 habitat from one site (Taulaght – SMP site code 0043) due to the deposition of algal mats, believed to be the result of eutrophication of the associated waterbody. The Favourable Reference Range has remained the same as the last reporting period (NPWS, 2013) due the fact that the habitat should be able to re-establish in the lost site if the conditions that caused the loss are addressed, as *Sarcocornia perennis* continues to be present at the site.	

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2006-2018***	
5.2 Surface area *(in km²)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***0.0028 km²***
5.3 Type of estimate	***Best estimate** / 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*	

5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km ^{2} or*	
	b) Operator >> (much greater than) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	***YES****/NO*
	b) yes, due to improved knowledge/more accurate data	*YES/****NO***
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): ***genuine change*** */ improved knowledge or more accurate data / the use of a different method*	

5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 2006 (McCorry, 2007) when the pilot baseline survey was carried out, and incorporates updates made by surveys carried out between 2006 and 2018, the details of which are listed in section 3.2, namely McCorry and Ryle (2009), Brophy *et al*. (in prep.) and Perrin (2018b). Given the limited range of the habitat in Ireland, it is unlikely that there are any areas of unmapped 1420 in the country. In NPWS (2013), the Favourable Reference Area (FRA) was set as more than 25% greater than the area calculated for that reporting period (0.011km^2) and, at that time, the habitat was known to have been lost from two sites (Duncormick and Grange). For the current reporting period, the FRA was not determined exactly, but is estimated to be >10% more than the current area, given that anthropogenic losses have occurred since the Directive came into force and since the last reporting period (Taulaght), and there may also have been losses due to natural processes. As noted in NPWS (2013), the mapping of the 1420 habitat is problematic as it can change depending on whether clusters of plants are divided into separate patches of habitat or included in one patch of habitat, with the latter method increasing the area significantly. This is exacerbated by the fact that the total area of this habitat nationally is very small. During the current reporting period four sites containing 1420 were visited and assessed for Area, three by Brophy *et al.* (in prep.) and one by Perrin (2018b). The four sites assessed for Area represent the total 0.0028km^2 area of 1420 habitat recorded in Ireland. Therefore, the conclusions drawn for the habitat are applicable to the entire extent of the habitat in Ireland. Short-term trend in Area was deemed to be decreasing. Loss due to anthropogenic activities in the current reporting period was calculated to be 120m^2, which represents 4% of the area surveyed in the period 2017-2018. Losses of area were also reported from the previous reporting period (NPWS 2013). The long-term trend in Area was deemed to be decreasing based on the fact the previous reporting period assessed it as decreasing (NPWS, 2013), and there has been no change in direction of the trend for the current reporting period.

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***0.0025 km²***
		Maximum	***0.0025 km²***
	b) Area in not-good condition	**Minimum**	***0.0003 km²***
		Maximum	***0.0003 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***

6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***
6.7 Typical species Method used *Optional*	The list of typical species has not changed since the last reporting period (NPWS, 2013). *Sarcocornia perennis* defines the habitat and so must be present to record the habitat. All sites surveyed in 2017-18 were previously surveyed by McCorry (2007) and McCorry and Ryle (2009) and plots were repeated in the same locations, where possible. New plot locations were chosen where it was not possible to repeat an existing plot. Plots measured 2m x 2m and all species within the plots were recorded. For further details, see Brophy *et al*. (in prep.).
6.8 Additional information *Optional*	The typical species for the 1420 habitat are: *Sarcocornia perennis*, *Salicornia* spp., *Puccinellia maritima*, *Limonium humile*, *Plantago maritima*, *Suaeda maritima*, *Aster tripolium*, *Spergularia marina* and *Atriplex portulacoides*. During the current reporting period, four sites containing 1420 were visited and all four were assessed for Structure and functions: three by Brophy *et al*. (in prep.) and one from data collected by the SAMFHIRES project (Perrin, 2018b). The four sites assessed for Structure and functions represents 0.0003km^2 (100%) of the total area of 1420 habitat recorded in Ireland. As this represents the total area of 1420, the conclusions drawn for the surveyed area apply to the total extent of the habitat in Ireland. Of the four sites assessed for Structure and functions in this reporting period, 88% (0.0025km^2) of the area was assessed as Favourable and 12% (0.0003km^2) was assessed as Unfavourable. This result does not deviate significantly from the findings of NPWS (2013) presented below. The approach used to estimate the percentage of the 1420 habitat in Unfavourable condition at each site was as follows:

	If none of the assessment criteria failed at the site level then none of the 1420 area was classified as Unfavourable and the whole area of 1420 at the site was assigned as being in good condition; if 1 to 2 criteria failed at the site level this resulted in 25% of the 1420 area being classified as having Unfavourable Structure and functions; if 3 assessment criteria failed this resulted in 75% of the 1420 area at the site being classified with Unfavourable Structure and functions; if 4 or more criteria failed at the site level this resulted in 100% of the 1420 area at the site being classified as Unfavourable. The only criterion for which a site failed was "Vegetation composition: negative species (stop level)", which reflects the fact that *Spartina anglica* is spreading at the site in the vicinity of the 1420 habitat. During the last reporting period, all sites were assessed as Favourable for Structure and functions of 1420, where the habitat was still present (NPWS, 2013). For the purposes of comparison, it is assumed that this constitutes 100% of the habitat being in good condition. The percentage of 1420 habitat assessed as Favourable in the current reporting period (88%) is based on a field survey of the entire national resource, and so represents the current area of 1420 habitat in good condition. The percentage of 1420 habitat assessed as Favourable in the current reporting period (88%) differs from the previously reported area due to the fact that the previous assessment did not consider *Spartina anglica* to pose a threat to 1420, while the current assessment does, resulting in the failed criterion. For this reason, the short-term trend of habitat area in good condition is taken to be stable.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**J02** Mixed source marine water pollution (marine and coastal) (H) **I02** Other invasive alien species (other than species of Union concern) (M)	**J02** Mixed source marine water pollution (marine and coastal) (H) **I02** Other invasive alien species (other than species of Union concern) (M)

7.2 Sources of information *Optional*	Pressures and threats were selected and ranked from the following data: Brophy, J.T. *et al*., (in prep.) Saltmarsh Monitoring Project 2017-2018: Final Report. *Irish Wildlife Manuals* No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin. McCorry, M.J. and Ryle, T. (2009) Saltmarsh Monitoring Project 2007-2008: Final report. An unpublished report for the National Parks

	and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. National Parks and Wildlife Service (2013). The Status of Protected EU Habitats and Species in Ireland. Overview Volume 1. Unpublished Report. National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin.
7.3 Additional information *Optional*	Pressures and threats in section 7.1 were selected and ranked based on intensity (high, medium or low), frequency of occurrence, and area of impact, using the data gathered during the 2017-18 saltmarsh monitoring survey and presented in Brophy *et al*. (in prep.), as well as reviewing other sources of information. All pressures presented in NPWS (2013) were considered for the current reporting period. Of the eight high or medium-ranked pressures in NPWS (2013), none were recorded for the current reporting period. *Invasive non-native species* (previously I01, now I02 under the new impact recording scheme) was previously ranked as being of low importance; however, for the current reporting period, it has been raised to medium importance. This is due to the fact that *Spartina anglica* may out-compete *Sarcocornia perennis* for light and resources and any evidence that *Spartina anglica* does not out-compete *Sarcocornia perennis* in Irish saltmarshes appears to be anecdotal. Previous research suggests that coverage of a range of saltmarsh vegetation communities declines as *Spartina anglica* spreads (Nehring and Hesse, 2008). The only pressure of high importance recorded affecting 1420 for the current reporting period was J02 *Mixed source marine water pollution (marine and coastal)*. This took the form of algal mats, which had a high-intensity impact at two sites and led to a loss of 1420 habitat. A09 *Intensive grazing or overgrazing by livestock* was noted at Ballyteige Burrow during the SAMFHIRES project (P. Perrin, pers. comm.), but this was not considered to be affecting 1420. Of the other pressures recorded in the previous reporting period, *species composition change (succession)* (previously K02.01, now L02 under the new impact recording scheme) was not assessed as it is considered a natural process. Similarly, *Erosion* (previously K01.01, now under L01) was considered a natural process and so was not assessed. The remaining pressures recorded in the previous reporting period were not noted during the 2017-18 survey. For some, this may be that they were not occurring at the sites surveyed, while others are difficult to define and assess, such as *diffuse household pollution* (H01.08). Climate change has not been added as an impact of medium or high importance, but it is likely to affect the range of 1420 over the coming decades. The long-term trend will see an increase in mean sea level and extreme weather events (Desmond *et al*., 2017), which will impact the formation of the 1420 habitat. The two pressures presented in section 7.1 are also considered to be the two main threats into the future.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* ***a) Measures identified, but none yet taken** or* *b) Measures identified and taken or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	None taken
8.6 Additional information *Optional*	No existing conservation measures were identified in the course of the survey or the assessment. Saltmarsh habitats are not the target of any of the actions listed for the GLAS agri-environment scheme (Image and Forster Brown, 2018). Conservation measures that are not currently being implemented, but whose implementation would improve the Structure and functions of the habitat, include CF04 Reduce/eliminate point pollution to surface or ground waters from industrial, commercial, residential and recreational areas and activities, CF05 Reduce/eliminate diffuse pollution to surface or ground waters from industrial, commercial, residential and recreational areas and activities, and CF07 Reduce/eliminate marine pollution from industrial, commercial, residential and recreational areas and activities. CI03 Management, control or eradication of other invasive alien species could be considered for *Spartina anglica*, but given the complexity of the issue this would need to be subject to a

	comprehensive assessment. Upgrades to the waste water infrastructure discharging into Bannow Bay have been proposed by Irish Water. While this is not with the express purpose of improving 1420 habitat, it will have a positive effect by reducing eutrophication within Bannow Bay, which will have the knock-on effect of reducing the production of algal mats. Algal mats have been the cause of loss of 1420 habitat within Bannow Bay. The timing of this upgrade is uncertain, however, having been proposed as far back as 2011 in Variation No. 1 of the County Wexford Development Plan 2007-2013 (Wexford County Council, 2011) and subsequently included in the Irish Water Capital Investment Plan 2014-2016 (Wexford County Council, 2017). For this reason, it was not considered when assessing Future prospects for 1420 in this reporting period. From a long-term standpoint, CN02 Implement climate change adaptation measures is likely to be required to address the issue of climate change. Sea level rise will impact negatively on 1420 area (Horton *et al*., 2018) and measures such as managed retreat may be required to maintain 1420 area and Structure and functions.

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	*Good / Poor / **Bad** / Unknown*
	b) Area	*Good / Poor / **Bad** / Unknown*
	c) Structure and functions	*Good / **Poor** / Bad / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as Decreasing. Current range is more than 10% below the Favourable Reference Range. Conservation status of Range is therefore Unfavourable-Bad. Future trend of Range is assessed as Stable, based on the current threats and range and the likelihood of further loss. Future prospects of Range are therefore Bad. Short-term trend direction of Area is assessed as Decreasing, as NPWS (2013) reported a loss of area due to anthropogenic impacts during the last reporting period and further losses have occurred. Current area is more than 10% below the Favourable Reference Area. Conservation status of Area is therefore Unfavourable-Bad. Future trend of Area is assessed as Negative as no conservation measures have been identified to counteract the listed pressures and return the habitat to the FRA. Future prospects of Area are therefore Bad. Short-term trend direction of Structure and functions is Stable for habitat that is in Good condition Current Structure and functions is assessed as 88% of the habitat in Good condition, which is below the 90% threshold for Favourable. Conservation status of Structure and functions is therefore Unfavourable-Inadequate.	

	Future trend of Structure and functions is assessed as Stable. Future prospects of Structure and functions are therefore Poor.

10 Conclusions

Assessment of conservation status at end of reporting period

10.1 Range	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
10.2 Area	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) / **Inadequate (U1**) / Bad (U2) / Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / **deteriorating** / stable / unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/**NO***	*YES/**NO***
	b) yes, due to genuine change	*YES/NO*	*YES/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	*YES/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information	The Conservation Status of Range is Unfavourable-Bad in this reporting period, while it was Favourable in the previous reporting		

Optional	period. The Conservation Status of Area is Unfavourable-Bad, as it was in the previous reporting period. The Conservation Status of Structure and functions is assessed as Unfavourable-Inadequate for this reporting period, while it was Favourable in the previous reporting period. The Conservation Status of Future prospects is Unfavourable-Bad, while it was Unfavourable-Inadequate in the previous reporting period. The Overall Conservation Status was assessed as Unfavourable-Bad, as it was during the last reporting period. The status of Unfavourable-Bad during the current reporting period was due to the range decreasing and being below the FRR, the current area being below the FRA and the area of the habitat decreasing, and the Future prospects declining from Unfavourable-Inadequate to Unfavourable-Bad. Overall Trend in Conservation Status was assessed as deteriorating due to the fact that 0.012ha of 1420 habitat had been lost due to anthropogenic causes in the current reporting period (4% of surveyed area, resulting in the total loss of the habitat from one site - Taulaght), in addition to losses of two sites reported in NPWS (2013). In NPWS (2013), the Overall Trend in Conservation Status was assessed as declining. Based on this, and in light of the fact that loss in area has continued into this reporting period, the level of anthropogenic loss is considered significant and therefore the Overall Trend in Conservation Status is assessed as deteriorating.

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***0.0028km²***
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable*** */ increasing / decreasing / uncertain/ unknown*	

11.5 Short-term trend of habitat area in good condition within network **Method used**	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing a union between the distribution polygon shapefile and the SAC shapefile. The area given in section 11.1 is the total area of 1420 habitat in SACs in the country. The habitat occurs in two SACs and is a qualifying interest (QI) in both. For the previous reporting period, loss of 1420 habitat at one site (Duncormick) was attributed to excessive grazing, while natural erosion and redistribution of sediment led to the loss of the Grange site (NPWS 2013). In the current reporting period, 100% of the 120m^2 of the 1420 habitat lost due to anthropogenic activities was from within an SAC that listed 1420 as a QI. There were no inconsistencies between the current distribution for the habitat and the Natura 2000 sites where 1420 is listed as a QI. The short-term trend of the habitat area in good condition within the SAC network is taken to be stable, with the same trend as the 1420 habitat nationally (see section 6.4 and 6.8), as all of the 1420 habitat in Ireland is within the SAC network. The surface area of 1420 habitat within the N2000 network has declined from the previous reporting period; this is in part due to genuine loss, but also due to a change in survey methodology.

12 Complementary information

Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*) (1420) Article 17 (2013 - 2018) Assessment

An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**2110 Embryonic shifting dunes**
1.2i Habitat short name	**Embryonic shifting dunes**
1.3i Habitat description	2110 Embryonic shifting dunes are low sand mounds (generally less than a metre high) occurring between the high tide mark and 2120 Shifting dunes (white dunes). Embryonic shifting dunes are unstable habitats where wind-blown sand is common and they are still vulnerable to saltwater intrusion. They represent the initial phase of dune formation and typically form where sand gathers around salt-tolerant species such as *Leymus arenarius* and *Elytrigia juncea*. Other plants such as *Cakile maritima*, *Honckenya peploides* and *Salsola kali* may also occur. They can be very short-lived habitats as they are subject to natural erosion processes and susceptible to removal by storms or high tides.

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***1996-2017***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) **Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted.
2.5i	The distribution map was compiled using 2110 polygons mapped by Martin *et al*. (2017), Devaney *et al*. (2014), Wilson and Duff (2014), Delaney *et al*. (2013), Fingal County Council (2010), Ryle *et al*. (2009), Dún Laoghaire-Rathdown County Council (date unknown) and Crawford *et al*. (1996). All references are detailed below in Section 3.2. All the aforementioned datasets published prior to 2014 were also used to compile the distribution maps from the last reporting period (NPWS, 2013). A certainty rating system was applied to all data that informed the distribution map. This system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1 is the lowest. The new data sources added since the last round of reporting (NPWS, 2013) that were based on a field survey, Martin *et al*. (2017), Devaney *et al*. (2014) and Wilson and Duff (2014), were judged to be good quality data

	(high certainty=3). Delaney *et al*. (2013) was assigned a high certainty of 3, following the judgement made during the last round of reporting. Ryle *et al*. (2009) and Crawford *et al*. (1996) were both assigned a certainty of 2. Although these two datasets were based on a field survey and had been assigned a certainty of 3 during the last round of reporting they are now over 10 years old, increasing the uncertainty in the data. Fingal County Council (2010) and Dún Laoghaire-Rathdown County Council (date unknown) were retained as a certainty of 2, following the judgement made during the last round of reporting. All polygons with certainty 2 and 3 were used to map the distribution for the 2110 habitat; there were no polygons with a certainty of 1 within this dataset. A review of the NPWS (2013) certainty=1 and certainty=2 polygons was conducted using remote imagery. Based on this review 135 polygons were deleted due to the fact that the spatial data had been superseded by data collected during more recent field surveys (Delaney *et al*. 2013; Ryle *et al.* 2009).

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned	
3 Biogeographical and marine regions	
3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Crawford, I., Bleasdale, A. and Conaghan, J. (1996) Biomar Survey of Irish machair. A report to the National Parks and Wildlife Service, Dublin. Delaney, A., Devaney, F.M., and Barron, S.J. (2013) Monitoring survey of Annex I sand dune habitats in Ireland. Irish Wildlife Manuals, No. 75. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. Devaney, F., Barron, S. and Delaney, A. (2014) Survey of sand dune habitats at Portrane, Co. Dublin. Unpublished report by BEC Consultants Ltd., Dublin. Dún Laoghaire-Rathdown County Council (date unknown) Habitat_Inland_Coastal_polygon.shp. EPA (2017) A Summary of the State of Knowledge on Climate Change Impacts for Ireland: Report 11 (2010-2016). Prepared for the Environmental Protection Agency by MaREI Centre, Environmental Research Institute, University College Cork. M. Desmond, P. O'Brien and F. McGovern. EPA, Wexford. Fingal County Council (2010) Habitat_Polygons.shp. Martin, J.R. (2018) Backing document for assessment of pressures and threats SDMN17_AR1719_pressures_assessment. Unpublished report submitted to National Parks and Wildlife Service, Dublin. Martin, J.R., Daly, O.H. and Devaney F.M. (2017) Survey and assessment of vegetated shingle and associated habitats at 30 coastal sites. Volume 1: Main report. Irish Wildlife Manuals, No.

	98. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.1. Unpublished Report, National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. Ryle, T., Connolly, K., Murray, A. and Swann, M. (2009) Coastal monitoring Project (2004-06). Unpublished report submitted to National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Rodwell, J.S. (2000) British Plant Communities: Volume 5, Maritime communities and vegetation of open habitats. Cambridge University Press, The Edinburgh Building, Cambridge CB2 2RU, UK. Wilson, F. and Duff, K. (2014) Derrynane National Historic Park dune grassland survey and management recommendations. Unpublished report for The Office of Public Works, Knockreer House, Killarney.
3.2i Additional information	

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***14,600 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend	**a) Minimum**	

Magnitude *Optional*	**b) Maximum**	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 14,700 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators There is no evidence of an anthropogenic loss in range since the Directive came into force and the geographic spread is considered sufficient for the long term survival of the habitat. The Favourable reference range value is the same as the last reporting period (NPWS, 2013) with the geographic spread considered sufficient for the long term survival of the habitat.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods? YES/**NO*** *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/NO*
	b) yes, due to improved knowledge/more accurate data	*YES/NO*
	c) yes, due to the use of different method	*YES/NO*
	d) yes, but there is no information on the nature of change	*YES/NO*
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data / the use of a different method*	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 2110 habitat. A maximum gap distance of two 10 km grid cells was used when running the range tool. Fourteen 10 km grid cells generated by the range tool that had no coastline were removed. Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013). None of the anthropogenic area losses recorded during the current reporting period led to a contraction in the range. Therefore the short-term trend is Stable. The number of 10 km grid cells in the current range (146) is one lower than the previous reporting period (NPWS, 2013). This change can be attributed to both the use of a slightly different methodology, with all 10 km grid cells with a coastline retained within the range, and improved knowledge. One 10 km grid cell present in the NPWS	

	(2013) range was removed from the current range as it had no coastline. Another 10 km grid cell with a small stretch of coastline that had been manually removed from the NPWS (2013) range was retained in the current range. Finally, there was one 10 km grid cell lost from the current range since NPWS (2013) due to natural fluctuations in this dynamic habitat. The Favourable reference range value is the same as the previous reporting period (NPWS, 2013). The Favourable reference range is the current range, reported in 4.10, plus the one 10 km grid cell where there was a natural loss of 2110 since the last reporting period (i.e. the 10 km grid cell L98).

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***1996-2017***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***2.17 km^2***
5.3 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b)* ***Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	

5.10 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator ≈ (is approximately equal to) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data /* ***the use of a different method***	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 1996 (Crawford *et al*., 1996) when the first baseline survey was carried out and incorporates updates made by surveys carried out between 2004 and 2016 that are listed in Section 3.2. Favourable Reference Area (FRA) is approximately equal to the current area. Some very minor losses have been reported, since the Directive came into force, which were linked to once-off beach cleaning which does not permanently remove the habitat. During the current reporting period ten 2110 sites were visited, eight by Martin *et al.* (2017), one by Devaney *et al.* (2014) and one by Wilson and Duff (2014). This represents only a small proportion of the 36 sites surveyed by Delaney *et al.* (2013) and the 118 sites with 2110 habitat that were surveyed by Ryle *et al.* (2009) and any conclusions that can be made based on this small subsample are limited.	

	The short-term trend in Area is stable as the losses incurred by beach cleaning were considered to be negligible. No anthropogenic losses were recorded from the nine sites; Wilson and Duff (2014) make no accurate assessment of area during the current reporting period. During this reporting period there was a net gain of 1.69 ha across the nine sites surveyed by Martin *et al*. (2017) and Devaney *et al*. (2014). All gains were attributed to natural fluctuations in this dynamic habitat. The difference in habitat extent between the area of 2.17 km^2 reported during this reporting period and the figure of 1.99 km^2 reported during the previous reporting period (NPWS, 2013) is due to a number of factors such as genuine changes due to natural fluctuations in this dynamic habitat, improved knowledge/more accurate data and largely due to the use of a different method. The surface area figure of 1.99 km^2 reported during the previous reporting period (NPWS, 2013) was the total area of 2110 habitat mapped by Delaney *et al.* (2013) and Ryle *et al.* (2009). The area of 2.17 km^2 for the current reporting period was extracted directly from the distribution shapefiles using all sources listed in Section 3.2. The 2110 polygons mapped during NPWS (2013) were updated/superseded by the data collected during this reporting period. In addition to this, all certainty=1 and certainty=2 polygons in the NPWS (2013) dataset were reviewed. Following this review, 135 polygons totalling 0.84 km^2 were removed from the dataset due to the fact that the spatial data had been superseded by data collected during more recent field surveys (Delaney *et al.* 2013; Ryle *et al.* 2009).

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***1.89 km²***
		Maximum	***1.89 km²***
	b) Area in not-good condition	**Minimum**	***0.28 km²***
		Maximum	***0.28 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition	***stable*** */ increasing / decreasing / uncertain/ unknown*		

Direction	
6.5 Short-term trend of habitat area in good condition **Method used**	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***
6.7 Typical species **Method used** *Optional*	The list of typical species is the same as the last reporting period (NPWS, 2013) and was devised by Delaney *et al.* (2013). The Structure and functions criteria, including typical species, used to assess the 2110 habitat are listed in Appendix I of Delaney *et al.* (2013).
6.8 Additional information *Optional*	During the current reporting period ten 2110 sites were visited, eight by Martin *et al.* (2017), one by Devaney *et al.* (2014) and one by Wilson and Duff (2014). This represents only a small proportion of the 36 sites surveyed by Delaney *et al.* (2013) and the 118 sites with 2110 habitat that were surveyed by Ryle *et al.* (2009) and any conclusions that can be made based on this small subsample are limited. During the current reporting period, data were only available to assess the Structure and functions at seven 2110 sites, six surveyed by Martin *et al.* (2017) and one surveyed by Wilson and Duff (2014). At all seven 2110 sites the Structure and functions were assessed as Favourable. This sample only represents 0.1 km^2 (5%) of the total area of 2.17 km^2 of 2110 habitat in Ireland, therefore it is not considered representative. During the last reporting period 87% of the 2110 habitat was assessed as Favourable. The most frequent criteria to fail the assessment were 'damage due to disturbance' and 'interference with sediment dynamics' (NPWS, 2013). Based on expert judgement 87% was utilised when calculating the current area of 2110 habitat in good condition, as the figure is based on a larger sample and considered to be more accurate than the figure of 100% in good condition calculated during the current reporting period. Although only seven sites were assessed for Structure and functions during the current reporting period, the short-term trend of habitat area in good condition is taken to be stable based mainly on expert opinion. Typical species: *Elytrigia juncea*, *Leymus arenarius.*

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**F07** Sports, tourism and leisure activities (H) **F08** Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defence or coast protection works and infrastructures) (H) **L01** Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization) (H) **C01** Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell) (M) **E03** Shipping lanes, ferry lanes and anchorage infrastructure (e.g. canalisation, dredging) (M) **F01** Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions) (M) **F06** Development and maintenance of beach areas for tourism and recreation incl. beach nourishment and beach cleaning (M) **L02** Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices) (M)	**F07** Sports, tourism and leisure activities (H) **F08** Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defence or coast protection works and infrastructures) (H) **L01** Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization) (H) **C01** Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell) (M) **E03** Shipping lanes, ferry lanes and anchorage infrastructure (e.g. canalisation, dredging) (M) **F01** Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions) (M) **F06** Development and maintenance of beach areas for tourism and recreation incl. beach nourishment and beach cleaning (M) **L02** Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices) (M)

7.2 Sources of information *Optional*	Pressures were sourced from the following reports and accompanying data: Devaney, F.M., Barron, S.J. and Delaney, A. (2014) Survey of sand dune habitats at Portrane, Co. Dublin. Unpublished report by BEC Consultants Ltd., Dublin. Martin, J.R., Daly, O.H. and Devaney, F.M. (2017) Survey and Assessment of Vegetated Shingle and Associated Habitats at 30 Coastal Sites. Volume 1: Main report. *Irish Wildlife Manuals* No. 98. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. NPWS (2013) The Status of Protected EU Habitats and Species in Ireland. Overview Volume 1. Unpublished Report. National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin. Wilson, F. and Duff, K. (2014) Derrynane National Park Dune Grassland Habitat Survey and Management Recommendations. Produced for the Office of Public Works, Department of Public Expenditure and Reform, Kerry.
7.3 Additional information *Optional*	The pressures and threats presented in 7.1 were selected and ranked based on intensity (high, medium or low), frequency of occurrence, and area of impact. Data gathered from the sources listed in Section 7.2 are summarised in Martin (2018). For the current reporting period, data on pressures were available for eight sites, six sites surveyed by Martin *et al*. (2017), one site by Devaney *et al*. (2014) and one site by Wilson and Duff (2014). As this represents only a small proportion of the data collected from 36 sites by Delaney *et al*. (2013) to inform NPWS (2013), the pressure and threats information presented in NPWS (2013) were also utilised to inform the current reporting period. All pressures presented in NPWS (2013) were considered for the current reporting period. For eight of the pressures presented in NPWS (2013) there was additional evidence provided for their importance by the data collected during the current reporting period. Using the crosswalk referenced in Martin (2018) to transfer pressures to the current recording system, these eight pressures crosswalked to F07 (recorded five times in the current reporting period), F08 (recorded three times, but twice as a neutral pressure), F09, I02, and L01 (each recorded twice during the current reporting period), and F06 and L02 (each recorded once during the current reporting period). Based on the evidence collected over the last two reporting periods and expert opinion, F07, F08 and L01 were retained as high-importance pressures, and F06 and L02 were retained as medium-importance pressures. Although F09, recorded under 'litter', and I02 were both recorded twice during the current reporting period, based on the evidence collected during the current reporting period and expert opinion both are considered to be currently low-importance pressures for the 2110 habitat. Both F09 and I02 were reported as medium-importance pressures during NPWS (2013). During the current reporting period no evidence was provided for the medium-importance pressures C01, E03 and F01; however, based on expert opinion all three are still considered to be medium-importance pressures for the 2110 habitat. The pressures

	'Agricultural activities not referred to above' and 'Paths, tracks, cycling tracks' were both listed as medium-importance pressures in NPWS (2013) but based on expert opinion and the fact that both activities have very little impact at the front of dune systems they were not included in the medium-importance pressures listed above in Section 7.1. The only low-importance impact recorded in NPWS (2013) was A09 Intensive grazing or overgrazing by livestock and this was retained as a low-importance pressure for the current reporting period. Climate change was ranked as a high pressure and threat for 2110 in NPWS (2013); however, it has not been added as an impact in this reporting period but it is likely to affect the range of 2110 over the coming decades. The short-term predictability of the effect of climate change and in particular the resultant mean sea level rise and extreme weather events are unknown but the gradual long-term trend will see an increase in the mean sea level and extreme weather events (EPA, 2017) which will affect the 2110 habitat. Rodwell (2000) describes the establishment of this pioneer habitat through the colonisation, by seed and rhizome fragments, of *Elytrigia juncea* onto small areas of sand from more established stands of the species. As mean sea levels rise and extreme weather events increase, this habitat will be threatened by these combined events removing established areas of the 2110 habitat and reducing niches where species such as *Elytrigia juncea* can re-establish the habitat. The eight pressures presented in Section 7.1 are also considered to be the eight main threats in the future.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* *b) Measures identified and taken or* ***c) Measures needed but cannot be identified***
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* *b) Both inside and outside Natura 2000 or*

	c) Only outside Natura 2000
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	None recorded
8.6 Additional information *Optional*	Other conservation measures that are not currently being implemented, but whose implementation would improve the condition of the 2110 habitat, include CF10 Manage changes in hydrological and coastal systems and regimes for construction and development, CC01 Adapt/manage extraction of non-energy resources, and CF03 Reduce impact of outdoor sports, leisure and recreational activities.

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	*Good /* ***Poor*** */ Bad / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as Stable. Current range is one 10km grid cell less than the Favourable Reference Range. However, this is attributed to natural loss of 2110 rather than anthropogenic loss. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as Stable, as no change in Range is expected based on an assessment of the pressures and threats. Future prospects of Range are therefore Good. Short-term trend direction of Area is assessed as Stable. Current area is approximately equal to the Favourable Reference Area. Conservation status of Area is therefore Favourable. Future trend of Area is assessed as Stable. Future prospects of Area are therefore Good. Short-term trend direction of Structure and functions is Stable for habitat that is in Good condition. Current Structure and functions are assessed as Unfavourable-Inadequate as >75% but <90% of the habitat is in Good Condition. Conservation status of Structure and functions is therefore Unfavourable-Inadequate. Future trend of Structure and functions is assessed as Stable. Future prospects of Structure and functions are therefore Poor.	

10 Conclusions			
Assessment of conservation status at end of reporting period			
10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* **stable** */ unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/****NO***	*YES/****NO***
	b) yes, due to genuine change	*YES/NO*	*YES/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	*YES/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*

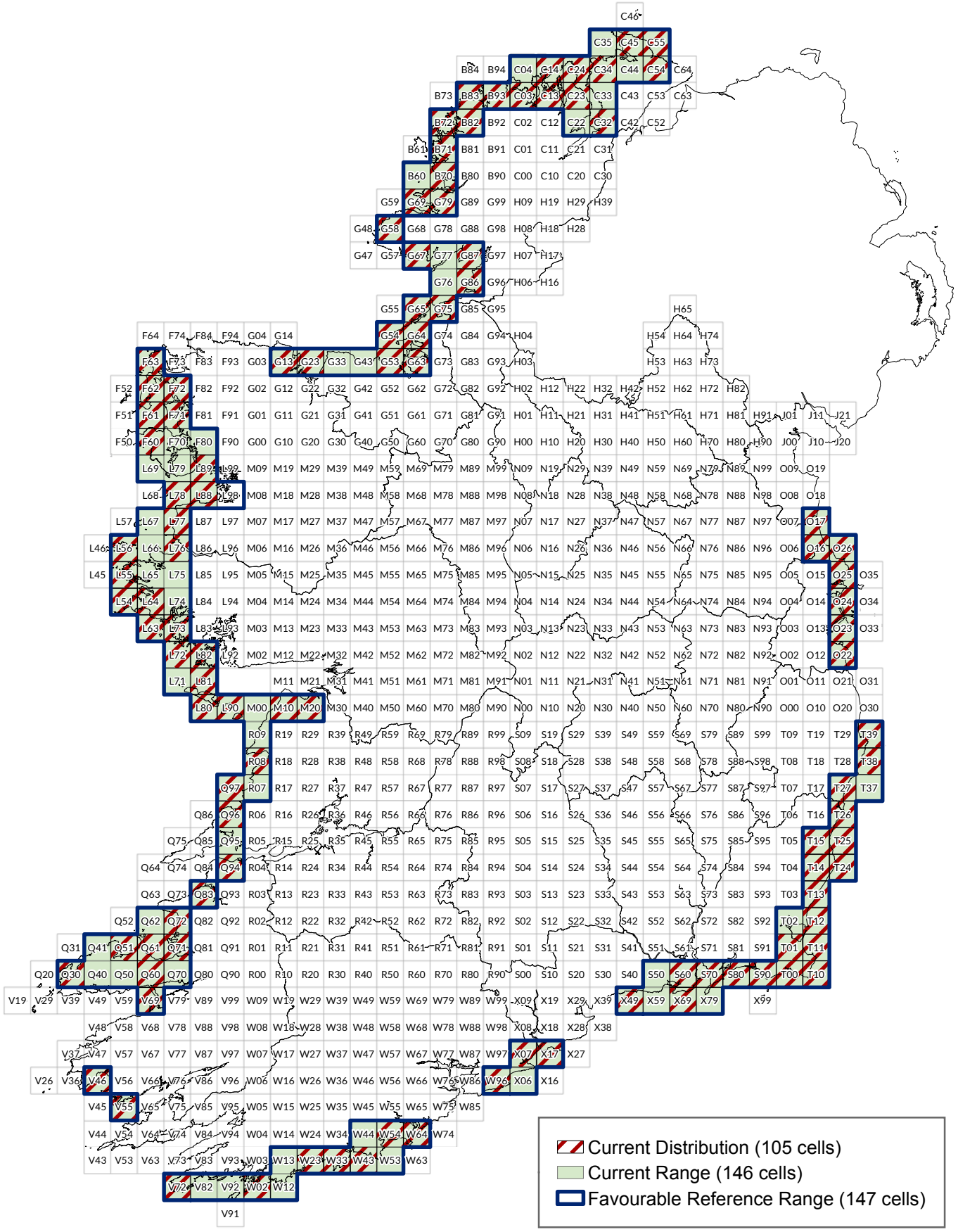
10.8 Additional information *Optional*	The Conservation Status of Range, Area, Structure and functions and Future prospects are all the same as the previous reporting period. The Overall assessment of Conservation Status is assessed as Unfavourable-Inadequate. This is the same as the previous reporting period. The current status of Unfavourable-Inadequate is due to 13% of the 2110 habitat being in poor condition.

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***1.83 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable** / increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing an intersect between the distribution shapefiles and the SAC shapefile. The area given in Section 11.1 is the total area of 2110 habitat in SACs in the country, including some SACs where 2110 is not listed as a qualifying interest (QI). The area of 2110 within the N2000 network where it is listed as a QI is 1.34 km^2. All of the 0.8 ha of 2110 habitat lost during the previous reporting period was within the North Dublin Bay SAC (site code 000206) where 2110 is listed as a QI, representativity A. No anthropogenic losses were reported within SACs during the current reporting period. There was one inconsistency between the current distribution for 2110 habitat and the Natura 2000 sites in which 2110 is listed as a QI: 2110 is listed as a QI for Rutland Island and Sound SAC, but there is no current record of the habitat there. The nearest record is in the	

	adjoining site Gweedore Bay and Islands SAC, c. 215m east, where 2110 is also a QI. The short-term trend of the habitat area in Good condition within the SAC network is taken to be Stable; this is derived from the trend of the 2110 habitat nationally (see Section 6.4 and 6.8), as almost all areas of 2110 habitat surveyed during the last two reporting periods were within the SAC network. The surface area of 2110 habitat within the N2000 network has increased from the previous reporting period; this is in part due to improved knowledge, but largely due to a change in methodology. In this reporting period an intersect between the current 2110 distribution (sources listed in Section 3.2) and the SAC shapefiles was used, whereas in the last reporting period an intersect between only the Ryle *et al.* (2009) and Delaney *et al.* (2013) 2110 shapefiles and the SAC shapefile was carried out (NPWS, 2013).

12 Complementary information

Embryonic shifting dunes (2110) Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**2120 Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)**
1.2i Habitat short name	**Marram dunes (white dunes)**
1.3i Habitat description	2120 Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) are dunes which are partly stabilised and are dominated by *Ammophila arenaria*. They tend to be taller than 2110 Embryonic shifting dunes and form further inland from these. The dunes are actively created by *Ammophila arenaria*, which traps sand, and vegetation cover is incomplete (Fossitt, 2000).

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***1996-2017***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) **Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was compiled using 2120 polygons mapped by Martin *et al.* (2017), Wilson and Duff (2014), Devaney *et al.* (2014), Delaney *et al.* (2013), NPWS (2012), Power (2011), Ryle *et al.* (2009), Fingal County Council (2010), Mayo County Council (2008) and Crawford *et al.* (1996). All references are detailed below in Section 3.2. No point data were available for the 2120 habitat. All of the aforementioned datasets published prior to 2014 were also used to compile the distribution map for the last reporting period (NPWS, 2013). A certainty rating system was applied to all data that informed the distribution map. This system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1, the lowest. The new data sources added since the last round of reporting (NPWS, 2013), Martin *et al.* (2017), Wilson and Duff (2014) and Devaney *et al.* (2014) were all judged to be a high certainty of 3. Delaney *et al.* (2013) and Power (2011) were also assigned a certainty of 3, following the judgement made during the last round of reporting. Ryle *et al.* (2009) and Crawford *et al.* (1996) were both assigned a certainty of 2. Although

	these two datasets were based on a field survey and had been assigned a certainty of 3 during the last round of reporting, they are now over 10 years old, increasing the uncertainty in the data. Fingal County Council data (2010) and Mayo County Council data (2008) were retained as certainty 2 following the judgement made during the last round of reporting. The NPWS (2012) polygons that had not been superseded by better quality data, such as Martin *et al.* (2017), Delaney *et al.* (2013), and Ryle *et al.* (2009), were retained as low certainty 1. All polygons with certainty 1 to 3 were used to map the distribution for the 2120 habitat. Following a review of the certainty 1 polygons using remote imagery, 43 polygons were deleted due to the fact that the spatial data had been superseded by data collected during more recent field surveys (Ryle *et al.* 2009; Delaney *et al.* 2013; Martin *et al.* 2017).

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
3.2 Sources of information	Crawford, I., Bleasdale, A. and Conaghan, J. (1996) Biomar Survey of Irish machair. A report to the National Parks and Wildlife Service, Dublin. Delaney, A., Devaney, F.M., and Barron, S.J. (2013) Monitoring survey of Annex I sand dune habitats in Ireland. *Irish Wildlife Manuals* No. 75. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. Devaney, F., Barron, S. and Delaney, A. (2014) Survey of sand dune habitats at Portrane, Co. Dublin. Unpublished report by BEC Consultants Ltd., Dublin. EPA (2017) A Summary of the State of Knowledge on Climate Change Impacts for Ireland: Report 11 (2010-2016). Prepared for the Environmental Protection Agency by MaREI Centre, Environmental Research Institute, University College Cork. M. Desmond, P. O'Brien and F. McGovern. EPA, Wexford. Fingal County Council (2010) Habitat_Polygons.shp. Martin, J.R. (2018) Backing document for assessment of pressures and threats SDMN17_AR1719_pressures_assessment. Unpublished report submitted to National Parks and Wildlife Service, Dublin. Martin, J.R., Daly, O.H. and Devaney F.M. (2017) Survey and assessment of vegetated shingle and associated habitats at 30 coastal sites. Volume 1: Main report. Irish Wildlife Manuals, No. 98. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. Mayo County Council (2008) Mayo_habitats_polygons_polygon.shp. NPWS (2012) Management Planning Support Unit Maps

	2405_imap95. CPU_Habitats_March_2012.shp NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.1. Unpublished Report, National Parks and Wildlife Service, Department of Arts, Heritage, and the Gaeltacht, Dublin. Power, G. (2011) Dungarvan Habitat Survey. Report prepared for Waterford County Council. Ryle, T., Connolly, K., Murray, A. and Swann, M. (2009). Coastal monitoring Project (2004-06). Unpublished report submitted to National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Wilson, F. and Duff, K. (2014) Derrynane National Historic Park dune grassland survey and management recommendations. Unpublished report for The Office of Public Works, Knockreer House, Killarney.
3.2i Additional information	

4 Range

Range within the biogeographical/marine region concerned

4.1 Surface area	***15,400 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	

<table>
<tr><td>4.9 Long-term trend
Method used

Optional</td><td colspan="2">Select one of the following methods:

a) Complete survey or a statistically robust estimate
b) Based mainly on extrapolation from a limited amount of data
c) Based mainly on expert opinion with very limited data
d) Insufficient or no data available</td></tr>
<tr><td rowspan="4">4.10 Favourable reference range</td><td colspan="2">a) 15,400 km^2</td></tr>
<tr><td colspan="2">b) Indicate if operators were used (using symbols ≈, >, >>) or</td></tr>
<tr><td colspan="2">c) If favourable reference range is unknown, indicate by using ‘x’</td></tr>
<tr><td colspan="2">d) Indicate method used to set reference value if other than operators

The Favourable reference range has been increased since the last reporting period (NPWS, 2013) due to the use of a different method. There is no evidence of loss of range since the Directive came into force and the geographic spread is considered sufficient for the long term survival of the habitat.</td></tr>
<tr><td rowspan="6">4.11 Change and reason for change in surface area of range</td><td colspan="2">Is there a change between reporting periods? YES/NO

If yes, provide the nature of that change. More than one option (a to d) can be chosen</td></tr>
<tr><td>a) yes, due to genuine change</td><td>YES/NO</td></tr>
<tr><td>b) yes, due to improved knowledge/more accurate data</td><td>YES/NO</td></tr>
<tr><td>c) yes, due to the use of different method</td><td>YES/NO</td></tr>
<tr><td>d) yes, but there is no information on the nature of change</td><td>YES/NO</td></tr>
<tr><td colspan="2">The change is mainly due to (select one of the reasons above):

genuine change / improved knowledge or more accurate data / the use of a different method</td></tr>
<tr><td>4.12 Additional information

Optional</td><td colspan="2">Range was calculated using the range tool, based on the current known distribution of the 2120 habitat. A maximum gap distance of two 10km grid cells was used when running the range tool. Seventeen 10km grid cells generated by the range tool that had no coastline or no suitable coastline (i.e. rocky shoreline and cliffs) were removed.

Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013). None of the area losses recorded during these two reporting periods led to a contraction in the range. The short-term trend is assessed as stable.

The number of 10km squares in the range (154) is one square higher than the last monitoring period (NPWS, 2013). This additional square is due to the use of a slightly different methodology, with all 10 km grid cells with a suitable coastline retained within the range within the current reporting period.

The Favourable reference range has increased since the last reporting period (NPWS, 2013) due to the use of a different method.</td></tr>
</table>

	The Favourable reference range is the current range, reported in 4.1.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***1996-2017***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***4.33 km²***
5.3 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator > (greater than) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	***YES****/NO*
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 1996 (Crawford *et al*., 1996) when the first baseline survey was carried out and incorporates updates made by surveys carried out between 1996 and 2016 that are listed in Section 3.2. Favourable Reference Area (FRA) was not determined exactly, but is estimated to be <10% more than the current area. FRA is deemed to be greater than the current area, given that some anthropogenic losses have occurred since the Directive came into force and there have also been losses due to natural processes. In NPWS (2013) a range was provided for the FRA, the maximum of which was set at 4.72 km^2, 9% more than the current area. During the current reporting period eleven 2120 sites were visited and ten of these were assessed for Area, nine by Martin e*t al*. (2017) and one by Devaney *et al*. (2014). The ten sites assessed for Area represent 0.55 km^2 (13%) of the total area of 2120 habitat recorded in Ireland. This represents a smaller proportion of the total area than the 36 sites with 2120 habitat that were surveyed by Delaney *et al.* (2013) and the 141 sites with 2120 that were surveyed by Ryle *et al*. (2009), limiting the conclusions that can be made. Short-term trend in Area was deemed to be decreasing due to a loss of 0.02 ha due to anthropogenic impacts reported during the last reporting period (NPWS, 2013). The magnitude of the known loss is approximately -0.01% per annum, measured over a period of 12	

	years (2007-2018). This figure is calculated by expressing the 0.02 ha area that was lost as a per-annum percentage of the 2.15 km^2 area surveyed in the last two reporting periods, including the area that has been lost within the total. The long-term trend in Area was deemed to be decreasing based on the fact that a 0.02 ha loss of 2120 habitat due to anthropogenic activities was reported in NPWS (2013). The difference in habitat extent between the area of 4.33 km^2 reported during this reporting period and the figure of 3.33 km^2 reported during the previous reporting period is due in part to genuine change, but largely due to improved knowledge/more accurate data. With regards to improved knowledge/more accurate data, the older data were superseded by the data collected during recent field surveys by Devaney *et al.* (2014) and Martin *et al.* (2017). There was a genuine change, a net increase, of 19.6 ha across ten of the 2120 sites in which Area was assessed during the current reporting period, with all gains and losses considered to be due to the natural fluctuations in a dynamic habitat. Martin *et al*. (2017) reported an increase in area (24.3 ha) at five sites due to habitat succession, including post-storm habitat succession, and a reduction in area (2.5 ha) at four sites also due to habitat succession, and erosion. Devaney *et al.* (2014) reported a net reduction of 2.2 ha in the Rogerstown Estuary due to the natural processes of stabilisation and succession.

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***3.90 km²***
		Maximum	***3.90 km²***
	b) Area in not-good condition	**Minimum**	***0.43 km²***
		Maximum	***0.43 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*		

6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***
6.7 Typical species Method used *Optional*	The list of typical species is the same as the last reporting period (NPWS, 2013) and was devised by Delaney *et al.* (2013). The Structure and functions criteria, including typical species, used to assess the 2120 habitat are listed in Appendix I of Delaney *et al.* (2013).
6.8 Additional information *Optional*	During the current reporting period eleven 2120 sites were visited and ten of these were assessed for Structure and functions, nine by Martin *et al.* (2017) and one by Wilson and Duff (2014). The ten sites assessed for Structure and functions represent 0.56 km^2 (13%) of the total area of 2120 habitat recorded in Ireland. This represents a smaller proportion of the total area than 36 sites with 2120 habitat that were surveyed by Delaney *et al.* (2013) and the 141 with 2120 that were surveyed by Ryle *et al.* (2009), limiting the conclusions that can be made. Of the ten sites assessed for Structure and functions in this reporting period, 97% (0.54 km^2) of the area was assessed as Favourable and 3% (0.02 km^2) was assessed as Unfavourable. Although based on a smaller sample size this result does not deviate significantly from the findings of NPWS (2013) presented below. The approach used to estimate the percentage of the 2120 habitat in unfavourable condition at each site was as follows: If none of the assessment criteria failed at the site level then none of the 2120 area was classified as unfavourable and the whole area of 2120 at the site was assigned as being in good condition; if 1 to 2 criteria failed at the site level this resulted in 25% of the 2120 area being classified as having unfavourable Structure and functions; if 3 to 4 assessment criteria failed this resulted in 50% of the 2120 area at the site being classified with unfavourable Structure and functions; if 5 to 6 criteria failed at the site level this resulted in 75% of the 2120 area at the site being classified as unfavourable; if 7 assessment criteria failed at the site level this resulted in 100% of the area of 2120 being assessed as unfavourable. During the last reporting period 90% of the 2120 habitat was assessed as Favourable (NPWS, 2013). The most frequent criteria to fail were 'damage due to disturbance' and 'interference with sediment dynamics'. During the current reporting period these same criteria were again the most frequent to fail the assessment. Based on expert judgement 90% was utilised when calculating the current area of 2120 habitat in good condition, as the figure is based on a larger sample (NPWS, 2013) and considered to be more accurate than the figure of 97% calculated during the current reporting period.

	Although during the current reporting period Structure and functions were assessed at only 10 sites, the short-term trend of habitat area in good condition is taken to be stable based on expert opinion. Typical species: *Ammophila arenaria, Elytrigia juncea, Leymus arenarius*.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**F07** Sports, tourism and leisure activities (H) **F08** Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defence or coast protection works and infrastructures) (H) **L01** Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization) (H) **E01** Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (M) **E03** (Shipping lanes, ferry lanes and anchorage infrastructure e.g. canalisation, dredging) (M) **F01** Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions) (M) **F06** Development and maintenance of beach areas for tourism and recreation incl. beach nourishment and beach cleaning (M) **I02** Other invasive alien species (other than species of Union	**F07** Sports, tourism and leisure activities (H) **F08** Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defence or coast protection works and infrastructures) (H) **L01** Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization) (H) **E01** Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (M) **E03** (Shipping lanes, ferry lanes and anchorage infrastructure e.g. canalisation, dredging) (M) **F01** Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions) (M) **F06** Development and maintenance of beach areas for tourism and recreation incl. beach nourishment and beach cleaning (M) **I02** Other invasive alien species (other than species of Union

	concern) (M)	concern) (M)
7.2 Sources of information *Optional*	Pressures and threats were selected and ranked from the following data: Devaney, F.M., Barron, S.J. and Delaney, A. (2014) Survey of sand dune habitats at Portrane, Co. Dublin. Unpublished report by BEC Consultants Ltd., Dublin. Martin, J.R., Daly, O.H. and Devaney, F.M. (2017) Survey and assessment of vegetated shingle and associated habitats at 30 coastal sites. Volume 1: Main report. *Irish Wildlife Manuals* No. 98. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. National Parks and Wildlife Service (2013). The Status of Protected EU Habitats and Species in Ireland. Overview Volume 1. Unpublished Report. National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin. Wilson, F. and Duff, K. (2014) Derrynane National Historic Park dune grassland survey and management recommendations. Unpublished report for The Office of Public Works, Knockreer House, Killarney.	
7.3 Additional information *Optional*	The pressures and threats presented in 7.1 were selected and ranked based on intensity (high, medium or low), frequency of occurrence, and area of impact. Data gathered from the sources listed in Section 7.2 are summarised in Martin (2018). For the current reporting period, data on pressures were available for eleven sites, nine sites surveyed by Martin *et al*. (2017), one by Devaney *et al.* (2014), and one by Wilson and Duff (2014). As this represents only a small proportion of the data collected from 36 sites by Delaney *et al.* (2013) to inform NPWS (2013), the pressure and threats information presented in NPWS (2013) was also utilised to inform the current reporting period. All pressures presented in NPWS (2013) were considered for the current reporting period. For ten of the pressures presented in NPWS (2013) there was additional evidence provided for their importance by the data collected during the current reporting period. These ten pressures were converted from the old impact recording system to the new, using the crosswalk referenced in Martin (2018), to F07 (recorded 15 times in the current reporting period), F09 (recorded five times during the current reporting period), F08 (recorded five times, three of these as a neutral impact), I02 (recorded three times during the current reporting period), A36 (recorded twice, once as a neutral impact), L01 and L02 (both recorded twice during the current reporting period), and E01 and F06 (both recorded once during the current reporting period). Although F09 was recorded on five occasions under 'litter' during the current reporting period it is considered, based on expert opinion, to be a low-importance pressure for the 2120 habitat. During the current reporting period no evidence was provided for the high-importance pressure F08; however, based on expert opinion sea defences and coastal protection works are still a high-importance pressure on the 2120 habitat. Based on expert opinion the pressures C01, E03 and F01, all listed during NPWS (2013), were retained as medium-importance	

	pressures. The impact 'fences, fencing' that crosswalked to A36 (Agriculture activities not referred to above) was listed as a medium-importance pressure in NPWS (2013), but based on expert opinion and the fact that this pressure was only recorded as a low-intensity or neutral pressure during the current recording period A36 was assessed as a low-importance pressure for the current reporting period. A09 (Intensive grazing or overgrazing by livestock) was listed as a medium-importance pressure in NPWS (2013) but was not recorded during the current recording period. Due to intensive grazing practices (A09) not normally being instigated in a habitat with such a low cover of recognised forage species A09 was assessed as a low-importance pressure for the current reporting period. Based on the data collected during the current reporting period and NPWS (2013), L02 (Natural succession resulting in species composition change) was initially assessed as a medium-importance pressure. However, as more than five medium-importance pressures were initially selected, all medium-importance pressures were reassessed. Based on the data collected and expert opinion, L02 was considered to have the lowest ranking and was reassessed as a low-importance pressure for the current reporting period. Climate change has not been added as an impact of medium or high importance but it is likely to affect the range of 2120 over the coming decades. The long-term trend will see an increase in mean sea level and extreme weather events (EPA, 2017) which will impact the formation, stabilisation and species diversity of the 2120 habitat. The eight pressures presented in Section 7.1 are also considered to be the eight main threats in the future.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type** or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* ***a) Only inside Natura 2000 or*** *b) Both inside and outside Natura 2000 or*

	c) Only outside Natura 2000
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* ***a) Short-term results (within the current reporting period, 2013-2018)*** *or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	**CL03** Restore habitats following geological and natural catastrophes
8.6 Additional information *Optional*	Conservation measures were selected and ranked based on the frequency of occurrence, using the data gathered during the current reporting period. These data were obtained from eleven sites, comprised of nine sites from the Vegetated Shingle Monitoring (VSM) survey (Martin *et al*., 2017), one site recorded by Devaney *et al*. (2014) and one site recorded by Wilson and Duff (2014). The maintenance of grazing by non-domestic grazers including hares and rabbits (recorded under code CG02) was frequently recorded during the current reporting period, with these species controlled by a combination of human hunting and natural predation. As there is no evidence that hare or rabbit populations are managed for the conservation of the 2120 habitat, CG02 was not recorded as a conservation measure in Section 8.5. The application of restoration measures (recorded under code CL03), including the use of straw bales and the planting of *Ammophila arenaria*, were recorded at one site, Tralee Bay And Magharees Peninsula, West To Cloghane SAC (site code 002070). Other conservation measures that are not currently being implemented, but whose implementation would improve the Structure and functions of the habitat, include CI02 Management, control or eradication of established invasive alien species of Union concern.

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	*Good /* ***Poor*** */ Bad / Unknown*
	c) Structure and functions	***Good*** */ Poor / Bad / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as Stable. Current range is equal to the Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as Stable, as no change in Range is expected based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Range are therefore Good. Short-term trend direction of Area is assessed as Decreasing as	

	NPWS (2013) reported a loss in area of 0.02 ha due to anthropogenic impacts during the last reporting period. Current area is <10% less than the Favourable Reference Area. Conservation status of Area is therefore Unfavourable-Inadequate. Future trend of Area is assessed as Stable as there is no evidence to suggest that these minor losses will continue into the future. Future prospects of Area are therefore Poor. Short-term trend direction of Structure and functions is Stable for habitat that is in Good condition. Current Structure and functions are assessed as Favourable as 90% of the habitat is in Good condition. Conservation status of Structure and functions is therefore Favourable. Future trend of Structure and functions is assessed as Stable. Future prospects of Structure and functions are therefore Good.

10 Conclusions

Assessment of conservation status at end of reporting period

10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.2 Area	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*
10.3 Specific structure and functions (incl. typical species)	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.4 Future prospects	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*
10.5 Overall assessment of Conservation Status	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*

	Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
a) no, there is no difference	*YES/****NO***	*YES/****NO***
b) yes, due to genuine change	*YES/NO*	*YES/NO*
c) yes, due to improved knowledge/more accurate	*YES/NO*	*YES/NO*

	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	The Conservation Status of Range is Favourable in this reporting period, as it was in the previous reporting period. The Conservation Status of Area and Future prospects are Unfavourable-Inadequate, as they were in the previous reporting period. The Conservation Status of Structure and functions is assessed as Favourable during this reporting period, whilst it was assessed as Unfavourable-Inadequate in the previous reporting period. This is due to the lower threshold required to attain a Favourable status rather than any notable improvements. The Overall assessment of Conservation Status was Unfavourable-Inadequate, as it was during the last reporting period. The status of Unfavourable-Inadequate during the current reporting period was due to the current area being below the Favourable Reference Area due to small losses since the Directive came into force. Trend in Overall assessment of Conservation Status was assessed as stable.		

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***3.75 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

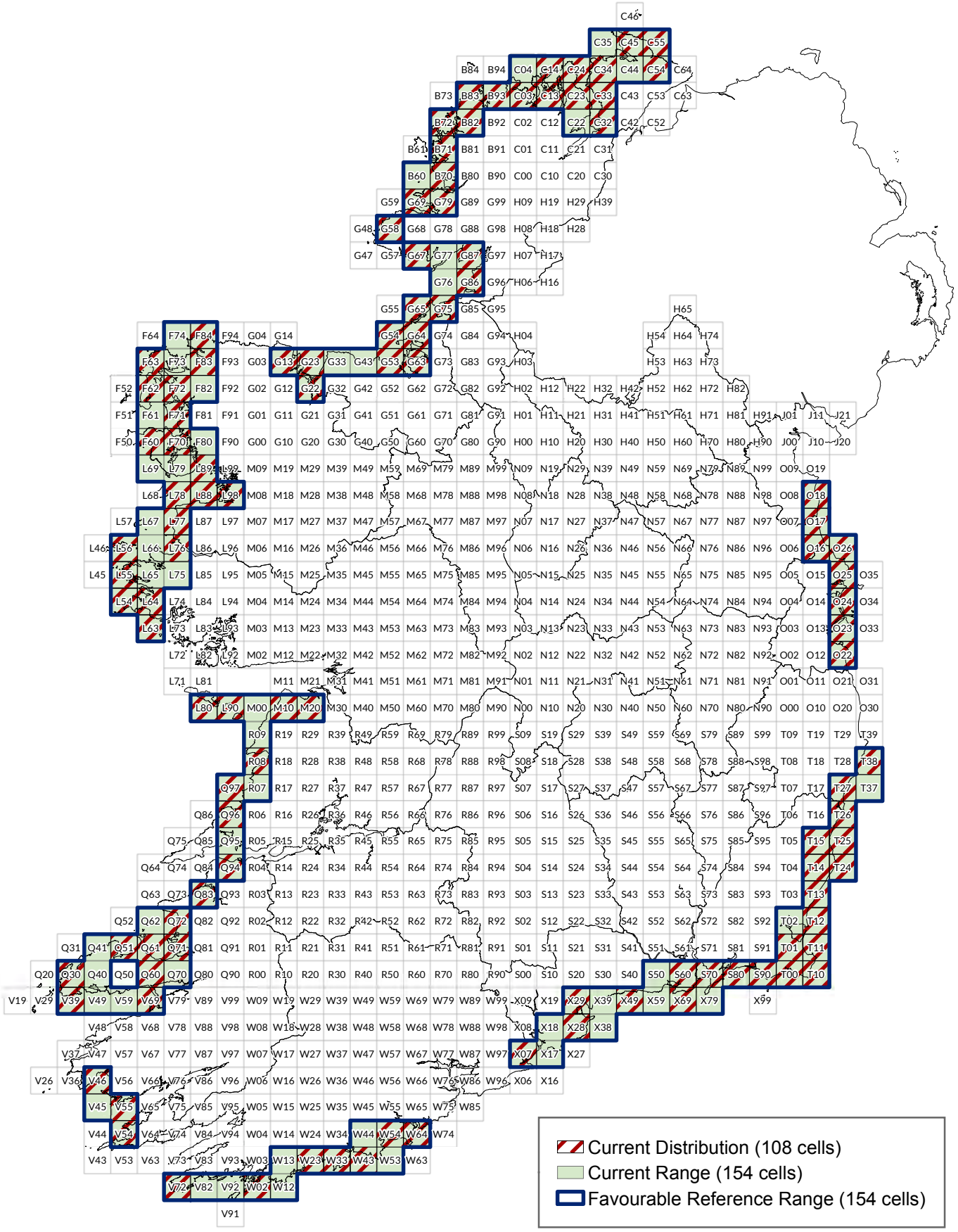
11.4 Short-term trend of habitat area in good condition within the network **Direction**	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable*** */ increasing / decreasing / uncertain/ unknown*
11.5 Short-term trend of habitat area in good condition within network **Method used**	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing an intersect between the distribution shapefiles and the SAC shapefiles. The area given in Section 11.1 is the total area of 2120 habitat in SACs in the country, including some SACs where 2120 is not listed as a qualifying interest (QI). The area of 2120 within the Natura 2000 network where it is listed as a QI is 3.40 km^2. No anthropogenic loss of 2120 habitat was reported in the current reporting period. During the previous reporting period (NPWS, 2013), 100% of the 0.02 ha of the 2120 habitat lost due to anthropogenic impacts was from within two SACs, both of which listed the habitat as a QI. There was one inconsistency between the current distribution for 2120 habitat and the Natura 2000 sites in which 2120 is listed as a QI: 2120 is listed as a QI for Rutland Island and Sound SAC, but there is no current record of the habitat there. The nearest record is in the adjoining site Gweedore Bay and Islands SAC, c. 215m east, where 2120 is also a QI. The short-term trend of the habitat area in good condition within the SAC network is taken to be stable, with the same trend as the 2120 habitat nationally (see Section 6.4 and 6.8), as almost all areas of 2120 habitat surveyed during the last two reporting periods were within the SAC network. The surface area of 2120 habitat within the N2000 network has increased from the previous reporting period. This is in part due to improved knowledge, but largely due to a change in methodology. In this reporting period an intersect between the current 2120 distribution (sources listed in Section 2.5) and the SAC shapefile was undertaken, whereas in the last reporting period an intersect between only the Ryle *et al.* (2009) and Delaney *et al.* (2013) 2120 shapefiles and the SAC shapefile was carried out (NPWS, 2013).

12 Complementary information

12.1 Justification of % thresholds for trends *Optional*	The reported loss of 0.02 ha due to trampling and beach cleaning in the last reporting round is not considered sufficient to warrant an overall declining trend.

12.2 Other relevant information *Optional*	

Marram Dunes
(White Dunes) (2120)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)***
1.2i Habitat short name	**Fixed dunes (grey dunes)**
1.3i Habitat description	Fixed coastal dunes with herbaceous vegetation (grey dunes) are relatively sheltered with sand mobility greatly reduced in comparison to fore-dune habitats, and have developed a more or less closed carpet of vegetation. The sandy substrate is frequently overlain by a layer of humus, and lichens and mosses are often abundant. Species diversity and composition varies, but usually the fixed dune vegetation is typical of herb-rich grassland. Species such as *Festuca rubra*, *Agrostis* spp., *Achillea millefolium*, *Lotus corniculatus*, *Anthyllis vulneraria*, *Plantago lanceolata*, *Euphrasia* spp., *Thymus polytrichus* and *Galium verum* are common. 2130 fixed dunes can also be an important habitat for orchids such as *Anacamptis pyramidalis* and *Ophrys apifera*.

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***1996-2016***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was compiled using 2130 polygons mapped by Martin *et al.* (2017), Long and Brophy (in prep.), Devaney *et al.* (2014), Wilson and Duff (2014), Woodrow and Denyer (2014), Delaney *et al.* (2013), NPWS (2012), Power (2011), Ryle *et al.* (2009), Fingal County Council (2010) and Crawford *et al.* (1996). All references are detailed below in Section 3.2. In addition to the sources listed above the distribution map also utilised points digitised from O'Neill and Martin (2017). Area was assigned (using remote imagery) to all points which did not occur within an assigned 2130 polygon. All references are detailed below in Section 3.2. All of the aforementioned datasets published prior to 2014 were also used to compile the distribution map from the last reporting period (NPWS, 2013).

	A certainty rating system was applied to all data that informed the distribution map. This system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1, the lowest. The new data sources added since the last round of reporting (NPWS, 2013), Martin *et al.* (2017), Long and Brophy (in prep.), O'Neill and Martin (2017), Devaney *et al.* (2014), Wilson and Duff (2014) and Woodrow and Denyer (2014), were all judged to be a high certainty of 3. Delaney *et al.* (2013) was assigned a certainty of 2 or 3, and Power (2011) was assigned a certainty of 3, following the judgement made during the last round of reporting. Ryle *et al.* (2009) and Crawford *et al.* (1996) were both assigned a certainty of 2. Although these two datasets were based on a field survey and had been assigned a certainty of 3 during the last round of reporting they are now over 10 years old, increasing the uncertainty in the data. Fingal County Council data (2010) were retained as certainty 2 following the judgement made during the last round of reporting. The NPWS (2012) polygons that had not been superseded by better quality data, such as Martin *et al.* (2017), were generally retained as certainty 1 or 2. All polygons with certainty 1 to 3 were used to map the distribution for the 2130 habitat. Following a review of certainty 1 polygons using remote imagery, three polygons were deleted due to the fact that the spatial data had been superseded by data collected during more recent field surveys (Ryle *et al.* 2009; Martin *et al.* 2017).

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Crawford, I., Bleasdale, A. and Conaghan, J. (1996) Biomar Survey of Irish machair. Unpublished report submitted to National Parks and Wildlife Service, Dublin. Delaney, A., Devaney, F.M., and Barron, S.J. (2013) Monitoring survey of Annex I sand dune habitats in Ireland. *Irish Wildlife Manuals* No. 75. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. Devaney, F., Barron, S. and Delaney, A. (2014) Survey of sand dune habitats at Portrane, Co. Dublin. Unpublished report by BEC Consultants Ltd., Dublin. EPA (2017) A Summary of the State of Knowledge on Climate Change Impacts for Ireland: Report 11 (2010-2016). Prepared for the Environmental Protection Agency by MaREI Centre, Environmental Research Institute, University College Cork. M. Desmond, P. O'Brien and F. McGovern. EPA, Wexford. Fingal County Council (2010) Habitat_Polygons.shp Houston, J. (2008). Management of Natura 2000 habitats. 2130*

	Fixed coastal dunes with herbaceous vegetation ('grey dunes'). Technical Report 2008 04/24 commissioned by The European Commission, Brussels. Long, M.P. and Brophy, J.T. (in prep.) Monitoring of sites and habitat for three Annex II species of whorl snail (*Vertigo*). Volume 1: Final Report. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin. Martin, J.R., Daly, O.H. and Devaney F.M. (2017) Survey and assessment of vegetated shingle and associated habitats at 30 coastal sites. Volume 1: Main report. *Irish Wildlife Manuals* No. 98. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. NPWS (2012) Management Planning Support Unit Maps 2405_imap95. CPU_Habitats_March_2012.shp NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.1. Unpublished Report, National Parks and Wildlife Service, Department of Arts, Heritage, and the Gaeltacht, Dublin. O'Neill, F.H. and Martin, J.R. (2018) The Irish Juniper Monitoring Survey 2017. *Irish Wildlife Manuals* No. 101. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland. Power, G. (2011) Dungarvan Habitat Survey. Report prepared for Waterford County Council. Ryle, T., Connolly, K., Murray, A. and Swann, M. (2009). Coastal monitoring Project (2004-06). Unpublished report submitted to National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Wilson, F. and Duff, K. (2014) Derrynane National Historic Park dune grassland survey and management recommendations. Unpublished report for The Office of Public Works, Knockreer House, Killarney. Woodrow, W. and Denyer, J. (2014) NIS: The use of designated machair within the West of Ardara / Maas Road SAC and Skeskinmore Lough SPA for the Annual Ardara Agricultural Show. Unpublished report submitted to National Parks and Wildlife Service, Dublin.
3.2i Additional information	

4 Range

Range within the biogeographical/marine region concerned	
4.1 Surface area	***16,600 km²***
4.2 Short-term trend Period	***2007–2018***
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*

4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994-2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b)* Based mainly on extrapolation from a limited amount of data ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 16,600 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable reference range has been increased since the last reporting period (NPWS, 2013) due to improved knowledge and the use of a different method. There is no evidence of loss of range since the Directive came into force and the geographic spread is considered sufficient for the long-term survival of the habitat, therefore the Favourable reference range is set as the current range.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***

	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data / **the use of a different method***
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 2130 habitat. A maximum gap distance of two 10 km grid cells was used when running the range tool. Twelve 10 km grid cells generated by the range tool that had no coastline or no suitable coastline (i.e. rocky shoreline and cliffs) were removed. Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013). None of the area losses recorded during these two reporting periods led to a contraction in the range. The short-term trend is Stable. The number of 10 km squares in the range (166) is seven squares higher than the last monitoring period (NPWS, 2013). These changes are due to the use of a slightly different methodology, with all 10 km grid cells with a suitable coastline retained within the range (six additional squares), and due to improved knowledge (one additional square) in the current reporting period. The Favourable reference range has been increased since the last reporting period (NPWS, 2013) to reflect the improved level of knowledge and the use of a different method. The Favourable reference range is the current range, reported in 4.1.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***1996-2016***	
5.2 Surface area *(in km²)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***80.84 km²***
5.3 Type of estimate	*Best estimate / 95% confidence interval / **minimum***	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable*** / increasing */ decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude	**a) Minimum**	
	b) Maximum	

Optional	**c) Confidence interval**	
5.8 Short-term trend Method used	*Select one of the following methods:* *a)* ***Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator > (greater than) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 1996 (Crawford *et al.*, 1996) when the first baseline survey was carried out and incorporates updates made by	

	surveys carried out between 1996 and 2016 that are listed in Section 3.2. During the current reporting period twenty 2130 sites were visited and ten of these sites were assessed for Area, nine by Martin e*t al*. (2017) and one by Devaney *et al.* (2014). The ten sites assessed for Area represent 9.44 km^2 (12%) of the total area of 2130 habitat recorded in Ireland. This represents a smaller proportion of the total national area of 2130 than the 36 sites with 2130 habitat that were surveyed by Delaney *et al.* (2013) and the 152 sites with 2130 that were surveyed by Ryle *et al.* (2009), limiting the conclusions that can be made. A loss in area of 3 ha was not deemed significant during the last reporting period and therefore NPWS (2013) reported the Area parameter as being Favourable. However it is likely that undocumented losses have occurred since the Directive came into force and therefore the FRA is set as greater than the current area and the long term trend is considered to be declining. The difference in habitat extent between the area of 80.84 km^2 reported during this reporting period and the figure of 72.8 km^2 reported during the previous reporting period (NPWS, 2013) is due to a number of factors, in part due to genuine changes because of natural fluctuations in this dynamic habitat and improved knowledge/more accurate data, but largely due to the use of a different method. There was a genuine change in area that was assessed during the current reporting period, with a net loss of 15 ha across ten of the 2130 sites, but all losses were considered to be due to the natural fluctuations in a dynamic habitat. Martin *et al*. (2017) reported a reduction in area (28.6 ha) at five 2130 sites due to habitat succession and erosion, and an increase in area (14.2 ha) at four sites due to habitat succession. Devaney *et al.* (2014) also recorded a loss, a net reduction in area of 0.62 ha in the Rogerstown Estuary SAC due to succession and erosion. With regards to improved knowledge/ more accurate data, the older data were superseded by the data collected during recent field surveys, such as Devaney *et al.* (2014) and Martin *et al.* (2017). The surface area of 72.8 km^2 reported during the 2007-2012 reporting period (NPWS, 2013) was an extrapolation of data from the Sand Dune Monitoring project (Delaney *et al*., 2013). A different method was used in this reporting period, whereby the area was extracted directly from the distribution shapefiles.

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***42.04 km²***
		Maximum	***60.55 km²***
	b) Area in not-good condition	**Minimum**	***20.29 km²***
		Maximum	***38.80 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***

6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***
6.4 Short-term trend of habitat area in good condition Direction	*stable / increasing / **decreasing** / uncertain/ unknown*
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***
6.7 Typical species Method used *Optional*	The list of typical species is the same as the last reporting period (NPWS, 2013) and was devised by Delaney *et al.* (2013). The Structure and functions criteria, including typical species, used to assess the 2130 habitat are listed in Appendix I of Delaney *et al.* (2013).
6.8 Additional information *Optional*	During the current reporting period twenty 2130 sites were visited, eleven of which were assessed for Structure and functions, nine by Martin *et al*. (2017) one by Wilson and Duff (2014), and one site by Woodrow and Denyer (2014). A further nine 2130 sites were visited in this reporting period by Long and Brophy (in prep.) and whilst a number of Structure and functions criteria were assessed during these surveys, these data were not included as site selection was biased towards rank 2130 habitat that provided suitable habitat for the snail species being studied. The eleven sites assessed for Structure and functions represents 9.54 km^2 (12%) of the total area of 2130 habitat recorded in Ireland. This represents only a small proportion of the 36 sites that were surveyed by Delaney *et al*. (2013) and the 152 sites with 2130 that were surveyed by Ryle *et al.* (2009) and any conclusions that can be made based on this small sample are limited. Of the eleven sites assessed for Structure and functions in this reporting period, 52% (4.93 km^2) of the area was assessed as being in good condition (Favourable) and 48% (4.61 km^2) of the area was assessed as not being in good condition (Unfavourable). Although these results deviate from the findings of NPWS (2013) (see below) the overall conclusion of Unfavourable-Bad is the same. During the current reporting period the approach used to estimate the percentage of the 2130 habitat in unfavourable condition at each

	site was as follows: If none of the assessment criteria failed at the site level then none of the 2130 area was classified as unfavourable and the whole area of 2130 at the site was assigned as being in good condition; if 1 to 2 criteria failed at the site level this resulted in 25% of the 2130 area being classified as having unfavourable Structure and functions; if 3 to 5 assessment criteria failed this resulted in 50% of the 2130 area at the site being classified with unfavourable Structure and functions; if 6 to 8 criteria failed this resulted in 75% of the 2130 area at the site being classified as unfavourable; if 9 to 11 assessment criteria failed at the site level this resulted in 100% of the area of 2130 being assessed as unfavourable. During the last reporting period 74.9% of the 2130 habitat was assessed as Favourable (NPWS, 2013) and the most frequent criteria to fail the assessment were 'disturbance', 'height of vegetation', 'non-native species' and 'lack of positive indicator species'. During the current reporting period these same criteria were again the most frequent to fail the assessment. There is a large deviation between 52% of the 2130 area in good condition (Favourable) reported during the current reporting period and the 74.9% in good condition reported in the last reporting period (NPWS, 2013). Based on expert opinion it was decided that 52% is likely to represent a minimum figure for the percentage of the national area of 2130 in good condition and 74.9% represents a maximum figure. Therefore the two figures were utilised to calculate the minimum and maximum area figures presented in Section 6.1 The short-term trend of habitat area in good condition was taken to be Decreasing. This is due to the fact that for the eight 2130 sites where the Structure and functions were assessed during both this reporting period and the previous reporting period, the status of the Structure and functions had decreased at four sites, increased at one site and remained the same at three sites, although it should be noted that at two of these sites the Structure and functions remained Unfavourable-Bad. Typical species: *Agrostis capillaris, Aira praecox, Anthyllis vulneraria, Carex arenaria, Carex flacca, Carex nigra, Carex pilulifera, Cladonia spp., Crepis capillaris, Daucus carota, Deschampsia flexuosa, Dicranum scoparium, Erodium cicutarium, Euphrasia officinalis* agg.*, Festuca ovina, Festuca rubra, Galium saxatile, Galium verum, Homalothecium lutescens, Hylocomium splendens, Hypnum cupressiforme, Hypochaeris radicata, Linum catharticum, Lotus corniculatus, Luzula campestris, Ononis repens, Peltigera spp., Phleum arenarium, Pilosella officinarum, Plantago lanceolata, Pleurozium schreberi, Poa pratensis, Polygala serpyllifolia, Potentilla erecta, Rhinanthus minor, Rhytidiadelphus squarrosus, Rhytidiadelphus triquetrus, Scleropodium purum, Sedum acre, Syntrichia ruraliformis, Thymus polytrichus, Trifolium repens, Viola chamaedrys, Viola canina, Viola riviniana, Viola tricolor.*

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A10** Extensive grazing or undergrazing by livestock (H) **I02** Problems related to invasive alien species other than those covered by EU Regulation 1143/2014 (H) **A02** Conversion from one type of agricultural land use to another (excluding drainage and burning) (M) **A09** Intensive grazing or overgrazing by livestock (M) **F07** Sports, tourism and leisure activities (M) **F08** Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defence or coast protection works and infrastructures) (M) **L02** Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices) (M)	**A10** Extensive grazing or undergrazing by livestock (H) **I02** Problems related to invasive alien species other than those covered by EU Regulation 1143/2014 (H) **A02** Conversion from one type of agricultural land use to another (excluding drainage and burning) (M) **A09** Intensive grazing or overgrazing by livestock (M) **F07** Sports, tourism and leisure activities (M) **F08** Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defence or coast protection works and infrastructures) (M) **L02** Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices) (M)

7.2 Sources of information

Optional

Pressures and threats were selected and ranked from the following data:

Devaney, F.M., Barron, S.J. and Delaney, A. (2014) Survey of sand dune habitats at Portrane, Co. Dublin. Unpublished report by BEC Consultants Ltd.

Martin, J.R. (2018) Backing document for assessment of pressures and threats SDMN17_AR1719_pressures_assessment. Unpublished report submitted to National Parks and Wildlife Service, Dublin.

Martin, J.R., Daly, O.H. and Devaney, F.M. (2017) Survey and Assessment of Vegetated Shingle and Associated Habitats at 30 Coastal Sites. Volume 1: Main report. *Irish Wildlife Manuals* No.

	98. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. National Parks and Wildlife Service (NPWS) (2013). The Status of Protected EU Habitats and Species in Ireland. Overview Volume 1. Unpublished Report. National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin. Wilson, F. and Duff, K. (2014) Derrynane National Historic Park dune grassland survey and management recommendations. Unpublished report for The Office of Public Works, Knockreer House, Killarney. Woodrow, W. and Denyer, J. (2014) NIS: The use of designated machair within the West of Ardara / Maas Road SAC and Skeskinmore Lough SPA for the annual Ardara agricultural show. Unpublished report for National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin.
7.3 Additional information *Optional*	The pressures and threats presented in 7.1 were selected and ranked based on intensity (high, medium or low), frequency of occurrence, and area of impact. Data gathered from the sources listed in Section 7.2 are summarised in Martin (2018). For the current reporting period, data on pressures were available for 12 sites, nine sites surveyed by Martin *et al.* (2017), and one site each from Denyer and Woodrow (2014), Devaney *et al.* (2014), and Wilson and Duff (2014). As this represents only a small proportion of the data collected from 36 sites by Delaney *et al.* (2013) to inform NPWS (2013), the pressure and threats information presented in NPWS (2013) were also utilised to inform the current reporting period. All pressures presented in NPWS (2013) were considered for the current reporting period. Pressures recorded under the old impact recording system were converted to the new system using the crosswalk referenced in Martin (2018). The most frequently recorded pressures in the current reporting period were crosswalked to F07 (recorded at all 12 sites during the current reporting period), F09 and I02 (recorded at eight sites during the current reporting period), L02 (recorded at 6 sites, and E01 and F08 (recorded at five sites during the current reporting period). Although F09 was recorded at eight sites during the current reporting period it is considered to be a low-importance pressure for the 2130 habitat as it was often recorded impacting a small area and at a low intensity. The other five frequently recorded pressures were listed in Section 7.1 as medium- or high-importance pressures based on expert opinion and taking account of the fact that of these five pressures NPWS (2013) only listed I02 as high importance. The pressures A09 Intensive grazing or overgrazing by livestock and A10 Extensive grazing or undergrazing by livestock were not among the most frequently recorded pressures during the current recording period, but both were listed as high-importance pressures in the previous round of reporting (NPWS, 2013). Also A02 Conversion from one type of agricultural land use to another (excluding drainage and burning) was not frequently recorded during the current reporting period but was listed as a medium-importance pressure in NPWS (2013). Based on expert judgement and the fact that when these

	three pressures were recorded during the current reporting period they were often noted as high intensity impacts, they were all listed in Section 7.1, with A10 listed as a high-importance pressure and A02 and A09 as medium importance. There were four pressures listed as medium importance in NPWS (2013) that were considered to be of low importance for the current reporting period. These were C01 Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell), F01 Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions), F09 Deposition and treatment of waste/garbage from household/ recreational facilities, and L01 Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization). These four pressures were assessed as low importance during the current reporting period, because they were noted less frequently, or not at all, and/or they affected only small areas, and/or they were often recorded at a low intensity. Further information is provided in Martin (2018). The issue of grazing is complex, livestock undergrazing (or extensive grazing) is recorded as a high-importance pressure and overgrazing (or intensive grazing) is recorded as medium-importance. Undergrazing can lead to scrub encroachment, over-stabilisation of dunes, loss of heterogeneity at a local and landscape level and loss of dune species diversity (Houston, 2008). Conversely, though, overgrazing can lead to bare ground and sand-drift (Houston, 2008). In order to achieve a suitable grazing regime to benefit the 2130 habitat, a balance needs to be maintained between the two effects. Climate change has not been added as an impact of medium or high importance but it is likely to affect the range of 2130 over the coming decades. The short-term predictability of the effect of climate change and in particular the resultant mean sea level rise and extreme weather events are unknown but the gradual long-term trend will see an increase in the mean sea level and extreme weather events (EPA, 2017) which will affect the 2130 habitat. One way this could occur is by extreme weather events impacting the formation and stabilisation of the foredune communities 2110 and 2120 which develop into the 2130 habitat. The seven pressures presented in Section 7.1 are also considered to be the seven main threats in the future.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*

8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type*** *or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000*** *or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* ***a) Short-term results (within the current reporting period, 2013-2018)*** *or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	**CA03** Maintain existing extensive agricultural practices and agricultural landscape features
8.6 Additional information *Optional*	Conservation measures were selected and ranked based on the frequency of occurrence, using the data gathered during the current reporting period. These sources are listed in Section 7.2 and these data are summarised in Martin (2018). The maintenance of extensive cattle grazing (recorded under code CA03) is the most frequent conservation measure applied to the habitat. In some cases the maintenance of extensive cattle grazing is undertaken through the Department of Agriculture's Green, Low-Carbon, Agri-Environment Scheme (GLAS). The maintenance of grazing by non-domestic grazers including hares and rabbits (recorded under code CG02) was recorded within the 2130 habitat during the current reporting period, with these species controlled by a combination of human hunting and natural predation. As there is no evidence that hare or rabbit populations are managed for the conservation of the 2130 habitat, CG02 was not recorded as a conservation measure in Section 8.5. It should be recognised that the management regimes of most fixed dunes are driven by the landowner rather than by any formal management plan or policy; therefore, the continued operation of the management regimes currently in place is not guaranteed. Other conservation measures that are not currently being implemented, but whose implementation would improve the Structure and functions of the habitat, include the control or removal of non-native species, particularly the invasive species Sea-buckthorn (*Hippophae rhamnoides*) and the management of scrub

	and tree encroachment on 2130 habitat.

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	*Good /* ***Poor*** */ Bad / Unknown*
	c) Structure and functions	*Good / Poor /* ***Bad*** */ Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as Stable. Current range is equal to the Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as Stable, as no change in Range is expected based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Range are therefore Good. Short-term trend direction of Area is assessed as Stable. Current Area is less than the Favourable Reference Area. Conservation status of Area is therefore Unfavourable-Inadequate. Future trend of Area is assessed as Stable as there is no evidence to suggest further losses will occur. Future prospects of Area are therefore Poor. Short-term trend direction of Structure and functions is assessed as Decreasing for habitat that is in Good condition. Current Structure and functions are assessed as Unfavourable-Bad as >25% of the habitat is not in “Good” condition. Conservation status of Structure and functions is therefore Unfavourable-Bad. Future prospects of Structure and functions are therefore Bad.	

10 Conclusions

Assessment of conservation status at end of reporting period	
10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.2 Area	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*
10.4 Future prospects	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*
10.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2****) / Unknown (XX)*
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving /* ***deteriorating*** */ stable / unknown*

<table>
<tr><td rowspan="8">10.7 Change and reasons for change in conservation status and conservation status trend</td><td colspan="3">Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.</td></tr>
<tr><td></td><td>Overall assessment of conservation status (10.5)</td><td>Overall trend in conservation status (10.6)</td></tr>
<tr><td>a) no, there is no difference</td><td>YES/<u>NO</u></td><td><u>YES</u>/NO</td></tr>
<tr><td>b) yes, due to genuine change</td><td>YES/NO</td><td><u>YES</u>/NO</td></tr>
<tr><td>c) yes, due to improved knowledge/more accurate</td><td>YES/NO</td><td>YES/<u>NO</u></td></tr>
<tr><td>d) yes, due to the use of different methods (including use of different thresholds)</td><td>YES/NO</td><td><u>YES</u>/NO</td></tr>
<tr><td>e) yes, but there is no information on nature of change</td><td>YES/NO</td><td>YES/<u>NO</u></td></tr>
<tr><td>The change is mainly due to (select one of the reasons above):</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td><td>genuine change / improved knowledge or more accurate data / <u>the use of a different method</u></td></tr>
<tr><td colspan="3"></td></tr>
<tr><td>10.8 Additional information

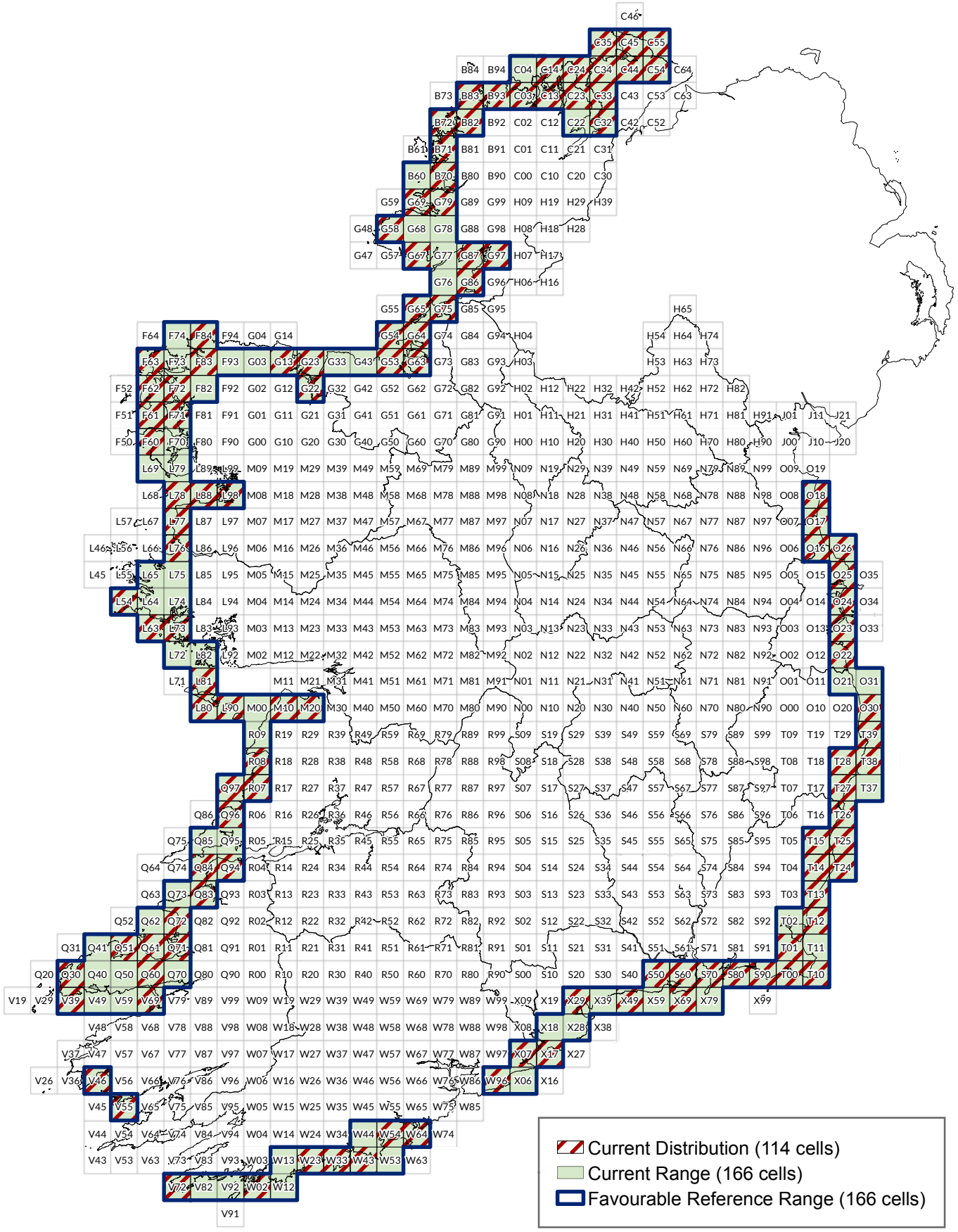
Optional</td><td colspan="2">The Conservation Status of Range is Favourable in this reporting period, as it was in the previous reporting period.
The Conservation Status of Area is Unfavourable-Inadequate in this reporting period, but was assessed as Favourable in the previous reporting period. The difference is due to further consideration of likely losses since the Directive came into force.
The Conservation Status of Structure and functions and Future prospects are Unfavourable-Bad in this reporting period, as they were in the previous reporting period.
The Overall Conservation Status was assessed as Unfavourable-Bad, as it was during the last reporting period. The status of Unfavourable-Bad during the current reporting period is due to <75% of the area of 2130 being assessed as having Favourable Structure and functions.
Trend in Overall Conservation Status was assessed as deteriorating. This is due to the fact that Structure and functions were assessed as decreasing. Trend was assessed as stable in the previous reporting period.</td></tr>
</table>

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***67.01 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval / **minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* *stable / increasing / **decreasing** / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing an intersect between the distribution shapefiles and the SAC shapefiles. The area given in Section 11.1 is the total area of 2130 habitat in SACs in the country, including some SACs where 2130 is not listed as a qualifying interest (QI). The area of 2130 within the Natura 2000 network where it is listed as a QI is 61.88 km^2. No anthropogenic loss of 2130 habitat was reported in the current reporting period. During the previous reporting period (NPWS, 2013), 100% of the 3 ha of the 2130 habitat lost due to anthropogenic impacts was from within eight SACs, seven of which listed 2130 as a QI. There were two inconsistencies between the current distribution for 2130 habitat and the Natura 2000 sites in which 2130 is listed as a QI. 2130 is listed as a QI for Rutland Island and Sound SAC, but there is no current record of the habitat there. The nearest record is in the adjoining site Gweedore Bay and Islands SAC, c. 215m east, where 2130 is also a QI. There is also no 2130 habitat found within Lough Yganavan and Loch Nambrackdarrig SAC (000370), the nearest record of the habitat being found over 2.5 km to the west. The short-term trend of the habitat area in good condition within the SAC network is taken to be decreasing, with the same trend as the 2130 habitat nationally (see Section 6.4 and 6.8), as almost all areas of 2130 habitat surveyed during the last two reporting periods were	

	within the SAC network. The surface area of 2130 habitat within the N2000 network has increased from the previous reporting period; this is in part due to improved knowledge, but largely due to a change in methodology. In this reporting period an intersect between the current 2130 distribution and the SAC shapefile was used, whereas in the last reporting period an intersect between only the Ryle *et al.* (2009) and Delaney *et al.* (2013) 2130 shapefiles and the SAC shapefile was carried out (NPWS, 2013).

12 Complementary information

Fixed dunes
(Grey dunes) (2130)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**2140 Decalcified fixed dunes with *Empetrum nigrum****
1.2i Habitat short name	**Decalcified *Empetrum* dunes**
1.3i Habitat description	2140 Decalcified fixed dunes with *Empetrum nigrum* are either found on the landward edge of dune systems where the surface layers of sand have been leached of their calcium content, or where sand has become fixed over siliceous rock. Typical species include *Empetrum nigrum*, *Calluna vulgaris, Thymus polytrichus*, *Lotus corniculatus, Carex panicea*, and the sand binding species *Carex arenaria* and *Ammophila arenaria*. 2140 is distinguished from 2150 by the presence of *Empetrum nigrum*, which is usually the most frequent dwarf shrub, within a more open dune heath community.

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***2010-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was compiled using 2140 points mapped by Martin (2018a). This reference is detailed in Section 3.2. As the largest single area of 2140 habitat mapped during the current reporting period was only 40 m^2, all locations were recorded using points rather than polygons. Martin (2018a; 2018b) surveyed all the 2140 areas that were used to compile the distribution map for the last reporting period (NPWS, 2013). A certainty rating system was applied to all data that informed the distribution map, this system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1, the lowest. As Martin (2018a) was based on a comprehensive field survey that included all known sites used to compile the distribution map for the last reporting period (NPWS, 2013) it was judged to be good-quality dataset with a high certainty of 3.

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned	
3 Biogeographical and marine regions	
3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
3.2 Sources of information	CEC (Commission of the European Communities) (2013) Interpretation manual of European Union habitats. EUR 28. European Commission, DG Environment. Delaney, A., Devaney, F.M., and Barron, S.J. (2013) Monitoring survey of Annex I sand dune habitats in Ireland. Irish Wildlife Manuals, No. 75. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. EPA (2017) A Summary of the State of Knowledge on Climate Change Impacts for Ireland: Report 11 (2010-2016). Prepared for the Environmental Protection Agency by MaREI Centre, Environmental Research Institute, University College Cork. M. Desmond, P. O'Brien and F. McGovern. EPA, Wexford. Martin, J.R. (2018a) SDMN17_2140_2150_points_2018.shp. Unpublished report submitted to National Parks and Wildlife Service, Dublin. Martin, J.R. (2018b) SDMN17_Coastal_habitats_database_2018.mdb. Unpublished report submitted to National Parks and Wildlife Service, Dublin. Martin, J.R. (2018c) SDMN17_AR1719_pressures_assessment. Unpublished report submitted to National Parks and Wildlife Service, Dublin. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.1. Unpublished Report, National Parks and Wildlife Service, Department of Arts, Heritage, and the Gaeltacht, Dublin.
3.2i Additional information	

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***500 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	

4.5 Short-term trend Method used	*Select one of the following methods:* *a) **Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable** / increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 500 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators There is no evidence of loss of range since the Directive came into force and the geographic spread is considered sufficient for the long term survival of the habitat, therefore the Favourable reference range is set as the current range. The Favourable reference range has been increased since the last reporting period (NPWS, 2013) to reflect the use of a different method for calculating range.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods? **YES**/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/**NO***
	b) yes, due to improved knowledge/more accurate data	*YES/**NO***
	c) yes, due to the use of different method	***YES**/NO*
	d) yes, but there is no information on the nature of change	*YES/**NO***

	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data / **the use of a different method***
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 2140 habitat. A maximum gap distance of two 10 km grid cells was used when running the range tool. Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013). The short-term trend is assessed as Stable. The Favourable reference range has been increased since the last reporting period (NPWS, 2013) to reflect the use of a different method to calculate the range. The Favourable reference range is the current range, reported in 4.1.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2010-2018***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***0.0002 km^2***
5.3 Type of estimate	***Best estimate** / 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* *a) **Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) **Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a)* ***Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator ≈ (approximately equal to) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/NO*
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/NO*
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 2010 (data presented in NPWS, 2013) and these data were updated during the current reporting period (Martin 2018a; 2018b). Favourable Reference Area (FRA) was not determined exactly, but is estimated to be approximately equal to the current area. No anthropogenic losses have been recorded since the Directive came into force. However, as no comprehensive survey for the habitat was undertaken until 2010 it is unclear if grazing pressure that took place before this date may have reduced the area of 2140 dune heath below the FRA. During the current reporting period the three sites where the habitat	

	had been recorded previously (NPWS, 2013) were surveyed by Martin (2018a; 2018b). The 2140 habitat was located at these three sites, Keadue and Cruit Island (SAC 001141) and Sheskinmore (SAC 000197), plus an additional two sites at Kincaslough (SAC 001141) and Maghera (SAC 000190). The total area of surveyed 2140 habitat was very small at 0.0002 km^2 (200 m^2). The short-term trend was deemed to be Stable as no anthropogenic losses were recorded within the current reporting period or during the previous reporting period of 2007-2012 (NPWS, 2013). For the two new 2140 sites the small area of 2140 at Kincaslough had been reported by Delaney *et al*. (2013) and should have been reported by NPWS (2013). It appears as if the area of 2140 at Maghera had been previously mapped as a component of the 2150 habitat at the site. Long-term trend in Area was deemed to be Stable with no anthropogenic losses recorded during the current or previous reporting period (NPWS, 2013). However, it is difficult to assess the long-term trend as the habitat was not defined or comprehensively surveyed until 2010. The difference in habitat extent between the area of 0.0002 km^2 reported during this reporting period and the figure of 0.01 km^2 reported during the previous reporting period (NPWS, 2013) is due to improved knowledge/more accurate data and the use of a different method. During the current reporting period all areas of 2140 were accurately mapped, whereas during the previous reporting period the area was estimated with some extrapolation. During the current reporting period the definition for the 2140 habitat was more clearly defined; only areas of sand dune habitat with a minimum of 25% cover of dwarf shrubs, with *Empetrum nigrum* usually the most frequent dwarf shrub, were mapped as 2140.

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***0.0002 km²***
		Maximum	***0.0002 km²***
	b) Area in not-good condition	**Minimum**	***0 km²***
		Maximum	***0 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		

6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period?* ***YES****/NO* A new typical plant species list for the 2140 habitat has been added to Section 6.8.
6.7 Typical species Method used *Optional*	The list of typical species for the current reporting period was derived from Martin (2018b), with all plant species that were recorded within all three monitoring plots included within the list, plus *Calluna vulgaris* (recorded in two plots) and *Carex arenaria* (listed as a characteristic species in CEC, 2013) also included within the list based on expert opinion. The list of typical species differs from the one proposed during the previous reporting period as some of the species listed in NPWS (2013) were not frequently recorded within the 2140 habitat during the current reporting period. It should be noted that the data on which the list of typical species is based are extremely limited. The Structure and functions criteria, including typical species, used to assess the 2140 habitat are listed and applied in Martin (2018b).
6.8 Additional information *Optional*	During the current reporting period all known 2140 sites were visited and the habitat was located at five sites. All five of these sites were assessed for Structure and functions by Martin (2018b), with three monitoring plots recorded across two of the sites. At the other three sites an assessment of the Structure and functions was made without recording a monitoring plot. The total known area of 2140 habitat was assessed during the current reporting period. All five sites, representing the 0.0002 km^2 of 2140 habitat that was surveyed, were assessed to have Favourable Structure and functions. Therefore all 2140 habitat was in Good condition. During the last reporting period 90% of the 2140 habitat was assessed as Favourable. This assessment was based on expert judgement and no specific reasons were listed for 10% of the habitat being in unfavourable condition. Based on expert opinion the short-term trend of the habitat area in Good condition is taken to be Stable with the small difference between the reporting periods being due to the different approaches that were used. The new typical plant species list for the 2140 habitat is: *Empetrum nigrum, Calluna vulgaris, Ammophila arenaria, Carex arenaria, Calliergonella cuspidata, Carex panicea, Holcus lanatus, Koeleria macrantha, Lotus corniculatus, Pilosella officinarum, Plantago lanceolata, Plantago maritima, Scleropodium purum, Thymus polytrichus,* and *Trifolium repens.*

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A06** Abandonment of grassland management (e.g. cessation of grazing or of mowing) (M) **F07** Sports, tourism and leisure activities (M) **I04** Problematic native species (M)	**A06** Abandonment of grassland management (e.g. cessation of grazing or of mowing) (M) **F07** Sports, tourism and leisure activities (M) **I04** Problematic native species (M)

7.2 Sources of information *Optional*	Pressures and threats were selected and ranked from the following data: Martin, J.R. (2018c) SDMN17_AR1719_pressures_assessment
7.3 Additional information *Optional*	The pressures and threats presented in Section 7.1 were selected and ranked based on intensity (high, medium or low), frequency of occurrence, and area of impact. For the current reporting period data on pressures were available for four 2140 sites surveyed by Martin (2018c), source referenced above in Section 7.2, with no pressures recorded impacting on the very small 2140 site at Kincaslough that accounts for <1% of the national 2140 area. Only three pressures were recorded on more than one occasion and all three are listed as medium-importance pressures in Section 7.1. The one medium-importance pressure recorded during the current reporting period which was not recorded in the previous recording period (NPWS, 2013) was F07 Sports, tourism and leisure activities. There were three medium/high-importance pressures recorded during the previous reporting period (NPWS, 2013) that were not considered to be of medium/high-importance during the current reporting period. One of these, A02 Conversion from one type of agricultural land use to another (excluding drainage and burning), was not recorded during the current reporting period. Another, I02 Other invasive alien species (other than species of Union concern), was recorded but as a neutral impact. The third one, L02 Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization), was recorded as A06 during the current reporting period. Pressures and threats noted less frequently and/or that impacted only small areas were deemed to be of low importance. The low-importance pressure recorded during the current reporting period was H08 Other human intrusions and disturbance not mentioned above; this code was used to record accidental burning of the 2140 dune heath.

	Climate change has not been added as an impact but it is likely to affect the range of 2140 over the coming decades. The short-term predictability of the effect of climate change and in particular the resultant mean sea level rise and extreme weather events is unknown but the gradual long-term trend will see an increase in mean sea level and extreme weather (EPA, 2017) which will affect the 2140 habitat. The three pressures presented in Section 7.1 are also considered to be the three main threats in the future. In the previous reporting period F08 Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defence or coast protection works and infrastructures) was considered to be a threat, but during the current reporting period it was not considered to be a threat as it was not applicable for the areas within the sites where the 2140 habitat was recorded.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type** or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* ***a) Only inside Natura 2000** or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* ***a) Short-term results (within the current reporting period, 2013-2018)** or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*

8.5 List of main conservation measures	**CA03** Maintain existing extensive agricultural practices and agricultural landscape features
8.6 Additional information *Optional*	Conservation measures were selected and ranked based on the frequency of occurrence, using the data gathered during the current reporting period. These data were obtained for four 2140 sites surveyed by Martin (2018c) that represent 99% of the known area of the habitat within Ireland. The maintenance of extensive grazing (recorded under code CA03) is the most frequent conservation measure applied to the habitat. In some cases the maintenance of extensive cattle grazing is undertaken through the Department of Agriculture's Green, Low-Carbon, Agri-Environment Scheme (GLAS). Details of participation in the GLAS scheme and of the uptake across various measures are not currently available. It is therefore not possible to precisely assess the effects of implementation of these measures.

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	***Good*** */ Poor / Bad / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as Stable. Current range is equal to the Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as Stable, as no change in range is expected based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Range are therefore Good. Short-term trend direction of Area is assessed as Stable. Current area is approximately equal to the Favourable Reference Area. Conservation status of Area is therefore Favourable. Future trend of Area is assessed as Stable as there have been no reported losses in area for the 2140 habitat over the last two reporting periods. Future prospects of Area are therefore Good. Short-term trend direction of Structure and functions is Stable for habitat that is in Good condition. Current Structure and functions are assessed as Favourable with 100% of the assessed habitat area in Good condition. Conservation status of Structure and functions is therefore Favourable. Future trend of Structure and functions is assessed as Stable. Future prospects of Structure and functions are therefore Good.	

10 Conclusions			
Assessment of conservation status at end of reporting period			
10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	***YES****/NO*	*YES/****NO***
	b) yes, due to genuine change	*YES/****NO***	*YES/NO*
	c) yes, due to improved knowledge/more accurate	***YES****/NO*	*YES/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	***YES****/NO*	*YES/NO*
	e) yes, but there is no information on nature of change	*YES/****NO***	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*

10.8 Additional information *Optional*	The Conservation Status of Range and Area are Favourable in this reporting period, as they were in the previous reporting period. The Conservation Status of Structure and functions and Future prospects are also Favourable; they were assessed as Unfavourable-Inadequate in the previous reporting period. This change in assessment is mostly due to more accurate monitoring data rather than a genuine change. The Overall assessment of Conservation Status is Favourable; it was assessed as Unfavourable-Inadequate during the previous reporting period. This change in assessment is mostly due to more accurate monitoring data rather than a genuine change. Trend in Overall assessment of Conservation Status was assessed as stable. This is the same as the previous reporting period.

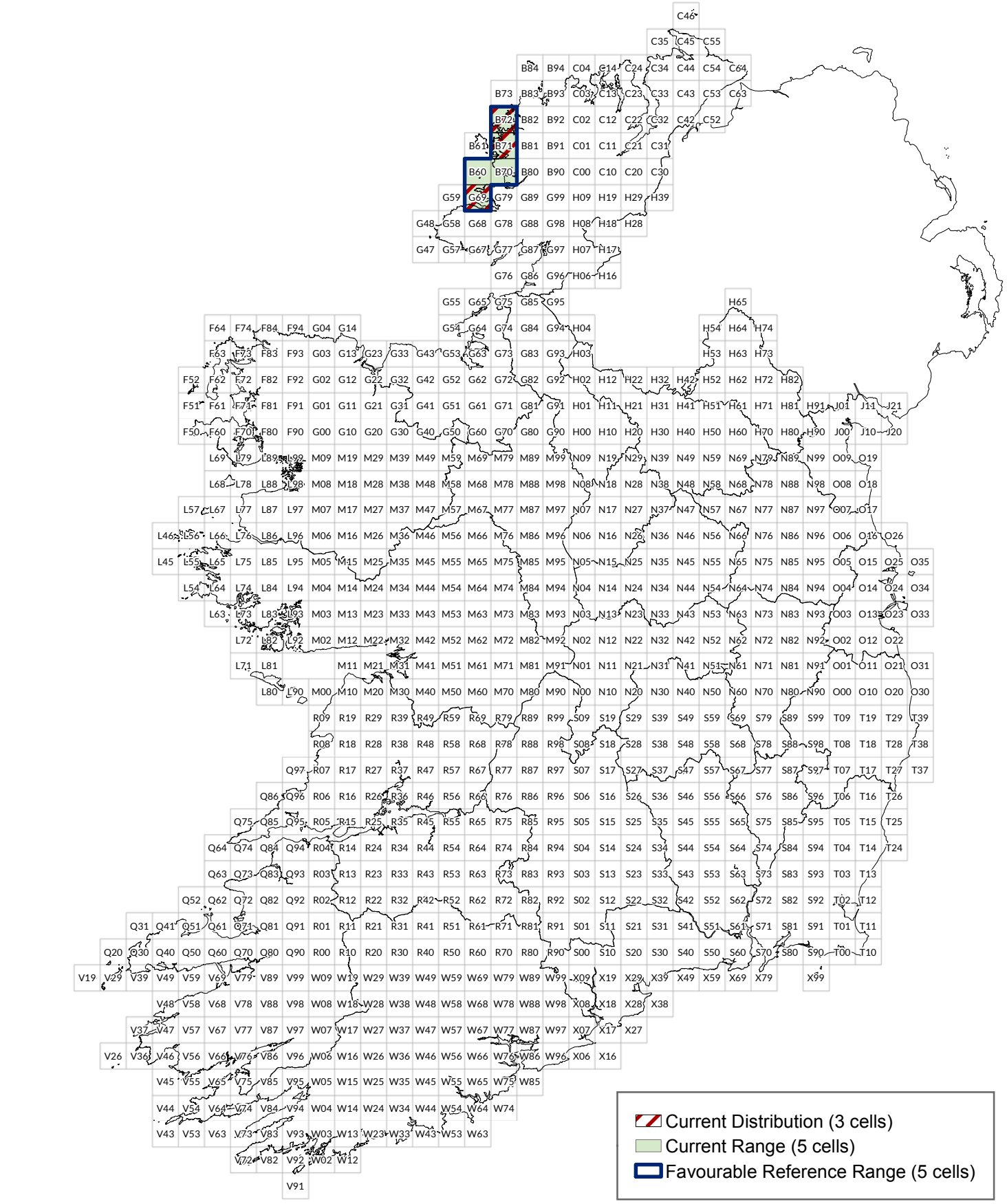
11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***0.0002 km²***
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a)* ***Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable*** */ increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a)* ***Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the Natura 2000 network and associated trend were estimated by performing an intersect between the distribution points and the SAC shapefile. The area given in section 11.1 is the total area of 2140 habitat in SACs in the country and the 2140 habitat is listed as a qualifying interest (QI) within all three SACs where it was recorded. There were two inconsistencies between the Natura 2000 sites where the 2140 habitat is listed as a QI and the current distribution for the habitat. The habitat 2140 is listed as a QI, representativity B,	

	for Lough Nagreany Dunes SAC (site code 000164), but most areas of heath surveyed by Martin (2018b) within this SAC were either heath growing on rock or within flushes; if heath was recorded on sand it was 2150 rather than 2140. There is no evidence for the 2140 habitat being present at Tranarossan and Melmore Lough SAC (site code 000194). This SAC was not surveyed during the current reporting period as a survey of potential 2140 sites had been undertaken during the previous reporting period (NPWS, 2013) and no evidence for the presence of the habitat was found within this SAC. The short-term trend of the habitat area in good condition within the SAC network is taken to be Stable, with the same trend as the 2140 habitat nationally (see Section 6.4 and 6.8) as all areas of 2140 habitat surveyed during the last two reporting periods are within the SAC network.

12 Complementary information

Decalcified *Empetrum* dunes* (2140) Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**2150 Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)***
1.2i Habitat short name	**Decalcified dune heath**
1.3i Habitat description	2150 Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) are most often found on the landward edge of dune systems where the surface layers of sand have been leached of their calcium content, or where sand has become fixed over siliceous rock. Typical species include *Calluna vulgaris*, *Lotus corniculatus*, *Anthoxanthum odoratum*, *Viola riviniana* and the sand binding species *Carex arenaria* and *Ammophila arenaria*.

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***2010-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) **Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was compiled using 2150 polygons and points mapped by Martin (2018a; 2018b). This reference is detailed below in Section 3.2. Martin (2018a; 2018b) surveyed all the 2150 areas that were used to compile the distribution map for the last reporting period (NPWS, 2013). A certainty rating system was applied to all data that informed the distribution map, this system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1, the lowest. As Martin (2018a; 2018b) was based on a comprehensive field survey that included all known sites used to compile the distribution map for the last reporting period (NPWS, 2013) it was judged to be good-quality dataset with a high certainty of 3.

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned	
3 Biogeographical and marine regions	
3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
3.2 Sources of information	Delaney, A., Devaney, F.M., and Barron, S.J. (2013) Monitoring survey of Annex I sand dune habitats in Ireland. *Irish Wildlife Manuals* No. 75. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. EPA (2017) A Summary of the State of Knowledge on Climate Change Impacts for Ireland: Report 11 (2010-2016). Prepared for the Environmental Protection Agency by MaREI Centre, Environmental Research Institute, University College Cork. M. Desmond, P. O'Brien and F. McGovern. EPA, Wexford. Martin, J.R., Daly, O.H. and Devaney F.M. (2017) Survey and assessment of vegetated shingle and associated habitats at 30 coastal sites. Volume 1: Main report. *Irish Wildlife Manuals* No. 98. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. Martin, J.R. (2018a) SDMN17_SDM_update_2018.shp. Unpublished report submitted to National Parks and Wildlife Service, Dublin. Martin, J.R. (2018b) SDMN17_2140_2150_points_2018.shp. Unpublished report submitted to National Parks and Wildlife Service, Dublin. Martin, J.R. (2018c) SDMN17_Coastal_habitats_database_2018.mdb. Unpublished report submitted to National Parks and Wildlife Service, Dublin. Martin, J.R. (2018d) SDMN17_AR1719_pressures_assessment. Unpublished report submitted to National Parks and Wildlife Service, Dublin. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.1. Unpublished Report, National Parks and Wildlife Service, Department of Arts, Heritage, and the Gaeltacht, Dublin.
3.2i Additional information	

4 Range	
Range within the biogeographical/marine region concerned	
4.1 Surface area	***400 km²***
4.2 Short-term trend Period	***2007–2018***
4.3 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*

4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 400 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators There is no evidence of loss of range since the Directive came into force and the geographic spread is considered sufficient for the long term survival of the habitat, therefore the Favourable reference range is set as the current range. The Favourable reference range has been reduced since the last reporting period (NPWS, 2013) to reflect the improved level of knowledge and the use of a different method.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	***YES****/NO*

	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 2150 habitat. A maximum gap distance of two 10 km grid cells was used when running the range tool. Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013). The fact that the 2150 habitat was not located at Crummies Bay (SAC 002012) during the current reporting period led to a contraction in the range of one 10 km square. As no confirmed areas of 2150 had been previously mapped for Crummies Bay this contraction in the range is most probably due to improved knowledge or more accurate data and the short-term trend is assessed as Stable. The Favourable reference range has been decreased since the last reporting period (NPWS, 2013) to reflect the improved level of knowledge and the use of a different method. The Favourable reference range is the current range, reported in 4.1.	

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2010-2018***	
5.2 Surface area *(in km²)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***0.205 km²***
5.3 Type of estimate	***Best estimate** / 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

5.8 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator ≈ (approximately equal to) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 2010 (data presented in NPWS, 2013) and these data were updated during the current reporting period (Martin 2018a; 2018b). Favourable Reference Area (FRA) was not determined exactly, but is estimated to be approximately equal to the current area. No	

	anthropogenic losses have been recorded since the Directive came into force. However, as no comprehensive survey for the habitat was undertaken until 2010 it is unclear if grazing pressure that took place before this date may have reduced the area of dune heath below the FRA. During the current reporting period the seven 2150 sites where the habitat had been recorded previously (NPWS, 2013) were surveyed by Martin (2018a; 2018b). The Annex I habitat was located at five of the seven sites visited, Aghleam (SAC 000470), Brittas Bay (SAC 000729), Lough Nagreany (SAC 000164), Maghera (SAC 000190), and Sheskinmore (SAC 000197), and 0.205 km^2 of 2150 habitat was mapped, which represents the total area of the habitat recorded within Ireland. The 2150 habitat was not located at two of the seven sites visited, Crummies Bay (SAC 002012) and Kincaslough (SAC 001141). For Crummies Bay no areas of 2150 had been previously mapped, and the areas of potential 2150 mapped at Kincaslough occurred on rocky habitat rather than sand dune. The short-term trend was deemed to be Stable as no anthropogenic losses were recorded within the current reporting period or during the previous reporting period of 2007-2012 (NPWS, 2013). The two sites, Crummies Bay and Kincaslough, where the 2150 habitat was not recorded were not considered to be losses as there is no evidence that the 2150 habitat occurred within Crummies Bay and the habitat had been misidentified at Kincaslough. Long-term trend in Area was deemed to be Stable with no anthropogenic losses recorded during the current or previous reporting period (NPWS, 2013). However, it is difficult to assess the long-term trend as the habitat was not defined or comprehensively surveyed until 2010. The difference in habitat extent between the area of 0.205 km^2 reported during this reporting period and the figure of 0.5 km^2 reported during the previous reporting period (NPWS, 2013) is due to improved knowledge/more accurate data and the use of a different method. During the current reporting period all areas of 2150 were accurately mapped, whereas during the previous reporting period the area was estimated with some extrapolation. During the current reporting period the definition for the 2150 habitat was more clearly defined with only areas of sand dune habitat with a minimum of 25% cover of *Calluna vulgaris* and/or *Erica* species mapped as 2150.

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***0.177 km²***
		Maximum	***0.177 km²***
	b) Area in not-good condition	**Minimum**	***0.028 km²***
		Maximum	***0.028 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***

6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period?* ***YES****/NO* A new typical plant species list for the 2150 habitat has been added to Section 6.8.
6.7 Typical species Method used *Optional*	The list of typical species for the current reporting period was derived from Martin (2018c), with all plant species that were recorded within at least 50% of the 2150 monitoring plots, plus *Festuca ovina*, included within the list. The list of typical species differs from the one proposed during the previous reporting period as some of the species listed in NPWS (2013) were not frequently recorded within the 2150 habitat during the current reporting period. The Structure and functions criteria, including typical species, used to assess the 2150 habitat are listed and applied in Martin (2018c).
6.8 Additional information *Optional*	During the current reporting period seven potential 2150 sites were visited and the habitat was located at five of these sites. All five of these sites were assessed for Structure and functions by Martin (2018c), with 18 monitoring plots recorded across four of the sites. At Lough Nagreany only 30 m^2 of the 2150 habitat was located and an assessment of the Structure and functions was made without recording a monitoring plot. The total known area of 2150 habitat was assessed during the current reporting period. Of the five sites assessed for Structure and functions, two sites were Favourable (Maghera and Sheskinmore) and three were Unfavourable-Inadequate (Aghleam, Brittas Bay, and Lough Nagreany). No site-based assessment of Structure and functions was presented during the previous reporting period. In total, 86.4% of the 0.205 km^2 of 2150 habitat that was surveyed during the current reporting period was in Good condition (favourable) and 13.6% was not in Good condition (unfavourable). The approach used to estimate the percentage of the 2150 habitat in

	unfavourable condition at each site was as follows: If none of the assessment criteria failed at the site level then none of the 2150 area was classified as unfavourable and the whole area of 2150 at the site was assigned as being in Good condition; if 1 to 2 criteria failed at the site level then a site-based assessment was made that assigned the proportion of the 2150 area with unfavourable Structure and functions. During the current reporting period there were no 2150 sites where more than two assessment criteria failed. At Aghleam 75% of the 2150 area was assigned as having unfavourable Structure and functions due to a scarcity of sand-binding species such as *Carex arenaria* and inadequate sand depth (inadequate was defined as sand that was not $\geq$ 15 cm deep). For Brittas Bay 100% of the 2150 area was assigned unfavourable Structure and functions due to a high incidence of bracken (*Pteridium aquilinum*) throughout the habitat, including a cover score of 45% within one monitoring stop. At Lough Nagreany 100% of the 2150 area was assigned as having unfavourable Structure and functions due to a scarcity of sand-binding species such as *Carex arenaria.* During the last reporting period 85% of the 2150 habitat was assessed as Favourable. This assessment was based on expert judgement and no specific reasons were listed for 15% of the habitat being unfavourable. Based on expert opinion the short-term trend of the habitat area in Good condition is taken to be Stable with the small difference between the reporting periods due to the different approaches that were used. The new typical plant species list for the 2150 habitat is: *Calluna vulgaris, Ammophila arenaria, Anthoxanthum odoratum, Carex arenaria, Danthonia decumbens, Festuca ovina, Festuca rubra, Holcus lanatus, Hylocomium splendens, Hypericum pulchrum, Lotus corniculatus, Potentilla erecta, Rhytidiadelphus triquetrus, Rosa spinosissima, Scleropodium purum, Succisa pratensis,* and *Viola riviniana.*

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**

List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A06** Abandonment of grassland management (e.g. cessation of grazing or of mowing) (M) **F07** Sports, tourism and leisure activities (M) **I04** Problematic native species (M)	**A06** Abandonment of grassland management (e.g. cessation of grazing or of mowing) (M) **F07** Sports, tourism and leisure activities (M) **I04** Problematic native species (M)
7.2 Sources of information *Optional*	Pressures and threats were selected and ranked from the following data: Martin, J.R. (2018d) SDMN17_AR1719_pressures_assessment	
7.3 Additional information *Optional*	The pressures and threats presented in Section 7.1 were selected and ranked based on intensity (high, medium or low), frequency of occurrence, and area of impact. Data were gathered from the source listed in Section 7.2. For the current reporting period data on pressures were available for four 2150 sites surveyed by Martin (2018d) that represent 99.9% of the known area of the habitat within Ireland. Only three pressures were recorded on more than one occasion and all three are listed as medium-importance pressures in Section 7.1. The one medium-importance pressure recorded during the current reporting period which was not recorded in the previous recording period (NPWS, 2013) was F07 Sports, tourism and leisure activities. There were five medium/high-importance pressures recorded during the previous reporting period (NPWS, 2013) that were not considered to be of medium/high-importance during the current reporting period. Two of these, A02 Conversion from one type of agricultural land use to another (excluding drainage and burning) and J04 Mixed source soil pollution and solid waste (excluding discharges), were not recorded during the current reporting period. Two more, I02 Other invasive alien species (other than species of Union concern) and CA03 Maintain existing extensive agricultural practices and agricultural landscape features, were recorded but as neutral or positive impacts. The final one, L02 Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization), was recorded as A06 during the current reporting period. Pressures and threats noted less frequently and/or that impacted only small areas were deemed to be of low importance. Low-importance pressures recorded during the current reporting period included C06 Dumping/depositing of inert materials from terrestrial extraction, F09 Deposition and treatment of waste/garbage from household/recreational facilities, and H08 Other human intrusions and disturbance not mentioned above; this code was used to record accidental burning of the dune heath. Climate change has not been added as an impact but it is likely to affect the range of 2150 over the coming decades. The short-term predictability of the effect of climate change and in particular the resultant mean sea level rise and extreme weather events is unknown but the gradual long-term trend will see an increase in mean sea level and extreme weather (EPA, 2017) which will affect	

	the 2150 habitat. The three pressures presented in Section 7.1 are also considered to be the three main threats in the future. In the previous reporting period F08 Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defence or coast protection works and infrastructures) was considered to be a threat, but during the current reporting period it was not considered to be a threat as it was not applicable for the areas within the sites where the 2150 habitat was recorded.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type** or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* ***a) Only inside Natura 2000** or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* ***a) Short-term results (within the current reporting period, 2013-2018)** or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	**CA03** Maintain existing extensive agricultural practices and agricultural landscape features

8.6 Additional information *Optional*	Conservation measures were selected and ranked based on the frequency of occurrence, using the data gathered during the current reporting period. These data were obtained for four 2150 sites surveyed by Martin (2018d) that represent 99.9% of the known area of the habitat within Ireland. The maintenance of extensive grazing (recorded under code CA03) is the most frequent conservation measure applied to the habitat. In some cases the maintenance of extensive cattle grazing is undertaken through the Department of Agriculture's Green, Low-Carbon, Agri-Environment Scheme (GLAS). Details of participation in the GLAS scheme and of the uptake across various measures are not currently available. It is therefore not possible to precisely assess the effects of implementation of these measures. Other conservation measures that are not currently being implemented, but whose implementation would improve the Structure and functions of the habitat, include the control of the native species bracken (*Pteridium aquilinum*) at the Brittas Bay site.

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	*Good /* ***Poor*** */ Bad / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as Stable. Current range is equal to the Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as Stable, as no change in Range is expected based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Range are therefore Good. Short-term trend direction of Area is assessed as Stable. Current area is approximately equal to the Favourable Reference Area. Conservation status of Area is therefore Favourable. Future trend of Area is assessed as Stable as there have been no reported losses in area for the 2150 habitat over the last two reporting periods Future prospects of Area are therefore Good. Short-term trend direction of Structure and functions is Stable for habitat that is in Good condition. Current Structure and functions are assessed as Unfavourable-Inadequate as ≥75% but <90% of the habitat is in Good condition. Conservation status of Structure and functions is therefore Unfavourable-Inadequate. Future trend of Structure and functions is assessed as Stable. Future prospects of Structure and functions are therefore Poor.	

10 Conclusions			
Assessment of conservation status at end of reporting period			
10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/****NO***	*YES/****NO***
	b) yes, due to genuine change	*YES/NO*	*YES/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	*YES/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*

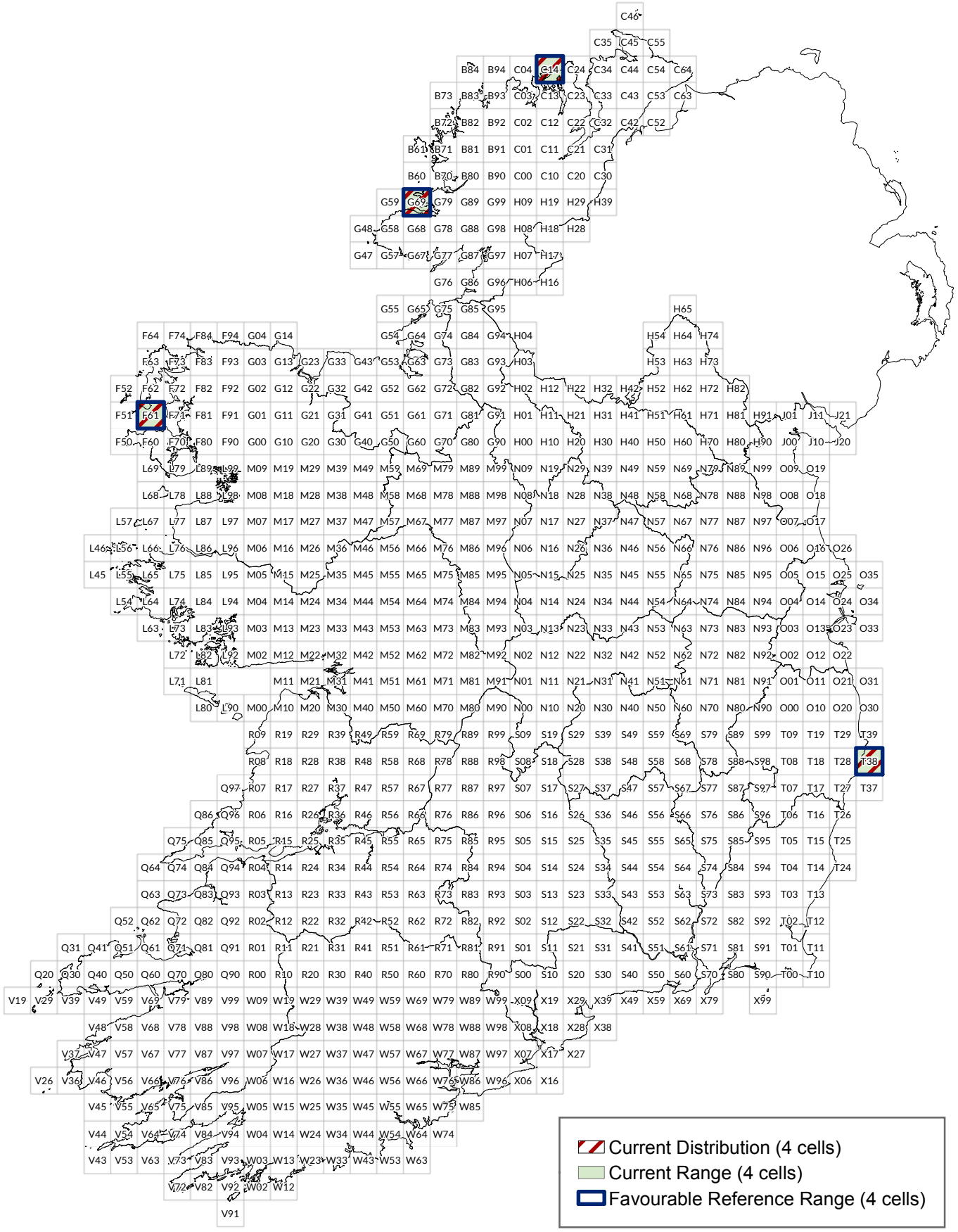
10.8 Additional information *Optional*	The Conservation Status of Range and Area are Favourable in this reporting period, as they were in the previous reporting period. The Conservation Status of Structure and functions and Future prospects are Unfavourable-Inadequate, as they were in the previous reporting period. The Overall assessment of Conservation Status is Unfavourable-Inadequate. This is the same as the previous reporting period. The status of Unfavourable-Inadequate is due to 13.6% of the 2150 habitat not being in good condition. Trend in Overall assessment of Conservation Status was assessed as stable. This is the same as the previous reporting period.

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***0.205 km²***
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable*** */ increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing an intersect between the distribution shapefiles and the SAC shapefile. The area given in section 11.1 is the total area of 2150 habitat in SACs in the country and the 2150 habitat is listed as a qualifying interest (QI) within all five SACs where it was recorded. There were six inconsistencies between the Natura 2000 sites where the 2150 habitat is listed as a QI and the current distribution for the habitat. The habitat 2150 is listed as a QI, representativity B, for Gweedore Bay and Islands SAC (site code 001141) but all areas surveyed by Martin (2018b; 2018c) within this SAC were either	

	considered to be heath growing on rock or if the habitat was found on sand it was 2140 rather than 2150 due to the high frequency of *Empetrum nigrum*. There is no evidence for the 2150 habitat being present at any of the other five SACs (000091, 000696, 001742, 001766, 001932). SAC 000696 (Ballyteige Burrow) was surveyed during the current reporting period (Martin *et al*., 2017) and no evidence for the presence of 2150 was recorded. The remaining four SACs where there are inconsistencies were not surveyed during the current reporting period as a survey of potential 2150 sites had been undertaken during the previous reporting period (NPWS, 2013) and no evidence for the presence of the habitat was found within these SACs. The short-term trend of the habitat area in good condition within the SAC network is taken to be Stable, with the same trend as the 2150 habitat nationally (see Section 6.4 and 6.8) as all areas of 2150 habitat surveyed during the last two reporting periods were within the SAC network. The previous reporting period (NPWS, 2013) stated that there was a small area of 2150 habitat outside the SAC network, but based on the more accurate mapping data collected during the current reporting period this is not the case.

12 Complementary information

Decalcified dune heath* (2150) Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**2170 Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*)**
1.2i Habitat short name	**Dunes with creeping willow**
1.3i Habitat description	2170 Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*) are typically found either within dune slacks on sandy hummocks, or on the sides of dune ridges adjacent to slacks. In order to be classified as the 2170 habitat the area should be beyond the influence of the water table. It is characterised by a dominance of *Salix repens*, which often forms a dense ground cover. Moisture-loving plant species typically associated with dune slacks should be absent or noticeably reduced (NPWS, 2008). Species associated with this habitat include *Carex flacca* and *Carex arenaria*, *Agrostis stolonifera*, *Pilosella officinarum*, *Euphrasia officinalis* agg., *Ononis repens* and *Lotus corniculatus*.

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***1996-2017***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) **Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was compiled using 2170 polygons mapped by Martin *et al.* (2017), Woodrow and Denyer (2014), Delaney *et al.* (2013), NPWS (2012), Fingal County Council (2010) and Ryle *et al.* (2009). All references are detailed in Section 3.2. All of the aforementioned datasets published prior to 2014 were also used to compile the distribution map from the last reporting period (NPWS, 2013). A certainty rating system was applied to all data that informed the distribution map. This system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1 the lowest. The new data sources added since the last round of reporting (NPWS, 2013) that were based on a field survey, Martin *et al.* (2017) and Woodrow and Denyer (2014), were judged to be good-quality data (high certainty=3). Delaney *et al.* (2013) was assigned a certainty of 3, following the judgement made during the last round of reporting.

	Ryle *et al.* (2009) was assigned a certainty of 2. Although this dataset was based on a field survey and had been assigned a certainty of 3 during the last round of reporting, it is now over 10 years old, increasing the uncertainty in the data. The NPWS (2012) and Fingal County Council (2010) polygons that had not been superseded by better quality data, such as Delaney *et al.* (2013) and Ryle *et al.* (2009), were retained as a certainty 2 and 1, respectively, following the judgement made during the last round of reporting. All polygons with certainty 1 to 3 were used to map the distribution of the 2170 habitat. Following a review of certainty 1 and 2 polygons using remote imagery, 17 polygons were deleted due to the fact that they are not in locations capable of supporting the 2170 habitat, for example deletions included polygons located within foredune habitat.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Delaney, A., Devaney, F.M., and Barron, S.J. (2013) Monitoring survey of Annex I sand dune habitats in Ireland. *Irish Wildlife Manuals* No. 75. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. EPA (2017) A Summary of the State of Knowledge on Climate Change Impacts for Ireland: Report 11 (2010-2016). Prepared for the Environmental Protection Agency by MaREI Centre, Environmental Research Institute, University College Cork. M. Desmond, P. O'Brien and F. McGovern. EPA, Wexford. Fingal County Council (2010) Habitat_Polygons.shp. Houston, J. (2008). Management of Natura 2000 habitats. 2130* Fixed coastal dunes with herbaceous vegetation ('grey dunes'). Technical Report 2008 04/24 commissioned by The European Commission, Brussels. Martin, J.R., Daly, O.H. and Devaney F.M. (2017) Survey and assessment of vegetated shingle and associated habitats at 30 coastal sites. Volume 1: Main report. *Irish Wildlife Manuals* No. 98. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. NPWS (2012) Management Planning Support Unit Maps 2405_imap95. CPU_Habitats_March_2012.shp. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.1. Unpublished Report, National Parks and Wildlife Service, Department of Arts, Heritage, and the Gaeltacht, Dublin. Ryle, T., Connolly, K., Murray, A. and Swann, M. (2009). Coastal monitoring Project (2004-06). Unpublished report submitted to

	National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Woodrow, W. and Denyer, J. (2014) NIS: The use of designated machair within the West of Ardara / Maas Road SAC and Skeskinmore Lough SPA for the annual Ardara agricultural show. Unpublished report for National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin.
3.2i Additional information	

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***3,000 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 3,000 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	

	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators There is no evidence of loss of range since the Directive came into force and the geographic spread is considered sufficient for the long term survival of the habitat, therefore the Favourable reference range is set as the current range. The Favourable reference range has been increased since the last reporting period (NPWS, 2013) to reflect the use of a different method.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	*YES/****NO***
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data /* ***the use of a different method***	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 2170 habitat. A maximum gap distance of two 10 km grid cells was used when running the range tool. One 10 km grid cell generated by the range tool that had no coastline was removed. Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013). None of the area losses recorded during these two reporting periods led to a contraction in the range. The short-term trend is Stable. The number of 10 km squares in the range (30) is one square higher than the last monitoring period (NPWS, 2013). This change is due to the use of a slightly different methodology with all 10 km grid cells with a suitable coastline (i.e. capable of supporting sand dune habitats) retained within the range within the current reporting period. The Favourable reference range has been increased since the last reporting period (NPWS, 2013) due to the use of a different method. The Favourable reference range is the current range, reported in 4.1.	

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***1996-2017***	
5.2 Surface area	**a) Minimum**	

(in km²)	**b) Maximum**	
	c) Best single value	***2.61 km²***
5.3 Type of estimate	*Best estimate / 95% confidence interval / **minimum***	
5.4 Surface area Method used	*Select one of the following methods:* *a) **Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	***stable** / increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator ≈ (approximately equal to)	
	c) If favourable reference area is unknown indicate by using 'x'	

<table>
<tr><td></td><td colspan="2">d) Indicate method used to set reference value if other than operators</td></tr>
<tr><td rowspan="6">5.14 Change and reason for change in surface area</td><td colspan="2">Is there a change between reporting periods? <u>YES</u>/NO

If yes, provide the nature of that change. More than one option (a to d) can be chosen.</td></tr>
<tr><td>a) yes, due to genuine change</td><td>YES/<u>NO</u></td></tr>
<tr><td>b) yes, due to improved knowledge/more accurate data</td><td><u>YES</u>/NO</td></tr>
<tr><td>c) yes, due to the use of different method</td><td><u>YES</u>/NO</td></tr>
<tr><td>d) yes, but there is no information on the nature of change</td><td>YES/<u>NO</u></td></tr>
<tr><td colspan="2">The change is mainly due to (select one of the reasons above):

genuine change / improved knowledge or more accurate data / <u>the use of a different method</u></td></tr>
<tr><td>5.15 Additional information

Optional</td><td colspan="2">The period over which the surface area of the habitat was determined begins in 1995 with the first data available on the 2170 habitat coming from Management Planning Support Unit Mapping carried out between 1995 and 2001 (NPWS, 2012) and incorporates updates made by surveys carried out between 1995 and 2016 that are listed in Section 3.2.

Favourable Reference Area (FRA) was not determined exactly, but is estimated to be approximately equal to the current area. There is little evidence of anthropogenic losses of the 2170 habitat since the Directive came into force.

During the current reporting period two 2170 sites were visited and one of these was assessed for Area by Martin et al. (2017). The one site assessed for Area represents 0.39 km^2 (15%) of the total area of 2170 habitat recorded in Ireland. This one site is a very small subsample of the 14 sites with 2170 habitat that were surveyed by Delaney et al. (2013) and the 17 sites with 2170 that were surveyed by Ryle et al. (2009), limiting the conclusions that can be made.

Short-term trend in Area was deemed to be Stable. This is due to the fact that no anthropogenic loss was recorded at the one 2170 site assessed for Area in the current reporting period, or in the 14 sites assessed in the previous reporting period, or the 17 sites assessed in the 2001-2006 reporting period (NPWS, 2013). During the last reporting period (NPWS, 2013), the short-term trend in Area was reported to be Increasing due to increases in the habitat recorded due to natural processes. However, based on current expert opinion the short-term trend of Area in the 2170 habitat in the last reporting period is now considered Stable, as any increases were due to natural fluctuations in the 2170 habitat.

The long-term trend in Area was deemed to be Stable based on the fact that there have been no reported losses in 2170 habitat area over the last three reporting periods.

The difference in habitat extent between the area of 2.61 km^2 reported during this reporting period and the figure of 1.5 km^2 reported during the previous reporting period (NPWS, 2013) is due to a number of factors, in part due to improved knowledge/more</td></tr>
</table>

	accurate data and genuine change due to natural fluctuations in this habitat, but largely due to the use of a different method. With regards to improved knowledge/more accurate data, some older data was superseded by more recent field surveys conducted by Martin *et al.* (2017). Martin *et al.* (2017) reported a gain in 10.33 ha at the one 2170 site in which Area was assessed during the current reporting period; this gain, which is a genuine change, is considered to be due to natural fluctuations in the habitat. The surface area of 1.5 km^2 reported during the 2007-2012 reporting period (NPWS, 2013) was an extrapolation of data from the Sand Dune Monitoring Project (Delaney *et al*., 2013). A different method was used in this reporting period, whereby the calculated 2170 area was based on all of the distribution shapefiles, including a large site (111 ha) in Portmarnock (adjacent to Baldoyle Bay SAC) with 57 polygons of certainty 2.

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***1.96 km²***
		Maximum	***1.96 km²***
	b) Area in not-good condition	**Minimum**	***0.65 km²***
		Maximum	***0.65 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***		

6.7 Typical species Method used *Optional*	The list of typical species is the same as the last reporting period (NPWS, 2013) and was devised by Delaney *et al.* (2013). The Structure and functions criteria, including typical species, used to assess the 2170 habitat are listed in Appendix I of Delaney *et al.* (2013).
6.8 Additional information *Optional*	During the current reporting period two 2170 sites were visited, both of which were assessed for Structure and functions, one by Martin *et al*. (2017) and one by Woodrow and Denyer (2014). This represents 0.4 km^2 (15%) of the total area of 2170 habitat recorded in Ireland. These two sites represent a much smaller proportion of the 14 sites with 2170 habitat that were surveyed by Delaney *et al.* (2013) and the 17 sites with 2170 that were surveyed by Ryle *et al*. (2009), limiting the conclusions that can be made. Of the two sites assessed for Structure and functions in this reporting period, 75% (0.30 km^2) of the area was assessed as being in Good condition (favourable) and 25% (0.10 km^2) of the area was assessed as not being in Good condition (unfavourable). These results deviate slightly from the findings of NPWS (2013) but the overall conclusion of Unfavourable-Inadequate is the same. The figure of 75% of the 2170 area being in Good condition was utilised when calculating the area figures in Section 6.1. The approach used to estimate the percentage of the 2170 habitat in unfavourable condition at each site was as follows: If none of the assessment criteria failed at the site level then none of the 2170 area was classified as unfavourable and the whole area of 2170 at the site was assigned as being in Good condition; if 1 to 2 criteria failed at the site level then a site-based assessment was made that assigned the proportion of the 2170 area with unfavourable Structure and functions. During the current reporting period two sites were assessed. No criteria failed at Sheskinmore (SAC 000197) and one criterion failed at Magherabeg (SAC 001766). At Magherabeg 25% of the 2170 area was assigned as having unfavourable Structure and functions due to a high incidence of *Senecio jacobaea* throughout the habitat, including a cover score of 15% within 4 of the 12 monitoring stops. During the last reporting period 78% of the 2130 habitat was assessed as Favourable (NPWS, 2013) and the most frequent criteria to fail the assessment were 'height of *Salix repens'* and 'the presence of negative indicator species', the latter of which is the one criterion that failed in this reporting period. The short-term trend of habitat area in good condition was taken to be stable. This is due to the fact that the Structure and functions assessment results in the current reporting period, whilst based on a small number of sample sites (two sites), was very similar to the assessment made in the last reporting period. During the last reporting period (NPWS, 2013), the short-term trend in Structure and functions was considered to be stable. Typical species: *Carex arenaria, Carex flacca, Euphrasia officinalis* agg*., Festuca rubra, Holcus lanatus, Lotus corniculatus, Ononis repens, Pilosella officinarum, Rhytidiadelphus squarrosus, Salix repens* ssp*. argentea, Scleropodium purum.*

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A09** Intensive grazing or overgrazing by livestock (H) **A10** Extensive grazing or undergrazing by livestock (H) **I02** Other invasive alien species (other than species of Union concern) (H) **A02** Conversion from one type of agricultural land use to another (excluding drainage and burning) (M) **E01** Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (M) **F07** Sports, tourism and leisure activities (M) **F08** Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defence or coast protection works and infrastructures) (M) **L02** Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices) (M)	**A09** Intensive grazing or overgrazing by livestock (H) **A10** Extensive grazing or undergrazing by livestock (H) **I02** Other invasive alien species (other than species of Union concern) (H) **A02** Conversion from one type of agricultural land use to another (excluding drainage and burning) (M) **E01** Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (M) **F07** Sports, tourism and leisure activities (M) **F08** Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defence or coast protection works and infrastructures) (M) **L02** Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices) (M)

7.2 Sources of information

Optional

Pressures and threats were selected and ranked from the following data:

Martin, J.R. (2018) Backing document for assessment of pressures and threats SDMN17_AR1719_pressures_assessment. Unpublished report submitted to National Parks and Wildlife Service, Dublin.

Martin, J.R., Daly, O.H. and Devaney, F.M. (2017) Survey and Assessment of Vegetated Shingle and Associated Habitats at 30 Coastal Sites. Volume 1: Main report. Irish Wildlife Manuals, No.

	98. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. NPWS (2013). The Status of Protected EU Habitats and Species in Ireland. Overview Volume 1. Unpublished Report. National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin. Woodrow, W. and Denyer, J. (2014) NIS: The use of designated machair within the West of Ardara / Maas Road SAC and Skeskinmore Lough SPA for the annual Ardara agricultural show. Unpublished report for National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin.
7.3 Additional information *Optional*	The pressures and threats presented in 7.1 are derived from the data presented in NPWS (2013) which were based on a more representative sample of sites. Data were recorded at fourteen 2130 sites by Delaney *et al.* (2013) in the previous reporting period (NPWS, 2013). During the current reporting period information on pressures was available from only two sites, one site from the Vegetated Shingle Monitoring (VSM) survey (Martin *et al*., 2017) and one site from the Natura Impact Statement for the annual Ardara agricultural show (Woodrow and Denyer, 2014). Data gathered from the sources listed in Section 7.2 are summarised in Martin (2018). The crosswalk referenced in the backing document was utilised when it was necessary to transfer pressures from the old impact recording system to the current system. The three high-importance pressures, A09, A10, and I02, presented in Section 7.1 were carried forward from the 2007-2012 reporting period (NPWS, 2013). For the high-importance pressure I02 there were additional data from one site that was surveyed during the current reporting period. Five of the medium-importance pressures listed in NPWS (2013), A02, E01, F07, F08, and L02, were retained as medium-importance pressures for the current reporting period and are listed in Section 7.1. The decision to retain these five medium-importance pressures was based on expert judgement; there was only evidence for the medium-importance pressure F08 collected from one site during the current reporting period. Five of the medium-importance pressures listed in NPWS (2013) were judged, based on expert opinion, to be low importance in the current reporting period. These were B Forestry, C01 Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell), F01 Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions) (in the form of discontinuous urbanisation), F09 Deposition and treatment of waste/garbage from household/ recreational facilities, and L01 Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization). A low-importance pressure recorded during the current reporting period was L06 Interspecific relations (competition, predation, parasitism, pathogens) (in the form of rabbit grazing and burrowing). NPWS (2013) recorded one low-importance pressure under 'discontinuous urbanisation' and this was crosswalked to F01 (discussed above). The issue of grazing is complex. Both undergrazing (or extensive grazing) and overgrazing (or intensive grazing) by livestock are

	recorded as high-importance pressures for the 2170 habitat. Undergrazing can lead to scrub encroachment, over-stabilisation of dunes, loss of heterogeneity at a local and landscape level and loss of dune species diversity (Houston, 2008). Conversely, though, overgrazing can lead to bare ground and sand-drift (Houston, 2008). In order to achieve a suitable grazing regime to benefit the 2170 habitat, a balance needs to be maintained between the two effects. Climate change has not been added as an impact of medium or high importance but it is likely to affect the range of 2170 over the coming decades. The short-term predictability of the effect of climate change and in particular the resultant mean sea level rise and extreme weather events are unknown but the gradual long-term trend will see an increase in the mean sea level and extreme weather events (EPA, 2017) which will affect the 2170 habitat. One way this could occur is by extreme weather events impacting the formation and stabilisation of foredune communities and dune slacks which both can develop into the 2170 habitat. The eight pressures presented in Section 7.1 are also considered to be the main threats in the future.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type** or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* ***a) Short-term results (within the current reporting period, 2013-2018)** or* *b) Medium-term results (within the next two reporting periods, 2019-*

	2030) or *c) Long-term results (after 2030)*
8.5 List of main conservation measures	**CA03** Maintain existing extensive agricultural practices and agricultural landscape features
8.6 Additional information *Optional*	Conservation measures were selected and ranked based on the frequency of occurrence, using the data gathered during the current reporting period. These sources are listed in Section 7.2 and these data are summarised in Martin (2018). The maintenance of extensive cattle grazing (recorded under code CA03) is the only reported conservation measure applied to the habitat. In some cases the maintenance of extensive cattle grazing is undertaken through the Department of Agriculture's Green, Low-Carbon, Agri-Environment Scheme (GLAS). Details of participation in the GLAS scheme and of the uptake across various measures are not currently available. It is therefore not possible to precisely assess the effects of implementation of these measures. It should be recognised that the management regimes of most fixed dunes are driven by the landowner rather than by any formal management plan or policy; therefore, the continued operation of the management regimes currently in place is not guaranteed. Other conservation measures that are not currently being implemented, but whose implementation would improve the Structure and functions of the habitat, include CI05 Management of problematic native species.

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	*Good /* ***Poor*** */ Bad / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as Stable. Current range is equal to the Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as Stable, as no change in Range is expected based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Range are therefore Good. Short-term trend direction of Area is assessed as Stable. Current area is approximately equal to the Favourable Reference Area. Conservation status of Area is therefore Favourable. Future trend of Area is assessed as Stable as there have been no reported losses in area for the 2170 habitat over the last two reporting periods. Future prospects of Area are therefore Good. Short-term trend direction of Structure and functions is Stable for	

	habitat that is in Good condition. Current Structure and functions are assessed as Unfavourable-Inadequate as ≥75% but <90% of the habitat is in Good condition. Current status of Structure and functions is therefore Unfavourable-Inadequate. Future trend of Structure and functions is assessed as Stable. Future prospects of Structure and functions are therefore Poor.

10 Conclusions

Assessment of conservation status at end of reporting period

10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) /* Unknown (XX)		
10.4 Future prospects	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/****NO***	*YES/****NO***
	b) yes, due to genuine change	*YES/NO*	*YES/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	*YES/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/NO*

	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	The Conservation Status of Range and Area are assessed as Favourable in the reporting period, as they were in the previous reporting period. The Conservation Status of Structure and functions and Future prospects are assessed as Unfavourable-Inadequate in this reporting period, as they were in the previous reporting period. The Overall assessment of Conservation Status is Unfavourable-Inadequate. This is the same as the previous reporting period. The status of Unfavourable-Inadequate is due to 25% of the 2170 habitat not being in good condition. Trend in Overall assessment of Conservation Status was assessed as stable. This is the same as the previous reporting period.		

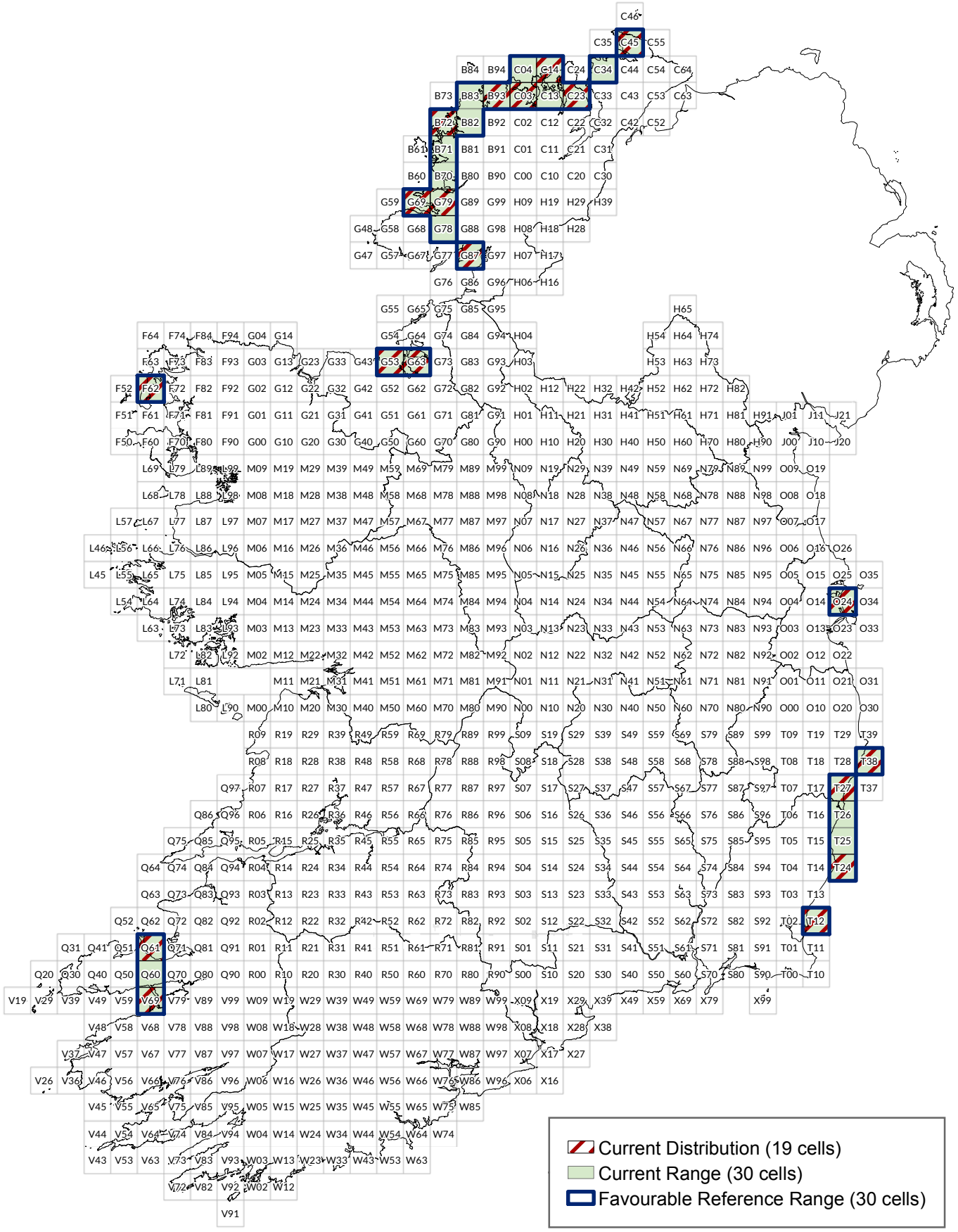
11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***1.48 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a)* ***Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable*** */ increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b)* ***Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing an intersect between the distribution shapefiles and the SAC shapefile.	

	The area given in Section 11.1 is the total area of 2170 habitat in SACs in the country, including some SACs where 2170 is not listed as a qualifying interest (QI). The area of 2170 within the Natura 2000 network where it is listed as a QI is 0.90 km^2. No anthropogenic loss of 2170 habitat was reported in the one 2170 site assessed for Area during the current reporting period, and no anthropogenic loss was recorded within the larger sample size of 14 sites assessed for Area during the previous reporting period (NPWS, 2013). There were three inconsistencies between the Natura 2000 sites where the 2170 is listed as a QI and the current distribution for the habitat. The habitat is listed as QI, representativity A, for Inishmore Island SAC (site code 000213) but there is no evidence for the habitat being present within this site and it was not located when the site was surveyed by Ryle *et al.* (2009). The habitat is also listed as a QI, representativity B, for Mweelrea/Sheeffry/Erriff Complex SAC (site code 001932) but there is no evidence for the habitat being present within this site and it was not located when the site was surveyed by Delaney *et al.* (2013). Similarly, the habitat was not located in Tranarossan and Melmore Lough SAC (000194) where it is listed as a QI, representativity B. The short-term trend of the habitat area in good condition within the SAC network is taken to be Stable, with the same trend as the 2170 habitat nationally (see Sections 6.4 and 6.8), as almost all areas of 2170 habitat surveyed during the last two reporting periods were within the SAC network. The surface area of 2170 habitat within the N2000 network has increased from the previous reporting period; this is in part due to improved knowledge, but largely due to a change in methodology. In this reporting period an intersect between the current 2170 distribution (listed in Section 3.2) and the SAC shapefile was used, whereas in the last reporting period an intersect between only the Ryle *et al.* (2009) and Delaney *et al.* (2013) 2170 shapefiles and the SAC shapefile was carried out (NPWS, 2013).

12 Complementary information

Dunes with creeping willow (2170) Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Mapáil V 2.0 Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**2190 Humid dune slacks**
1.2i Habitat short name	**Dune slacks**
1.3i Habitat description	Humid dune slacks are topographically the lowest lying regions within a dune system, found in hollows or depressions either behind or between dune ridges. The waterlogged condition of the soil is an important determinant of the vegetation; the water table is usually within 1 m of the surface, with diurnal, seasonal and annual fluctuations. Dune slacks can remain flooded from two to six months annually, with fluctuations in the water table based on precipitation and evapotranspiration. They can be classified as either primary or secondary depending on how they are formed. Primary slacks are formed by rapidly advancing dune ridges cutting off former beach plains from the influence of the sea, while secondary slacks are formed by blowing out in older dunes. In each case, the wind erodes the bare sand until the groundwater level is reached and pioneer dune slack vegetation begins to colonise. Humid dune slacks have a number of vegetation communities demonstrating phases of succession within slacks, from pioneer to mature slacks. They are floristically rich and support wetland communities. Typical species include *Juncus* spp., *Carex* spp., *Hydrocotyle vulgaris*, *Mentha aquatica*, *Agrostis stolonifera*, *Potentilla anserina*, *Anagallis tenella* and orchids such as *Epipactis palustris*, *Dactylorhiza* spp. and *Neottia ovata*.

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***1996-2016***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was compiled using 2190 polygons mapped by Martin *et al.* (2017), Delaney (2016), Wilson and Duff (2014), Woodrow and Denyer (2014), Delaney *et al.* (2013), NPWS (2012), Ryle *et al.* (2009), Fingal County Council (2010), and Crawford *et al.* (1996). All datasets that were published prior to 2014 were also used to compile the distribution map presented during the last round of

	reporting (NPWS, 2013). The distribution also utilised 2190 points mapped by Campbell *et al*. (in prep.). The point information was used to inform the distribution and area data, with an area assigned to all points. All references are detailed below in section 3.2. The new data sources added since the last round of reporting (NPWS, 2013), Campbell *et al.* (in prep.), Martin *et al.* (2017), Delaney (2016), Wilson and Duff (2014), and Woodrow and Denyer (2014), were all judged to be good quality data (high certainty=3). Delaney *et al.* (2013) was also assigned a certainty of 3, following the judgement made during the last round of reporting. Ryle *et al.* (2009) and Crawford *et al.* (1996) were both assigned a certainty of 2. Although these two datasets were based on a field survey and had been assigned a certainty of 3 during the last round of reporting they are now over 10 years old, increasing the uncertainty in the data. The NPWS (2012) polygon data that had not been superseded by better quality data, such as Martin *et al.* (2017), were generally retained as certainty 2, as were Fingal County Council (2010) data. All polygons and points with certainty 1 to 3 were used to map the distribution for the 2190 habitat.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Campbell, C., Hodd, R.L. and O'Neill, F.H. (in prep.) *Petalophyllum ralfsii* Monitoring Survey 2015-2018. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin. Crawford, I., Bleasdale, A. and Conaghan, J. (1996) Biomar Survey of Irish machair. A report to the National Parks and Wildlife Service, Dublin. Delaney, A., Devaney, F.M., and Barron, S.J. (2013) Monitoring survey of Annex I sand dune habitats in Ireland. *Irish Wildlife Manuals* No. 75. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. Delaney, A. (2016) Biological communities and environmental controls in a seasonal wetland habitat. Ph.D. thesis, University of Dublin, Trinity College, Dublin. Devaney, F., Barron, S. and Delaney, A. (2014) Survey of sand dune habitats at Portrane, Co. Dublin. Unpublished report by BEC Consultants Ltd., Dublin. EPA (2017) A Summary of the State of Knowledge on Climate Change Impacts for Ireland: Report 11 (2010-2016). Prepared for the Environmental Protection Agency by MaREI Centre, Environmental Research Institute, University College Cork. M. Desmond, P. O'Brien and F. McGovern. EPA, Wexford.

	Fingal County Council (2010) Shapefile supplied by Fingal for NPWS. Dublin. Martin, J.R., Daly, O.H. and Devaney F.M. (2017) Survey and assessment of vegetated shingle and associated habitats at 30 coastal sites. Volume 1: Main report. *Irish Wildlife Manuals*, No. 98. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. NPWS (2012) Management Planning Support Unit Maps 2405_imap95. CPU_Habitats_March_2012.shp NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.1. Unpublished Report, National Parks and Wildlife Service, Department of Arts, Heritage, and the Gaeltacht, Dublin. Ryle, T., Connolly, K., Murray, A. and Swann, M. (2009). Coastal monitoring Project (2004-06). Unpublished report submitted to National Parks and Wildlife Service. Wilson, F. and Duff, K. (2014) Derrynane National Historic Park dune grassland survey and management recommendations. Unpublished report for The Office of Public Works, Knockreer House, Killarney. Woodrow, W. and Denyer, J. (2014) Natura Impact Statement: The use of designated machair within the West of Ardara / Maas Road SAC and Skeskinmore Lough SPA for the annual Ardara agricultural show. Unpublished report submitted to National Parks and Wildlife Service.
3.2i Additional information	

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***8,100 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	

4.7 Long-term trend Direction *Optional*	*stable / increasing / **decreasing** / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 8,200 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable Reference Range has been increased since the last reporting period (NPWS, 2013) to reflect the improved level of knowledge.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods? **YES**/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/**NO***
	b) yes, due to improved knowledge/more accurate data	***YES**/NO*
	c) yes, due to the use of different method	***YES**/NO*
	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data / **the use of a different method***	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 2190 habitat. A maximum gap distance of two 10km grid cells was used when running the range tool. Four 10km grid cells generated by the range tool that had no coastline were removed. Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013). None of the area losses recorded during the current reporting period led to a contraction in the range. However, during the previous reporting period (NPWS, 2013) one 10km square on the east coast was lost due to anthropogenic impact and therefore the short-term trend is decreasing. The number of 10km squares in the range (81) is four squares higher than the last monitoring period (NPWS, 2013), with the additional squares found throughout the range. One additional square in Clare	

	is due to improved knowledge and more accurate data. The other three additional squares are due to the use of a slightly different methodology, with all 10km grid cells with a coastline retained within the range within the current reporting period. The long-term trend was estimated as decreasing based on the fact that in the last round of reporting the 2190 habitat was reported to be lost, due to anthropogenic activities, from one 10km square (O17) on the east coast (NPWS, 2013). There is no evidence from the current reporting period that the 2190 habitat within this area has been restored. The Favourable Reference Range (FRR) has been increased since the last reporting period (NPWS, 2013) to reflect the improved level of knowledge and the use of a different method. The FRR is the current range, reported in 4.1, plus the one 10km square that was lost due to anthropogenic impacts during the last reporting period (NPWS, 2013).

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***1996-2016***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***2.71 km^2***
5.3 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	*stable / increasing / **decreasing** / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	***b) Operator > (greater than)** or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods? **YES**/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	***YES**/NO*
	b) yes, due to improved knowledge/more accurate data	***YES**/NO*
	c) yes, due to the use of different method	***YES**/NO*
	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 1996 (Crawford *et al.*, 1996) when the first baseline survey was carried out and incorporates updates made by surveys carried out between 1996 and 2016 that are listed in section 3.2. Favourable Reference Area (FRA) was not determined exactly, but is estimated to be greater than the current area but not by more than 10%. FRA is deemed to be greater than the current area given that some anthropogenic losses have occurred since the Directive came into force; there have also been losses due to natural processes. During the current reporting period, thirty-five 2190 sites were visited: four by Martin *et al.* (2017), three of which were also visited	

	by Delaney (2016); 27 sites were visited by Delaney (2016), with one of these sites also visited by Woodrow and Denyer (2014); nine sites were visited by Campbell *et al.* (in prep.), three of which were also visited by Delaney (2016); and one site was visited by Wilson and Duff (2014). This represents 0.98 km^2 (36%) of the total area of 2190 habitat recorded within Ireland and is considered to be a representative sample. During the current reporting period an Area assessment was only undertaken at the four sites surveyed by Martin *et al.,* (2017). Short-term trend in Area was deemed to be decreasing due to the loss of 4.8 ha, due to the anthropogenic impact of drying out (Martin *et al.*, 2017). The magnitude of the known loss is approximately -1.35% per annum, measured over a period of six years (2013-2018). This figure is calculated by expressing the 4.8 ha area that was lost as a per-annum percentage of the 40.99 ha area surveyed. In the last reporting period (NPWS, 2013) a loss of 1 ha of 2190 habitat due to anthropogenic impacts was reported with a magnitude of less than 1% per year. The long-term trend in Area was estimated as decreasing based on the fact that, in the last two rounds of reporting, areas of 2190 habitat were reported to be lost due to anthropogenic activities. The difference in habitat extent between this reporting period and the last (NPWS, 2013) is in part due to a loss of 4.8 ha of 2190 habitat due to drying out and partly due to improved knowledge and more accurate data with older data superseded by the data collected during recent field surveys, such as Delaney (2016) and Martin *et al.* (2017). To allow point files extracted from Campbell *et al.* (in prep.), to contribute to the total area of 2190 habitat calculated for the current reporting period, a review of the datasets was carried out using remote imagery. Following this review an area of 0.055 ha was assigned to three points within the dune slack at Bunduff machair and a value of 0.01 ha was assigned to all remaining points.

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***2.40 km²***
		Maximum	***2.40 km²***
	b) Area in not-good condition	**Minimum**	***0.31 km²***
		Maximum	***0.31 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***

6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***
6.7 Typical species Method used *Optional*	The list of typical species is the same as the last reporting period (NPWS, 2013) and was devised by Delaney *et al.* (2013). The Structure and functions criteria, including typical species, used to assess the 2190 habitat are listed in Appendix I of Delaney *et al.* (2013).
6.8 Additional information *Optional*	During the current reporting period, thirty-five 2190 sites were visited and 32 of these sites were assessed for Structure and functions: four by Martin *et al.* (2017), of which three were also visited by Delaney (2016); 27 sites assessed by Delaney (2016), with one of these sites also assessed by Woodrow and Denyer (2014); three sites visited by Campbell *et al.* (in prep.); and one site assessed by Wilson and Duff (2014). This represents 0.98 km^2 (36%) of the total area of 2190 habitat recorded within Ireland and is considered to be a representative sample. Of the 32 sites assessed for Structure and functions, 88.5% of the 0.98 km^2 of 2190 habitat that was surveyed during the current reporting period was in good condition (Favourable) and 11.5% was not in good condition. The approach used to estimate the percentage of the 2190 habitat in Unfavourable condition at each site was as follows: If none of the assessment criteria failed at the site level, then none of the 2190 area was classified as Unfavourable and the whole area of 2190 at the site was assigned as being in good condition; if 1 criterion failed at the site level this resulted in 25% of the 2190 area being classified as having Unfavourable Structure and functions; if 2 or more criteria failed, this resulted in between 25% and 100% of the area of 2190 being assessed as Unfavourable based on a review of the plot data and expert opinion. During the last reporting period 92.1% of the 2190 habitat was

	assessed as Favourable (NPWS, 2013) and the most frequent criteria to fail the assessment were 'lack of indicator species, 'cover of scrub', 'lack of broadleaved herbs,' 'the proportion of bare ground', and 'damage due to disturbance'. During the current reporting period these same criteria were again the most frequent to fail the assessment. Due to the fact that 92.1% of the 2190 habitat was assessed as Favourable in the last reporting period and 88.5% of the 2190 habitat is now assessed as Favourable, the short-term trend of the habitat area in good condition is taken to be stable, even though there appears to be a slight decline in habitat condition. This is based on expert opinion as there was a difference between how sites were sampled during the current round and previous round of reporting (NPWS, 2013) and this sampling difference may have contributed to a slight difference in the percentage of the 2190 area assessed as Favourable. During the current round of reporting a Structure and functions assessment was made at 32 sites, with only one dune slack surveyed per site within the majority of the dune systems, resulting in an area of 0.98 km^2 being surveyed. During the previous round of reporting (NPWS, 2013), a Structure and functions assessment was made at 29 sites with all dune slacks within each system assessed, resulting in a larger area of 2.05 km^2 being surveyed. Also the group of sites surveyed within each reporting period was different, with 11 of the sites surveyed during the current round of reporting not surveyed during the previous round (NPWS, 2013). Typical species: *Agrostis stolonifera, Anagallis tenella, Bryum pseudotriquetrum, Calliergonella cuspidata, Campylium stellatum, Carex arenaria, Carex flacca, Carex nigra, Dactylorhiza* spp*., Epipactis palustris, Equisetum* spp., *Festuca rubra, Galium palustre, Hydrocotyle vulgaris, Juncus articulatus, Lotus corniculatus, Mentha aquatica, Potentilla anserina, Prunella vulgaris, Ranunculus flammula, Sagina nodosa, Salix repens* ssp*. argentea, Ophioglossum vulgatum, Aneura pinguis, Petalophyllum ralfsii.*

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**

List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A19** Application of natural fertilisers on agricultural land (M) **A31** Drainage for use as agricultural land (M) **F07** Sports, tourism and leisure activities (M) **I02** Other invasive alien species (other than species of Union concern) (M) **L02** Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices) (M)	**A19** Application of natural fertilisers on agricultural land (M) **A31** Drainage for use as agricultural land (M) **F07** Sports, tourism and leisure activities (M) **I02** Other invasive alien species (other than species of Union concern) (M) **L02** Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices) (M)
7.2 Sources of information *Optional*	Pressures were sourced from the following reports and accompanying data: Campbell, C., Hodd, R.L. and O'Neill, F.H. (in prep.) *Petalophyllum ralfsii* Monitoring Survey 2015-2018. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin. Delaney, A. (2016) Biological communities and environmental controls in a seasonal wetland habitat. Ph.D. thesis, University of Dublin, Trinity College, Dublin. Martin, J.R., Daly, O.H. and Devaney, F.M. (2017) Survey and Assessment of Vegetated Shingle and Associated Habitats at 30 Coastal Sites. Volume 1: Main report. *Irish Wildlife Manuals*, No. 98. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. Wilson, F. and Duff, K. (2014) Derrynane National Park Dune Grassland Habitat and Management Recommendation. Produced for the Office of Public Works, Department of Public Expenditure and Reform, Kerry. Woodrow, W. and Denyer, J. (2014) Natura Impact Statement: The use of designated machair within the West of Ardara/ Mass Road SAC and Sheskinmore Lough SPA for the annual Ardara agricultural show. Unpublished report submitted to National Parks and Wildlife Service.	
7.3 Additional information *Optional*	Pressures and threats were selected and ranked based on intensity (high, medium or low), frequency of occurrence, and area of impact, using the data gathered from the sources listed in section 7.2; these data are summarised in the backing document 'SDMN17_AR1719_pressures_assessment'. For the current reporting period, data on pressures were available for 34 2190 sites, 24 surveyed by Delaney (2016), four surveyed by Martin *et al.* (2017), four surveyed by Campbell *et al.* (in prep.), one by Denyer and Woodrow (2014), and one by Wilson and Duff (2014). Within the 2190 habitat, no pressures were identified as being of high importance. F07 was the most frequently recorded pressure, recorded in 'SDMN17_AR1719_pressures_assessment' under 'walking', 'trampling', 'off-road driving' and 'golf courses'. A31 was	

	the second most frequently recorded pressure recorded in 'SDMN17_AR1719_pressures_assessment' under 'drainage'. L02 recorded at three sites under 'succession to scrub' was the third most frequently recorded pressure. L02 could also be linked to the drying out of slacks. I02 was recorded as a medium-importance pressure due to the fact that a large stand of the alien invasive species *Hippophae rhamnoides* was causing an area of dune slack within the Tralee Bay and Magharees Peninsula, West to Cloghane SAC (site code 002070) to dry out, resulting in a loss of 4.8 ha of 2190 habitat (see section 5.15 above). A19 recorded under 'fertilisation' was only recorded at one site but is included as a medium-importance pressure based on expert judgement. Three of the five medium-importance pressures listed in section 7.1, F07, I02 and L02 were also listed as medium/high-importance pressures in NPWS (2013). A19 and A31 were not specifically listed in NPWS (2013) but the pressure of 'agricultural intensification' was recorded as a medium-importance pressure. The pressures A09 Intensive grazing or overgrazing by livestock and A10 Extensive grazing or undergrazing by livestock, were recorded as high-importance pressures in the previous round of reporting (NPWS, 2013), but were not recorded at the subsample of sites surveyed during the current reporting period. This difference is considered to be either due to an interpretative change, or the smaller subsample of sites visited during the current recording period, rather than any actual change in the occurrence of grazing within the habitat. For six of the medium-importance pressures recorded in NPWS (2013) no evidence of their occurrence was recorded during the current reporting period. These were 'forest and plantation management', 'sand and gravel extraction', 'roads and paths', 'sea defence or coastal protection works', 'erosion', and 'disposal of household waste'. 'Paths and roads' were recorded as an impact at one site by Martin *et al.* (2016) but as the impact was recorded as neutral it was not assessed as a negative pressure. These differences between recording periods are either due to an interpretative change, or to the smaller subsample of sites visited during the current recording period. All six pressures are considered as low-importance pressures for the current reporting period. Pressures and threats noted less frequently during the current reporting period and/or that impacted only small areas were deemed to be of low importance. Low-importance impacts recorded during the current reporting period included F09 Deposition and treatment of waste/garbage from household/recreational facilities (in the form of litter) and K05 Physical alteration of water bodies, in the form of artificial ponds that have been constructed for the Annex IV species Natterjack toad (*Epidalea calamita*). Climate change has not been added as an impact of medium- or high-importance but it is likely to affect the range of 2190 over the coming decades. In NPWS (2013) climate change was recorded under 'changes in abiotic conditions' as a high-importance pressure. The short-term predictability of the effect of climate change and in particular the resultant mean sea level rise and extreme weather events are unknown, but the gradual long-term trend will see an

	increase in the mean sea level and extreme weather events (EPA, 2017) which will impact the 2190 habitat. The five pressures presented in section 7.1 are also considered to be the five main threats in the future.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type** or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* ***a) Short-term results (within the current reporting period, 2013-2018)** or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	**CA03** Maintain existing extensive agricultural practices and agricultural landscape features
8.6 Additional information *Optional*	Conservation measures were selected and ranked based on the frequency of occurrence, using the data gathered during the current reporting period. These sources are listed in section 7.2 and these data are summarised in the backing document 'SDMN17_AR1719_pressures_assessment'. The maintenance of extensive cattle grazing (recorded under code CA03) is the most frequent conservation measure applied to the habitat. In some cases the maintenance of extensive cattle grazing is undertaken through the Department of Agriculture's Green, Low-Carbon, Agri-Environment Scheme (GLAS).

	The maintenance of grazing by non-domestic grazers including hares and rabbits (recorded under code CG02) was recorded at one site during the current reporting period, with these species controlled by a combination of human hunting and natural predation. As there is no evidence that hare or rabbit populations are managed for the conservation of the 2190 habitat, CG02 was not recorded as a conservation measure in section 8.5. It should be recognised that the management regimes of most dune slacks are driven by the landowner rather than by any formal management plan or policy; therefore the continued operation of the management regimes currently in place is not guaranteed. Other conservation measures that are not currently being implemented, but whose implementation would improve the Structure and functions of the habitat, include the control or removal of non-native species, particularly the invasive species Sea-buckthorn (*Hippophae rhamnoides*) and the blocking of drains that are contributing to the drying out of the 2190 habitat (i.e. CA15 Manage drainage and irrigation operations and infrastructures in agriculture).

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	*Good / **Poor** / Bad / Unknown*
	b) Area	*Good / **Poor** / Bad / Unknown*
	c) Structure and functions	*Good / **Poor** / Bad / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as decreasing. Current range is less than the Favourable Reference Range. Conservation status of Range is therefore Unfavourable-Inadequate. Future trend of Range is assessed as stable as no further change in range is expected based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Range are therefore poor. Short-term trend direction of Area is assessed as decreasing. Current area is <10% less than the Favourable Reference Area. Conservation status of Area is therefore Unfavourable-Inadequate. Future trend of Area is assessed as decreasing, as Martin *et al.* (2017) reported a loss in area of 4.8 ha for the current reporting period. Future prospects of Area are therefore poor. Short-term trend direction of Structure and functions is stable for habitat that is in good condition. Current Structure and functions are assessed as Unfavourable-Inadequate as ≥75% but <90% of the habitat is in good condition. Conservation status of Structure and functions is therefore Unfavourable-Inadequate. Future trend of Structure and functions is assessed as stable. Future prospects of Structure and functions are therefore poor.	

10 Conclusions			
Assessment of conservation status at end of reporting period			
10.1 Range	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*		
10.2 Area	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / **deteriorating** / stable / unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/**NO***	*YES/**NO***
	b) yes, due to genuine change	*YES/NO*	*YES/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	*YES/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	The Conservation Status of Range, Area, Structure and functions and Future prospects are Unfavourable-Inadequate, as they were in the previous reporting period. The Overall Conservation Status was assessed as Unfavourable-Inadequate, as it was during the last reporting period. The status of Unfavourable-Inadequate during the current reporting period was		

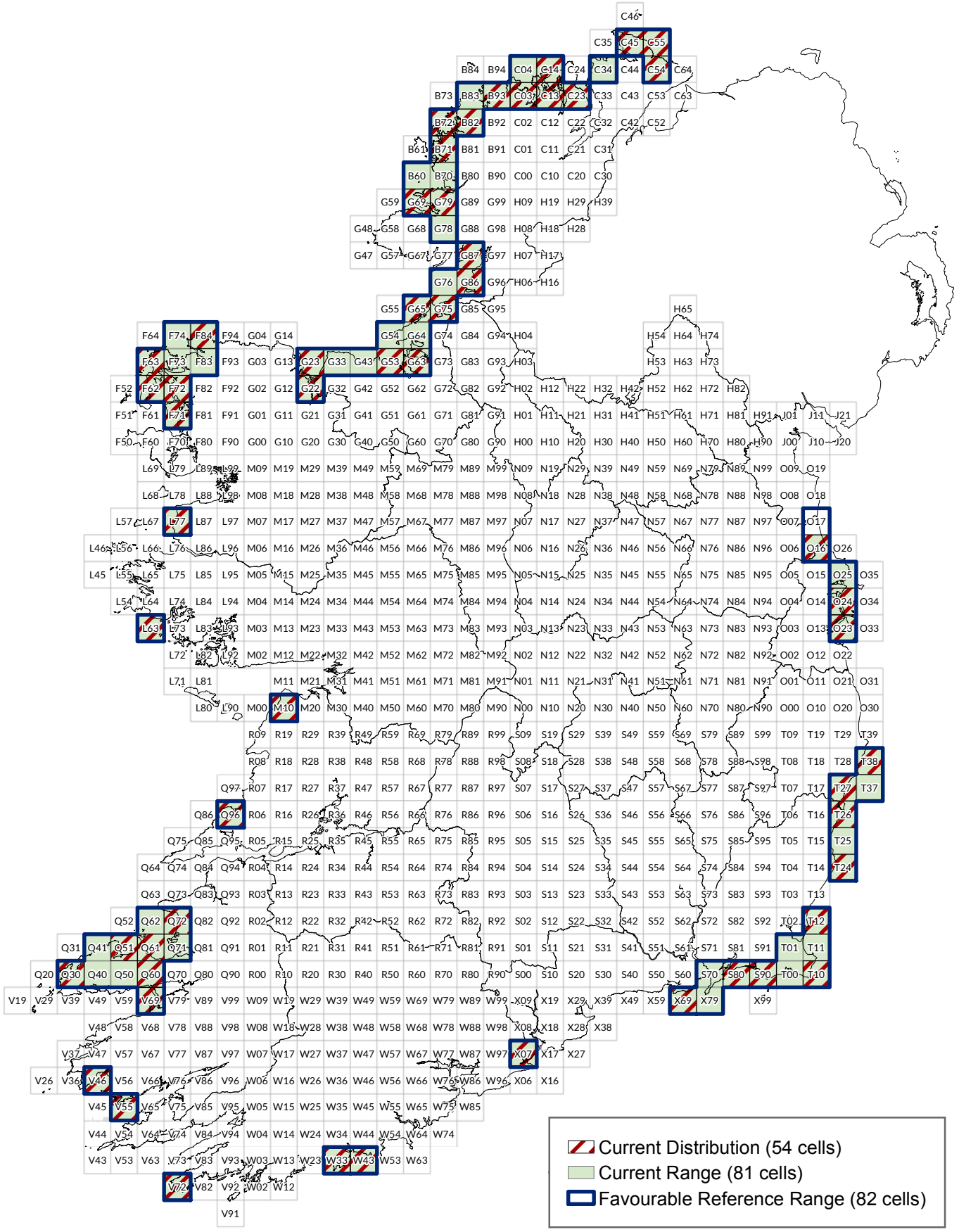
	due to the current range being below the Favourable Reference Range, a decreasing area that is below the Favourable Reference Area, and 11.5% of the 2190 habitat not being in good condition. Trend in Overall Conservation Status was assessed as deteriorating. This is the same as the previous reporting period. The decreasing trend in Area was due to genuine change, with some of the main pressures listed in 7.1 the drivers of this change. F07 Sports, tourism and leisure activities, A31 Drainage for use as agricultural land, and I02 Other invasive alien species (other than species of Union concern) could all be contributing to the drying out of the 2190 habitat.

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***2.61 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable** / increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing an intersect between the distribution shapefile and the SAC shapefile. The area given in section 11.1 is the total area of 2190 habitat in SACs in the country, including some SACs where 2190 is not listed as a qualifying interest (QI). The area of 2190 within the SAC network where it is listed as a QI is 1.87 km^2. The site where the 4.8 ha loss of 2190 habitat due to the anthropogenic impact of drying out was reported is within the Tralee Bay and Magharees Peninsula, West to Cloghane SAC (site code 002070), where the 2190 habitat is listed as a QI, representativity A.	

	The 2190 habitat is listed as a QI for Inishmore Island SAC (site code 000213) but there is no evidence for the habitat being present within this site and it was not located when the site was surveyed by Ryle *et al*. (2009). There is also no 2190 found in Rutland Island and Sound SAC. The nearest distribution to this is in the adjoining site Gweedore Bay and Islands SAC c. 215m east, where the habitat is also a QI. The short-term trend of the habitat area in good condition within the SAC network is taken to be stable, with the same trend as the 2190 habitat nationally (see sections 6.4 and 6.8), as almost all areas of 2190 habitat surveyed during the last two reporting periods were within the SAC network. The surface area of 2190 habitat within the SAC network has increased from the previous reporting period; this is in part due to improved knowledge, and largely due to a change in methodology. In this reporting period an intersect between the current 2190 distribution and the SAC shapefile was carried out, whereas in the last reporting period an intersect between only the Ryle *et al*. (2009) and Delaney *et al*. (2013) 2190 shapefiles and the SAC shapefile was carried out (NPWS, 2013).

12 Complementary information

Dune slack (2190)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**21A0 Machairs (* in Ireland)**
1.2i Habitat short name	**Machair**
1.3i Habitat description	21A0 Machairs are complex and dynamic systems which are considered natural landforms that are the product of both wind erosion and cultural activities. They are globally restricted to the northwest coasts of Ireland and Scotland. Frequent species include *Festuca rubra, Lotus corniculatus, Plantago lanceolata, Bellis perennis, Carex arenaria, Galium verum* and *Trifolium repens*. There is, however, no suite of species unique to machair and physical characteristics are important in its definition. A machair should typically be a flat, sandy, coastal plain, in an oceanic location with a cool, moist climate. The sandy substrate should have a significant percentage of shell-derived material, producing a lime-rich soil with a pH normally greater than 7. The vegetation should be herb-rich, with a low frequency of sand-binding species. Wetness of the soil varies, due to the proximity of the water table, with much of the vegetation transitional between wet and dry communities. There should be a history of human interference, principally from grazing. This habitat is found in exposed locations between Galway Bay and Malin Head, Co. Donegal.

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***1995-2017***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was compiled using 21A0 polygons mapped by McGurn *et al*. (2018), Campbell *et al*. (in prep.), Martin *et al.* (in prep.), Martin *et al.* (2017), Woodrow and Denyer (2014), Delaney *et al.* (2013), NPWS (2012), Ryle *et al.* (2009) and Crawford *et al.* (1996). No points were used to inform the distribution map. All references are detailed below in Section 3.2. All the aforementioned datasets published prior to 2014 were also used to compile the distribution maps from the last reporting period

	(NPWS, 2013). A certainty rating system was applied to all data that informed the distribution map. This system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1, the lowest. The new data sources added since the last round of reporting (NPWS, 2013) that were based on a field survey, McGurn *et al*. (2018), Campbell *et al.* (in prep.), Martin *et al.* (2017) and Woodrow and Denyer (2014), were judged to be good quality data (high certainty=3). Delaney *et al.* (2013) was assigned a certainty of 2 or 3 following the judgement made during the last round of reporting. Ryle *et al.* (2009) and Crawford *et al.* (1996) were both assigned a certainty of 2. Although these two datasets were based on a field survey and had been assigned a certainty of 3 during the last round of reporting they are now over 10 years old, increasing the uncertainty in the data. The NPWS (2012) polygons that had not been superseded by better quality data, such as Martin *et al.* (2017), were generally retained as certainty 2. There were no polygons with certainty 1 in the dataset. All polygons with certainty 2 and 3 were used to map the distribution for the 21A0 habitat. Following a review of the NPWS (2012) and Crawford *et al*. (1996) certainty=2 polygons using remote imagery, 1006 polygons were deleted, largely due to the fact that the spatial data had been superseded by data collected during more recent surveys, predominantly Delaney *et al.* (2013) and Ryle *et al.* (2009), and to a smaller extent due to the fact that some polygons were not in locations capable of supporting the 21A0 habitat, for example deletions included polygons located in foredune areas.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Campbell, C., Hodd, R. & O'Neill, F. (in prep.) The monitoring and assessment of *Petalophyllum ralfsii* (Petalwort) in Ireland 2015-2018. *Irish Wildlife Manuals* No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin. Crawford, I., Bleasdale, A. and Conaghan, J. (1996) Biomar Survey of Irish machair. A report submitted to National Parks and Wildlife Service, Dublin. Delaney, A., Devaney, F.M., and Barron, S.J. (2013) Monitoring survey of Annex I sand dune habitats in Ireland. *Irish Wildlife Manuals* No. 75. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. Doddy, J.P. (2013) Sand Dune Conservation, Management and Restoration. Coastal Research Library 4. National Coastal

	Consultants, Huntingdon, UK. EPA (2017) A Summary of the State of Knowledge on Climate Change Impacts for Ireland: Report 11 (2010-2016). Prepared for the Environmental Protection Agency by MaREI Centre, Environmental Research Institute, University College Cork. M. Desmond, P. O'Brien and F. McGovern. EPA, Wexford. Martin, J.R. (2018) Backing document for assessment of pressures and threats SDMN17_AR1719_pressures_assessment. Unpublished report submitted to National Parks and Wildlife Service, Dublin. Martin, J.R., O'Neill, F.H. and Daly, O.H. (2018) The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats. Irish Wildlife Manuals, No. 102. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin. Martin, J.R., Daly, O.H. and Devaney F.M. (2017) Survey and assessment of vegetated shingle and associated habitats at 30 coastal sites. Volume 1: Main report. *Irish Wildlife Manuals* No. 98. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. McGurn, P., Browne, A., Ní Chonghaile, G. (2018). AranLIFE Final Report 2013 to 2018. The sustainable management of the priority terrestrial Habitats Directive Annex I habitats of the Aran Islands. LIFE 12 NAT IE 000995. NPWS (2012) Management Planning Support Unit Maps 2405_imap95 (CPU_Habitats_March_2012). NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.1. Unpublished Report, National Parks and Wildlife Service, Department of Arts, Heritage, and the Gaeltacht, Dublin. Ryle, T., Connolly, K., Murray, A. and Swann, M. (2009). Coastal monitoring project (2004-06). Unpublished report submitted to National Parks and Wildlife Service, Dublin. Woodrow, W. and Denyer, J. (2014) Natura Impact Assessment: The use of designated machair within the West of Ardara / Maas Road SAC and Skeskinmore Lough SPA for the annual Ardara agricultural show. Unpublished report submitted to National Parks and Wildlife Service, Dublin.
3.2i Additional information	

4 Range	
Range within the biogeographical/marine region concerned	
4.1 Surface area	***5,800 km²***
4.2 Short-term trend Period	***2007–2018***
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*

4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 5,800 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators Favourable reference range has been decreased as the figure presented in the last reporting period (NPWS, 2013) included a square that was not on the coastline. There is no evidence of an actual loss of range since the Directive came into force and the geographic spread is considered sufficient for the long term survival of the habitat.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	*YES/****NO***
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***

	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data / **the use of a different method***
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 21A0 habitat. A maximum gap distance of two 10 km grid cells was used when running the range tool. Three 10 km grid cells generated by the range tool that had no coastline were removed; during the last round of reporting (NPWS, 2013) only two 10 km grid cells were removed due to no coastline. Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013). None of the area losses recorded during these two reporting periods led to a contraction in the range. The short-term trend is stable. The number of 10 km squares in the range (58) is one square less than the last monitoring period (NPWS, 2013). This change is due to the use of a slightly different methodology where all 10 km grid cells without a coastline were removed. In NPWS (2013) one square which was not on the coastline was retained. Based on current expert opinion this one square is not considered capable of supporting 21A0 habitat and was removed from the range in this reporting period. The favourable reference range (FRR) has been decreased in this current reporting period from the figure (5,900 km^2) presented in the last reporting period (NPWS, 2013) to 5,800 km^2. This change in the FRR is not due to genuine change but due to a change in methodology whereby all 10 km grid squares not on the coastline were removed.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***1995-2017***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***30.88 km^2***
5.3 Type of estimate	*Best estimate / 95% confidence interval / **minimum***	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*	

5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator > (greater than) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	***YES****/NO*
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data /* ***the use of a different method***	
5.15 Additional information	The period over which the surface area of the habitat was	

Optional	determined begins in 1995 with the first data available on the 21A0 habitat coming from Management Planning Support Unit Mapping carried out between 1995 and 2001 (NPWS, 2012) and incorporates updates made by surveys carried out between 1995 and 2017 that are listed in Section 3.2. Favourable reference area (FRA) was not determined exactly, but is estimated to be <10% greater than the current area. FRA is deemed to be greater than the current area, given that some anthropogenic losses have occurred since the Directive came into force and there have also been losses due to natural processes. During the current reporting period ten 21A0 sites were visited and two of these sites were assessed for Area by Martin e*t al*. (2017). The two sites assessed for Area represent 1.63 km^2 (5.3%) of the total area of 21A0 habitat recorded in Ireland. This represents a smaller proportion of the total national area of 21A0 than the 12 sites (11.3 km^2) that were surveyed by Delaney *et al.* (2013) and the 59 sites (18.1 km^2) that were surveyed by Ryle *et al.* (2009), limiting the conclusions that can be made. Short-term trend in Area was deemed to be decreasing due to a loss of 6.5 ha due to direct anthropogenic impacts to four 21A0 sites reported during the last reporting period (NPWS, 2013). The magnitude of the known loss is approximately -0.04% per annum, measured over a period of 12 years (2007-2018). This figure is calculated by expressing the 6.5 ha area that was lost as a per-annum percentage of the 13 km^2 area surveyed in the last two reporting periods, including the area that has been lost within the total. The long-term trend in Area was deemed to be decreasing based on the fact that a 6.5 ha loss of 21A0 habitat due to anthropogenic activities was reported in NPWS (2013). The difference in habitat extent between the area of 30.88 km^2 reported during this reporting period and the figure of 29.42 km^2 reported during the previous reporting period (NPWS, 2013) is due to a number of factors, in part due to genuine changes due to natural fluctuations in this dynamic habitat and improved knowledge/more accurate data, but largely due to the use of a different method. There was a genuine change, a net loss of 8.5 ha within the two 21A0 sites in which Area was assessed during the current reporting period, but all losses were considered to be due to the natural fluctuations in a dynamic habitat. Martin *et al*. (2017) reported the reduction in area at these two 21A0 sites due to habitat change to 2120 white dunes and 2130 fixed dunes and erosion. With regards to improved knowledge/more accurate data, the older data were superseded by the data collected during recent field surveys, such as Martin *et al*. (2017). The surface area of 29.42 km^2 reported during the 2007-2012 reporting period (NPWS, 2013) was comprised of the machair mapped during the Coastal Monitoring Project (Ryle *et al.,* 2009) and the Sand Dune Monitoring project (Delaney *et al*., 2013). The subset of 21A0 sites mapped by Ryle *et al.* (2009) which were revisited by Delaney *et al*. (2013) were increased by 14.1% in NPWS (2013), an extrapolation of the 21A0 area at these sites, and this change was included in the total surface area of 29.42 km^2. A different method was used in this reporting period, whereby the area was extracted

	directly from all the distribution shapefiles.

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***23.89 km²***
		Maximum	***23.89 km²***
	b) Area in not-good condition	**Minimum**	***6.99 km²***
		Maximum	***6.99 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***		
6.7 Typical species Method used *Optional*	The list of typical species is the same as the last reporting period (NPWS, 2013) and was devised by Delaney *et al.* (2013). The Structure and functions criteria, including typical species, used to assess the 21A0 habitat are listed in Appendix I of Delaney *et al.* (2013).		
6.8 Additional information *Optional*	During the current reporting period ten 21A0 sites were assessed for Structure and functions, four by Campbell *et al.* (in prep.), three by McGurn *et al*. (2018), two by Martin *et al*. (2017), and one site by Woodrow and Denyer (2014). The 10 sites assessed for Structure and functions represents 2.62 km^2 (8%) of the total area of 21A0 habitat recorded in Ireland. This is a smaller proportion than the 12 sites (11.3 km^2) that were surveyed by Delaney *et al*. (2013). Of the 10 sites assessed for Structure and functions in this reporting period, 77% (2.03 km^2) of the area was assessed as Favourable (i.e. in		

	good condition) and 23% (0.59 km^2) of the area was assessed as Unfavourable (i.e. not in good condition). These results deviate from the findings of NPWS (2013), with the overall conclusion of Unfavourable-Inadequate differing from the Unfavourable-Bad reported by NPWS (2013). The approach used to estimate the percentage of the 21A0 habitat in unfavourable condition at each site was as follows: If none of the assessment criteria failed at the site level then none of the 21A0 area was classified as unfavourable and the whole area of 21A0 at the site was assigned as being in good condition; if 1 to 2 criteria failed at the site level this resulted in 25% of the 21A0 area being classified as having unfavourable Structure and functions; if 3 to 5 assessment criteria failed this resulted in 50% of the 21A0 area at the site being classified with unfavourable Structure and functions; if 6 to 8 criteria failed this resulted in 75% of the 21A0 area at the site being classified as unfavourable; if 9 to 10 assessment criteria failed at the site level this resulted in 100% of the area of 21A0 being assessed as unfavourable. During the last reporting period only 22% of the 21A0 habitat was assessed as being in good condition (NPWS, 2013) and the most frequent criteria to fail the assessment were sward height, negative indicator species and damage due to disturbance. During the current reporting period similar criteria were again the most frequent to fail the assessment, with sward height and percentage of bare ground the two most frequent reasons for failure. The significant difference between the percentage of 21A0 habitat reported as being in good condition during the previous reporting period (NPWS, 2013) and current reporting period is due to a change in the methodology. The short-term trend of habitat area in good condition was assessed, based on expert opinion, as stable. This is due to the fact that, for the four sites that were surveyed in both the current round of reporting and the last round (NPWS, 2013), three sites had improved from 1-2 criteria failing to no criteria failing, and one site had deteriorated from no criteria failing to three criteria failing. The reason the short-term trend is thought to be stable rather than increasing is due to the fact that only two of the sites were adequately sampled during both rounds of monitoring, with one of these two sites improving and the other deteriorating. The remaining two 21A0 sites were sampled during the current round of reporting for a *Petalophyllum ralfsii* survey (Campbell *et al*., in prep.) and the areas of 21A0 habitat at these two sites were not as comprehensively surveyed as they were by Delaney *et al.* (2013) for the last round of reporting. Typical species: *Agrostis stolonifera, Aira praecox, Bellis perennis, Carex arenaria, Carex flacca, Carex nigra, Cerastium fontanum, Crepis capillaris, Euphrasia officinalis* agg.*, Festuca rubra, Galium verum, Hydrocotyle vulgaris, Linum catharticum, Lotus corniculatus, Orchid* spp.*, Plantago lanceolata, Potentilla anserina, Prunella vulgaris, Rhinanthus minor, Sedum acre, Thymus polytrichus, Trifolium repens, Viola canina, Viola riviniana, Viola tricolor.*

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A02** Conversion from one type of agricultural land use to another (excluding drainage and burning) (H) **A09** Intensive grazing or overgrazing by livestock (H) **F01** Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions) (H) **A10** Extensive grazing or undergrazing by livestock (M) **A20** Application of synthetic (mineral) fertilisers on agricultural land (M) **A30** Active abstractions from groundwater, surface water or mixed water for agriculture (M) **F07** Sports, tourism and leisure activities (M) **L01** Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization) (M)	**A02** Conversion from one type of agricultural land use to another (excluding drainage and burning) (H) **A09** Intensive grazing or overgrazing by livestock (H) **F01** Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions) (H) **A10** Extensive grazing or undergrazing by livestock (M) **A20** Application of synthetic (mineral) fertilisers on agricultural land (M) **A30** Active abstractions from groundwater, surface water or mixed water for agriculture (M) **F07** Sports, tourism and leisure activities (M) **L01** Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization) (M)

7.2 Sources of information

Optional

Pressures and threats were selected and ranked from the following data:

McGurn, P., Browne, A., Ní Chonghaile, G. (2018) AranLIFE Final Report 2013 to 2018. The sustainable management of the priority terrestrial Habitats Directive Annex I habitats of the Aran Islands. LIFE 12 NAT IE 000995.

Martin, J.R., Daly, O.H. and Devaney, F.M. (2017) Survey and Assessment of Vegetated Shingle and Associated Habitats at 30 Coastal Sites. Volume 1: Main report. Irish Wildlife Manuals, No. 98. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin, Ireland.

National Parks and Wildlife Service (2013) The Status of Protected EU Habitats and Species in Ireland. Overview Volume 1. Unpublished Report. National Parks and Wildlife Services. Department of Arts,

	Heritage and the Gaeltacht, Dublin. Woodrow, W. and Denyer, J. (2014) NIS: The use of designated machair within the West of Ardara / Maas Road SAC and Skeskinmore Lough SPA for the annual Ardara agricultural show. Unpublished report for National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin.
7.3 Additional information *Optional*	The pressures and threats presented in 7.1 are derived from the data presented in NPWS (2013) which was based on a more representative sample of sites. Data were recorded at twelve 21A0 sites by Delaney *et al.* (2013) in the previous reporting period (NPWS, 2013). During the current reporting period information on pressures were available from seven sites, three sites from the AranLIFE project (Browne, in prep.), two sites from the Vegetated Shingle Monitoring (VSM) survey (Martin *et al*., 2017) and one site from a Natura Impact Statement for the annual Ardara agricultural show (Woodrow and Denyer, 2014). Data gathered from the sources listed in Section 7.2 are summarised in Martin (2018). The crosswalk referenced in Martin (2018) was utilised when it was necessary to transfer pressures from the old to the current impact recording system. The three high-importance pressures, A02, A09, and F01, presented in Section 7.1 were carried forward from the 2007-2012 reporting period (NPWS, 2013). For the high-importance pressures A09 and F01 there were additional data provided from three machair sites that were surveyed during the current reporting period (see Martin, 2018). Five of the pressures listed in NPWS (2013), A10, A20, A30, F07, and L01, were retained as medium-importance pressures for the current reporting period and are listed in Section 7.1. The decision to retain these five medium-importance pressures was based on expert judgement; the only evidence for the five medium-importance pressures collected during the current reporting period was for the pressure F07 at three sites. Five of the medium-importance pressures listed in NPWS (2013) were judged, based on expert opinion, to be of low importance in the current reporting period: C01 Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell), E01 Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels), F08 Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defence or coast protection works and infrastructures), F28 Modification of flooding regimes, flood protection for residential or recreational development, and J01 Mixed source pollution to surface and ground waters (limnic and terrestrial). NPWS (2013) recorded one low-importance pressure under 'Forest and plantation management and use' and this was crosswalked to B Forestry. Additional low-importance pressures recorded during the current reporting period included A08 Mowing or cutting of grasslands (in the form of summer mowing), A14 Livestock farming (without grazing) (in the form of supplementary feeding), F09 Deposition and treatment of waste/garbage from household/recreational facilities (in the form of dumping and litter), L02 Natural succession resulting in species composition change (other than by direct changes of

	agricultural or forestry practices), and L06 Interspecific relations (competition, predation, parasitism, pathogens) (in the form of rabbit grazing) which is discussed further below. The issue of grazing is complex, with both undergrazing and overgrazing by livestock recorded as medium/high-importance pressures for the 21A0 habitat. On one hand, undergrazing can lead to the machair grassland becoming rank, with a subsequent loss of plant species richness (Doddy, 2013). Conversely, overgrazing can lead to a loss in machair habitat quality, and increase the habitat's susceptibility to erosion (Doddy, 2013). In order to achieve a suitable grazing regime to benefit the 21A0 habitat, a balance needs to be maintained between the two effects. Reduced fencing and low to medium-stocked seasonal cattle grazing is the preferred livestock grazing practice for machair, as sheep are more selective grazers (Doddy, 2013). Climate change has not been added as an impact of medium or high importance but it is likely to impact 21A0 over the coming decades. The short-term predictability of the effect of climate change and in particular the resultant mean sea level rise and extreme weather events are unknown but the gradual long-term trend will see an increase in the mean sea level and extreme weather events (EPA, 2017) which will impact 21A0. The eight pressures presented in Section 7.1 are also considered to be the eight main threats in the future.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type** or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*

8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* ***a) Short-term results (within the current reporting period, 2013-2018)*** *or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	**CA03** Maintain existing extensive agricultural practices and agricultural landscape features **CA16** Other measures related to agricultural practices **CG02** Management of hunting , recreational fishing and recreational or commercial harvesting or collection of plants **CI05** Management of problematic native species
8.6 Additional information *Optional*	Conservation measures were selected and ranked based on the frequency of occurrence, using the data gathered during the current reporting period. These sources are listed in Section 7.2 and these data are summarised in Martin (2018). The maintenance of extensive cattle and sheep grazing (recorded under code CA03) is the most frequent conservation measure applied to the habitat. In some cases the maintenance of extensive cattle and sheep grazing is undertaken through the Department of Agriculture's Green, Low-Carbon, Agri-Environment Scheme (GLAS). Details of participation in the GLAS scheme and of the uptake across various measures are not currently available. It is therefore not possible to precisely assess the effects of implementation of these measures. Other reported conservation measures applied to approximately 30 ha of this habitat are the application of seaweed for fertilisation (CA16), the culling of rabbits (CG02) to prevent damage from overgrazing and burrows, and the cutting of *Pteridium aquilinum* (CI05) in Inis Meáin and Inis Mór as part of the AranLIFE project (Browne, in prep.). It should be recognised that the management regimes for most areas of 21A0 habitat are driven by the landowner rather than by any formal management plan or policy; therefore, the continued operation of the management regimes currently in place is not guaranteed.

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	*Good /* ***Poor*** */ Bad / Unknown*
	c) Structure and functions	*Good /* ***Poor*** */ Bad / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as Stable. Current Range is equal to the Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as Stable, as no change in Range is	

	expected based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Range are therefore Good. Short-term trend direction of Area is assessed as Decreasing. Current Area is <10% less than Favourable Reference Area. Conservation status of Area is therefore Unfavourable-Inadequate. Future trend of Area is assessed as Stable as no losses have been reported since NPWS (2013), which considered the loss of 6.5 ha as negligible. Future prospects of Area are therefore Poor. Short-term trend direction of Structure and functions is assessed as Stable for habitat that is in Good condition. Current Structure and functions are assessed as Unfavourable-Inadequate as >75% but <90 % of the habitat is in "Good" condition. Conservation status of Structure and functions is therefore Unfavourable-Inadequate. Future prospects of Structure and functions are therefore Poor.

10 Conclusions

Assessment of conservation status at end of reporting period

10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	***YES****/NO*	*YES/****NO***
	b) yes, due to genuine change	*YES/****NO***	*YES/NO*
	c) yes, due to improved knowledge/more accurate	*YES/****NO***	*YES/NO*

	d) yes, due to the use of different methods (including use of different thresholds)	***YES**/NO*	*YES/NO*
	e) yes, but there is no information on nature of change	*YES/**NO***	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / **the use of a different method***	*genuine change / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	The Conservation Status of Range is Favourable in this reporting period, as it was in the previous reporting period. The Conservation Status of Area is Unfavourable-Inadequate in this reporting period, as it was in the previous reporting period. The Conservation Status of Structure and functions and Future prospects are Unfavourable-Inadequate in this reporting period; they were both assessed as Unfavourable-Bad in the previous reporting period. As stated above, any changes between the two reporting periods are assessed, based on expert opinion, to be due to the use of different methods. The Overall assessment of Conservation Status for the current reporting period is Unfavourable-Inadequate; it was assessed as Unfavourable-Bad in the last reporting period. Any changes between the two reporting periods are assessed, based on expert opinion, to be due to the use of different methods. The status of Unfavourable-Inadequate during the current reporting period is due to the current area being below the favourable reference area, and >75% but <90% of the area of 21A0 habitat being assessed as having favourable Structure and functions. Trend in Overall assessment of Conservation Status is assessed as stable. Although the short-term trend in Area was decreasing, this same loss in area of 6.5 ha due to anthropogenic impacts (NPWS, 2013) was not considered to represent a significant decrease in area on the national scale.		

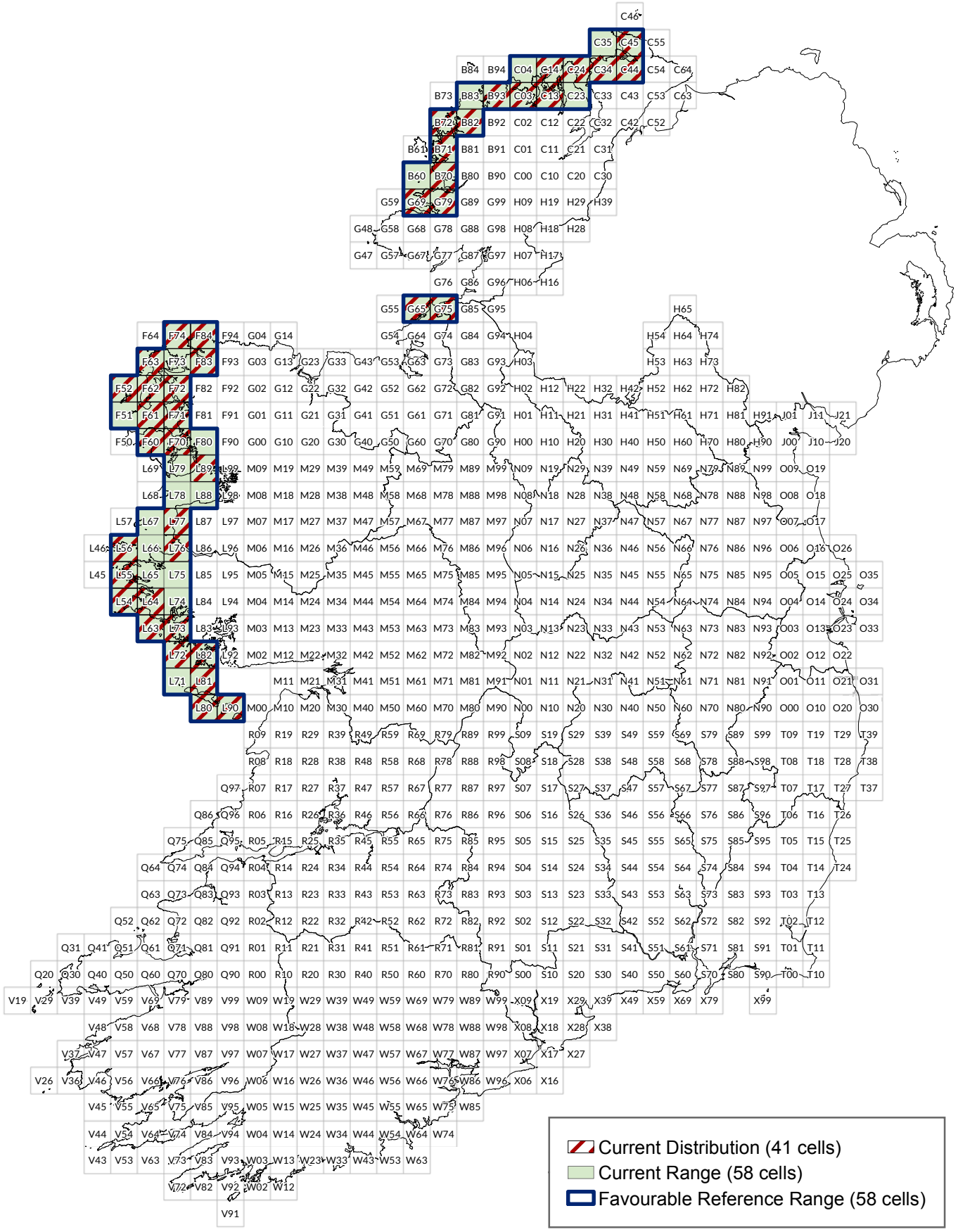
11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***26.5 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval / **minimum***	

11.3 Surface area of the habitat type inside the network **Method used**	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
11.4 Short-term trend of habitat area in good condition within the network **Direction**	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable** / increasing / decreasing / uncertain/ unknown*
11.5 Short-term trend of habitat area in good condition within network **Method used**	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing an intersect between the distribution shapefiles and the SAC shapefile. The area given in Section 11.1 is the total area of 21A0 habitat in SACs in the country, including some SACs where 21A0 is not listed as a qualifying interest (QI). The area of 21A0 within the Natura 2000 network where it is listed as a QI is 25.6 km^2. No anthropogenic loss of 21A0 habitat was reported in the two 21A0 sites assessed for Area during the current reporting period. During the previous reporting period (NPWS, 2013) the 6.5 ha of the 21A0 habitat that was lost due to anthropogenic impacts was from within four SACs, all of which listed 21A0 as a QI. There was one inconsistency between the Natura 2000 sites where the 21A0 is listed as a QI and the current distribution for the habitat. The habitat is listed as QI, representativity C, for Sheephaven SAC (site code 001190) but there is no evidence for the habitat being present within this site and it was not located when the site was surveyed by Ryle *et al.* (2009). The short-term trend of the habitat area in good condition within the SAC network is taken to be stable, with the same trend as the 21A0 habitat nationally (see Section 6.4 and 6.8), as almost all areas of 21A0 habitat surveyed during the last two reporting periods were within the SAC network. The surface area of 21A0 habitat within the N2000 network has increased from the previous reporting period; this is in part due to improved knowledge, but largely due to a change in methodology. In this reporting period an intersect between the current 21A0 distribution (listed in Section 3.2) and the SAC shapefile was undertaken, whereas in the last reporting period an intersect between only the Ryle *et al.* (2009) and Delaney *et al.* (2013) 21A0 shapefiles and the SAC shapefile was carried out (NPWS, 2013).

12 Complementary information	
12.1 Justification of % thresholds for trends *Optional*	Although a negative trend has been assigned to Area, the 0.04% loss per annum is considered negligible at the national level.
12.2 Other relevant information *Optional*	

Machair* (21A0)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**3110 Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)**
1.2i Habitat short name	**Oligotrophic isoetid lake habitat**
1.3i Habitat description	Ireland is a European stronghold for this soft-water, nutrient-poor lake habitat. It is quite species-poor and dominated by plants with an isoetid growth form, such as Quillwort (*Isoetes lacustris*), or Water Lobelia (*Lobelia dortmanna*). Other species such as Bulbous Rush (*Juncus bulbosus*) and Bog Pondweed (*Potamogeton polygonifolius*) also commonly occur. Habitat 3110 is frequent in catchments where peatland overlies acid bedrock (notably granite and old red sandstone). It is best developed on more gentle slopes along sheltered shorelines. The habitat is also found in upland lakes, such as corries, and earlier references to it as a "lowland lake" type were incorrect. Habitat 3110 can co-occur with the more species-poor dystrophic lake habitat (3160) and the more species-rich habitat 3130. Habitat 3110 has a widespread distribution in Ireland, occurring in a large number of lakes. It is under significant pressure from eutrophication, and from drainage and other damage to peatland. Damage to peatland can result in hydrological changes in lakes, increased organic matter, water colour and turbidity, changes in sediment characteristics, acidification and even enrichment. The habitat requires oligotrophic or Water Framework Directive High status.

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***2000-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution of habitat 3110 in Ireland is based largely on the 2007-2012 Article 17 distribution map. However, published site-specific conservation objective maps were also used to update these data (NPWS 2015, 2016, 2017). The resultant distribution was, therefore, a hybrid dataset of lake polygons mapped at two scales:

	1:50,000 (WFD Lake Segments) and 1:5,000 (site-specific conservation objectives). NPWS (2013) and O Connor (2015) provide details on the 2007-2012 Article 17 mapping. In summary, the "WFD_LakeSegment" feature data class from the EPA's Water Framework Geodatabase (WFDGeodatabase.mdb, Version Oct 2011) was used to create the 2007-2012 3150 distribution map. Primary data sources were aquatic macrophyte data from EPA routine Water Framework Directive monitoring, Free *et al*. (2006, 2009) and Heuff (1984). 1,276 lake segments* were mapped in the distribution of the habitat for 2007-2012. Following revision, the 2013-2018 distribution is based on 1,618 lake segments*, occupying a total of 176 10 x 10 km squares. Six 10 x 10 km squares were added to the distribution and two were removed based on site-specific conservation objective data and field survey (for *Najas flexilis* and lake habitat 3130). Two squares (G94 and V89) were removed from the distribution because it was considered unlikely that habitat 3110 occurs in the small areas of lake shoreline occurring within the 10 x 10 km square. (*In general, a GIS lake segment corresponds to a single lake.) The habitat is distributed across 14 counties (Cavan, Clare, Cork, Donegal, Galway, Kerry, Kildare, Leitrim, Mayo, Monaghan, Sligo, Tipperary, Waterford, and Wicklow). The inclusion of data at a different map scale (1:5,000) may lead to small differences between reporting periods, as shoreline geometry and lake segment area vary between map bases. It may also lead to slight differences between the 2013-2018 Article 17 data and the Standard Data Forms, which will be resolved as the transition from 1:50,000 to 1:5,000 map bases is completed and reported to the EU.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Fanning, A., Craig, M., Webster, P., Bradley, C., Tierney, D., Wilkes, R., Mannix, A., Treacy, P., Kelly, F., Geoghegan, R., Kent, T. and Mageean, M. (2017) *2010-2015. EPA Water Quality in Ireland*. Environmental Protection Agency, Wexford. Free, G., Little, R., Tierney, D., Donnelly, K. and Coroni, R. (2006) A reference-based typology and ecological assessment system for Irish lakes. Preliminary Investigations. Final Report. Project 2000-FS-1-M1 Ecological Assessment of Lakes Pilot Study to Establish Monitoring Methodologies EU (WFD). EPA, Wexford. Free G., Bowman, J., McGarrigle, M., Little, R., Caroni, R., Donnelly, K., Tierney, D. and Trodd, W. (2009) The identification,

characterization and conservation value of isoetid lakes in Ireland. *Aquatic Conservation: Marine and Freshwater Ecosystems* 19 (3): 264–273.

Government of Ireland (2018) *River Basin Management Plan for Ireland 2018 – 2021*. Prepared by the Department of Housing, Planning and Local Government.

Heuff, H. (1984) The Vegetation of Irish Lakes. Parts 1 and 2. Unpublished report to the Wildlife Service, Office of Public Works, Dublin.

NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished report, National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

O Connor, Á. (2015) Habitats Directive Annex I lake habitats: a working interpretation for the purposes of site-specific conservation objectives and Article 17 reporting. Unpublished report, National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.

Published conservation objectives:

NPWS (2015) *Conservation Objectives: West of Ardara/Maas Road SAC 000197*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2015) *Conservation Objectives: Inishbofin and Inishshark SAC 000278. Version 1*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2015) *Conservation Objectives: Connemara Bog Complex SAC 002034*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2015) *Conservation Objectives: Slyne Head Peninsula SAC 002074*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2016) *Conservation Objectives: Caha Mountains SAC 000093. Version 1*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

NPWS (2016) *Conservation Objectives: Lough Nillan Bog (Carrickatlieve) SAC 000165. Version 1*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

NPWS (2016) *Conservation Objectives: Cuilcagh - Anierin Uplands SAC 000584. Version 1*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

NPWS (2016) *Conservation Objectives: Mount Brandon SAC 000375*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2016) *Conservation Objectives: Ox Mountains Bogs SAC 002006. Version 1*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

	NPWS (2017) *Conservation Objectives: Gannivegil Bog SAC 000142. Version 1*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2017) *Conservation Objectives: Lough Corrib SAC 000297*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2017) *Conservation Objectives: Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC 000365*. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. NPWS (2017) *Conservation Objectives: Owenduff/Nephin Complex SAC 000534. Version 1*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2017) *Conservation Objectives: Lough Hoe Bog SAC 000633. Version 1.* National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. NPWS (2017) *Conservation Objectives: Glanmore Bog SAC 001879. Version 1*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2017*) Conservation Objectives: Mweelrea/Sheeffry/Erriff Complex SAC 001932*. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. NPWS (2017) *Conservation Objectives: Maumturk Mountains SAC 002008. Version 1*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2017) *Conservation Objectives: The Twelve Bens/Garraun Complex SAC 002031*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2017) *Conservation Objectives: Cloghernagore Bog and Glenveagh National Park SAC 002047. Version 1*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2017) *Conservation Objectives: Wicklow Mountains SAC 002122. Version 1*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2017) *Conservation Objectives: River Finn SAC 002301. Version 1.* National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. Roden, C. and Murphy, P. (2014) Targeted survey of *Najas flexilis*. Unpublished report to the National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland. Roden, C., Murphy, P. and Ryan, J. (2016) A study of the Mixed *Najas flexilis* lake habitat (3130) from 2015 to 2018, 2016 Progress Report. November 2016. Unpublished Report to the National Parks and Wildlife Service. Roden, C., Murphy, P. and Ryan, J. (2017) A report on the 2017 fieldwork undertaken as part of the 2015-18 *Najas* lake survey

	for NPWS. Unpublished report to the National Parks and Wildlife Service, DCHG, Dublin. Roden, C., Murphy, P. and Ryan, J. (2018) A report on the 2018 fieldwork undertaken as part of the 2015-18 *Najas* lake survey for NPWS. Unpublished report to the National Parks and Wildlife Service, DCHG, Dublin. Roden, C., Murphy, P. and Ryan, J. (in prep.) A study of the Mixed *Najas flexilis* lake habitat (3130), 2015-2018. A report to the National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.
3.2i Additional information	Duigan, C.A., Kovach, W.L. and Palmer, M. (2006) *Vegetation communities of British Lakes: a revised classification*. Joint Nature Conservation Committee, Peterborough. Duigan, C., Kovach, W. and Palmer, M. (2007) Vegetation communities of British lakes: a revised classification scheme for conservation. *Aquatic conservation: Marine and Freshwater Ecosystems* 17: 147–173. EPA (Catchments Science and Management Unit) (2016) *Draft. Version 4. September 2016. Guidance on Characterisation Methodology*. EPA, Dublin. O Connor, Á. (2016) Incorporating nature conservation objectives and measures into the Water Framework Directive. *Biology and Environment: Proceedings of the Royal Irish Academy*, 116B(3): 329-337. doi:10.3318/bioe.2016.29 Palmer, M.A., Bell, S.L. and Butterfield, I. (1992) A botanical classification of standing waters in Britain: applications for conservation and monitoring. *Aquatic conservation: Marine and Freshwater Ecosystems* 2: 125-143. Preston, C.D. and Croft, J.M. (2001) *Aquatic Plants in Britain and Ireland*. Harley Books, Colchester.

4 Range

Range within the biogeographical/marine region concerned

4.1 Surface area	***23,300 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	

4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 23,300 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators There is no evidence of a decline in Range since the Directive came into force, the area of the range is large at approximately 27% of the terrestrial grid and the habitat is widespread (found in 14 counties). Therefore, it is assumed that the current range includes all significant Irish ecological variations of the habitat and is sufficiently large to allow the long-term viability of the habitat. As a result, the current range is set as the Favourable Reference Range.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	

4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 3110 habitat. A maximum gap distance of two 10 km grid cells was used. The resultant range contained 233 10 km cells. There is no evidence of a decline in the range of habitat 3110. Lake habitats suffer damage as a result of hydrological and morphological change, decreased water clarity, eutrophication and other impacts, but are seldom destroyed. The result is that the Range of lake habitats remains stable. As six 10 x 10 km squares were added to the distribution and two removed since the 2007-12 report, the range increased by 400 km^2. The distribution changes resulted from improved knowledge that led to better habitat classification. Lakes were re-classified as habitat 3110, rather than 3130, following field survey for *Najas flexilis* and lake habitat 3130 (e.g. Lough Derg, Co. Donegal). Also, review of existing data for site-specific conservation objective mapping resulted in changes to lake classification, as well as classification of additional lake segments. Site-specific conservation objective data are at a different scale (1:5,000) (different method).

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2000-2018***	
5.2 Surface area *(in km^2)*	**a) Minimum**	***399 km^2***
	b) Maximum	***416 km^2***
	c) Best single value	
5.3 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	***a) 399 km²***	
	b) Indicate if operators were used (≈, >, >>, <) or	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators There is no evidence of a decline in Area since the Directive came into force and the estimated minimum surface area is considered sufficient to ensure the long-term viability of the habitat type. As a result, the estimated minimum surface area is set as the Favourable Reference Area.	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data /* ***the use of a different method***	

5.15 Additional information *Optional*	The distribution was used to estimate habitat area, following the approach employed for the 2007-2012 cycle (NPWS, 2013; O Connor, 2015). Estimates used the surface area of the lake polygons classified as containing the habitat. Lake surface area is likely to over-estimate the area of habitat 3110 as its vegetation seldom covers the substratum of the lake, and because more than one Annex I standing water habitat can occur in a lake (e.g. 3110 with 3160 or 3130). The minimum estimate summed the surface areas of all 1,618 lake segments that were classified as containing the habitat. The maximum estimate included a correction factor for unclassified lake segments. Following the 2007-2012 methods (NPWS, 2013; O Connor, 2015), it was assumed that 33% (17 km^2) of the area of the remaining 4,338 unclassified segments is habitat 3110. 399 km^2 and 17 km^2 were summed to give the maximum of 416 km^2, which is likely to be a significant overestimate. A single area value of 407.1 km^2 was provided for the 2007-2012 reporting cycle, which is within the range reported here (399-416 km^2,) The 9 km^2 increase for the maximum estimate is the result of the use of 1:5,000 scale mapping data (different method) primarily, as well as the re-classification of lake segments following field survey (improved knowledge).

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***37 km²***
		Maximum	***39 km²***
	b) Area in not-good condition	**Minimum**	***122 km²***
		Maximum	***226 km²***
	c) Area where condition is not known	**Minimum**	***151 km²***
		Maximum	***240 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*		

6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***
6.7 Typical species Method used *Optional*	
6.8 Additional information *Optional*	Habitat 3110 is a naturally nutrient-poor habitat that is associated with peatland areas and base-poor water. By definition, the habitat requires oligotrophic conditions and, therefore, a target of High Status is considered appropriate for relevant WFD elements. No dedicated monitoring programme exists for lake habitat 3110 in Ireland and a standard method for assessing its conservation condition at individual sites has not been developed. However, data on water quality are available from the EPA WFD monitoring programme for a sample of 3110 lakes, and these were used to assess Structure and functions. The assessment followed the approach used for the 2007-2012 cycle (NPWS, 2013; O Connor, 2015), using WFD data for 2013-2015 (Fanning *et al*., 2018). A target of oligotrophic (or WFD 'high status') or better was used. EPA data for Macrophyte, Phytobenthos, Phytoplankton, Nutrient Conditions and Acidification Status were used. WFD status is categorised as high, good, moderate, poor or bad. For Structure and functions to be considered to be in Favourable condition, all five elements had to reach high status. If one or more WFD elements were moderate, poor or bad status, conservation condition was assessed as Bad. If one or more elements were at good status, but none were moderate, poor or bad, Structure and functions were assessed as in Poor/Inadequate conservation condition. A total of 64 WFD monitoring lakes, with a total area of 265.6 km^2, are considered likely to contain habitat 3110. The minimum areas in 'good', 'not-good' and 'unknown' condition used data for 56, with a total area of 157 km^2, of the 64 WFD monitoring lakes likely to contain habitat 3110. Seven of the eight lakes were removed from this analysis because they may be dominated by habitat 3130 (e.g. Loughs Acoose, Caragh and Leane), and the eighth lake (Lough Mask) also has the hard water lake habitat, 3140. 26 of the 56 monitored lakes were assessed as in Good/Favourable condition, 21 as in Poor/Unfavourable-Inadequate condition and nine as in Bad/Unfavourable-Bad conservation condition. This equates to 46% of the sites monitored in Good condition, 38% Poor and 16% Bad. In terms of area, the surface area of the 26 lakes assessed as in Good condition sums to 37 km^2, the surface area of the 21 lakes assessed as in Poor condition sums to 100 km^2, and the surface area of the nine lakes assessed as in Bad condition sums to 22 km^2. This gives a total surface area of 122 km^2

	in 'not-good' condition. These areas equate to 23% of the monitored area in 'good' condition and 77% of the monitored area in 'not-good' condition. The maximum areas in 'good' and in 'not-good' condition used data for all 64 lakes. 29, 26 and nine lakes were assessed as Favourable, Poor and Bad conservation condition, respectively. This equates to 45% of the sites monitored in Good condition, 41% Poor and 14% Bad. In terms of area, this is 39 km^2 Good, 204 km^2 Poor and 22 km^2 Bad condition; or 15% of the monitored area in 'good' and 85% in 'not-good' condition. The 'Area where condition is not known' was estimated by subtracting the areas in 'good' and in 'not-good' condition from the minimum and maximum surface areas reported at 5.2. As a result, the minimum values sum to the value of 399 km^2 reported at 5.2a and the maximum values sum to 416 km^2 reported at 5.2b. Because the total area (265.6 km^2) of the 64 lakes used to estimate the maximum areas in 'good' and in 'not-good' condition was so much larger (more than 100 km^2) than the total area (157 km^2) of the 56 lakes used, this leads to the unusual situation where the estimated minimum area where condition is not known is larger than the estimated maximum. Of the 64 WFD monitored 3110 lakes, macrophytes were at High Status in 34 of 64 monitored, phytoplankton status was High at 52 of 64 monitored and nutrient condition status was High at 50 of 64 monitored. These data suggest that factors other than eutrophication are contributing to the loss of High macrophyte status at these lakes. All 64 lakes passed the Acidification Status target. As the estimated area in 'not-good' condition was 77-85%, in line with the General evaluation matrix and the Explanatory Notes and Guidelines, Structure and functions was assessed as Bad overall. It should be cautioned, however, that only 8-14% of the monitored area was assessed as in Bad condition, and that the assessment was based on WFD rather than habitat-specific monitoring, so that confidence in the Structure and functions assessment is low. To examine trends, changes in water quality and WFD status at individual lakes over time were considered. Data were available from the EPA 2009-2011 and 2013-2015 monitoring cycles for 62 of the 64 WFD monitoring lakes classified as 3110. The condition had improved at 17, was the same at 36 and worse at nine. This corresponded to the following by area: 26 km^2 better (10%), 158 km^2 the same (60%), 79 km^2 worse (30%). As a result, the short-term trend was reported as stable. Work is needed to develop specific conservation condition assessment methods for habitat 3110, and to test the applicability of the WFD elements/metrics used above. Further elucidation of the natural variation in habitat 3110 and its ecological requirements is also required, in particular in relation to altitude. The development of indicators and targets for supporting conditions such as water colour and organic matter, as well as the more standard suite of nutrients, is also a priority in order to inform conservation objectives and measures. The list of typical species for habitat 3110 was based on the

	interpretation manual of EU habitats (CEC, 2013), available publications on lake macrophyte communities in Ireland and Great Britain, as well as publications on aquatic macrophyte species and macrophyte data from routine Water Framework Directive monitoring. The list of typical species is: *Isoetes lacustris, Isoetes echinospora, Littorella uniflora, Lobelia dortmanna, Eriocaulon aquaticum, Juncus bulbosus, Potamogeton polygonifolius, Sparganium angustifolium, Deschampsia setacea* (in Connemara), *Subularia aquatica, Pilularia globulifera, Nitella translucens, Nitella opaca, Nitella confervacea, Myriophyllum alterniflorum, Nymphaea alba, Nuphar lutea, Potamogeton natans, Utricularia intermedia, Utricularia minor, Eleogiton fluitans*. See NPWS (2013) and O Connor (2015) for more information.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A26** Agricultural activities generating diffuse pollution to surface or ground waters (H) **B23** Forestry activities generating pollution to surface or ground waters (H) **C05** Peat extraction (H) **A31** Drainage for use as agricultural land (H) **B27** Modification of hydrological conditions, or physical alteration of water bodies and drainage for forestry (including dams) (H) **F12** Discharge of urban waste water (excluding storm overflows and/or urban run-offs) generating pollution to surface or ground water (M)	**A26** Agricultural activities generating diffuse pollution to surface or ground waters (H) **B23** Forestry activities generating pollution to surface or ground waters (H) **C05** Peat extraction (H) **A31** Drainage for use as agricultural land (H) **B27** Modification of hydrological conditions, or physical alteration of water bodies and drainage for forestry (including dams) (H) **F12** Discharge of urban waste water (excluding storm overflows and/or urban run-offs) generating pollution to surface or ground water (M)

7.2 Sources of information *Optional*	Fanning, A., Craig, M., Webster, P., Bradley, C., Tierney, D., Wilkes, R., Mannix, A., Treacy, P., Kelly, F., Geoghegan, R., Kent, T. and Mageean, M. (2017) *2010-2015. EPA Water Quality in Ireland*. Environmental Protection Agency, Wexford. Free, G., Little, R., Tierney, D., Donnelly, K. and Coroni, R. (2006) A reference-based typology and ecological assessment system for Irish lakes. Preliminary Investigations. Final Report. Project 2000-FS-1-M1 Ecological Assessment of Lakes Pilot Study to Establish Monitoring Methodologies EU (WFD). EPA, Wexford. Free G., Bowman, J., McGarrigle, M., Little, R., Caroni, R., Donnelly, K., Tierney, D. and Trodd, W. (2009) The identification, characterization and conservation value of isoetid lakes in Ireland. *Aquatic Conservation: Marine and Freshwater Ecosystems* 19 (3): 264–273. Government of Ireland (2018) *River Basin Management Plan for Ireland 2018 – 2021*. Prepared by the Department of Housing, Planning and Local Government. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished report, National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. O Connor, Á. (2015) Habitats Directive Annex I lake habitats: a working interpretation for the purposes of site-specific conservation objectives and Article 17 reporting. Unpublished report, National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.
7.3 Additional information *Optional*	Free *et al*. (2009) recognised that the main threats to isoetid lakes across Europe come from eutrophication, acidification and alkalinisation, water level changes, habitat destruction, peat erosion and invasive alien species. Pressures and threats reported for the 2007-2012 cycle were used again for this cycle. NPWS (2013) detailed how these were identified through examination of information on pressures on general water quality and use of expert judgement. See also O Connor (2015). In addition, reference was made to the 2018-2021 River Basin Management Plan under the Water Framework Directive, which included an assessment of significant pressures impacting on water status for the 16% of lake water bodies, or 132 individual lakes, considered to be 'at risk' (Government of Ireland, 2018). It was not possible to readily access the pressures and impacts data for specific lakes, so analyses could not be conducted to distinguish the pressures impacting on 3110. Agriculture was identified as a significant pressure at 80 lakes, or 61% of 'at risk' lakes (Government of Ireland, 2018). The other significant pressures identified as impacting on the 'at risk' lakes were forestry at 18 lakes (14%), urban and domestic waste-water at 15 lakes each (11%), hydromorphology at 10 lakes (8%), industry and peat extraction each at 3 lakes (2%) and urban run-off at 2 lakes (2%) (Government of Ireland, 2018). Pollution with dissolved and particulate organic matter and nutrients, as well as fine sediment and increased water colour, are significant concerns for habitat 3110. Pollution can arise from

	agriculture, primarily through land reclamation and fertilisation practices, as well as over-grazing of peatland. Increased stocking densities and housing of stock, leading to the generation of slurry, are particular concerns. Code A26 for diffuse pollution was used, although, with drainage of peatland and wet soils in these catchments, agricultural pollution can effectively be point source. Pollution also arises from forestry (B23), where slow decomposition of organic soils, conifer needles and small branches leads to significant losses of organic matter and, ultimately, nutrients. Similar types of pollution, albeit smaller loads, result from turf cutting. Peatland and other organic soils are drained in 3110 catchments to facilitate agriculture, conifer plantations and peat extraction. Drains can be pollution sources, as well as impacting the hydrological regimes of lakes (A31, B27 and C05). F12 covers discharges from both urban waste-water (UWW) treatment plants (sewered) and on-site systems (unsewered). On-site systems are more common pressures in the catchments of 3110 lakes. Owing to their likely continuation, all pressures were also listed as threats. No genuine changes in pressures or threats were identified. Both the reporting form and Article 17 pressures and threats list have changed since Article 17 2013. Abstractions for drinking water (F33) or other purposes (F34, A30, C14) are considered to be pressures of low importance, as they impact on relatively few 3110 lakes. It is possible, however, that abstractions may be a more significant threat, in combination with predicted droughts owing to climate change.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* ***a) Measures identified, but none yet taken** or* *b) Measures identified and taken or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*

8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	None taken
8.6 Additional information *Optional*	Although there has been no dedicated monitoring of habitat 3110, sufficient information is available from EPA water quality and other WFD data and analyses to broadly identify the conservation measures required to maintain or restore the habitat. These include: 1. reversal of drainage impacts/ restoration of hydrological regime, and 2. reducing pollution (with dissolved and/or particulate nutrients, humic substances, organic matter and fine sediment/turbidity) from agricultural, forestry, turf-cutting, and domestic and urban waste-water sources. Significant progress has been made with domestic waste-water treatment systems through the inspection regime (under the Domestic Waste-Water Treatment Regulations) and associated grant scheme. There is also on-going substantial investment by Irish Water in urban waste-water treatment and collection systems. Option (a) "*Measures identified, but none yet taken*" was chosen, however, as the majority of the most important measures identified, particularly in relation to agriculture, forestry, and peat extraction, have not yet been implemented. No targeted conservation measures are currently being undertaken to restore or enhance areas of 3110 habitat within SACs. As option (a) was used, fields 8.2 to 8.5 were not filled. The Programmes of Measures under the WFD River Basin Management Plan will help improve water quality generally, however the WFD's default option of "Good ecological status" may not be sufficient to return habitat 3110, Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*), to Favourable conservation status. While further work is needed to identify effective, practical and iterative solutions and to establish interim targets, this habitat is considered to require oligotrophic or WFD high status in Ireland (NPWS, 2013; O Connor, 2015). It also requires clear water with low water colour and low dissolved and particulate organic matter (Free *et al*., 2009; O Connor, 2015). Given the resources invested in the Local Authority Water

	Programme and the Agricultural Sustainability Support and Advisory Programme, particularly the catchment managers and scientists and agricultural advisors, the WFD should assist in maintaining and improving the conservation condition of Annex I freshwater habitats and Annex II species in SACs. To ensure the correct measures are implemented, consideration must be given to the site-specific conservation objectives and ecological requirements of the habitat/species, as well as specific information on conservation condition and impacting pressures. Changes in the state of aquatic ecosystems, such as nutrient enrichment or hydrological changes, have multiple drivers and sources, especially when, as for Article 17, summarised at regional or national scale. Therefore, a large number of the new standard list of conservation measures are applicable and some measures may have more than one function (e.g. changes to grazing regime to prevent pollution, restore hydrological function, enhance biodiversity, etc.). Based on the assessment of the pressures impacting on habitat 3110, measures are required to address pollution from agriculture (CA09, CA10, CA11, CA15, CA12, CA01, CA03, CA05, CA06, CA08), peat extraction (CC08, CC09, CC01, CC02) and forestry (CB10, CB14, CB09, CB11, CB04, CB01), as well as drainage impacts (CA15, CC07, CB14), pollution from on-site systems (unsewered) (CF05) and possibly also urban waste-water (CF04). Measures may also be necessary to address abstraction pressures (CF11), and other hydromorphological pressures from a variety of sources, including damage to wetland hydrology (examples of appropriate measures include CA08, CE06, CF10, CF02, CF03, CJ03, etc.).

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	*Good / Poor /* ***Bad*** */ Unknown*
9.2 Additional information *Optional*	The Future prospects of the Range, Area and Structure and functions of habitat 3110 were assessed by reference to pressures and threats and conservation measures, as well as each parameter's 'future trends' and current status: **Pressures and threats:** Five pressures of high importance were recorded and one of medium importance and all were listed as threats, owing to their likely continuation. These pressures and threats result in changes in water quality and hydrological regime and, therefore, have negative influence on the status of the habitat's Structure and functions. **Conservation measures**: No habitat-specific, concrete conservation measures are currently being undertaken to maintain, restore or enhance areas of 3110 habitat, either within SACs or the wider countryside. It will take time to identify conservation measures based on the ecological requirements of the habitat, combined with the site-specific conservation objectives, conditions and significant	

	pressures and threats; and there is likely to be a significant time-lag before conservation measures, once implemented, take effect (e.g. measures to reverse hydrological damage to peat and other organic soils). Therefore, conservation measures cannot halt or reverse the negative influence of the threats in the next 12 years. **Range**: The short- and long-term trends of the Range were assessed as stable. The current range is equal to the Favourable Reference Range and considered to include 'all significant Irish ecological variations of the habitat' and be sufficiently large to allow the long-term viability of the habitat. Therefore, the Conservation Status of the Range is Favourable. While threats may lead to significant deterioration in Structure and functions of the habitat, they are unlikely to result in the loss of any 3110 lakes, hence the range is unlikely to change. The future trend of the Range is, therefore, likely to remain stable and the Future prospects of the Range have been assessed as Good. **Area**: The short- and long-term trends of the Area were assessed as stable. The estimated minimum surface area of the habitat is equal to the Favourable Reference Area and is considered sufficient to ensure the long-term viability of the habitat type. Therefore, the Conservation Status of the Area is Favourable. While threats may lead to significant deterioration in Structure and functions of the habitat, they are unlikely to result in the loss of any 3110 lakes, hence the habitat area is unlikely to change. The future trend of the Area is, therefore, likely to remain stable and the Future prospects of the Area have been assessed as Good. **Structure and functions**: The short-term trend in Structure and functions was assessed as stable, based on WFD data for 62 lakes, which indicated that status was the same or better at 184 km^2 or 70% of the monitored area. Despite this evidence of a stable trend, the predicted future trend has been assessed as negative owing to the negative influence of the identified pressures and threats on the status of the Structure and functions and the lack of conservation measures. 77-85% of the monitored area of the habitat was assessed as in 'not-good' condition (min 63% Poor, 14% Bad, max 77% Poor, 8% Bad). As this is more than 25%, Structure and functions were assessed as Unfavourable-Bad. As a result, the Future prospects of the Structure and functions were assessed as Bad. As the Future prospects of the Structure and functions were assessed as Bad, the Future prospects for habitat 3110 were assessed as Unfavourable-Bad overall.

10 Conclusions

Assessment of conservation status at end of reporting period	
10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*

<table>
<tr><td>10.4 Future prospects</td><td colspan="3">Favourable (FV) / Inadequate (U1) / <u>Bad (U2)</u> / Unknown (XX)</td></tr>
<tr><td>10.5 Overall assessment of Conservation Status</td><td colspan="3">Favourable (FV) / Inadequate (U1) / <u>Bad (U2)</u> / Unknown (XX)</td></tr>
<tr><td>10.6 Overall trend in Conservation Status</td><td colspan="3">Indicate the trend (qualifier) for FV, U1 and U2:

improving / deteriorating / <u>stable</u> / unknown</td></tr>
<tr><td rowspan="8">10.7 Change and reasons for change in conservation status and conservation status trend</td><td colspan="3">Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.</td></tr>
<tr><td></td><td>Overall assessment of conservation status (10.5)</td><td>Overall trend in conservation status (10.6)</td></tr>
<tr><td>a) no, there is no difference</td><td>YES/<u>NO</u></td><td><u>YES</u>/NO</td></tr>
<tr><td>b) yes, due to genuine change</td><td>YES/NO</td><td>YES/<u>NO</u></td></tr>
<tr><td>c) yes, due to improved knowledge/more accurate</td><td>YES/NO</td><td>YES/<u>NO</u></td></tr>
<tr><td>d) yes, due to the use of different methods (including use of different thresholds)</td><td>YES/NO</td><td><u>YES</u>/NO</td></tr>
<tr><td>e) yes, but there is no information on nature of change</td><td>YES/NO</td><td>YES/<u>NO</u></td></tr>
<tr><td>The change is mainly due to (select one of the reasons above):</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td><td>genuine change / improved knowledge or more accurate data / <u>the use of a different method</u></td></tr>
<tr><td>10.8 Additional information

Optional</td><td colspan="3">Range: As there is no evidence of a decline in Range since the Directive came into force (stable short- and long-term trends), the area of the Range is equal to the Favourable Reference Range and is large at approximately 27% of the terrestrial grid, and the current range is considered to include all significant Irish ‘ecological variations of the habitat’ and be sufficiently large to allow the long-term viability of the habitat, Range was assessed as Favourable. While there may be significant deterioration in Structure and functions of the habitat, it is unlikely that any 3110 lakes will be lost; hence, the range is unlikely to change.

Area: There is no evidence of a decline in Area since the Directive came into force (stable short- and long-term trends) and the Area is large at 399 km^2-416 km^2. The estimated minimum surface area of the habitat is equal to the Favourable Reference Area and is considered sufficient to ensure the long-term viability of the habitat</td></tr>
</table>

	type. As a result, Area was assessed as Favourable. While there may be significant deterioration in Structure and functions of the habitat, it is unlikely that any 3110 lakes will be lost; hence, the habitat area is unlikely to change. Range and Area are insensitive measures of the conservation status of lake habitats, given that lakes are damaged rather than lost. Further research may demonstrate that deterioration of habitat quality can reach a point beyond which the habitat is no longer restorable and lakes where this occurs may be reported as site loss, and result in a reduction in habitat area, and possibly even range. Until such time, the conservation status of lake habitats will be determined by the Structure and functions assessment. **Structure and functions**: Biological and physico-chemical data were available from the WFD for 64 lakes considered to possibly contain habitat 3110. 85% of the area of the 64 monitored lakes was assessed as in 'not-good' condition for Structure and functions. A minimum estimate of 77% of the area in 'not-good' condition was based on 57 of the 64 lakes. As these estimates are significantly more than 25%, Structures and functions were assessed as Unfavourable-Bad. The short-term trend in Structure and functions was assessed as stable because conservation condition based on WFD status was the same or better at 85% of the 64 x 3110 lakes monitored, or 70% of the monitored area. Confidence is low, however, in both the condition and trend assessments as general water quality indicators have been used in the absence of habitat-specific indicators and data. **Future prospects**: The conservation statuses of Range and Area were assessed as Favourable and their predicted future trend was overall stable. Structure and functions were assessed as Unfavourable-Bad. Although the short-term trend in Structure and functions was assessed as stable, owing to the significant and widespread pollution and hydrological pressures identified and the absence of conservation measures for the habitat, the predicted future trend in Structure and functions is negative. Therefore, Future prospects were assessed as Bad/ Unfavourable-Bad overall. As Structure and functions and Future prospects were assessed as Unfavourable-Bad, the Overall Conservation Status of 3110 was assessed as Unfavourable-Bad. As trends for Range, Area and Structure and functions were assessed as stable, the overall trend was assessed as stable in accordance with the reporting guidelines. For the 2007-2012 cycle, the overall trend was reported as decreasing, based on the prediction that pressures are most likely to increase on the habitat in the future, i.e. its Future prospects. The change in reported trend does not represent a genuine change or an improvement in knowledge. Dedicated survey during the reporting cycle of habitat 3130 (which occurs within the same catchments and some of the same lakes as habitat 3110), found evidence of deteriorating 3130 Structure and functions at nine of 32 lakes (Roden and Murphy, 2014; Roden *et al*., 2016, 2017, 2018, in prep). This could indicate that Structure and functions of habitat 3110 may also be deteriorating.

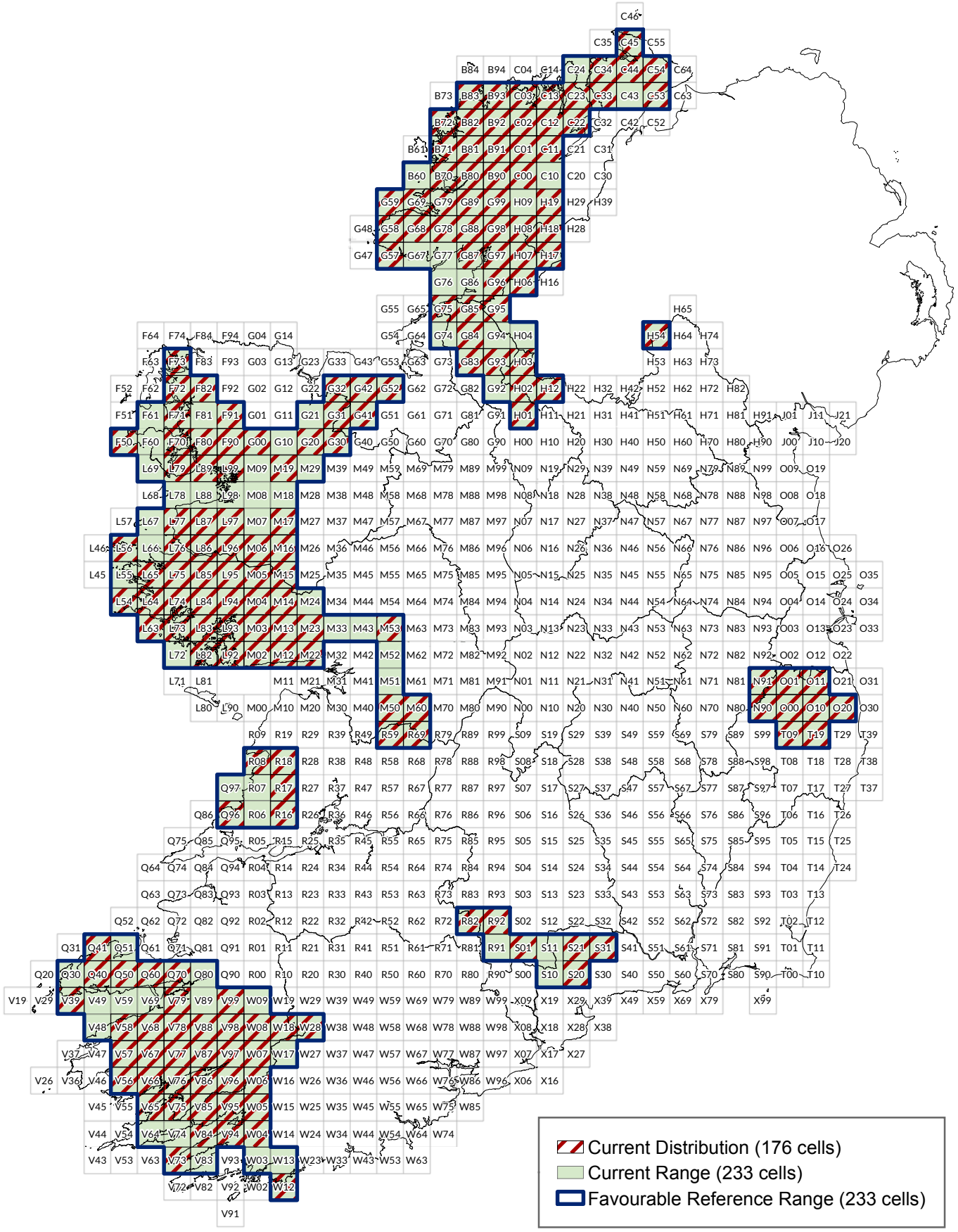
	Work is needed to develop specific conservation condition assessment methods for habitat 3110, and to test the applicability of the WFD elements/metrics used above. Assessing Structure and functions and overall trends will continue to be a challenge. Even where dedicated and standardised monitoring and assessment methodologies are in use, data will be too temporally infrequent to estimate or quantify the trend magnitude or identify when changes in trend occur.

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	***315 km²***
	b) Maximum	***350 km²***
	c) Best single value	
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable*** */ increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.6 Additional information *Optional*	The distribution was used to estimate the surface area of the habitat inside the pSCIs, SCIs and SACs network, following the approach employed for the 2007-2012 cycle (NPWS, 2013; O Connor, 2015). Estimates used the surface area of the lake polygons classified as containing the habitat. The minimum estimate summed the surface areas of lake segments that were classified as containing the habitat and were wholly within SACs designated for the protection of the habitat. The maximum estimate summed the surface areas of lake segments that were classified as containing the habitat and were wholly within any SAC (342 km^2), and included a correction factor for the unclassified SAC lake segments. Following the 2007-2012 methods (NPWS, 2013; O Connor, 2015), it was assumed that 33% (8 km^2) of the area of the remaining unclassified segments in SACs is habitat	

	3110. 342 km^2 and 8 km^2 were summed to give the maximum of 350 km^2. 49 of the 64 WFD monitored lakes considered likely to have habitat 3110 are in SACs, all of which have habitat 3110 listed as a qualifying interest. The conservation conditions for these 49 lakes, based on WFD status data, were compared between the 2009-2011 and 2013-2015 reporting cycles. Condition had improved for 27% of the lakes, was the same at 59% and worse at 14%. In terms of habitat area, 9% was better, 58% the same and 33% of the habitat area within the network was worse, i.e. very similar to the national level. As a result, the short-term trend of habitat area in good condition within the network was assessed as stable.

12 Complementary information

Oligotrophic isoetid lake habitat (3110) Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**3130 Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea***
1.2i Habitat short name	**Mixed *Najas flexilis* lake habitat**
1.3i Habitat description	Habitat 3130, 'Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoeto-Nanojuncetea*' has been interpreted as a mixed *Najas flexilis* lake habitat in Ireland. The habitat occurs in lakes with circum-neutral, low-nutrient waters in catchments of mixed geology. Base-rich influences come from basalt, limestone, marble, sedimentary deposits or calcareous coastal sand, and peatland is often widespread in the catchments. The Annex II macrophyte *Najas flexilis* is a character species. The co-occurrence of *Potamogeton perfoliatus* and *Isoetes lacustris* is also characteristic. Owing to its rare species and relatively high species richness, habitat 3130 is of high conservation value. Ireland is a European stronghold for the habitat and for *Najas flexilis*. The habitat is widespread particularly along the western fringe (NPWS, 2013a, b; Roden and Murphy, 2014; Roden *et al*., 2016, 2017, 2018, in prep.). It is under significant pressure from drainage, agriculture, peat extraction, forestry and wastewaters. Habitat 3130 co-occurs with habitat 3110 in some lakes, and may also co-occur with habitats 3140 and 3150.

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***2000-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution of habitat 3130 in Ireland is based on recent survey of the habitat and its characteristic Annex II species *Najas flexilis* (species code 1833) (Roden and Murphy, 2014; Roden *et al*., 2016, 2017, 2018, in prep.), as well as the 2007-2012 Article 17 3130 distribution map. *Najas flexilis* is considered to be extant in 52 lakes and extinct from a further six, and these 58 were mapped as containing the habitat. Roden *et al*. (2016, 2017, 2018, in prep.) also recorded habitat 3130

	in six lakes that did not contain *Najas flexilis.* Published site-specific conservation objective data were also used to update the 2007-2012 Article 17 distribution map. The distribution is a hybrid dataset of lake polygons mapped at two scales: 1. 1:5,000 (from the *Najas flexilis* distribution and site-specific conservation objectives); and 2. 1:50,000 (from the 2007-2012 Article 17 mapping, based on the "WFD_LakeSegment" feature data class from the EPA's Water Framework Geodatabase (WFDGeodatabase.mdb, Version Oct 2011). NPWS (2013a) and O Connor (2015) provide further details on the 2007-2012 Article 17 mapping. 417 lake segments* were mapped in the distribution of the habitat for 2007-2012. Following revision, the 2013-2018 distribution is based on 446 lake segments*, occupying a total of 170 10 x 10 km squares. Of the 170 10 x 10 km squares in the 2013-2018 distributions, 167 were also mapped as 3130 for 2007-2012. Three new squares were added to the distribution and 11 were removed, as a result of improved knowledge owing to recent field surveys. (*In general, a GIS lake segment corresponds to a single lake.) Confidence in habitat classification is high for the 64 lakes with field survey data, but is low for most of the other 382 lakes classified as 3130, where classification was based on geological and other mapping data. This is particularly true of areas of the southeast (Waterford, Wexford) and the drumlin belt (Monaghan, Cavan, Leitrim) (NPWS, 2013a). Field survey is necessary to confirm the habitat's exact distribution. The habitat is distributed across 16 counties (Cavan, Clare, Cork, Donegal, Galway, Kerry, Leitrim, Louth, Mayo, Meath, Monaghan, Roscommon, Sligo, Waterford, Wexford and Wicklow). The inclusion of data at a different map scale (1:5,000) leads to small differences between reporting periods, as shoreline geometry and lake segment area vary between map bases. It may also lead to slight differences between the 2013-2018 Article 17 data and the Standard Data Forms, which will be resolved as the transition from 1:50,000 to 1:5,000 map bases is completed and reported to the EU.

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned	
3 Biogeographical and marine regions	
3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
3.2 Sources of information	NPWS (2013a) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished

report, National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

NPWS (2013b) The Status of EU Protected Habitats and Species in Ireland. Species Assessments Volume 3. Version 1.0. Unpublished report, National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

O Connor, Á. (2013) Article 17 assessment form and audit trail for *Najas flexilis*, the Slender Naiad (species code 1833) – Backing Document. Unpublished report, National Parks and Wildlife Service, Dublin.

O Connor, Á. (2015) Habitats Directive Annex I lake habitats: a working interpretation for the purposes of site-specific conservation objectives and Article 17 reporting. Unpublished report, National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.

Roden, C.M. (1999) A survey of the sublittoral vegetation of 15 machair loughs in north west Ireland. Report to the National Heritage Council, Kilkenny.

Roden, C.M. (2002) *Najas flexilis* in Donegal. Unpublished report to the National Parks and Wildlife Service, Dublin.

Roden, C.M. (2003) *Najas flexilis* in Connemara. Unpublished report to the National Parks and Wildlife Service, Dublin.

Roden, C.M (2004) The distribution of *Najas flexilis* in Ireland 2002-2004. Unpublished report to the National Parks and Wildlife Service, Dublin.

Roden, C.M. (2005) A new station for *Hydrilla verticillata* in Connemara*. Irish Naturalists' Journal* 28(3): 138-139.

Roden, C. (2007) Conservation Assessment of Slender Naiad (*Najas flexilis* (Willd.) Rostk. & W.L.E.Schmidt) in Ireland. March 2007. Slender Naiad (*Najas flexilis*) (1833) Conservation Status Assessment Report. Backing Document. In: National Parks and Wildlife Service (Ed.) The Status of EU Protected Habitats and Species in Ireland, Backing Documents, Article 17 Forms, Maps. Volume 2, 824-840.

Roden, C. (2012) A report on the sub-littoral environment around selected navigation markers in the north west sector of Lough Corrib. Unpublished report to RPS Group.

Roden, C. and Murphy, P. (2014) Targeted survey of *Najas flexilis*. Unpublished report to the National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.

Roden, C., Murphy, P. and Ryan, J. (2016) A study of the Mixed *Najas flexilis* lake habitat (3130) from 2015 to 2018, 2016 Progress Report. November 2016. Unpublished report to the National Parks and Wildlife Service.

Roden, C., Murphy, P. and Ryan, J. (2017) A report on the 2017 fieldwork undertaken as part of the 2015-18 *Najas* lake survey for NPWS. Unpublished report to the National Parks and Wildlife Service, DCHG, Dublin.

Roden, C., Murphy, P. and Ryan, J. (2018) A report on the 2018 fieldwork undertaken as part of the 2015-18 *Najas* lake survey for NPWS. Unpublished report to the National Parks and Wildlife

	Service, DCHG, Dublin. Roden, C., Murphy, P. and Ryan, J. (in prep.) A study of the Mixed *Najas flexilis* lake habitat (3130), 2015-2018. A report to the National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. Published conservation objectives: NPWS (2014) *Conservation Objectives: Horn Head and Rinclevan SAC 000147*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. NPWS (2014) *Conservation Objectives: Kilkieran Bay and Islands SAC 002111*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. NPWS (2015) *Conservation Objectives: West of Ardara/Maas Road SAC 000197*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. NPWS (2015) *Conservation Objectives: Gweedore Bay and Islands SAC 001141*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. NPWS (2015) *Conservation Objectives: Connemara Bog Complex SAC 002034*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. NPWS (2015) *Conservation Objectives: Slyne Head Peninsula SAC 002074*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. NPWS (2016) *Conservation Objectives: Mount Brandon SAC 000375*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. NPWS (2017) *Conservation Objectives: Lough Nagreany Dunes SAC 000164*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2017) *Conservation Objectives: Lough Corrib SAC 000297*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2017) *Conservation Objectives: Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC 000365*. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. NPWS (2017*) Conservation Objectives: Mweelrea/Sheeffry/Erriff Complex SAC 001932*. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. NPWS (2017) *Conservation Objectives: Ballyhoorisky Point to Fanad Head SAC 001975*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2017) *Conservation Objectives: The Twelve Bens/Garraun Complex SAC 002031*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

3.2i Additional information	Duigan, C.A., Kovach, W.L. and Palmer, M. (2006) *Vegetation communities of British Lakes: a revised classification*. Joint Nature Conservation Committee, Peterborough. Duigan, C., Kovach, W. and Palmer, M. (2007) Vegetation communities of British lakes: a revised classification scheme for conservation. *Aquatic conservation: Marine and Freshwater Ecosystems* 17: 147–173. EPA (Catchments Science and Management Unit) (2016) *Draft. Version 4. September 2016. Guidance on Characterisation Methodology*. EPA, Dublin. Free, G., Little, R., Tierney, D., Donnelly, K. and Coroni, R. (2006) A reference-based typology and ecological assessment system for Irish lakes. Preliminary Investigations. Final Report. Project 2000-FS-1-M1 Ecological Assessment of Lakes Pilot Study to Establish Monitoring Methodologies EU (WFD). EPA, Wexford. Fanning, A., Craig, M., Webster, P., Bradley, C., Tierney, D., Wilkes, R., Mannix, A., Treacy, P., Kelly, F., Geoghegan, R., Kent, T. and Mageean, M. (2017) *2010-2015. EPA Water Quality in Ireland*. Environmental Protection Agency, Wexford. Government of Ireland (2018) *River Basin Management Plan for Ireland 2018 – 2021*. Prepared by the Department of Housing, Planning and Local Government. Heuff, H. (1984) The Vegetation of Irish Lakes. Parts 1 and 2. Unpublished report to the Wildlife Service, Office of Public Works, Dublin. O Connor, Á. (2016) Incorporating nature conservation objectives and measures into the Water Framework Directive. *Biology and Environment: Proceedings of the Royal Irish Academy* 116B(3): 329-337. doi:10.3318/bioe.2016.29 Palmer, M.A., Bell, S.L. and Butterfield, I. (1992) A botanical classification of standing waters in Britain: applications for conservation and monitoring. *Aquatic conservation: Marine and Freshwater Ecosystems* 2: 125-143. Preston, C.D. (1995) Pondweeds of Great Britain and Ireland. *BSBI Handbook* No. 8. BSBI, London. Preston, C.D. and Croft, J.M. (2001) *Aquatic Plants in Britain and Ireland*. Harley Books, Colchester.

4 Range

Range within the biogeographical/marine region concerned		
4.1 Surface area	***25,600 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend	**a) Minimum**	

Magnitude *Optional*	**b) Maximum**	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 25,600 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators There is no evidence of a decline in Range since the Directive came into force, the area of the range is large at approximately 29% of the terrestrial grid and the habitat is widespread (found in 16 counties). Therefore, it is assumed that the current range includes all significant Irish ecological variations of the habitat and is sufficiently large to allow the long-term viability of the habitat. As a result, the current range is set as the Favourable Reference Range.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***

	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 3130 habitat. A maximum gap distance of two 10 km grid cells was used. The resultant range contained 256 x 10 km cells. There is no evidence of a decline in the range of habitat 3130. Lake habitats suffer damage as a result of hydrological and morphological change, decreased water clarity, eutrophication and other impacts, but are seldom destroyed. The result is that the range of lake habitats remains stable. The range has reduced by 500 km^2 since the last reporting cycle, owing to improved knowledge from dedicated field survey which led to the identification of previously unknown 3130 lakes (e.g. Knocka Lough, Co. Clare) and the re-classification of lakes as habitat 3110, rather than 3130 (e.g. Lough Derg, Co. Donegal). Three 10 km squares were added to the range and nine were removed from the 2013 range as a result of more accurate data.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2000-2018***	
5.2 Surface area *(in km^2)*	**a) Minimum**	***78 km^2***
	b) Maximum	***372 km^2***
	c) Best single value	
5.3 Type of estimate	***Best estimate** / 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	***a) 78 km²***	
	b) Indicate if operators were used (≈, >, >>, <) or	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators There is no evidence of a decline in Area since the Directive came into force and the estimated minimum surface area is considered sufficient to ensure the long-term viability of the habitat type. As a result, the estimated minimum surface area is set as the Favourable Reference Area.	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	

5.15 Additional information *Optional*	The distribution was used to estimate habitat area, following the approach used for the 2007-2012 cycle (NPWS, 2013a; O Connor, 2015). Estimates used the surface area of the lake polygons classified as containing the habitat. The minimum estimate summed the areas of the following lake segments: 1. 52 lakes that have populations of *Najas flexilis.* For Lough Corrib, only the north-western basin was included (4.96 km^2); 2. Six lakes where *Najas flexilis* has gone extinct; and 3. Six lakes identified as having habitat 3130 by Roden *et al*. (2016, 2017, 2018, in prep.). The habitat area may be less than the surface area of the lake, particularly where more than one Annex I standing water habitat occurs (3130 with 3110, 3140 or 3150). Alternatively, where the habitat occupies the entire available lake substratum (e.g. Lough Ballynakill), its area may be greater than the surface area of the lake. The maximum estimate summed the surface area of all 446 lake segments identified in the distribution as containing habitat 3130 (354 km^2) and, following the 2007-2012 methods (NPWS, 2013a; O Connor, 2015), assumed that 46% (18 km^2) of the area of the remaining 180 unclassified segments of greater than 1 ha in area is habitat 3130. 354 km^2 and 18 km^2 were summed to give the maximum of 372 km^2, which is likely to be a significant overestimate. A single area value of 558.4 km^2 was provided for the 2007-2012 reporting cycle. The 186 km^2 reduction to 372 km^2 for the maximum estimate is the result of the re-classification of lake segments following field survey (improved knowledge) and use of 1:5,000 scale mapping data (different method).

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***12 km²***
		Maximum	***56.8 km²***
	b) Area in not-good condition	**Minimum**	***63 km²***
		Maximum	***298.5 km²***
	c) Area where condition is not known	**Minimum**	***3 km²***
		Maximum	***16.7 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		

6.4 Short-term trend of habitat area in good condition Direction	*stable / increasing / **decreasing** / uncertain/ unknown*
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***
6.7 Typical species Method used *Optional*	
6.8 Additional information *Optional*	Habitat 3130 is associated with high water quality, i.e. the absence of eutrophication impacts: naturally low dissolved nutrients, clear water (large euphotic depth) and low algal growth. Dedicated survey during the reporting cycle yielded information on the condition of the habitat for 42 lakes (Roden and Murphy, 2014; Roden *et al.*, 2016, 2017, 2018, in prep.). 24 lakes were assessed as in Good/Favourable condition, 14 as Poor/Unfavourable-Inadequate and four as Bad/Unfavourable-Bad. This equates to 57% of the sites monitored in Good condition, 33% Poor and 10% Bad. In terms of area: The surface area of the 24 lakes assessed as in Good condition sums to 12 km^2 The surface area of the 14 lakes assessed as in Poor condition sums to 57 km^2 The surface area of the four lakes assessed as in Bad condition sums to 6 km^2. This gives a total surface area of 63 km^2 in 'not-good' condition. These areas equate to: 16% of the monitored area in 'good' condition, 84% of the monitored area in 'not-good' condition The Annex II species *Najas flexilis* (1833) characterises habitat 3130 and is a highly sensitive species of the lower euphotic depths. The conservation status of *Najas flexilis* was assessed as Unfavourable-Inadequate for the reporting cycle (2013-2018). While the combined area (Poor and Bad) in 'not-good' condition is more than 25%, the habitat's Structure and functions were assessed as Inadequate overall, as the majority of sites monitored were in Good condition, the majority of the area monitored was in Poor condition and the characteristic Annex II species *Najas flexilis* (1833) had overall Unfavourable-Inadequate status for the reporting cycle. The use of area to measure the Structure and functions of habitats is particularly problematic for aquatic habitats, where survey and assessment methods are specifically designed to characterise the overall condition of the water body, and mapping the area of the

	habitat, or its constituent species, zones and assemblages, is often impractical and inaccurate. The minimum areas in 'good' (12 km^2), 'not-good' (63 km^2) and 'unknown' (3 km^2) condition sum to the reported Minimum surface area of the habitat (78 km^2). The 'area where condition is not known' was, therefore, 4.5% of the reported Minimum surface area. The maximum areas were calculated by applying the minimum percentage areas to the reported maximum surface area of the habitat: 4.5% of the estimated minimum area had unknown condition. Applying this to the estimated maximum area of 372 km^2 gave 16.7 km^2 unknown and 355.3 km^2 known. 16% of the monitored minimum area was in 'good' condition. Applying this to the estimated maximum known area of 355.3 km^2 gave 56.8 km^2 in 'good' condition. 84% the monitored minimum area was in 'not-good' condition, giving 298.5 km^2 of the estimated maximum area in 'not-good' condition. The short-term trend in the habitat's Structure and functions was assessed by comparing habitat condition during the reporting cycle to data from earlier surveys. Data were available for 32 x 3130 lakes in two time periods – typically 2000-2005 (Roden, 1999, 2002, 2003, 2004, 2005, 2007) and 2013-2018 (Roden and Murphy, 2014; Roden *et al*., 2016, 2017, 2018, in prep.). 23 of the 32 sites were considered likely to have 'stable' habitat condition between the periods and nine (28%) were considered to be 'decreasing'. Where uncertainty was high, the default trend in Structure and functions was assessed as 'stable'. Therefore a 'decreasing' assessment required strong evidence of decline in habitat quality. Impacts observed on the habitat included eutrophication (epiphytic algae, phytoplankton blooms and increased perennial biomass), deposited, decomposing organic matter, reduced and fluctuating transparency/euphotic-depth (peat-staining and turbidity), and competition from *Elodea canadensis* (Roden and Murphy, 2014; Roden *et al*., 2016, 2017, 2018, in prep.). For the 2007-2012 cycle, the assessment of habitat quality and trends was largely based on Irish EPA WFD lake status data. The use of dedicated Mixed *Najas flexilis* lake habitat condition assessments for the 2013-2018 cycle represents an improvement in knowledge. Habitat 3130 is notable for the frequent co-occurrence of *Potamogeton perfoliatus* and *Isoetes lacustris*. As well as *Najas flexilis*, *Nitella confervacea* is a characteristic species. Other typical species are *Apium inundatum, Callitriche hermaphroditica, Chara aspera, Chara virgata, Elatine hexandra, Eriocaulon aquaticum, Fontinalis antipyretica, Hydrilla verticillata, Isoetes echinospora, Juncus bulbosus, Littorella uniflora, Lobelia dortmanna, Myriophyllum alterniflorum, Nitella flexilis, Nitella translucens, Pilularia globulifera, Potamogeton berchtoldii, Potamogeton gramineus, Potamogeton natans, Potamogeton obtusifolius, Sparganium angustifolium,* and *Utricularia* sp. See NPWS (2013a) and O Connor (2015) for more information.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**K04** Modification of hydrological flow (H) **K05** Physical alteration of water bodies (H) **A26** Agricultural activities generating diffuse pollution to surface or ground waters (H) **A25** Agricultural activities generating point source pollution to surface or ground waters (H) **F12** Discharge of urban waste water (excluding storm overflows and/or urban run-offs) generating pollution to surface or ground water (H) **I02** Other invasive alien species (other than species of Union concern) (M) **B23** Forestry activities generating pollution to surface or ground waters (M) **C05** Peat extraction (M)	**K04** Modification of hydrological flow (H) **K05** Physical alteration of water bodies (H) **A26** Agricultural activities generating diffuse pollution to surface or ground waters (H) **A25** Agricultural activities generating point source pollution to surface or ground waters (H) **F12** Discharge of urban waste water (excluding storm overflows and/or urban run-offs) generating pollution to surface or ground water (H) **I02** Other invasive alien species (other than species of Union concern) (M) **B23** Forestry activities generating pollution to surface or ground waters (M) **C05** Peat extraction (M)

7.2 Sources of information

Optional

Roden, C. and Murphy, P. (2014) Targeted survey of *Najas flexilis*. Unpublished report to the National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.

Roden, C., Murphy, P. and Ryan, J. (2016) A study of the Mixed *Najas flexilis* lake habitat (3130) from 2015 to 2018, 2016 Progress Report. November 2016. Unpublished report to the National Parks and Wildlife Service.

Roden, C., Murphy, P. and Ryan, J. (2017) A report on the 2017 fieldwork undertaken as part of the 2015-18 *Najas* lake survey for NPWS. Unpublished report to the National Parks and Wildlife Service, DCHG, Dublin.

Roden, C., Murphy, P. and Ryan, J. (2018) A report on the 2018 fieldwork undertaken as part of the 2015-18 *Najas* lake survey for NPWS. Unpublished report to the National Parks and Wildlife Service, DCHG, Dublin.

Roden, C., Murphy, P. and Ryan, J. (in prep.) A study of the Mixed

	Najas flexilis lake habitat (3130), 2015-2018. A report to the National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.
7.3 Additional information *Optional*	Pressures and threats were recorded in the field, as well as through examination of aerial imagery for the catchments of lakes with Mixed *Najas flexilis* habitat (3130) (Roden and Murphy, 2014; Roden *et al.*, 2016, 2017, 2018, in prep.). Data were available for 50 x 3130 lake catchments. K04 and K05 were used for the drainage pressure that lowered water levels at Kiltooris, leading to the conservation condition of the habitat declining to Bad at one of the most important 3130 and *Najas flexilis* lakes in Ireland. Drainage (K04, K05), associated with agriculture, forestry and turf cutting, was a significant pressure in at least five other catchments. Agriculture (A26, A25) was noted as a pressure at 30 (60%) of the 3130 lake catchments examined. F12 covers discharges from both urban waste-water (UWW) treatment plants (sewered) and on-site systems (unsewered). On-site systems are present in at least 31 (62%) of catchments examined, whereas UWW discharges may be present in 6 (12%). Competition from *Elodea canadensis* (I02) was noted as impacting at two sites (Sessiagh and Port). Introduction of this non-native species may work in combination with eutrophication, and its impact (invasive response) may not be long term. Impacts were also indicated at three more lakes (Nageltia, Tully and Kindrum), but these may be recovering from the initial *Elodea canadensis* invasion. Forestry (B23) was noted as a pressure in 14 (28%) of 3130 lake catchments examined. Turf cutting (C05) was noted as a pressure at 4 catchments (8%). Golf courses were present adjacent to at least two 3130 lakes, therefore F16 'Other residential and recreational activities and structures generating diffuse pollution to surface or ground waters' can be considered a pressure and threat of low importance. There are abstractions from at least three of the lakes (Knocka, Shannagh and Ballynakill); however there is no evidence that these are currently impacting on the habitat. It is possible, however, that abstractions may be a threat, in combination with predicted droughts owing to climate change. Owing to their likely continuation, all pressures were also listed as threats. No genuine changes in pressures or threats were identified. Both the reporting form and Article 17 pressures and threats list have changed since Article 17 2013.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* ***a) Measures identified, but none yet taken** or* *b) Measures identified and taken or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	None taken
8.6 Additional information *Optional*	As the pressures impacting on habitat 3130 have been documented, the conservation measures required to maintain or restore it are broadly understood. These include: 1. reversal of drainage impacts/ restoration of hydrological regime; and 2. reducing pollution (with dissolved and/or particulate nutrients, humic substances, organic matter and fine sediment/turbidity) from agricultural, forestry, turf-cutting, golf-course and domestic and urban waste-water sources. Significant progress has been made with domestic waste-water treatment systems through the inspection regime (under the Domestic Waste-Water Treatment Regulations) and associated grant scheme. There is also on-going substantial investment by Irish Water in urban waste water treatment and collection systems. Option (a) "*Measures identified, but none yet taken*" was chosen, however, as

	the majority of the most important measures identified, particularly in relation to agriculture and forestry, have not yet been implemented. No targeted conservation measures are currently being undertaken to restore or enhance areas of 3130 habitat within SACs. As option (a) was used, fields 8.2 to 8.5 were not filled. The Programmes of Measures under the WFD River Basin Management Plan will help improve water quality generally; however the WFD's default option of "Good ecological status" may not be sufficient to return the Mixed *Najas flexilis* lake habitat (3130) to Favourable conservation status. While further work is needed to identify effective, practical and iterative solutions and to establish interim targets, this habitat is considered to require oligotrophic or WFD high status in Ireland (NPWS, 2013a; O Connor, 2013, 2015). It also requires very clear water with low water colour and low dissolved and particulate organic matter (O Connor, 2015; Roden *et al*., 2018, in prep.). Given the resources invested in the Local Authority Water Programme and the Agricultural Sustainability Support and Advisory Programme, particularly the catchment managers and scientists and agricultural advisors, the WFD should assist in maintaining and improving the conservation condition of Annex I freshwater habitats and Annex II species in SACs. To ensure the correct measures are implemented, consideration must be given to the site-specific conservation objectives and ecological requirements of the habitat/species, as well as specific information on conservation condition and impacting pressures. Changes in the state of aquatic ecosystems, such as nutrient enrichment or hydrological changes, have multiple drivers and sources, especially when, as for Article 17, summarised at regional or national scale. Therefore, a large number of the new standard list of conservation measures are applicable and some measures may have more than one function (e.g. changes to grazing regime to prevent pollution, restore hydrological function, enhance biodiversity, etc.). Based on the assessment of the pressures impacting on the Mixed *Najas flexilis* lake habitat, measures are required to address drainage impacts (CA15, CC07, CB14), pollution from agriculture (CA09, CA10, CA11, CA15, CA12, CA01, CA03, CA05, CA06, CA08), peat extraction (CC08, CC09, CC01, CC02), forestry (CB10, CB14, CB09, CB11, CB04, CB01), on-site systems (unsewered) (CF05) and urban waste-water (CF04). Measures may also be necessary to address abstraction pressures (CF11), and other hydromorphological pressures from a variety of sources, including damage to wetland hydrology (examples of appropriate measures include CA08, CE06, CF10, CF02, CF03, CJ03, etc.).

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*

	c) Structure and functions	*Good / **Poor** / Bad / Unknown*
9.2 Additional information *Optional*	The Future prospects of the Range, Area and Structure and functions of habitat 3130 were assessed by reference to pressures and threats and conservation measures, as well as each parameter's 'future trends' and current status: **Pressures and threats:** Five pressures of high importance were recorded and three of medium importance and all were listed as threats, owing to their likely continuation. These pressures and threats result in changes in hydrological regime and water quality and, therefore, have negative influence on the status of the habitat's Structure and functions. **Conservation measures**: No habitat-specific, concrete conservation measures are currently being undertaken to maintain, restore or enhance areas of 3130 habitat, either within SACs or the wider countryside. It will take time to identify conservation measures based on the ecological requirements of the habitat, combined with the site-specific conservation objectives, conditions and significant pressures and threats; and there is likely to be a time-lag before conservation measures, once implemented, take effect. Therefore, conservation measures cannot halt or reverse the negative influence of the threats in the next 12 years. **Range**: The short- and long-term trends of the Range were assessed as stable. The current range is equal to the Favourable Reference Range and considered to include 'all significant Irish ecological variations of the habitat' and be sufficiently large to allow the long-term viability of the habitat. Therefore, the Conservation Status of the Range is Favourable. While threats may lead to significant deterioration in Structure and functions of the habitat, they are unlikely to result in the loss of any 3130 lakes, hence the range is unlikely to change. The future trend of the Range is, therefore, likely to remain stable and the Future prospects of the Range have been assessed as Good. **Area**. The short- and long-term trends of the Area were assessed as stable. The estimated minimum surface area of the habitat is equal to the Favourable Reference Area and is considered sufficient to ensure the long-term viability of the habitat type. Therefore, the Conservation Status of the Area is Favourable. While threats may lead to significant deterioration in Structure and functions of the habitat, they are unlikely to result in the loss of any 3130 lakes, hence the habitat area is unlikely to change. The future trend of the Area is, therefore, likely to remain stable and the Future prospects of the Area have been assessed as Good. **Structure and functions**: The short-term trend in Structure and functions was assessed as decreasing owing to evidence of habitat deterioration at nine of 32 lakes with data from two points in time. 75.5% of the monitored area of the habitat was assessed as in Poor condition and 8.5% as in Bad condition. While the combined value exceeds 25% in 'not-good' condition, as the majority of the habitat was in Poor/Inadequate condition, Structure and functions were assessed as Unfavourable-Inadequate. Given the negative influence of the identified pressures and threats on the status of the Structure	

	and functions and the lack of conservation measures, the predicted future trend is negative. As a result, the Future prospects of the Structure and functions were assessed as Poor. As Future prospects of the Structure and functions were assessed as Poor, the Future prospects for habitat 3130 were assessed as Unfavourable-Inadequate.

10 Conclusions

Assessment of conservation status at end of reporting period

10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving /* ***deteriorating*** */ stable / unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/****NO***	***YES****/NO*
	b) yes, due to genuine change	*YES/NO*	***YES****/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	***YES****/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/****NO***
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/****NO***

	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / **improved knowledge or more accurate data** / the use of a different method*
10.8 Additional information *Optional*	**Range**: As there is no evidence of a decline in Range since the Directive came into force (stable short- and long-term trends), the area of the range is equal to the Favourable Reference Range and is large at approximately 29% of the terrestrial grid, and the current range is considered to include all significant Irish 'ecological variations of the habitat' and be sufficiently large to allow the long-term viability of the habitat, Range was assessed as Favourable. While there may be significant deterioration in Structure and functions of the habitat, it is unlikely that any 3130 lakes will be lost; hence, the range is unlikely to change. **Area**: There is no evidence of a decline in Area since the Directive came into force (stable short- and long-term trends) and the area is large at 78-372 km^2. The estimated minimum surface area of the habitat is equal to the Favourable Reference Area and is considered sufficient to ensure the long-term viability of the habitat type. As a result, Area was assessed as Favourable. While there may be significant deterioration in Structure and functions of the habitat, it is unlikely that any 3130 lakes will be lost; hence, the habitat area is unlikely to change. Range and Area are insensitive measures of the conservation status of lake habitats, given that lakes are damaged rather than lost. Further research may demonstrate that deterioration of habitat quality can reach a point beyond which the habitat is no longer restorable and lakes where this occurs may be reported as site loss, and result in a reduction in habitat area, and possibly even range. Until then, the conservation status of lake habitats will be determined by the Structure and functions assessment. **Structure and functions**: Dedicated monitoring of habitat 3130 and its associated species produced habitat condition/Structure and functions assessments for 42 lakes. 16% of the monitored area was assessed as in Good condition. 75.5% of the monitored area of the habitat was assessed as in Poor condition and 8.5% as in Bad condition. While the combined value of 84% in 'not-good' condition is more than 25%, Structure and functions were assessed as Unfavourable-Inadequate as the majority of the habitat by area was in Poor/Inadequate condition. This assessment is further supported by consideration of site numbers. 24 lakes (57% of those monitored) were in Good condition and 14 lakes (33%) in Poor condition. Only four (10%) of the monitored lakes, covering an area of 6 km^2 (8.5% of the monitored area), were assessed as in Bad condition. In addition, the Annex II species *Najas flexilis*, which is characteristic of habitat 3130 and one if its most sensitive indicators, was assessed as in Unfavourable-Inadequate) status for the reporting cycle. The short-term trend in Structure and functions was assessed as decreasing owing to evidence of habitat deterioration at nine of 32 lakes having data from two points in time.		

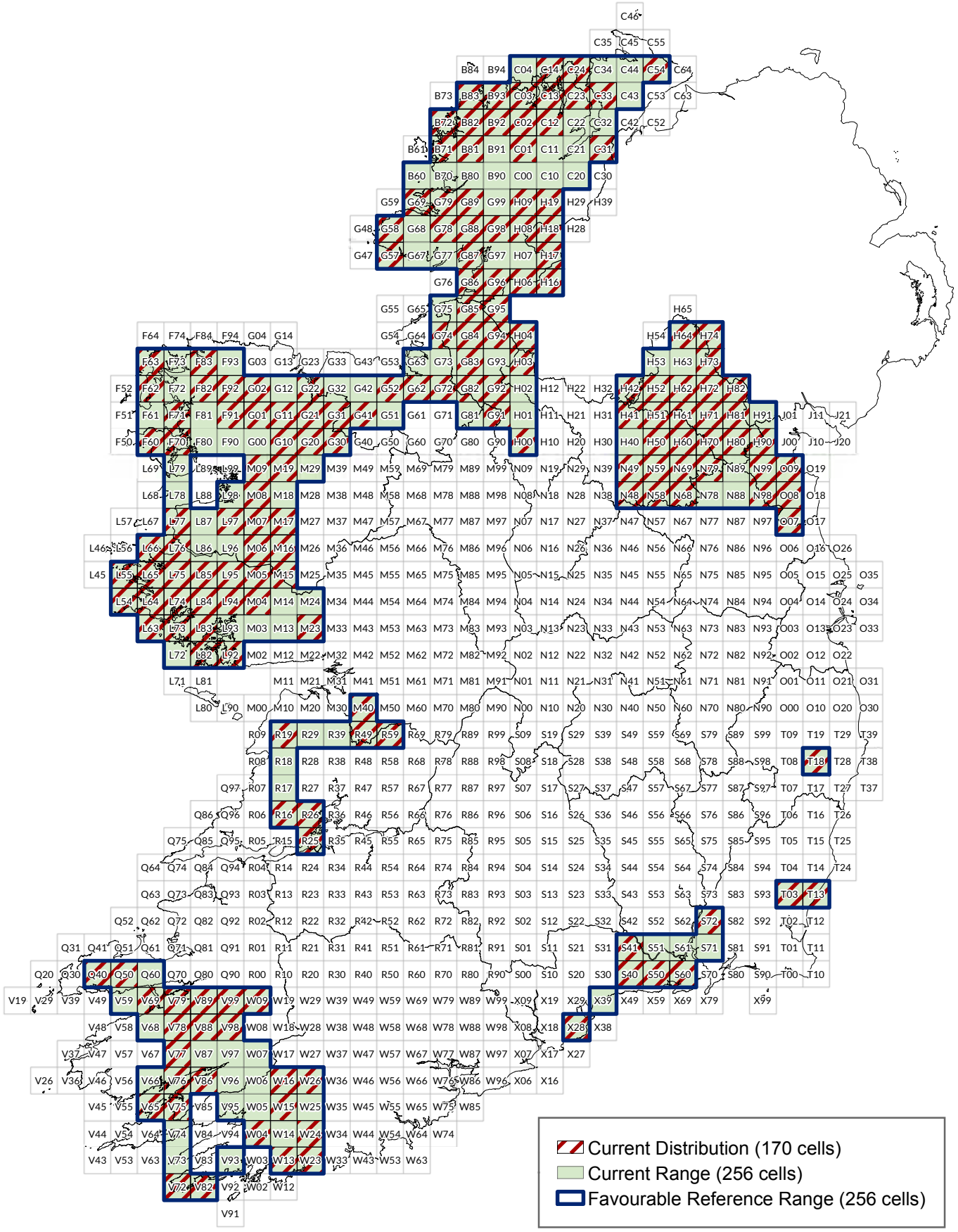
	Future prospects: Given the Favourable and stable status of Range and Area, and the predicted negative 'future trend' and Unfavourable-Inadequate status of the habitat's Structure and functions, the pressures and threats identified, and the lack of habitat-specific conservation measures, the Future prospects were assessed as Unfavourable-Inadequate. As Structure and functions were assessed as Unfavourable-Inadequate, the Overall Conservation Status of 3130 was assessed as Unfavourable-Inadequate. The trend in Structure and functions and overall trend were reported as 'stable' for the 2007-2012 cycle, based on examination of the long-term trend in trophic status in Irish lakes illustrated in Tierney *et al*. (2010). Based on improved knowledge through dedicated survey during the reporting cycle (Roden and Murphy, 2014; Roden *et al*., 2016, 2017, 2018, in prep.), including evidence of deteriorating Structure and functions at nine of 32 lakes having data from two points in time, the trend for this cycle was reported as 'deteriorating'. As data were available for only two points in time, it was not possible to identify when deterioration began, to determine whether it was on-going throughout the reporting cycle, or to otherwise estimate or quantify the trend magnitude.

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	***66 km²***
	b) Maximum	***252 km²***
	c) Best single value	
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* *stable / increasing /* ***decreasing*** */ uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

11.6 Additional information *Optional*	Estimates used the surface area of the lake polygons classified as containing the habitat. The minimum estimate summed the areas of 41 lakes within SACs designated for the protection of habitat 3130: 1. 36 lakes that have populations of *Najas flexilis.* For Lough Corrib, only the north-western basin was included (4.96 km^2); 2. Two lakes where *Najas flexilis* has gone extinct; and 3. Three lakes identified as having habitat 3130 by Roden *et al*. (2016, 2017, 2018, in prep.) The maximum estimate summed the areas of all lake segments within all SACs that are classified as having habitat 3130. The short-term trend in the habitat's Structure and functions was assessed by comparing habitat condition for 3130 lakes in SACs to data from earlier surveys. Data were available for 26 x 3130 lakes in two time periods – typically 2000-2005 (Roden, 1999, 2002, 2003, 2004, 2005, 2007) and 2013-2018 (Roden and Murphy, 2014; Roden *et al*., 2016, 2017, 2018, in prep.). 18 of the 26 sites were considered likely to have 'stable' habitat condition between the periods and eight (31%) were considered to be 'decreasing'. Where uncertainty was high, the default trend in Structure and functions was assessed as 'stable'. Therefore a 'decreasing' assessment required strong evidence of decline in habitat quality. As for the short-term trend in Structure and functions and the overall trend, therefore, the trend within the network was assessed as 'decreasing'.

12 Complementary information

Mixed *Najas flexilis* lake habitat (3130) Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**3140 Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.**
1.2i Habitat short name	**Hard-water lake habitat**
1.3i Habitat description	The hard-water lake habitat (Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.) is strongly associated with lowland lakes over limestone bedrock. It is also found on calcareous sand at the landward side of machair plains and in canals. The habitat is dominated by algae, particularly stoneworts (*Chara* spp.). Stonewort diversity is high and includes a number of rare and threatened species. Irish examples of the habitat are also of international importance for their 'krustenstein', an organic crust found on bedrock and cobbles in shallow waters. The characteristic depth-related vegetation zonation described from Irish hard water lakes has up to six distinct, stonewort-dominated zones. Higher plants are generally at low abundance and restricted to the *Chara rudis* zone and sheltered shorelines. Ireland has some of the best European examples of the hard-water lake habitat and, as a result, particular responsibility for maintaining/restoring this natural habitat at Favourable conservation status within the EU. The hard-water lake habitat is under significant pressure from eutrophication, the primary sources of nutrients and organic material being agriculture and municipal and industrial wastewaters. Movement of pollutants, especially phosphorus, through ground water is a significant concern.

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***2000-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution of habitat 3140 in Ireland is based on the 2007-2012 Article 17 3140 distribution map (NPWS, 2013) and updated through inclusion of canals with habitat 3140, as well as recent survey of the habitat and its characteristic stonewort species (Roden and Murphy,

	2018; Stewart, 2018). The 2007-2012 Article 17 3140 distribution map contained 527 lake segments* occupying 167 x 10 km squares, and was based on ecological data (relatively small number of sites) and geological data, physico-chemical data and aerial imagery, in combination with expert judgement (NPWS, 2013; O Connor, 2015). Ecological data included information on aquatic macrophytes from Roden and Murphy (2013, in prep.), Roden (1999, 2000, 2012), Bruinsma *et al*. (2009) and Heuff (1984). Charophyte records collected and collated by Nick Stewart for the aquatic plant atlas (Preston and Croft, 2001) were also reviewed. Dr Cilian Roden identified important hard water lake sites (C. Roden, pers. comm.). Published site-specific conservation objective data (NPWS, 2015, 2017, 2018) were used to update the 2007-2012 Article 17 distribution. In addition, canals with habitat 3140 were included in the 2013-2018 distribution. The resultant distribution was a hybrid dataset of polygons mapped at two scales: 1. 1:5,000 (lake polygons from the site-specific conservation objectives and the Waterways Ireland canal polygons); and 2. 1:50,000 (from the 2007-2012 Article 17 mapping, based on the "WFD_LakeSegment" feature data class from the EPA's Water Framework Geodatabase (WFDGeodatabase.mdb, Version Oct 2011). Following revision, the 2013-2018 distribution is based on 557 lake segments* and seven canal segments, occupying a total of 195 10 x 10 km squares. (*In general, a GIS lake segment corresponds to a single lake.) Confidence in habitat classification is high for the approx. 70-80 lakes, and the canals, with field survey data, but is low for most of the other lakes classified as 3140, where classification was based on geological and other mapping data. The habitat is distributed across 21 counties (Cavan, Clare, Donegal, Dublin, Galway, Kerry, Kildare, Kilkenny, Laois, Leitrim, Limerick, Longford, Mayo, Meath, Monaghan, Offaly, Roscommon, Sligo, Waterford, Westmeath and Wexford). The inclusion of data at a different map scale (1:5,000) leads to small differences between reporting periods, as shoreline geometry and lake segment area vary between map bases. It may also lead to slight differences between the 2013-2018 Article 17 data and the Standard Data Forms, which will be resolved as the transition from 1:50,000 to 1:5,000 map bases is completed and reported to the EU.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Bruinsma, J., Landsdown, R., Roden, C. and Van der Wyer, C. (2009) The Botany and Vegetation of the Lakes of South East Co. Clare. Unpublished report to the Heritage Council, Kilkenny. Doddy, P. (2015) Preliminary report of research undertaken by Mr Philip Doddy on cyanobacterial crusts in Irish lakes. Report to National Parks and Wildlife Service. Doddy, P. (2016) Krustenstein and Marl Lakes Project – Progress Report Autumn 2016. Report to National Parks and Wildlife Service. Doddy, P. (2017) The cyanophyte crust of marl lakes as a biological indicator. Progress Report - July, 2017. Report to National Parks and Wildlife Service. Doddy, P. (2017) The cyanophyte crust of marl lakes as a biological indicator. Progress Report - November, 2017. Report to National Parks and Wildlife Service. Doddy, P. (2018) The cyanophyte crust of marl lakes as a biological indicator. Experimental verification of changes in krustenstein community in nutrient-polluted conditions. Progress Report - November, 2018. Report to National Parks and Wildlife Service. Doddy, P., Roden, C.M. and Gammell, M.P. (submitted paper) Krustenstein in Irish limestone lakes: a novel indicator of trophic status? Paper submitted to *Hydrobiologia*. Foster, G.N., Nelson, B.H. and O Connor, Á. (2009) *Ireland Red List No. 1 – Water beetles.* National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland. Government of Ireland (2018) *River Basin Management Plan for Ireland 2018 – 2021*. Prepared by the Department of Housing, Planning and Local Government. Heuff, H. (1984) The Vegetation of Irish Lakes. Parts 1 and 2. Unpublished report to the Wildlife Service, Office of Public Works, Dublin. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished report, National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. O'Callaghan, E., Foster, G.N., Bilton, D.T. and Reynolds, J.D. (2009) *Ochthebius nilssoni* Hebauer new for Ireland (Coleoptera: Hydraenidae), including a key to Irish *Ochthebius* and *Enicocerus*. *Irish Naturalists' Journal* 30: 19-23. O Connor, Á. (2015) Habitats Directive Annex I lake habitats: a working interpretation for the purposes of site-specific conservation objectives and Article 17 reporting. Unpublished report, National Parks and Wildlife Service, Department of Arts,

Heritage and the Gaeltacht, Ireland.

Preston, C.D. and Croft, J.M. (2001) *Aquatic Plants in Britain and Ireland*. Harley Books, Colchester.

Roden, C.M. (1999) A survey of the sublittoral vegetation of 15 machair loughs in north west Ireland. Report to the National Heritage Council, Kilkenny.

Roden, C.M. (2000) A study of Charophyte algae growing in karstic habitats in the west of Ireland. Report to the National Heritage Council, Kilkenny.

Roden, C. (2010) The effect of excessive water abstraction on the vegetation and conservation status of Lough Bane County Meath/Westmeath. 3rd Report, December 2010. Unpublished report to Meath County Council.

Roden, C. (2012) A report on the sub-littoral environment around selected navigation markers in the north west sector of Lough Corrib. Unpublished report to RPS Group.

Roden, C. and Murphy, P. (2013) A survey of the benthic macrophytes of three hard-water lakes: Lough Bunny, Lough Carra and Lough Owel. *Irish Wildlife Manuals*, No. 70. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Roden, C. and Murphy, P. (2018) A report on the 2018 fieldwork undertaken as part of the hard water lake monitoring survey for NPWS. Unpublished report to the National Parks and Wildlife Service, DCHG, Dublin.

Stewart, N.F. (2018) A review of the Irish records for stoneworts (charophytes). January 2018. Unpublished report, the National Parks and Wildlife Service, DCHG, Dublin.

Stewart, N.F. and Church, J.M. (1992) *Red Data Books of Britain and Ireland, Charophytes.* Joint Nature Conservation Committee and Office of Public Works.

Published conservation objectives:

NPWS (2015) Conservation Objectives: Tranarossan and Melmore Lough SAC 000194. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2015) Conservation Objectives: Slyne Head Peninsula SAC 002074. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2017) Conservation Objectives: Lough Corrib SAC 000297. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

NPWS (2017) Conservation Objectives: Errit Lough SAC 000607. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2017) Conservation Objectives: Omey Island Machair SAC 001309. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

NPWS (2017) Conservation Objectives: Urlaur Lakes SAC 001571.

	Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. NPWS (2017) Conservation Objectives: Ballyhoorisky Point to Fanad Head SAC 001975. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2018) Conservation Objectives: Lough Owel SAC 000688. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. NPWS (2018) Conservation Objectives: Ross Lake and Woods SAC 001312. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.
3.2i Additional information	Bryant, J.A., Stewart, N.F. & Stace, C.A. (2002) A checklist of Characeae of the British Isles. *Watsonia* 24: 203-208. Duigan, C.A., Kovach, W.L. and Palmer, M. (2006) *Vegetation communities of British Lakes: a revised classification*. Joint Nature Conservation Committee, Peterborough. Duigan, C., Kovach, W. and Palmer, M. (2007) Vegetation communities of British lakes: a revised classification scheme for conservation. *Aquatic conservation: Marine and Freshwater Ecosystems* 17: 147–173. EPA (Catchments Science and Management Unit) (2016) *Draft. Version 4. September 2016. Guidance on Characterisation Methodology.* EPA, Dublin. Fanning, A., Craig, M., Webster, P., Bradley, C., Tierney, D., Wilkes, R., Mannix, A., Treacy, P., Kelly, F., Geoghegan, R., Kent, T. and Mageean, M. (2017) *2010-2015. EPA Water Quality in Ireland*. Environmental Protection Agency, Wexford. Free, G., Little, R., Tierney, D., Donnelly, K. and Coroni, R. (2006) A reference-based typology and ecological assessment system for Irish lakes. Preliminary Investigations. Final Report. Project 2000-FS-1-M1 Ecological Assessment of Lakes Pilot Study to Establish Monitoring Methodologies EU (WFD). EPA, Wexford. Free, G., Tierney, D., Little, R., Kelly, F.L., Kennedy, B., Plant, C., Trodd, W., Wynne, C., Caroni, R. and Byrne, C. (2016) Lake ecological assessment metrics in Ireland: relationships with phosphorus and typology parameters and the implications for setting nutrient standards. *Biology and Environment: Proceedings of the Royal Irish Academy* 116: 191-204. Groves, J. and Bullock-Webster, G.R. (1920, 1924) *The British Charophyta.* Ray Society, London. Kennedy, B., M. O'Grady, and B.A. Whitton. (2012) Online supplement to *Ecology of Cyanobacteria II* (Chap. 31), Whitton BA (ed.) Springer, Dordrecht. O Connor, Á. (2016) Incorporating nature conservation objectives and measures into the Water Framework Directive. *Biology and Environment: Proceedings of the Royal Irish Academy* 116B(3): 329-337. doi:10.3318/bioe.2016.29 Palmer, M.A., Bell, S.L. and Butterfield, I. (1992) A botanical classification of standing waters in Britain: applications for

	conservation and monitoring. *Aquatic conservation: Marine and Freshwater Ecosystems* 2: 125-143. Pentecost, A. (1981) The tufa deposits of the Malham district, north Yorkshire. *Field Studies* 5: 365-387. Pentecost, A. (2009) The marl lakes of the British Isles. *Freshwater Reviews* 2: 167-197. Preston, C.D. (1995) *Pondweeds of Great Britain and Ireland*. BSBI Handbook No. 8. BSBI, London. Wiik, E., Bennion, H., Sayer, C.D., Davidson, T.A., Clarke, S.J., McGowan, S., Prentice, S., Simpson, G.L. and Stone, L. (2015) The coming and going of a marl lake: multi-indicator palaeolimnology reveals abrupt ecological change and alternative views of reference conditions. *Frontiers in Ecology and Evolution* 3 (82) DOI: 10.3389/fevo.2015.00082

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***28,000 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data***	

Optional	*c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 28,000 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators There is no evidence of a decline in Range since the Directive came into force, the area of the range is large at approximately 32% of the terrestrial grid and the habitat is widespread (found in 21 counties). Therefore, it is assumed that the current range includes all significant Irish variations of the habitat and is sufficiently large to allow the long-term viability of the habitat. As a result, the current range is set as the Favourable Reference Range.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 3140 habitat. A maximum gap distance of two 10 km grid cells was used. The resultant range contained 280 10 km cells. There is no evidence of a decline in the range of habitat 3140. Lake habitats suffer damage as a result of hydrological and morphological change, decreased water clarity, eutrophication and other impacts, but are seldom destroyed. The result is that the Range of lake habitats remains stable. The range has increased by 2,800 km^2 since the last reporting cycle (reported range was 25,200 km^2), owing to more accurate data. The Grand Canal, Royal Canal, Barrow Navigation and the significant canal feeders (Naas Branch, Milltown Feeder and Lough Owel Feeder) have been included in the 2013-2018 distribution. These canals are known strongholds for habitat 3140 and charophyte species, and should have been included in previous 3140 reports. Changes also resulted from incorporation of site-specific conservation objective data for lakes at 1:5,000 scale (more accurate data and use of a different method).	

5 Area covered by habitat		
Area covered by the habitat type within the range in the biogeographical/marine region concerned		
5.1 Year or period	***2000-2018***	
5.2 Surface area *(in km^2)*	**a) Minimum**	***283 km^2***
	b) Maximum	***464 km^2***
	c) Best single value	
5.3 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	***a) 283 km²***	
	b) Indicate if operators were used (≈, >, >>, <) or	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators There is no evidence of a decline in Area since the Directive came into force and the minimum surface area is considered sufficient to ensure the long term viability of the habitat. As a result, the estimated minimum surface area is set as the Favourable Reference Area.	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods? **YES**/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/**NO***
	b) yes, due to improved knowledge/more accurate data	***YES**/NO*
	c) yes, due to the use of different method	***YES**/NO*
	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*	
5.15 Additional information *Optional*	The distribution was used to estimate habitat area, following the approach used for the 2007-2012 cycle (NPWS, 2013; O Connor, 2015). Estimates used the surface area of the lake polygons classified as containing the habitat. The total area of the Waterways Ireland canal polygons used was 4.6 km^2. The minimum estimate summed the areas of the lake segments with ecological data and/or classified as 3140 by experts (including Cilian Roden, Nick F. Stewart and James B. Ryan). A total of 75 lakes with a summed surface area of 278 km^2 was used. The area of the habitat in the canals (4.7 km^2) was then added, giving an estimate minimum surface area of approximately 283 km^2. The habitat area may be less than the surface area of a lake, particularly where more than one Annex I standing water habitat occurs (3140 with 3130, 3150 or 3180). Alternatively, where the habitat occupies the entire available lake substratum, its area may be greater than the surface area of the lake. The maximum estimate summed the surface area of all 557 lake segments identified in the distribution as containing habitat 3140 (436 km^2), plus the area of the canal segments (4.6 km^2), and,	

	following the 2007-2012 methods (NPWS, 2013; O Connor, 2015), assumed that 45% (23 km^2) of the area of the 4,338 unclassified segments is habitat 3140. 436 km^2, 4.7 km^2 and 23 km^2 were summed to give the maximum of approximately 464 km^2, which is likely to be a significant overestimate. A single area value of 556 km^2 was provided for the 2007-2012 reporting cycle. The 92 km^2 decrease to 464 km^2 for the maximum estimate is the result of the inclusion of the canals and the re-classification of lake segments (improved knowledge), as well as the use of 1:5,000 scale mapping data (different method).

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***20 km²***
		Maximum	***28 km²***
	b) Area in not-good condition	**Minimum**	***224 km²***
		Maximum	***371 km²***
	c) Area where condition is not known	**Minimum**	***39 km²***
		Maximum	***65 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	*stable / increasing /* ***decreasing*** */ uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/****NO***		
6.7 Typical species Method used *Optional*			
6.8 Additional information	The marl lake or hard-water habitat has an unusual flora, vegetation and fauna, which is very restricted in Europe as a whole, and Ireland		

Optional	contains a large proportion of the total European habitat. The habitat is associated with high water quality, i.e. the absence of eutrophication impacts: naturally low dissolved nutrients, very clear water (large euphotic depth) and low phytoplankton growth (see Roden and Murphy, 2013 and O Connor, 2015 for further information). Dedicated survey during the reporting cycle yielded information on the condition of the habitat for lakes and the canals: Doddy (2015, 2016, 2017, 2018; Doddy *et al*., submitted paper) surveyed the krustenstein communities of 16 x 3140 lakes as part of his PhD research on the use of this cyanophyte community as an indicator of the status of marl lakes; Roden and Murphy (2018) surveyed ten of the highest conservation value and most important 3140 lakes. All are in SACs designated to protect the habitat and nine of the ten are considered to be 'classic marl lakes' rather than coastal or peaty variants. Five of the ten overlapped with Philip Doddy's study sites; Stewart (2018, in prep.) surveyed the Grand and Royal canals, as well as five 3140 lakes. The data from these sources were collated, providing information on a total of 25 x 3140 lakes. Where there was a discrepancy between the assessments based on krustenstein (Doddy 2015, 2016, 2017, 2018) and those using the established 3140 methods (Roden and Murphy, 2011; NPWS, 2013; O Connor, 2015; Roden and Murphy, 2018), the latter condition assessments were used. Nine lakes were assessed as in Good/Favourable condition, three as Poor/Unfavourable-Inadequate and 13 as Bad/Unfavourable-Bad. This equates to 36% of the lakes monitored in Good condition, 12% Poor and 52% Bad. Of the ten SAC lakes surveyed by Roden and Murphy (2018), eight were in Good condition, one Poor (Lough Carrra) and one Bad (Melmore Lough). These data were used to assess the minimum areas in 'good' and in 'not-good' condition, as follows: **Lakes** – The surface areas of the lake segments were summed: The surface area of the nine lakes assessed as in Good condition sums to 17 km^2; The surface area of the three lakes assessed as in Poor condition sums to 107 km^2; The surface area of the 13 lakes assessed as in Bad condition sums to 115 km^2. This gives a total surface area of 222 km^2 in 'not-good' condition. These areas equate to: 7% of the monitored lake area in 'good' condition, 93% of the monitored lake area in 'not-good' condition. As 93% of the monitored lake area was in 'not-good' condition, and in line with the General evaluation matrix and the Explanatory Notes and Guidelines, Structure and functions were assessed as Unfavourable-Bad overall. **Canals** – Based on the 2018 charophyte survey work of N.F. Stewart

	in the Grand and Royal Canals and the Barrow Navigation: the Grand Canal and Barrow Navigation were assessed as in Good condition, having a combined surface area of 2.8 km^2; the Royal Canal, with surface area of 1.9 km^2, was assessed as in Poor condition owing to the failure to re-find *Tolypella intricata*, the widespread and abundant filamentous algae in the stretches in and near Dublin and the widespread occurrence of the alien invasive *Elodea nuttallii*. The lake and canal areas were summed to give the final minimum areas: Area in 'good' condition 17 km^2 of lake plus 2.8 km^2 of canal = approximately 20 km^2, or 8% of the total monitored area; Area in 'not-good' condition 222 km^2 of lake plus 1.9 km^2 of canal = approximately 224 km^2, or 92% of the total monitored area. The minimum area where condition is not known was calculated by deleting 244 km^2 from estimated minimum surface area of 283 km^2 = 39 km^2. The maximum areas were estimated by applying the percentage areas for the sampled lakes to the maximum surface area of the habitat in lakes. 14% of the estimated minimum lake area had 'unknown' condition. Applying this to the estimated maximum lake area of 464 km^2 gave 65 km^2 'unknown' and 399 km^2 known. 7% of the monitored lake area was in 'good' condition. Applying this to the estimated maximum known of 399 km^2 gives 28 km^2. 93% the monitored lake area was in 'not-good' condition, giving 371 km^2. The short-term trend in the habitat's Structure and functions was assessed by comparing lake habitat condition to data for the reporting cycle (Doddy, 2015, 2016, 2017, 2018; Doddy *et al*., submitted paper; Roden and Murphy, 2018) to 2011 and 2012 surveys (NPWS, 2013; Roden and Murphy, 2013; and unpublished data). Data were available for 16 x 3140 lakes in the two cycles. 12 of the 16 lakes had the same conservation condition assessments and were considered likely to have 'stable' habitat condition between the cycles, condition had improved at one lake and was worse at three. In terms of area, 133 km^2 (56%) had the same condition assessment, 87 km^2 (37%) had improved condition and 17 km^2 (7%) had worse condition. Considering only the habitat in Good condition, however, seven lakes summing to 20 km^2 were in Good condition for the 2007-2012, while nine lakes summing to 17 km^2 were Good for the 2013-2018 cycle. Six lakes were assessed as Good in both cycles and one had declined from Good to Poor. While condition was assessed as Good at Lough Owel in both periods, there were some indications of episodes of poor condition that need to be monitored to determine if they are indicative of an overall, gradual decline. The samples were also biased towards the highest quality and SAC lakes and the trends are unlikely to be indicative of the overall national trend. On balance, therefore, the short-term trend within the network was assessed as decreasing.

	Impacts observed on the habitat included increased biomass of vascular plants (native (*Myriophyllum verticillatum* at Lough Carra) and alien (*Elodea canadensis* at Melmore Lough)), a cyanobacterial bloom, zebra mussels and a fish kill (at Lough Owel), as well as other indications of eutrophication (epiphytic algae, and phytoplankton blooms, reduced and fluctuating transparency/euphotic-depth and increased turbidity) (Roden and Murphy, 2018). Impacts on the krustenstein community include absence or degradation of the crust, over-growth with green algae, changes in microbial community and increased chlorophyll content (Doddy, 2015, 2016, 2017, 2018; Doddy *et al*., submitted paper). The typical species list of the hard-water lake habitat in Ireland is dominated by algae (Roden and Murphy, 2013, in prep). The core species of the characteristic zones are Krustenstein, *Ophrydium versatile, Oscillatoria, Chara aculeolata, Chara aspera, Chara contraria, Chara curta, Chara denudata, Chara globularis, Chara rudis, Chara virgata* var. *annulata, Chara virgata, Nitella flexilis, Littorella uniflora, Phragmites australis, Potamogeton gramineus, Potamogeton* x *nitens, Potamogeton perfoliatus, Schoenoplectus lacustris, Utricularia vulgaris.* The vulnerable water beetle, *Ochthebius nilssoni* is also characteristic (Foster *et al*., 2009; O'Callaghan *et al*., 2009). In addition, a characteristic water beetle fauna of vegetation rafts in hard-water lakes includes *Agabus unguicularis, Hydroporus angustatus, Hydroporus memnonius, Hydroporus planus, Hydroporus striola, Hydroporus tessellatus, Hydroporus umbrosus, Ilybius ater, Ilybius guttiger, Ilybius quadriguttatus, Cercyon convexiusculus, Coelostoma orbiculare, Anacaena limbata, Anacaena lutescens, Hydrobius fuscipes* agg., *Enochrus coarctatus,* and *Enochrus testaceus.*

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A26** Agricultural activities generating diffuse pollution to surface or ground waters (H) **A25** Agricultural activities generating point source pollution to surface or ground waters (H) **F12** Discharge of urban waste water (excluding storm overflows and/or urban run-offs) generating pollution to surface or ground water (H)	**A26** Agricultural activities generating diffuse pollution to surface or ground waters (H) **A25** Agricultural activities generating point source pollution to surface or ground waters (H) **F12** Discharge of urban waste water (excluding storm overflows and/or urban run-offs) generating pollution to surface or ground water (H)

	F13 Plants, contaminated or abandoned industrial sites generating pollution to surface or ground water (H) **B23** Forestry activities generating pollution to surface or ground waters (H) **C05** Peat extraction (M) **B27** Modification of hydrological conditions, or physical alteration of water bodies and drainage for forestry (including dams) (M) **A31** Drainage for use as agricultural land (M) **F33** Abstraction of ground and surface waters (including marine) for public water supply and recreational use (M) **I02** Other invasive alien species (other than species of Union concern) (M)	**F13** Plants, contaminated or abandoned industrial sites generating pollution to surface or ground water (H) **B23** Forestry activities generating pollution to surface or ground waters (H) **C05** Peat extraction (M) **B27** Modification of hydrological conditions, or physical alteration of water bodies and drainage for forestry (including dams) (M) **A31** Drainage for use as agricultural land (M) **F33** Abstraction of ground and surface waters (including marine) for public water supply and recreational use (M) **I02** Other invasive alien species (other than species of Union concern) (M)
7.2 Sources of information *Optional*	Doddy, P. (2015) Preliminary report of research undertaken by Mr Philip Doddy on cyanobacterial crusts in Irish lakes. Report to National Parks and Wildlife Service. Doddy, P. (2016) Krustenstein and Marl Lakes Project – Progress Report Autumn 2016. Report to National Parks and Wildlife Service. Doddy, P. (2017) The cyanophyte crust of marl lakes as a biological indicator. Progress Report - July, 2017. Report to National Parks and Wildlife Service. Doddy, P. (2017) The cyanophyte crust of marl lakes as a biological indicator. Progress Report - November, 2017. Report to National Parks and Wildlife Service. Doddy, P. (2018) The cyanophyte crust of marl lakes as a biological indicator. Experimental verification of changes in krustenstein community in nutrient-polluted conditions. Progress Report - November, 2018. Report to National Parks and Wildlife Service. Doddy, P., Roden, C.M. and Gammell, M.P. (submitted paper) Krustenstein in Irish limestone lakes: a novel indicator of trophic status? Paper submitted to *Hydrobiologia*. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. O Connor, Á. (2015) Habitats Directive Annex I lake habitats: a working interpretation for the purposes of site-specific conservation objectives and Article 17 reporting. Unpublished report, National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland. Roden, C. and Murphy, P. (2018) A report on the 2018 fieldwork	

	undertaken as part of the hard water lake monitoring survey for NPWS. Unpublished report to the National Parks and Wildlife Service, DCHG, Dublin. Stewart, N.F. (2018) A review of the Irish records for stoneworts (charophytes). January 2018. Unpublished report, the National Parks and Wildlife Service, DCHG, Dublin.
7.3 Additional information *Optional*	The pressures and threats reported for the 2007-2012 cycle were reviewed against data from dedicated 3140 and charophyte survey during this reporting cycle. NPWS (2013) detailed how habitat-specific information, documented pressures on general water quality, and expert judgement were used to determine the pressures on lake habitat. See also O Connor (2015). In addition, reference was made to the 2018-2021 River Basin Management Plan under the Water Framework Directive, which included an assessment of significant pressures impacting on water status for the 16% of lake water bodies, or 132 individual lakes, considered to be 'at risk' (Government of Ireland, 2018). It was not possible to readily access the pressures and impacts data for specific lakes, so analyses could not be conducted to distinguish the pressures impacting on 3140. Agriculture was identified as a significant pressure at 80 lakes, or 61% of 'at risk' lakes (Government of Ireland, 2018). The other significant pressures identified as impacting on the 'at risk' lakes were forestry at 18 lakes (14%), urban and domestic waste-water at 15 lakes each (11%), hydromorphology at 10 lakes (8%), industry and peat extraction each at 3 lakes (2%) and urban run-off at 2 lakes (2%) (Government of Ireland, 2018). Pollution with dissolved and particulate nutrients is the most significant concern for habitat 3140. Other pollutants, notably dissolved and particulate organic matter, as well as increased water colour and fine sediment, also appear to impact on the habitat in catchments with damaged and disturbed peatland. Agriculture (A26, A25), e.g. application of chemical fertilisers (A20) and slurry spreading (A19), is the largest source of dissolved and particulate nutrients. Other agricultural activities, notably land reclamation (A01, A04), drainage (A31) and drain maintenance, ploughing (A16, A15) and re-seeding (A13), also give rise to pollution. F12 covers discharges from both urban waste-water (UWW) treatment plants (sewered) and on-site systems (unsewered). Urban waste-waters, as well as other point-sources (F13), are discharged to tributaries of some 3140 lakes, notably Lough Corrib. Forestry (B23) and peat extraction (C05) in catchments with areas of deep peat result in pollution with dissolved and particulate organic matter and nutrients. Further study is needed of the 'peaty-type' 3140 lakes occurring in these catchments to establish their natural vegetation communities and their ecological requirements in terms of water quality. Drains (A31, B27 and C05) are pathways for nutrient and other pollutants and can also be a source of hydrological change and pollution (e.g. sediment, organic matter). Abstractions for drinking water (F33) are common from 3140 lakes, owing to their high water quality and proximity to urban areas. Very low water levels were recorded in Lough Owel in 2017 and 2018.

	More study is required of the impacts of this and other abstractions on krustenstein and charophyte communities. Abstractions are considered to be a more significant threat to 3140, owing to predicted droughts as a result of climate change. Invasive alien species have been noted as colonising the habitat, notably *Elodea nuttallii* in Lough Arrow and the canals. Invasive behaviour in native vascular plants, e.g. *Myriophyllum verticillatum* in Lough Carra, has also been recorded in 3140 habitat and from eutrophication. Owing to their likely continuation, all pressures were also listed as threats. No genuine changes in pressures or threats were identified. Both the reporting form and Article 17 pressures and threats list have changed since Article 17 2013.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* ***a) Measures identified, but none yet taken** or* *b) Measures identified and taken or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	None taken

8.6 Additional information *Optional*	As the pressures impacting on habitat 3140 have been documented, the conservation measures required to maintain or restore it are broadly understood. These include: 1. reducing pollution (particularly with dissolved and/or particulate nutrients, but also humic substances, organic matter and fine sediment/turbidity) from agricultural, domestic and urban waste-water, forestry, turf-cutting and other sources; and 2. reversal/mitigation of hydrological and morphological impacts, e.g. abstractions and drainage. Further investigations will be necessary in the catchments of target lakes in order to identify sources of nutrients and to better understand pathways. Particular consideration is needed of the movement of pollutants, especially phosphorus, through ground water pathways There is on-going substantial investment by Irish Water in urban waste-water treatment and collection systems. Significant progress has also been made with domestic waste-water treatment systems through the inspection regime (under the Domestic Waste-Water Treatment Regulations) and associated grant scheme. Option (a) "*Measures identified, but none yet taken*" was chosen, however, as the majority of the most important measures identified, particularly in relation to agriculture and forestry, have not yet been implemented. No targeted conservation measures are currently being undertaken to restore or enhance areas of 3140 habitat within SACs. As option (a) was used, fields 8.2 to 8.5 were not filled. The Programmes of Measures under the WFD River Basin Management Plan will help improve water quality generally, however the WFD's default option of "Good ecological status" may not be sufficient to return the hard-water lake habitat (3140) to Favourable conservation status. While further work is needed to identify effective, practical and iterative solutions and to establish interim targets, this habitat is considered to require oligotrophic or WFD high status in Ireland, allowing for some site-specific variation in coastal lakes (NPWS, 2013; O Connor, 2015). The 2018-2021 RBMP recognised marl lakes as "potentially requiring more stringent water quality conditions" and included as a measure "research to develop the required water related standards to support the conservation objectives". The Lough Carra catchment was listed amongst the 'WFD Areas for Action'. In addition, a community-driven Lough Carra Catchment Association is active and proposing to apply for LIFE funding to maintain/restore the habitats in and around the lake. Given the resources invested in the Local Authority Water Programme and the Agricultural Sustainability Support and Advisory Programme, particularly the catchment managers and scientists and agricultural advisors, the WFD should assist in maintaining and improving the conservation condition of Annex I freshwater habitats and Annex II species in SACs. To ensure the correct measures are implemented, consideration must be given to the site-specific conservation objectives and ecological requirements of the habitat/species, as well as specific information on conservation condition and impacting pressures.

	Changes in the state of aquatic ecosystems, such as nutrient enrichment or hydrological changes, have multiple drivers and sources, especially when, as for Article 17, summarised at regional or national scale. Therefore, a large number of the new standard list of conservation measures are applicable and some measures may have more than one function (e.g. changes to grazing regime to prevent pollution, restore hydrological function, enhance biodiversity, etc.). Based on the assessment of the pressures impacting on habitat 3140, measures are required to address pollution from agriculture (CA09, CA10, CA11, CA15, CA12, CA01, CA03, CA05, CA06, CA08), pollution from urban waste-water (CF04) and possibly also on-site systems (unsewered) (CF05), peat extraction (CC08, CC09, CC01, CC02) and forestry (CB10, CB14, CB09, CB11, CB04, CB01), as well as drainage impacts (CA15, CC07, CB14). Measures may also be necessary to address abstraction pressures (CF11), and other hydromorphological pressures from a variety of sources, including damage to wetland hydrology (examples of appropriate measures include CA08, CE06, CF10, CF02, CF03, CJ03, etc.).

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	*Good / Poor /* ***Bad*** */ Unknown*
9.2 Additional information *Optional*	The Future prospects of the Range, Area and Structure and functions of habitat 3140 were assessed by reference to pressures and threats and conservation measures, as well as each parameter's 'future trends' and current status: **Pressures and threats:** Five pressures of high importance were recorded and five of medium importance and all were listed as threats, owing to their likely continuation. These pressures and threats primarily result in changes in water quality, but also in impacts to hydrological regime and, therefore, have negative influence on the status of the habitat's Structure and functions. **Conservation measures**: No habitat-specific, concrete conservation measures are currently being undertaken to maintain, restore or enhance areas of 3140 habitat, either within SACs or the wider countryside. It will take time to identify conservation measures based on the ecological requirements of the habitat, combined with the site-specific conservation objectives, conditions and significant pressures and threats; and there is likely to be a significant time-lag before conservation measures, once implemented, take effect, particularly owing to interactions with ground water. Therefore, conservation measures cannot halt or reverse the negative influence of the threats in the next 12 years. **Range**: The short- and long-term trends of the Range were assessed as stable. The current range is equal to the Favourable Reference Range and considered to include 'all significant Irish ecological variations of the habitat' and be sufficiently large to allow the long-	

	term viability of the habitat. Therefore, the Conservation Status of the Range is Favourable. While threats may lead to significant deterioration in Structure and functions of the habitat, they are unlikely to result in the loss of any 3140 lakes, hence the range is unlikely to change. The future trend of the Range is, therefore, likely to remain stable and the Future prospects of the Range have been assessed as Good. **Area**. The short- and long-term trends of the Area were assessed as stable. The estimated minimum surface area of the habitat is equal to the Favourable Reference Area and is considered sufficient to ensure the long-term viability of the habitat type. Therefore, the Conservation Status of the Area is Favourable. While threats may lead to significant deterioration in Structure and functions of the habitat, they are unlikely to result in the loss of any 3140 lakes, hence the habitat area is unlikely to change. The future trend of the Area is, therefore, likely to remain stable and the Future prospects of the Area have been assessed as Good. **Structure and functions**: Based on dedicated monitoring data for 25 lakes, 93% of the monitored lake area of 3140 was assessed as in 'not-good' condition (48% of the area was assessed as in Bad condition). As this is significantly more than 25%, Structure and functions were assessed as Unfavourable-Bad. The short-term trend in Structure and functions was assessed as decreasing, based on dedicated monitoring data. As a result and owing to the Bad condition of Structure and functions, the negative influence of the identified pressures and threats and the lack of conservation measures, the predicted future trend has been assessed as negative. The Future prospects of the Structure and functions were, therefore, assessed as Bad. As the Future prospects of the Structure and functions were assessed as Bad, the Future prospects for habitat 3140 were assessed as Unfavourable-Bad overall.

10 Conclusions	
Assessment of conservation status at end of reporting period	
10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*
10.4 Future prospects	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*
10.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving /* ***deteriorating*** */ stable / unknown*

<table>
<tr><td rowspan="8">10.7 Change and reasons for change in conservation status and conservation status trend</td><td colspan="3">Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.</td></tr>
<tr><td></td><td>Overall assessment of conservation status (10.5)</td><td>Overall trend in conservation status (10.6)</td></tr>
<tr><td>a) no, there is no difference</td><td>YES/<u>NO</u></td><td>YES/<u>NO</u></td></tr>
<tr><td>b) yes, due to genuine change</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>c) yes, due to improved knowledge/more accurate</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>d) yes, due to the use of different methods (including use of different thresholds)</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>e) yes, but there is no information on nature of change</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>The change is mainly due to (select one of the reasons above):</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td></tr>
<tr><td>10.8 Additional information

Optional</td><td colspan="2">Range: As there is no evidence of a decline in Range since the Directive came into force (stable short- and long-term trends), the area of the range is equal to the Favourable Reference Range and is large at approximately 32% of the terrestrial grid, and the current range is considered to include all significant Irish ‘ecological variations of the habitat’ and be sufficiently large to allow the long-term viability of the habitat, Range was assessed as Favourable. While there may be significant deterioration in Structure and functions of the habitat, it is unlikely that any 3140 lakes will be lost; hence, the range is unlikely to change.

Area: There is no evidence of a decline in Area since the Directive came into force (stable short- and long-term trends) and the area is large at 283 km^2-464 km^2. The estimated minimum surface area of the habitat is equal to the Favourable Reference Area and is considered sufficient to ensure the long-term viability of the habitat type. As a result, Area was assessed as Favourable. While there may be significant deterioration in Structure and functions of the habitat, it is unlikely that any 3140 lakes will be lost; hence, the habitat area is unlikely to change.

Range and Area are insensitive measures of the conservation status of lake habitats, given that lakes are damaged rather than lost. Further research may demonstrate that deterioration of habitat</td></tr>
</table>

	quality can reach a point beyond which the habitat is no longer restorable and lakes where this occurs may be reported as site loss, and result in a reduction in habitat area, and possibly even range. Until such time, the conservation status of lake habitats will be determined by the Structure and functions assessment. **Structure and functions**: Dedicated 3140 monitoring data were available for 25 lakes and three canals during the reporting cycle. 222 km^2 or 93% of the area of the 25 monitored lakes was assessed as in 'not-good' condition for Structure and functions. A minimum area of 1.9 km^2 or 40% was assessed as in 'not-good' condition in the canals. As these estimates are significantly more than 25%, Structure and functions were assessed as Unfavourable-Bad. The short-term trend in Structure and functions was assessed as decreasing because the area in Good condition had decreased from 20km^2 to 17km^2 between the 2007-2012 and 2013-2018 reporting cycles, and one lake had declined from Good to Poor condition. The sample was also biased towards the highest quality SAC lakes, and it is possible that the national trend of habitat area in good condition is worse. **Future prospects**: The conservation statuses of Range and Area were assessed as Favourable and their predicted future trend was overall stable. Structure and functions were assessed as Unfavourable-Bad, the short-term trend of habitat area in good condition was assessed as decreasing, and the predicted future trend in Structure and functions was assessed as negative. As a result, and owing to the significant and widespread pollution and hydrological pressures identified and the absence of conservation measures for the habitat, Future prospects were assessed as Unfavourable-Bad overall. As Structure and functions and Future prospects were assessed as Unfavourable-Bad, the Overall Conservation Status of 3140 was assessed as Unfavourable-Bad. As for the 2007-2012 cycle, the overall trend was assessed as deteriorating, based on the current condition of the Structure and functions, the decreasing short-term trend of habitat area in good condition, the identified pressures and lack of conservation measures, leading to a predicted negative future trend in Structure and functions and Bad Future prospects. Assessing trends in Structure and functions will continue to be a challenge. Data will be too temporally infrequent to estimate or quantify the trend magnitude or identify when changes in trend occur.

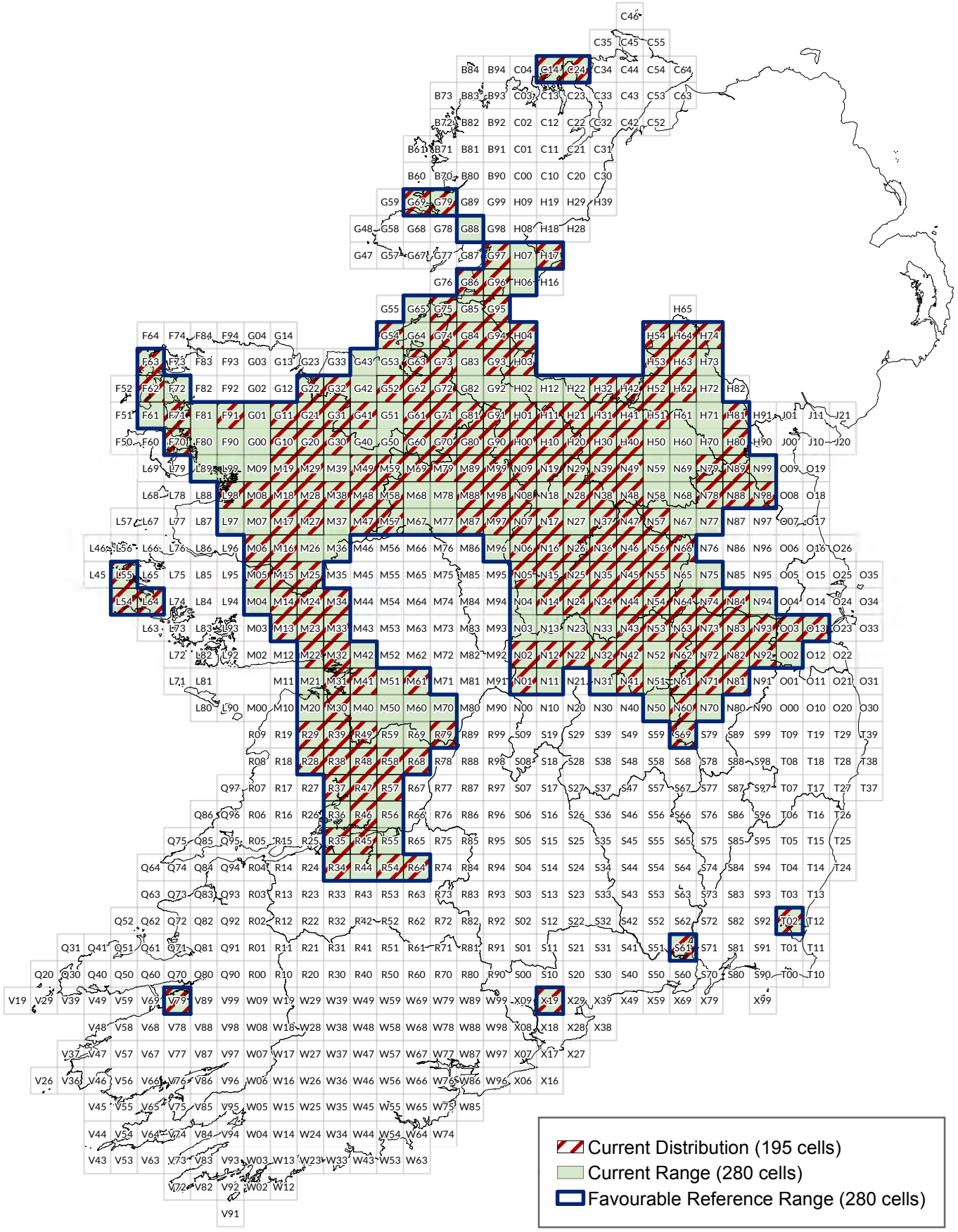
11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km^2 in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	***225 km^2***
	b) Maximum	***315 km^2***
	c) Best single value	
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	

11.3 Surface area of the habitat type inside the network **Method used**	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
11.4 Short-term trend of habitat area in good condition within the network **Direction**	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* *stable / increasing / **decreasing** / uncertain/ unknown*
11.5 Short-term trend of habitat area in good condition within network **Method used**	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
11.6 Additional information *Optional*	The distribution was used to estimate habitat area, following the approach used for the 2007-2012 cycle (NPWS, 2013; O Connor, 2015). Estimates used the surface area of the lake polygons classified as containing the habitat. As the 3140 canals are not within the SAC network, canals were not included in the calculations. The minimum estimate summed the areas of the lake segments that are within SACs designated for the protection of habitat 3140 (225 km^2). The maximum estimate summed the surface area of all lake segments within any SAC identified in the distribution as containing habitat 3140 (315 km^2) The short-term trend in the habitat's Structure and functions was assessed by comparing lake habitat condition to data for the reporting cycle (Doddy, 2015, 2016, 2017, 2018; Doddy *et al*., submitted paper; Roden and Murphy, 2018) to 2011 and 2012 surveys (NPWS, 2013; Roden and Murphy, 2013; and unpublished data). Data were available for twelve 3140 lakes in the two cycles. Nine of the twelve lakes had the same conservation condition assessments and were considered likely to have 'stable' habitat condition between the cycles, condition had improved at one lake and was worse at two. In terms of area, 122 km (54%) had the same condition assessment, and 87 km (39%) had improved condition. Considering only the habitat in Good condition, however, six lakes summing to 20 km^2 were in Good condition for the 2007-2012, while eight lakes summing to 17 km^2 were Good for the 2013-2018 cycle. Five lakes were assessed as Good in both cycles and one had declined from Good to Poor. While condition was assessed as Good at Lough Owel in both periods, there were some indications of episodes of poor condition that need to be monitored to determine if they are indicative of an overall, gradual decline. On balance, therefore, the short-term trend within the network was assessed as decreasing.

12 Complementary information

Hard water
lake habitat (3140)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**3150 Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation**
1.2i Habitat short name	**Rich pondweed lake habitat**
1.3i Habitat description	Little is known about the characteristics or ecology of Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation in Ireland. This lake habitat is considered likely to occur in lowland, base-rich lakes in the midlands and north-east of Ireland, where it is characterised by high abundance and diversity of pondweeds (*Potamogeton* spp.), such as *Potamogeton lucens*, *P. praelongus*, *P. perfoliatus*, *P. obtusifolius*, *P. berchtoldii* and *P. pectinatus*. Other rooted, predominantly submerged higher plants frequently co-occur, including *Myriophyllum spicatum*, *Hippuris vulgaris*, *Callitriche* spp., *Sagittaria sagittifolia* and *Ceratophyllum demersum*, while free-floating species such *Lemna trisulca* are also common. The habitat is associated with large lakes in large catchments, such as those of the Shannon system, and with small, but naturally more productive lakes, such as those found in parts of the drumlin-belt of Cavan, Monaghan and Leitrim or the lowlands south-east of the Burren. It seems likely that the pondweed-rich variant found in Ireland requires mesotrophic waters. 3150 lakes typically have well-developed reed swamp, fen and/or marsh communities around much of their shoreline. Wet woodland would have surrounded much of the shoreline in the past and has survived or re-colonised patches of many 3150 lake shores. Lakes with habitat 3150 are associated with catchments dominated by mineral soil and, hence, some of the most intensive agricultural lands in Ireland. Consequently, the habitat has been under pressure from eutrophication since the 1970s or before. It may, therefore, represent an altered state, caused by anthropogenic enrichment of habitats that in their natural or reference condition would have conformed to habitat 3140, 3130 or 3110.

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***2000-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*

2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution of habitat 3150 in Ireland is based largely on the 2007-2012 Article 17 distribution map. However, for five of the nine SACs designated for the protection of habitat 3150 (i.e. SACs where 3150 is a Qualifying Interest), site-specific conservation objectives are published and the associated data (OSi 1:5,000) were used (NPWS, 2014, 2016, 2017, 2018). The distribution was, therefore, a hybrid dataset of lake polygons mapped at two scales: 1:50,000 and 1:5,000. NPWS (2013) and O Connor (2015) provide details on the 2007-2012 Article 17 mapping. In summary, the "WFD_LakeSegment" feature data class from the EPA's Water Framework Geodatabase (WFDGeodatabase.mdb, Version Oct 2011) was used to create the 2007-2012 3150 distribution map. Primary data sources included NPWS Natura forms, explanatory notes and site synopses (for the nine SAC where habitat 3150 is a Qualifying Interest) and Heuff (1984). Confidence in the distribution is low, however, as the majority of lakes included were classified as 3150 based on geological and other mapping data. Field survey is necessary to confirm the habitat's distribution and to improve understanding of its typical species, ecological variation and the impacts that result from anthropogenic pressures. For the 2007-2012 cycle, 574 lake segments* were mapped in the distribution of the habitat. Following revision, the 2013-2018 distribution is based on 572 lake segments*, occupying a total of 89 10 x 10 km squares. (*In general, a GIS lake segment corresponds to a single lake.) The habitat is distributed across 13 counties (Cavan, Clare, Galway, Leitrim, Limerick, Longford, Louth, Mayo, Meath, Monaghan, Roscommon, Sligo and Westmeath). The inclusion of site-specific conservation data at a different map scale (1:5,000) has led to small differences between reporting periods, as shoreline geometry and lake segment area vary between map bases. This may also lead to slight differences between the 2013-2018 Article 17 data and the Standard Data Forms, which will be resolved as the transition from 1:50,000 to 1:5,000 map bases is completed and reported to the EU.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*

3.2 Sources of information	Fanning, A., Craig, M., Webster, P., Bradley, C., Tierney, D., Wilkes, R., Mannix, A., Treacy, P., Kelly, F., Geoghegan, R., Kent, T. and Mageean, M. (2017) *2010-2015. EPA Water Quality in Ireland.* Environmental Protection Agency, Wexford. Government of Ireland (2018) *River Basin Management Plan for Ireland 2018 – 2021.* Prepared by the Department of Housing, Planning and Local Government. Heuff, H. (1984) The Vegetation of Irish Lakes. Parts 1 and 2. Unpublished report to the Wildlife Service, Office of Public Works, Dublin. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. NPWS (2014) Conservation Objectives: Mullet/Blacksod Bay Complex SAC 000470. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. NPWS (2016) Conservation Objectives: Lough Ree SAC 000440. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2016) Conservation Objectives: Lough Forbes Complex SAC 001818. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. NPWS (2017) Conservation Objectives: Ballyallia Lake SAC 000014. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. NPWS (2018) Conservation Objectives: Dromore Woods and Loughs SAC 000032. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. O Connor, Á. (2015) Habitats Directive Annex I lake habitats: a working interpretation for the purposes of site-specific conservation objectives and Article 17 reporting. Unpublished report, National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.
3.2i Additional information	Duigan, C.A., Kovach, W.L. and Palmer, M. (2006) *Vegetation communities of British Lakes: a revised classification.* Joint Nature Conservation Committee, Peterborough. Duigan, C., Kovach, W. and Palmer, M. (2007) Vegetation communities of British lakes: a revised classification scheme for conservation. *Aquatic Conserv: Mar. Freshw. Ecosyst.* 17: 147-173. EPA (Catchments Science and Management Unit) (2016) *Draft. Version 4. September 2016.* Guidance on Characterisation Methodology. EPA, Dublin. Free, G., Little, R., Tierney, D., Donnelly, K. and Coroni, R. (2006) A reference-based typology and ecological assessment system for Irish lakes. Preliminary Investigations. Final Report. Project 2000-FS-1-M1 Ecological Assessment of Lakes Pilot Study to Establish Monitoring Methodologies EU (WFD). EPA, Wexford. O Connor, Á. (2016) Incorporating nature conservation objectives and

	measures into the Water Framework Directive. *Biology and Environment: Proceedings of the Royal Irish Academy* 116B(3): 329-337. doi:10.3318/bioe.2016.29 Palmer, M.A., Bell, S.L. and Butterfield, I. (1992) A botanical classification of standing waters in Britain: applications for conservation and monitoring. *Aquatic conservation: Marine and Freshwater Ecosystems* 2: 125-143. Preston, C.D. (1995) *Pondweeds of Great Britain and Ireland*. BSBI Handbook No. 8. BSBI, London. Preston, C.D. and Croft, J.M. (2001) *Aquatic Plants in Britain and Ireland*. Harley Books, Colchester.

4 Range

Range within the biogeographical/marine region concerned

4.1 Surface area	***11,100 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	1994–2018	
4.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference	***a) 11,100 km²***	

range	*b) Indicate if operators were used (using symbols ≈, >, >>) or*	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators There is no evidence of a decline in Range since the Directive came into force, the area of the range is large at approximately 13% of the terrestrial grid (869 10 km x10 km squares) and the habitat is widespread (found in 13 counties). It is considered that 3150 may not be a natural habitat in Ireland, but rather result from anthropogenic pressures impacting on other Annex I lake habitats. Therefore, it is assumed that the current range includes all significant Irish ecological variations of the habitat and is sufficiently large to allow the long-term viability of the habitat. As a result, the current range was set as the Favourable Reference Range.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods? YES/**NO*** *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/NO*
	b) yes, due to improved knowledge/more accurate data	*YES/NO*
	c) yes, due to the use of different method	*YES/NO*
	d) yes, but there is no information on the nature of change	*YES/NO*
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data / the use of a different method*	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 3150 habitat. A maximum gap distance of two 10 km grid cells was used. The resultant range contained 119 10 km cells. Following review, eight 10 km squares were removed as the habitat is known not to occur within them, owing to the geology, soils and the known occurrence of other standing water habitat within the lakes. The cells removed from the range were: M50, M60, R39, R55, R56, R59, R65, and R69. The final range file contains 111 x 10 km squares. There is no evidence of a decline in the range of habitat 3150. Lake habitats suffer damage as a result of hydrological and morphological change, decreased water clarity, eutrophication and other impacts, but are seldom destroyed. The result is that the range of lake habitats remains stable.	

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2000-2018***	
5.2 Surface area	**a) Minimum**	***144 km²***

(in km²)	**b) Maximum**	***394 km²***
	c) Best single value	
5.3 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	1994–2018	
5.10 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	***a) 144 km²***	
	b) Indicate if operators were used (≈, >, >>, <) or	
	c) If favourable reference area is unknown indicate by using 'x'	

<table>
<tr><td></td><td colspan="2">d) Indicate method used to set reference value if other than operators
As there is no evidence of a decline in Area since the Directive came into force and it is considered that it may not be a natural habitat, but rather result from anthropogenic pressures impacting on other Annex I lake habitats, the estimated minimum surface area was considered sufficient to ensure the long-term viability of the habitat type and is set as the Favourable Reference Area.</td></tr>
<tr><td rowspan="6">5.14 Change and reason for change in surface area</td><td colspan="2">Is there a change between reporting periods? <u>YES</u>/NO
If yes, provide the nature of that change. More than one option (a to d) can be chosen.</td></tr>
<tr><td>a) yes, due to genuine change</td><td>YES/<u>NO</u></td></tr>
<tr><td>b) yes, due to improved knowledge/more accurate data</td><td>YES/<u>NO</u></td></tr>
<tr><td>c) yes, due to the use of different method</td><td><u>YES</u>/NO</td></tr>
<tr><td>d) yes, but there is no information on the nature of change</td><td>YES/<u>NO</u></td></tr>
<tr><td colspan="2">The change is mainly due to (select one of the reasons above):
genuine change / improved knowledge or more accurate data / <u>the use of a different method</u></td></tr>
<tr><td>5.15 Additional information

Optional</td><td colspan="2">The distribution was used to estimate habitat area, following the approach used for the 2007-2012 cycle (NPWS, 2013; O Connor, 2015). Estimates used the surface area of the lake polygons classified as containing the habitat. The minimum estimate summed the areas of lake segments within the nine SACs designated for the protection of habitat 3150 (i.e. SACs where 3150 is a Qualifying Interest). Even the minimum value may significantly overestimate the actual area of the habitat, because:
confidence in the distribution of the habitat is low;
even where field survey data indicate that the habitat occurs, it may be an anthropogenically impacted state of another Annex I lake habitat of higher conservation value; and
the habitat area is likely to be far less than the surface area of the lake, as vegetation does not cover the entire substratum of these lakes, and some were classified as containing more than one Annex I standing water habitat (3150 with 3130, 3140 or 3180).
The maximum estimate summed the area of all 572 lake segments identified as containing habitat 3150 (381 km^2) and, following the 2007-2012 methods (NPWS, 2013; O Connor, 2015), assumed that 33% of the area (13 km^2) of the remaining 180 unclassified segments of greater than 1 ha in area is habitat 3150. 381 km^2 and 13 km^2 were summed to give the maximum of 394 km^2, which is likely to be a significant overestimate.
A single area value of 411.1 km^2 was provided for the 2007-2012 reporting cycle. The 17 km^2 reduction to 394 km^2 for the maximum estimate is mainly the result of the use of 1:5,000-scale site-specific conservation objective data.</td></tr>
</table>

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***5 km²***
		Maximum	***5 km²***
	b) Area in not-good condition	**Minimum**	***126 km²***
		Maximum	***333 km²***
	c) Area where condition is not known	**Minimum**	***13 km²***
		Maximum	***56 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***		
6.7 Typical species Method used *Optional*			
6.8 Additional information *Optional*	No dedicated monitoring programme exists for lake habitat 3150 in Ireland and a standard method for assessing its conservation condition at individual sites has not been developed. Evidence-based 3150-specific targets need to be established for water quality and other ecological drivers. It is assumed that the pondweed-rich variant of habitat 3150 native to Ireland is associated with naturally mesotrophic waters (NPWS, 2013; O Connor, 2015). Structure and functions was assessed, following the Article 17 2013 approach (NPWS, 2013; O Connor, 2015), by examining WFD water quality data for 2013-2015 (Fanning *et al*., 2018), for lakes with habitat 3150. A target of mesotrophic (or WFD 'good status') or better was used. EPA data for Macrophyte, Phytobenthos, Phytoplankton, Nutrient Conditions and Acidification		

	Status were used. WFD status is categorised as high, good, moderate, poor or bad. For Structure and functions to be considered to be in Favourable condition, all five elements had to reach at least good status. If one or more WFD element was poor or bad status, conservation condition was assessed as Bad. All other combinations (i.e. if one or more element was at moderate status) were assessed as Inadequate conservation condition. 'Condition of the habitat' areas were based on the surface areas of lakes classified as 3150. The minimum areas in 'good', 'not-good' and 'unknown' condition used data for 112 lakes classified as 'potential 3150' in SACs designated for the habitat, only. This approach was taken because the habitat is so poorly understood that confidence in its occurrence and extent is low even for these SACs. 19 of the 112 lakes are EPA WFD monitoring lakes. Six of the monitored lakes were assessed as in Good/Favourable condition, 11 as in Poor/Unfavourable-Inadequate condition and two as in Bad/Unfavourable-Bad conservation condition. This equates to 32% of the sites monitored in Good condition, 58% Poor and 10% Bad. In terms of area, the surface area of the six lakes assessed as in Good condition sums to 5 km^2, the surface area of the 11 lakes assessed as in Poor condition sums to 112 km^2, and the surface area of the two lakes assessed as in Bad condition sums to 14 km^2. This gives a total surface area of 126 km^2 in 'not-good' condition. These areas equate to 4% of the monitored area in 'good' condition and 96% of the monitored area in 'not-good' condition. The maximum areas in 'good', 'not-good' and 'unknown' condition used data for the 572 lakes classified as 'potential 3150' throughout Ireland. 61 of the 572 are EPA WFD monitoring lakes and 9, 27 and 25 lakes were assessed as Favourable, Inadequate and Bad conservation condition, respectively. This equates to 15% of the sites monitored in Good condition, 44% Poor and 41% Bad. In terms of area, this is 5.2 km^2 Good, 281.8 km^2 Poor and 51 km^2 Bad condition; or 1.5% of the monitored area 'good' and 98.5% in 'not-good' condition. Condition at 511 lakes covering 56 km^2 was 'unknown'. Of the WFD monitored 3150 lakes, macrophytes were at less than good WFD status at 49 of 60 monitored, phytoplankton status was less than good at 34 of 61 monitored and nutrient condition status was less than good at 37 of 61 monitored. Although the estimated area in 'not-good' condition was 96-98.5%, Structure and functions were assessed as Unfavourable-Inadequate overall, because 83%-86% of the monitored area was assessed as in Poor condition. The use of area to measure the Structure and functions of habitats is particularly problematic for aquatic habitats, where survey and assessment methods are specifically designed to characterise the overall condition of the water body, and mapping the area of the habitat, or its constituent species, zones and assemblages, is often impractical and inaccurate. Furthermore, confidence in this assessment is low, given the poor knowledge of the distribution, ecology, conservation-value and water quality requirements of habitat 3150, including the

	applicability of WFD tools to assessing its conservation condition. The majority of lakes included in the distribution were classified as 3150 based on geological and other mapping data. Dedicated field survey is needed to describe the habitat, its typical species, ecological variants, ecological requirements and responses to anthropogenic pressures. In Ireland, habitat 3150 may represent an altered state caused by anthropogenic impacts on habitats that in their natural or reference condition would have conformed to habitat 3140, 3130 or 3110. It may not, however, be possible to restore these natural habitats, and alternative objectives and targets may need to be identified. To examine trends, changes in water quality and WFD status at individual lakes over time were considered. Of the 61 EPA WFD monitoring lakes classified as 3150, the overall conservation condition had improved at nine between the 2009-2011 and 2013-2015 cycles. Conservation condition was the same at 46 and worse at six. This corresponded to the following by area: 10.6 km^2 better, 303.6 km^2 the same, 24.2 km^2 worse. As a result, the short-term trend is reported as stable. Changes in water quality assessment metrics following implementation of the WFD have made assessing trends challenging. By way of illustration, Tierney *et al*. (2010) reported on the long-term trends in trophic status at 27 lakes using maximum chlorophyll *a* concentrations, averaged over each 3-year monitoring cycle. WFD chlorophyll *a* status is now based on average concentration during the growing season (March-Oct) (The European Communities Environmental Objectives (Surface Waters) Regulations 2009), data on annual maximum chlorophyll *a* are not readily available and Fanning *et al*. (2018) did not report any long-term chlorophyll *a* trends. Habitat 3150 is notable for the abundance and diversity of pondweeds, particularly the broad-leaved species and many of their hybrids. O Connor (2015) and NPWS (2013) list the following typical species: *Callitriche* spp., *Ceratophyllum demersum, Chara* spp., *Hippuris vulgaris, Lemna gibba, Lemna minor, Lemna trisulca, Myriophyllum spicatum, Nuphar lutea, Potamogeton berchtoldii, P. filiformis, P. friesii, P. gramineus, P. lucens, P. natans, P. obtusifolius, P. pectinatus, P. perfoliatus, P. praelongus, P. pusillus, P.* x *zizii, Sagittaria sagittifolia, Sparganium emersum, Spirodela polyrhiza.* The non-native, *Elodea canadensis* is also frequent in habitat 3150. Further work is required to fully describe the typical and characteristic species of habitat 3150, particularly *Potamogeton*, *Chara* and *Callitriche* species, the natural variations in the habitat in Ireland and how the habitat changes as a result of anthropogenic impacts.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A25** Agricultural activities generating point source pollution to surface or ground waters (H) **A26** Agricultural activities generating diffuse pollution to surface or ground waters (H) **B23** Forestry activities generating pollution to surface or ground waters (H) **F12** Discharge of urban waste water (excluding storm overflows and/or urban run-offs) generating pollution to surface or ground water (H) **K04** Modification of hydrological flow (H) **K05** Physical alteration of water bodies (M) **F13** Plants, contaminated or abandoned industrial sites generating pollution to surface or ground water (M) **C05** Peat extraction (M) **F11** Pollution to surface or ground water due to urban run-offs (M)	**A25** Agricultural activities generating point source pollution to surface or ground waters (H) **A26** Agricultural activities generating diffuse pollution to surface or ground waters (H) **B23** Forestry activities generating pollution to surface or ground waters (H) **F12** Discharge of urban waste water (excluding storm overflows and/or urban run-offs) generating pollution to surface or ground water (H) **K04** Modification of hydrological flow (H) **K05** Physical alteration of water bodies (M) **F13** Plants, contaminated or abandoned industrial sites generating pollution to surface or ground water (M) **C05** Peat extraction (M) **F11** Pollution to surface or ground water due to urban run-offs (M)

7.2 Sources of information *Optional*	2018-2021 River Basin Management Plan, assessment of significant pressures impacting on water status for the 16% of lake water bodies, or 132 individual lakes, considered to be 'at risk' (Government of Ireland, 2018). http://www.housing.gov.ie/sites/default/files/publications/files/rbmp_full_reportweb.pdf
7.3 Additional information *Optional*	The 2018-2021 River Basin Management Plan under the Water Framework Directive included an assessment of significant pressures impacting on water status for the 16% of lake water bodies, or 132 individual lakes, considered to be 'at risk' (Government of Ireland, 2018). It was not possible to readily access the pressures and impacts data for specific lakes, so analyses could not be conducted to distinguish the pressures impacting on 3150. Agriculture was identified as a significant pressure at 80 lakes, or 61% of 'at risk' lakes (Government of Ireland, 2018). The other significant pressures

	identified as impacting on the 'at risk' lakes were forestry at 18 lakes (14%), urban and domestic waste-water at 15 lakes each (11%), hydromorphology at 10 lakes (8%), industry and peat extraction each at 3 lakes (2%) and urban run-off at 2 lakes (2%) (Government of Ireland, 2018). These data were used to select and rank the pressures and threats. Government of Ireland (2018) did not distinguish between pollution (diffuse or point), hydrological, morphological and other pressures. In the pressures and threats list provided for Article 17 purposes ('Version 2.2 - Updated final version with crosswalk with WFD & MSFD presures [*sic*]/activities: 05/01/2018') the 'crosswalk with WFD pressures', the WFD driver 'agriculture' corresponds to 31 coded Article 17 pressures. As a result, there is some uncertainty as to whether the Article 17 codes used are appropriate to the actual pressures. Owing to their likely continuation, all pressures were also listed as threats. No genuine changes in pressures or threats were identified. Both the reporting form and Article 17 pressures and threats list have changed since Article 17 2013.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* ***a) Measures identified, but none yet taken** or* *b) Measures identified and taken or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-*

	2030) or *c) Long-term results (after 2030)*
8.5 List of main conservation measures	None taken
8.6 Additional information *Optional*	Although there has been no dedicated monitoring of habitat 3150, sufficient information is available from EPA water quality and other WFD data and analyses to broadly identify the conservation measures required to maintain or restore the habitat. These include: 1. reducing pollution (particularly with dissolved and/or particulate nutrients, but also humic substances, organic matter and fine sediment/turbidity) from agricultural, domestic and urban waste-water, forestry, turf-cutting and other sources; and 2. reversal/mitigation of hydrological and morphological impacts, e.g. abstractions and drainage. There is on-going substantial investment by Irish Water in urban waste-water treatment and collection systems. Significant progress has also been made with domestic waste-water treatment systems through the inspection regime (under the Domestic Waste-Water Treatment Regulations) and associated grant scheme. Option (a) "*Measures identified, but none yet taken*" was chosen, however, as the majority of the most important measures identified, particularly in relation to agriculture and forestry, have not yet been implemented. No targeted conservation measures are currently being undertaken to restore or enhance areas of 3150 habitat within SACs, and further research into the habitat is required before such measures could be further developed and prioritised. As option (a) was used, fields 8.2 to 8.5 were not filled. The Programmes of Measures under the WFD River Basin Management Plan should help to improve water quality generally, and help to protect habitat 3150. While further work is needed to define the ecological requirements of habitat 3150, and recognising that a range of variation in requirements may be identified over time, this habitat is considered to require mesotrophic or WFD good status in Ireland (NPWS, 2013; O Connor, 2015). Given the resources invested in the Local Authority Water Programme and the Agricultural Sustainability Support and Advisory Programme, particularly the catchment managers and scientists and agricultural advisors, the WFD should assist in maintaining and improving the conservation condition of habitat 3150. Changes in the state of aquatic ecosystems, such as nutrient enrichment or hydrological changes, have multiple drivers and sources, especially when, as for Article 17, summarised at regional or national scale. Therefore, a large number of the new standard list of conservation measures are applicable and some measures may have more than one function (e.g. changes to grazing regime to prevent pollution, restore hydrological function, enhance biodiversity, etc.). Based on the assessment of significant pressures impacting on lakes for the 2018-2021 River Basin Management Plan under the WFD (Government of Ireland, 2018), measures are required to address pollution from agriculture (CA09, CA10, CA11, CA15, CA12, CA01,

	CA03, CA05, CA06, CA08), forestry (CB10, CB14, CB09, CB11, CB04, CB01), urban (CF04) and domestic waste-water (CF05), industry (CF04), peat extraction (CC08, CC09, CC01, CC02) and urban run-off (CF05, CE02). Measures are also likely to be necessary to address abstraction pressures (CF11), and hydromorphological pressures from a variety of sources from recreational uses (e.g. boat infrastructure) to peat extraction and other damage to wetland hydrology owing to various drivers (agriculture, forestry, development etc.; examples of appropriate measures include CA15, CA08, CB14, CC04, CC07, CE06, CF10, CF02, CF03, CJ03, etc.). Recreation of wet and dry woodland along lake shorelines and in-flowing rivers may also be necessary (CB08, CB04).

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	*Good /* ***Poor*** */ Bad / Unknown*
9.2 Additional information *Optional*	The Future prospects of the Range, Area and Structure and functions of habitat 3150 were assessed by reference to pressures and threats and conservation measures, as well as each parameter's 'future trends' and current status: **Pressures and threats:** Five widespread pressures of high importance were recorded and three of medium importance and all were listed as threats, owing to their likely continuation. These pressures and threats result in changes in water quality, hydrological regime and morphology and, therefore, have negative influence on the status of the habitat's Structure and functions. **Conservation measures**: No habitat-specific, concrete conservation measures are currently being undertaken to maintain, restore or enhance areas of 3150 habitat, either within SACs or the wider countryside. It will take time to identify the ecological requirements and to develop conservation measures based on these and site-specific conservation objectives, conditions and significant pressures and threats; and there is likely to be a time-lag before conservation measures, once implemented, take effect. Therefore, conservation measures cannot halt or reverse the negative influence of the threats in the next 12 years. **Range**: The short-term trend in the Range was assessed as stable. The current range is equal to the Favourable Reference Range and considered to include 'all significant Irish ecological variations of the habitat' and be sufficiently large to allow the long-term viability of the habitat. Therefore, the Conservation Status of the Range is Favourable. The future trend of the Range is, therefore, likely to remain stable and the Future prospects of the Range have been assessed as Good. **Area**: The short-term trend in the Area was assessed as stable. The estimated minimum surface area of the habitat is equal to the Favourable Reference Area and is considered sufficient to ensure the	

	long-term viability of the habitat type. Therefore, the Conservation Status of the Area is Favourable. The future trend of the Area is, therefore, likely to remain stable and the Future prospects of the Area have been assessed as Good. **Structure and functions**: The short-term trend in Structure and functions was assessed as stable as status was stable or better at over 90% of 3150 sites monitored under the WFD. Given the on-going stable trends, the predicted future trend is overall stable. 96-98.5% of the monitored area of the habitat was assessed as in 'not-good' condition. Although this is significantly more than 25%, Structures and functions were assessed as Unfavourable-Inadequate because the majority of the area was in Poor condition. As a result, the Future prospects of the Structure and functions were assessed as Poor. As the Future prospects of the Structure and functions were assessed as Poor, the Future prospects for habitat 3150 were assessed as Unfavourable-Inadequate.

10 Conclusions

Assessment of conservation status at end of reporting period

10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/****NO***	*YES/****NO***
	b) yes, due to genuine change	*YES/NO*	*YES/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	*YES/NO*

	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	As for previous Article 17 Reports, there was no dedicated monitoring of habitat 3150 during the reporting cycle. **Range**: As there is no evidence of a decline in Range since the Directive came into force, the short-term trend was stable, the area of the range is equal to the Favourable Reference Range, the range is considered to include all significant Irish 'ecological variations of the habitat' and be sufficiently large to allow the long-term viability of the habitat, Range was assessed as Favourable. While there may be deterioration in the Structure and functions of the habitat, it is unlikely that any 3150 lakes will be lost; hence, the range is unlikely to change. **Area**: There is no evidence of a decline in Area since the Directive came into force, the short-term trend was stable and the area is large at 144-394 km^2. The estimated minimum surface area of the habitat is equal to the Favourable Reference Area and considered sufficient to ensure the long-term viability of the habitat type. As a result, Area was assessed as Favourable. While there may be deterioration in the Structure and functions of the habitat, it is unlikely that any 3150 lakes will be lost, hence, the habitat area is unlikely to change. **Structure and functions**: Biological and physico-chemical data were available from the WFD for 61 lakes considered to possibly contain habitat 3150. 98.5% of the area of the 61 monitored lakes was assessed as in 'not-good' condition for Structure and functions. 19 of the 61 WFD monitoring lakes are in SACs designated for habitat 3150 and 96% of their area was in 'not-good' condition. Although these estimates are significantly more than 25%, Structure and functions were assessed as Unfavourable-Inadequate, owing to the very poor knowledge of the habitat, the uncertainty as to the applicability of the WFD data and the fact that the majority of the area (83-86%) monitored was in Poor, rather than Bad, condition. The short-term trend in Structure and functions was assessed as stable because WFD status was stable or better at over 90% of the 61 x 3150 sites monitored under the WFD. In area terms, the overall conservation condition had improved across 10.6 km^2 between the 2009-2011 and 2013-2015 cycles, was the same in 303.6 km^2 and worse in 24.2 km^2. **Future prospects**: Given the predicted stable 'future trend' in all		

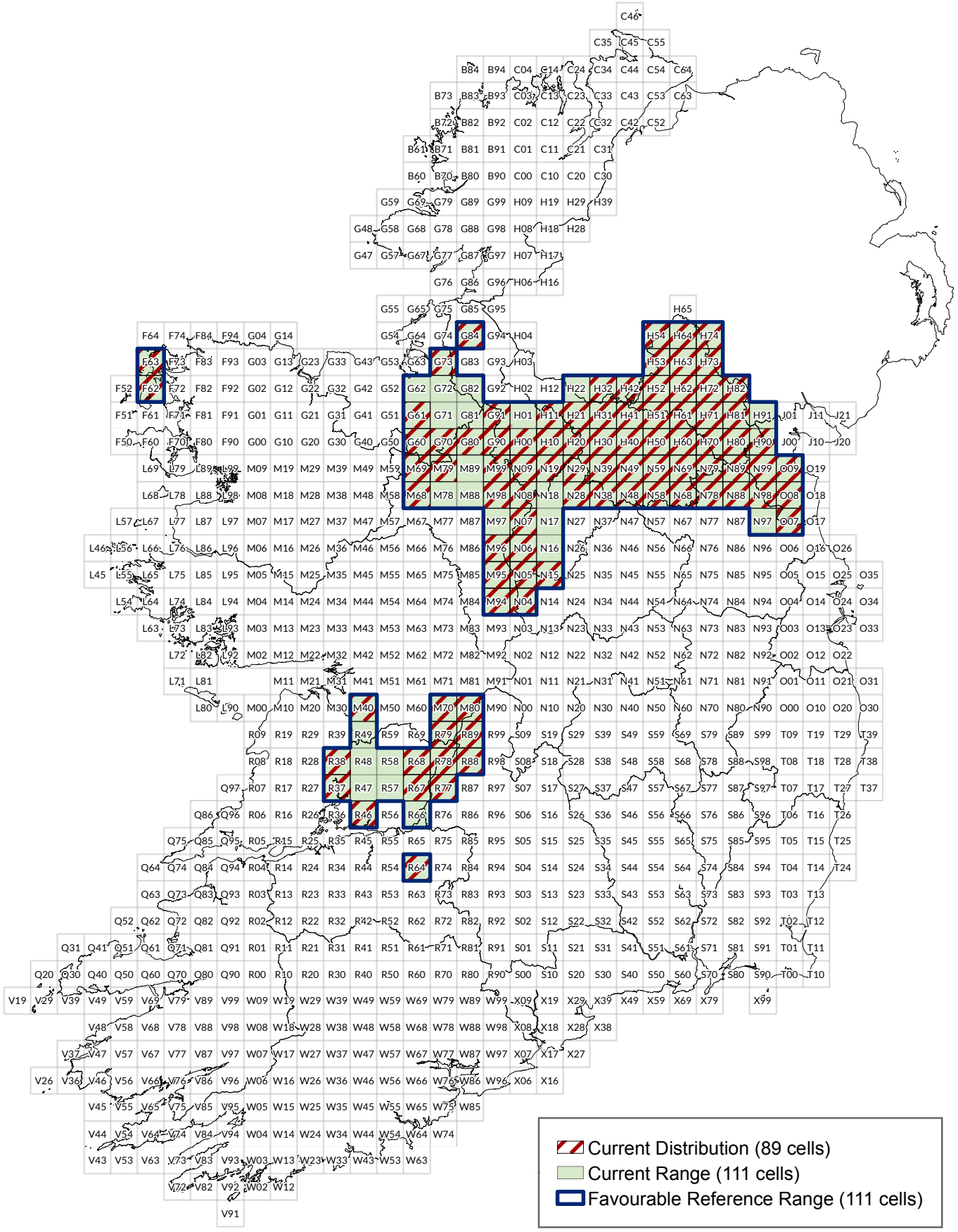
	parameters, the Favourable status of Range and Area, and the Unfavourable-Inadequate status of the habitat's Structure and functions, the Future prospects were assessed as Unfavourable-Inadequate. As both Structure and functions and Future prospects were assessed as Unfavourable-Inadequate, the Overall Conservation Status of 3150 was assessed as Unfavourable-Inadequate. Confidence in this assessment is low, given the poor knowledge of the distribution, ecology, conservation value and ecological requirements of habitat 3150. The majority of lakes included in the distribution were classified as 3150 based on geological and other mapping data. Dedicated field survey is needed to describe the habitat, its typical species, ecological variants, ecological requirements and responses to anthropogenic pressures. In Ireland, habitat 3150 may represent an altered state caused by anthropogenic impacts to habitats that in their natural or reference condition would have conformed to habitat 3140, 3130 or 3110. It may not, however, be possible to restore these natural habitats, and alternative objectives and targets may need to be identified. The overall trend was assessed as stable as the trends for Range, Area, Structure and functions and Future prospects were assessed as stable.

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	***144 km²***
	b) Maximum	***174 km²***
	c) Best single value	
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable*** */ increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	

11.6 Additional information *Optional*	The minimum estimate summed the areas of lake segments within the nine SAC designated for the protection of habitat 3150. The maximum estimate summed the areas of all lake segments within SACs that were classified as having habitat 3150. Changes in water quality and WFD status at 19 EPA WFD monitoring lakes within 3150 SACs informed the trend assessment. The overall conservation condition had improved at four lakes between the 2009-2011 and 2013-2015 cycles, was the same at 14 and worse at one. This corresponded to the following by area: 8 km^2 better, 109 km^2 the same, 14 km^2 worse. As a result, the short-term trend is reported as stable.

12 Complementary information

Rich pondweed
lake habitat (3150)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**3160 Natural dystrophic lakes and ponds**
1.2i Habitat short name	**Acid oligotrophic lake habitat**
1.3i Habitat description	The Natural dystrophic lakes and ponds habitat (3160), or acid oligotrophic lake habitat, is mainly found in small lakes and ponds in a mosaic with Atlantic and upland blanket bog and wet heath. As for other ombrotrophic peatland habitats, habitat 3160 is species poor botanically, but has relatively greater invertebrate species richness. Additionally, while individual pools or lakes may be species poor, among-site variation means that the habitat displays higher species richness at landscape and regional scales. Many of the typical 3160 species are strongly associated with and sometimes restricted to the habitat. The habitat also varies across its Irish range, with altitude, geology and distance from the sea the most likely drivers of the variation. Lakes and ponds with habitat 3160 are dominated by Coleoptera (water beetles), followed by Trichoptera (caddisfly larvae) and Heteroptera (aquatic bugs, such as water boatmen). The invertebrate fauna is also characterised by some rare and threatened species, such as the endangered Downy Emerald dragonfly (*Cordulia aenea*). On-going damage to peatland results in hydrological changes in dystrophic lakes and ponds, as well as increased sedimentation, colour, turbidity, organic material and ammonia. Fertilisation of forests can contribute to enrichment of the habitat.

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***2000-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *ptional*	Range maps were submitted
2.5i	The distribution of habitat 3160 in Ireland is based largely on the 2007-2012 Article 17 distribution map. However, published site-specific conservation objective maps were also used to update these data (NPWS, 2015, 2016, 2017). The resultant distribution was,

	therefore, a hybrid dataset of lake polygons mapped at two scales: 1:50,000 (WFD Lake Segments) and 1:5,000 (site-specific conservation objectives). Site-specific conservation objectives are published for all ten of the SACs designated for the protection of habitat 3160. NPWS (2013) and O Connor (2015) provide details on the 2007-2012 Article 17 mapping. In summary, the "WFD_LakeSegment" feature data class from the EPA's Water Framework Geodatabase (WFDGeodatabase.mdb, Version Oct 2011) was used to create the 2007-2012 3160 distribution map. Expert knowledge was used to assign habitat 3160 to lake and pond segments in blanket bog and upland areas known to have well-developed dystrophic pool and lake systems. Decisions were informed by OSi 2005 orthophotographs, bedrock geology and areas of blanket peat (BkPt) in the Teagasc, GSI and EPA soils shapefile, as well as a very limited amount of aquatic macrophyte data from EPA routine Water Framework Directive monitoring, Free *et al*. (2006, 2009) and Heuff (1984). 4,274 lake segments*, within 130 10 km x 10 km cells, were mapped in the distribution of the habitat for 2007-2012, most of these being less than 1 ha in area. Following revision, the 2013-2018 distribution is based on 13,034 lake segments*, occupying a total of 134 10 x 10 km squares. Of the 134 10 x 10 km squares, 130 were mapped in the 3160 distribution for 2007-2012. The additional four 10 x 10 km squares resulted from the classification, for site-specific conservation objectives, of previously unclassified lake segments. (*In general, a GIS lake segment corresponds to a single pool or lake.) The habitat is distributed across 13 counties (Cavan, Clare, Cork, Donegal, Dublin, Galway, Kerry, Leitrim, Louth, Mayo, Sligo, Waterford and Wicklow). There are significant differences between the two mapping scales (1:5,000 and 1:50,000) in terms of the number, location, shoreline geometry and area of small lakes and pools mapped, particularly in peatland. Hence, the inclusion of the data at a different map scale (1:5,000) has led to differences between reporting periods. It may also lead to slight differences between the 2013-2018 Article 17 data and the Standard Data Forms, which will be resolved as the transition from 1:50,000 to 1:5,000 map bases is completed and reported to the EU.

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned	
3 Biogeographical and marine regions	
3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Drinan, T.J., Nelson, B., Tickner, M., O'Donnell, G., O'Halloran, J. and

Harrison, S. (2011) First discovery of larvae of the Downy Emerald *Cordulia aenea* (L.) in Ireland and the species' use of lakes in treeless blanket bog in Connemara, Co. Galway. *Journal of the British Dragonfly Society* 27: 1–12.

Drinan, T.J. (2012) The impact of conifer plantation forestry on the ecology of peatland lakes. Unpublished Ph.D. Thesis, UCC, Cork.

Drinan, T.J., Graham, C.T., O'Halloran, J. and Harrison, S.S.C. (2013a) The impact of catchment conifer plantation forestry on the hydrochemistry of peatland lakes. *Science of the Total Environment* 443: 608–620.

Drinan, T.J., Graham, C.T., O'Halloran, J. and Harrison, S.S.C. (2013b) The impact of conifer plantation forestry on the Chydoridae (Cladocera) communities of peatland lakes. *Hydrobiologia* 700: 203–219.

Fanning, A., Craig, M., Webster, P., Bradley, C., Tierney, D., Wilkes, R., Mannix, A., Treacy, P., Kelly, F., Geoghegan, R., Kent, T. and Mageean, M. (2017) *2010-2015. EPA Water Quality in Ireland*. Environmental Protection Agency, Wexford.

Foster, G. N., Nelson, B. H. and O Connor, Á. (2009) *Ireland Red List No. 1 – Water beetles.* National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Free, G., Little, R., Tierney, D., Donnelly, K. and Coroni, R. (2006) A reference-based typology and ecological assessment system for Irish lakes. Preliminary Investigations. Final Report. Project 2000-FS-1-M1 Ecological Assessment of Lakes Pilot Study to Establish Monitoring Methodologies EU (WFD). EPA, Wexford.

Free G., Bowman, J., McGarrigle, M., Little, R., Caroni, R., Donnelly, K., Tierney, D. and Trodd, W. (2009) The identification, characterization and conservation value of isoetid lakes in Ireland. *Aquatic Conservation: Marine and Freshwater Ecosystems* 19 (3): 264–273.

Government of Ireland (2018) *River Basin Management Plan for Ireland 2018 – 2021*. Prepared by the Department of Housing, Planning and Local Government.

Heuff, H. (1984) The Vegetation of Irish Lakes. Parts 1 and 2. Unpublished report to the Wildlife Service, Office of Public Works, Dublin.

Nelson, B. and Thompson, R. (2004) *The Natural History of Ireland's Dragonflies*. MAGNI Publication No 013, National Museums and Galleries of Northern Ireland, Belfast.

Nelson, B., Ronayne, C. and Thompson, R. (2011) *Ireland Red List No.6: Damselflies & Dragonflies (Odonata)*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished report, National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

O Connor, Á. (2015) Habitats Directive Annex I lake habitats: a working interpretation for the purposes of site-specific

	conservation objectives and Article 17 reporting. Unpublished report, National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland. Published conservation objectives: NPWS (2015) *Conservation Objectives: Connemara Bog Complex SAC 002034*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. NPWS (2016) *Conservation Objectives: Caha Mountains SAC 000093. Version 1.* National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2016) *Conservation Objectives: Cuilcagh - Anierin Uplands SAC 000584. Version 1*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2016) *Conservation Objectives: Ox Mountains Bogs SAC 002006. Version 1*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2016) *Conservation Objectives: Boleybrack Mountain SAC 002032. Version 1*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2017) *Conservation Objectives: Glenamoy Bog Complex SAC 000500. Version 1.* National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2017) *Conservation Objectives: Owenduff/Nephin Complex SAC 000534. Version 1*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2017) *Conservation Objectives: Bellacorick Bog Complex SAC 001922. Version 1*. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. NPWS (2017*) Conservation Objectives: Mweelrea/Sheeffry/Erriff Complex SAC 001932*. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. NPWS (2017) *Conservation Objectives: Wicklow Mountains SAC 002122. Version 1*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.
3.2i Additional information	Duigan, C.A., Kovach, W.L. and Palmer, M. (2006) *Vegetation communities of British Lakes: a revised classification*. Joint Nature Conservation Committee, Peterborough. Duigan, C., Kovach, W. and Palmer, M. (2007) Vegetation communities of British lakes: a revised classification scheme for conservation. *Aquatic conservation: Marine and Freshwater Ecosystems* 17: 147–173. EPA (Catchments Science and Management Unit) (2016) *Draft. Version 4. September 2016. Guidance on Characterisation*

	Methodology. EPA, Dublin. O Connor, Á. (2016) Incorporating nature conservation objectives and measures into the Water Framework Directive. *Biology and Environment: Proceedings of the Royal Irish Academy*, 116B(3): 329-337. doi:10.3318/bioe.2016.29 Palmer, M.A., Bell, S.L. and Butterfield, I. (1992) A botanical classification of standing waters in Britain: applications for conservation and monitoring. *Aquatic conservation: Marine and Freshwater Ecosystems* 2: 125-143. Preston, C.D. and Croft, J.M. (2001) *Aquatic Plants in Britain and Ireland*. Harley Books, Colchester.

4 Range

Range within the biogeographical/marine region concerned

4.1 Surface area	***18,700 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference	***a) 18,700 km²***	

<table>
<tr><td rowspan="3">range</td><td colspan="2">b) Indicate if operators were used (using symbols ≈, >, >>) or</td></tr>
<tr><td colspan="2">c) If favourable reference range is unknown, indicate by using ‘x’</td></tr>
<tr><td colspan="2">d) Indicate method used to set reference value if other than operators
While the range of dystrophic lakes and ponds declined significantly in the past, there is no evidence of a decline since the Directive came into force. The area of the range is large at approximately 22% of the terrestrial grid and the habitat is widespread, occurring in 13 counties. Therefore, it is assumed that the current range includes all significant Irish ecological variations of the habitat and is sufficiently large to allow the long-term viability of the habitat. As a result, the current range is set as the Favourable Reference Range.</td></tr>
<tr><td rowspan="6">4.11 Change and reason for change in surface area of range</td><td colspan="2">Is there a change between reporting periods? <u>YES</u>/NO
If yes, provide the nature of that change. More than one option (a to d) can be chosen</td></tr>
<tr><td>a) yes, due to genuine change</td><td>YES/<u>NO</u></td></tr>
<tr><td>b) yes, due to improved knowledge/more accurate data</td><td><u>YES</u>/NO</td></tr>
<tr><td>c) yes, due to the use of different method</td><td><u>YES</u>/NO</td></tr>
<tr><td>d) yes, but there is no information on the nature of change</td><td>YES/<u>NO</u></td></tr>
<tr><td colspan="2">The change is mainly due to (select one of the reasons above):
genuine change / improved knowledge or more accurate data / <u>the use of a different method</u></td></tr>
<tr><td>4.12 Additional information

Optional</td><td colspan="2">Range was calculated using the range tool, based on the current known distribution of the 3160 habitat. A maximum gap distance of two 10 km grid cells was used. The resultant range contained 187 x 10 km cells.
Unlike the other Annex I lake habitat types that occur in Ireland (3110, 3130, 3140 and 3150), ponds or pools with lake habitat 3160 can be lost through damage and degradation of peatland. The habitat would have been widespread in the Irish midlands in the past, but was lost from this region through drainage of raised bogs for peat extraction and coniferous forestry. Drainage of blanket bog for similar reasons also led to significant declines along the western seaboard. Most of this habitat destruction would have occurred before the end of the 1980s; however, losses of blanket bog pool systems to forestry continued until at least the early 1990s. While individual sites may have been lost since 1994, it is considered unlikely that these led to a reduction in the habitat’s range.
No dedicated monitoring programme exists for lake habitat 3160 in Ireland. While the conservation status of blanket bogs (7130) and wet heaths (4010) continues to be Unfavourable-Bad (and deteriorating), in the absence of 3160-specific survey data, it is assumed that the range of the habitat is stable.
The range has increased by 400 km^2 since the last reporting cycle, owing to the incorporation of the site-specific conservation objective mapping data at the 1:5,000 scale. Existing data were used to classify previously unclassified lake segments. The change is therefore a</td></tr>
</table>

	combination of the use of a different method and more accurate data; however, no new field survey data were available for the reporting cycle.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2000-2018***	
5.2 Surface area *(in km^2)*	**a) Minimum**	***26.5 km^2***
	b) Maximum	***36.5 km^2***
	c) Best single value	
5.3 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	1994-2018	
5.10 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	

5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	***a) 26.5 km²***	
	b) Indicate if operators were used (≈, >, >>, <) or	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators While the area of dystrophic lakes and ponds declined significantly in the past, there is no evidence of a decline since the Directive came into force. As the habitat is widespread and found in a large number of individual lakes and ponds, it is assumed that the current area includes all significant Irish ecological variations of the habitat and is sufficiently large to allow the long-term viability of the habitat. As a result, the estimated minimum surface area is set as the Favourable Reference Area.	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	*YES/****NO***
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data /* ***the use of a different method***	
5.15 Additional information *Optional*	The distribution was used to estimate habitat area, following the approach employed for the 2007-2012 cycle (NPWS, 2013; O Connor, 2015). Estimates used the surface area of the lake and pond polygons classified as containing the habitat. It became clear during mapping of 3160 for the 2007-2012 report and the site-specific conservation objectives that many dystrophic lakes and ponds, within areas of blanket bog in particular, were not mapped at 1:50,000 or 1:5,000 scales. Therefore, the surface areas provided are considered likely to underestimate the area of the habitat in Ireland. The minimum estimate summed the surface areas of all 13,034 lake segments that were classified as containing the habitat (26.5 km^2). The maximum estimate included a correction factor for unclassified lake segments. Following the 2007-2012 methods (NPWS, 2013; O Connor, 2015), it was assumed that 96% (10 km^2) of the area of the 4,158 unclassified segments of less than 1 ha in area is habitat 3160. 26.5 km^2 and 10 km^2 were summed to give the maximum of	

	36.5 km^2. No long-term trend was reported, owing to the absence of reliable, field-based data on the habitat. A single area value of 32.1 km^2 was provided for the 2007-2012 reporting cycle, which is within the range reported here (26.5-36.5 km^2). The changes result from the incorporation of 1:5,000 scale mapping data (different method).

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***0.03 km^2***
		Maximum	***0.03 km^2***
	b) Area in not-good condition	**Minimum**	***1.15 km^2***
		Maximum	***1.15 km^2***
	c) Area where condition is not known	**Minimum**	***25.32 km^2***
		Maximum	***35.32 km^2***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	*stable / increasing / decreasing / uncertain/* ***unknown***		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/****NO***		
6.7 Typical species Method used *Optional*			
6.8 Additional information *Optional*	Habitat 3160 is a naturally dystrophic, botanically species-poor habitat found in peatland areas, commonly as a mosaic with blanket bog and wet heath habitats. By definition, the habitat requires highly oligotrophic conditions. There is no dedicated monitoring programme for lake habitat 3160 in		

	Ireland and a standard method for assessing its conservation condition at individual sites has not yet been developed. As a result, there is no reliable means of estimating the area in 'good' and in 'not-good' condition. EPA WFD water quality data are available for five lakes considered likely to have habitat 3160 (Loughs Tay, Bray Lower and Upper Glendalough in SAC 002122, Lough Enask in SAC 002034, and Loughaunore, also in Connemara). As the sample size is small, it is uncertain whether these data are representative of the condition of habitat across its distribution in lakes. Lake data cannot be representative of the condition of the habitat in peatland pool systems. Nevertheless, the data for the five lakes were examined, using the approach adopted for habitat 3110 (NPWS, 2013; O Connor, 2015), and WFD data for 2013-2015 (Fanning *et al*., 2018). A target of High Status was used for each of the five elements Macrophyte, Phytobenthos, Phytoplankton, Nutrient Conditions and Acidification. For Structure and functions to be considered to be in Favourable condition, all five elements had to reach high status. If one or more WFD element was moderate, poor or bad status, conservation condition was assessed as Bad. If one or more element was at good status, but none were moderate, poor or bad, Structure and functions were assessed as in Inadequate conservation condition. Only one of the five lakes was assessed in Good/Favourable condition, two were in Poor/Unfavourable-Inadequate condition and two in Bad/Unfavourable-Bad condition. In terms of area, this was 3 ha in Good condition, 31 ha in Poor condition and 83 ha in Bad condition. Macrophytes were at High Status in one lake, Good Status in two and Moderate Status in two. By contrast, phytoplankton status was high at five lakes and nutrient condition status at three, which could suggest that the macrophyte assessment is influenced by the habitat's naturally low species richness. This further emphasises that the WFD data cannot be reliably used at this point in time to assess the condition of habitat 3160. While the combined area (Poor and Bad) in 'not-good' condition is more than 25%, the habitat's Structure and functions were assessed as Inadequate overall, as: 1. the sample size was small and restricted to lakes. The occurrence of the habitat in the five lakes has not been confirmed; 2. confidence is very low in the applicability of WFD metrics to assessment of the conservation condition of habitat 3160; 3. no data were available for peatland pool systems; however it is noted that the Conservation Status of blanket bogs (7130) and wet heath (4010) were assessed as Unfavourable-Bad and deteriorating for the reporting cycle. The overall Unfavourable-Inadequate Structure and functions assessment is conservative and in keeping with the Conservation Status for the 2007-2012 cycle (NPWS, 2013). The 2007-2012 assessment was informed by research demonstrating significant impacts in blanket bog lakes as a result of conifer plantation forestry (Drinan, 2012; Drinan *et al.*, 2013 a, b). The loss of the high conservation value odonate and coleopteran species from

	impacted lakes was of particular concern. The changes in hydrochemistry, chydorid and macroinvertebrate assemblages documented were the result of enrichment, rather than acidification, processes. A 2013 review of other research into the impacts of forest operations, particularly clear-felling, on water quality demonstrated that significant increases in nutrient, sediment and DOC are common across forests on peatland, particularly during and after clear-felling (NPWS, 2013; O Connor, 2015). For the 2007-2012 report, by combining: 1. the significant negative ecological impacts documented in the studied blanket bog lakes, with 2. the data on physico-chemical impacts on water quality emerging from studies on forestry on peatland, and 3. the scale of the pressures, notably forestry on peatland, peat extraction and other degradation of peatland, in the catchments of dystrophic lakes and ponds in Ireland, the habitat was assessed as Unfavourable-Inadequate. While blanket bog pool systems are found in the wettest areas of upland and western peatland that are best protected from on-going pressures, the on-going Bad status of the associated peatland habitats is a cause for concern. Given the scale of the pressures on peatland, notably forestry, peat extraction and overgrazing, Poor and Bad conservation condition may be more widespread for the habitat in small lakes. Dedicated monitoring of habitat 3160 is a priority for the next reporting cycle (2019-2024). In the absence of data on the condition of the habitat, the trend in Structures and function must be reported as unknown. Work is needed to develop specific conservation condition assessment methods for habitat 3160 in pool systems and in lakes. As part of this, the applicability of the WFD lake elements/metrics to assessing 3160 conservation condition should be tested. Further elucidation of the natural variation in habitat 3160 and its ecological requirements is also required, in particular in relation to altitude. The development of indicators and targets for supporting conditions such as water colour and organic matter, as well as the more standard suite of nutrients, is also a priority in order to inform conservation objectives and measures. The list of typical 3160 species has not changed since the 2007-2012 cycle and was reported in NPWS (2013) and O Connor (2015). O Connor (2015) provides details of how the list was derived. The typical species include plant species, chydorid cladoceran species and aquatic macroinvertebrate species. The typical plant species were: *Sphagnum cuspidatum, Sphagnum auriculatum* (= *denticulatum*), *Juncus bulbosus, Potamogeton polygonifolius, Cladium mariscus, Eleogiton fluitans, Menyanthes trifoliata, Myriophyllum alterniflorum, Nitella flexilis, Nitella translucens, Nymphaea alba, Sparganium angustifolium, Utricularia intermedia, Utricularia minor.* The typical chydorid cladoceran species were: *Alona affinis, Alona costata, Alona rustica, Alonella excise, Alonella nana, Alonopsis*

	elongata, Camptocercus rectirostris, Chydorus sphaericus, Eurycercus lamellatus and *Pleuroxus truncatus.* The typical aquatic macroinvertebrate species were: *Acilius sulcatus, Aeshna juncea, Agabus arcticus, Cordulia aenea, Dytiscus lapponicus, Gyrinus minutus, Gyrinus substriatus, Helophorus flavipes, Hydroporus gyllenhalii, Hydroporus obscurus, Hydroporus pubescens, Hydroporus tristis, Ilybius aenescens, Leptophlebia vespertina, Pyrrhosoma nymphula, Sigara scotti.*

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**B23** Forestry activities generating pollution to surface or ground waters (H) **C05** Peat extraction (H) **A26** Agricultural activities generating diffuse pollution to surface or ground waters (H) **B27** Modification of hydrological conditions, or physical alteration of water bodies and drainage for forestry (including dams) (H) **A31** Drainage for use as agricultural land (M) **D08** Energy production and transmission activities generating pollution to surface or ground waters (M)	**B23** Forestry activities generating pollution to surface or ground waters (H) **C05** Peat extraction (H) **A26** Agricultural activities generating diffuse pollution to surface or ground waters (H) **B27** Modification of hydrological conditions, or physical alteration of water bodies and drainage for forestry (including dams) (H) **A31** Drainage for use as agricultural land (M) **D08** Energy production and transmission activities generating pollution to surface or ground waters (M)

7.2 Sources of information *Optional*	NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished report, National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. O Connor, Á. (2015) Habitats Directive Annex I lake habitats: a working interpretation for the purposes of site-specific conservation objectives and Article 17 reporting. Unpublished report, National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.
7.3 Additional information *Optional*	Pressures and threats reported for the 2007-2012 cycle were used again for this cycle. NPWS (2013) detailed how these were identified through examination of available pressure data from research projects, as well as WFD and forestry data. See also O Connor (2015). Reference was also made to the pressures and threats reported for

	blanket bog (7130) for the 2013-2018 cycle. Dystrophic lakes and ponds can be destroyed and damaged by drainage. While there is no evidence of new drainage directly impacting on the habitat during the reporting period, pre-existing drains are considered likely to have on-going significant impacts (C05, B27, A31). The habitat is also significantly impacted by indirect pressures in the upstream catchment. Drainage (C05, B27, A31) can cause hydrological changes in dystrophic lakes and ponds, while the resultant mineralization of peat increases losses of ammonia and dissolved and particulate organic fractions (C05, B23, A26). These pollutants in turn cause increased colour and turbidity, increased sedimentation and enrichment of dystrophic lakes and ponds. Enrichment in these instances is through increased biomass of the bacteria and fungi that can utilise organic matter, as well as of primary producers. The loss of organic acids from drained and degraded peatland has also been demonstrated to result in acid episodes is Irish streams; however, there is less evidence for acidification of lakes and ponds. Conifer forest on peatland results in high pollutant loads (B23), owing to the practices of fertilising crops (B19). Direct loss of dissolved nutrients can occur during fertilisation (B23). Significant losses of both organic matter and nutrients occur following tree-felling (B09, B12), where slow decomposition of conifer needles, branches and roots leads to significant losses of organic matter and, ultimately, nutrients (B23). Pollution with dissolved and particulate organic matter, as well as fine sediment (A26), can also arise from agriculture through overgrazing of peatland (A09), as well as burning (A11). Pollution (D08) also results from drainage and disturbance of peatland for wind farm development (D01). Owing to their likely continuation, all pressures were also listed as threats. No genuine changes in pressures or threats were identified. Both the reporting form and Article 17 pressures and threats list have changed since Article 17 2013. Climate change (predicted droughts (N02), increased rainfall intensity/storm events (N03) and increased temperatures (N01)) has the potential to exacerbate all of the listed pressures and may already be having an impact on the habitat. It has not been included, however, as it has not been formally documented as impacting on dystrophic lakes and ponds. Warmer temperatures and greater seasonal variations in rainfall (droughts and floods) are likely to increase the decomposition of damaged peatlands and the losses of organic matter and ammonia, further increasing enrichment, sedimentation and acidification pressures. In addition, increased rainfall/storm events would increase direct losses of chemical fertilisers. Acid episodes are also likely to increase, as they are related to rainfall events in Irish rivers.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* ***a) Measures identified, but none yet taken** or* *b) Measures identified and taken or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	None taken
8.6 Additional information *Optional*	Option (a) "*Measures identified, but none yet taken*" was chosen as the majority of the most important measures identified, particularly in relation to forestry and peat extraction, have not yet been implemented. As option (a) was used, fields 8.2 to 8.5 were not filled. No conservation measures are currently being undertaken to restore or enhance areas of 3160 habitat within SACs. Drain-blocking measures, undertaken by the INTERREG-funded CABB (Co-operation across Borders for Biodiversity) project, to restore blanket bog previously drained for conifer forestry at Fiddandarry in the Ox Mountains (SAC 002006) may benefit 3160 pools in the area. Efforts to restore sustainable grazing levels, through voluntary Department of Agriculture, Food and the Marine schemes (the European Innovation Partnership (EIP) in the Wicklow Mountains and GLAS-Green, Low Carbon, Agri-Environment Scheme

	Commonage and private Management Plans), may reduce pollution pressures on habitat 3160 arising from overgrazing. These plans do not, however, specifically aim to achieve the specific conservation objectives for the Annex I peatland habitats. Conservation measures for 3160 must be based on site-specific objectives and conditions for the associated mosaic of peatland habitats (e.g. blanket bog, wet and dry heath), as well as for the habitat itself. Measures are likely to be required to restore areas damaged by conifer plantation and turf-cutting in particular (e.g. CJ03, CC07, CB14, CA15), and to prevent further exploitation and damage (e.g. CA01, CB01).

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	*Good /* ***Poor*** */ Bad / Unknown*
9.2 Additional information *Optional*	The Future prospects of the Range, Area and Structure and functions of habitat 3160 were assessed by reference to pressures and threats and conservation measures, as well as each parameter's 'future trends' and current status: **Pressures and threats:** Four pressures of high importance were recorded and two of medium importance and all were listed as threats, owing to their likely continuation. These pressures and threats result in changes in water quality and hydrological regime and, therefore, have a negative influence on the status of the habitat's Structure and functions. **Conservation measures**: No habitat-specific, concrete conservation measures are currently being undertaken to maintain, restore or enhance areas of 3160 habitat, either within SACs or the wider countryside. It will take time to identify conservation measures based on the ecological requirements of the habitat, combined with the site-specific conservation objectives (for 3160 and associated habitats - 7130, 4010, etc.), conditions and significant pressures and threats; and there is likely to be a significant time-lag before conservation measures, once implemented, take effect (e.g. measures to reverse hydrological damage to peat). Therefore, conservation measures cannot halt or reverse the negative influence of the threats in the next 12 years. **Range**: The short- and long-term trends of the Range were assessed as stable. The current range is equal to the Favourable Reference Range and considered to include 'all significant Irish ecological variations of the habitat' and be sufficiently large to allow the long-term viability of the habitat. Therefore, the Conservation Status of the Range is Favourable. The future trend of the Range is, therefore, likely to remain stable and the Future prospects of the Range have been assessed as Good. **Area**: The short-term trend of the Area was assessed as Stable. The estimated minimum surface area of the habitat is equal to the	

	Favourable Reference Area and is considered sufficient to ensure the long-term viability of the habitat type. Therefore, the Conservation Status of the Area is Favourable. The future trend of the Area is, therefore, likely to remain stable and the Future prospects of the Area have been assessed as Good. **Structure and functions**: As there has been no dedicated monitoring of habitat 3160, no short-term trend in Structure and functions could be reported. Based largely on the 2007-2012 report, which was informed by ecological impacts documented in blanket bog lakes, data on water quality impacts emerging from studies of forestry on peatland, and the scale of the pressures on peatland from forestry, peat extraction, agriculture and other developments of peatland, the Structure and functions were assessed as Unfavourable-Inadequate. Given the scale of the threats, particularly the maturation of conifer plantations on peat, and the absence of specific conservation measures, the Future prospects of the Structure and functions were assessed as Poor. As the Future prospects of the Structure and functions were assessed as Poor, the Future prospects for habitat 3160 were assessed as Unfavourable-Inadequate overall.

10 Conclusions

Assessment of conservation status at end of reporting period

10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/****NO***	***YES****/NO*
	b) yes, due to genuine change	*YES/NO*	*YES/****NO***

	c) yes, due to improved knowledge/more accurate	*YES/NO*	*YES/**NO***
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	***YES**/NO*
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/**NO***
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / **the use of a different method***
10.8 Additional information *Optional*	**Range**: There is no evidence of a decline in range since the Directive came into force (stable short- and long-term trends). While the range of dystrophic lakes and ponds is believed to have declined prior to the Directive, the area of the current range is large at approximately 22% of the terrestrial grid, and the habitat is widespread, occurring in 13 counties. Therefore, it is assumed that the current range includes all significant Irish ecological variations of the habitat and is sufficient to allow the long-term viability of the habitat, i.e. the range is equal to the Favourable Reference Range. As a result, Range was assessed as Favourable. **Area**: There is no evidence of a decline in area since the Directive came into force (stable short-term trend) and the area is large at 26.5-36.5 km^2. It is assumed that the current area includes all significant Irish ecological variations of the habitat, is sufficiently large to allow the long-term viability of the habitat and, therefore, the estimated minimum surface area of the habitat is equal to the Favourable Reference Area. As a result, Area was assessed as Favourable. **Structure and functions**: As there has been no dedicated monitoring of habitat 3160, the Structure and functions assessment was based largely on the 2007-2012 report, which was in turn informed by ecological impacts documented in blanket bog lakes, data on water quality impacts emerging from studies of forestry on peatland, and the scale of the pressures on peatland from forestry, peat extraction, agriculture and other developments of peatland. Using these data, and informed by the conservation assessments of blanket bogs (7130) and wet heaths (4010), the Structure and functions were assessed as Unfavourable-Inadequate. No short-term trend in Structure and functions could be reported. **Future prospects**: The conservation statuses of Range and Area were assessed as Favourable and their predicted future trend was overall stable. Structure and functions were assessed as Unfavourable-Inadequate. Although the short-term trend in Structure and functions was assessed as unknown, owing to the significant and widespread pollution and hydrological pressures identified and the		

	absence of conservation measures for the habitat, the predicted future trend in Structure and functions was assessed as negative. Therefore, Future prospects were assessed as Unfavourable-Inadequate overall. As Structure and functions and Future prospects were assessed as Unfavourable-Inadequate, the Overall Conservation Status of 3160 was assessed as Unfavourable-Inadequate. As trends for Range and Area were assessed as stable, and Structure and functions trends were unknown, the overall trend was assessed as stable in accordance with the reporting guidelines and ETC advice. For the 2007-2012 cycle, the overall trend was reported as decreasing, based on the identified pressures (particularly on-going turf-cutting, maturing conifer crops, overgrazing and wind farm developments) and lack of conservation measures. The change in reported trend does not represent a genuine change or an improvement in knowledge. Work is needed to develop specific conservation condition assessment methods for habitat 3160 in pool systems and in lakes, as well as to test the applicability of the WFD elements/metrics to assessing 3160 conservation condition in lakes. Further elucidation of the natural variation in habitat 3160 and its ecological requirements is also required, in particular in relation to altitude. The development of indicators and targets for supporting conditions such as water colour and organic matter, as well as the more standard suite of nutrients, is also a priority in order to inform conservation objectives and measures. Assessing trends in Area and Structure and functions will continue to be a challenge. Even where dedicated and standardised monitoring and assessment methodologies are in use, data will be too temporally infrequent to estimate or quantify the trend magnitude or identify when changes in trend occur.

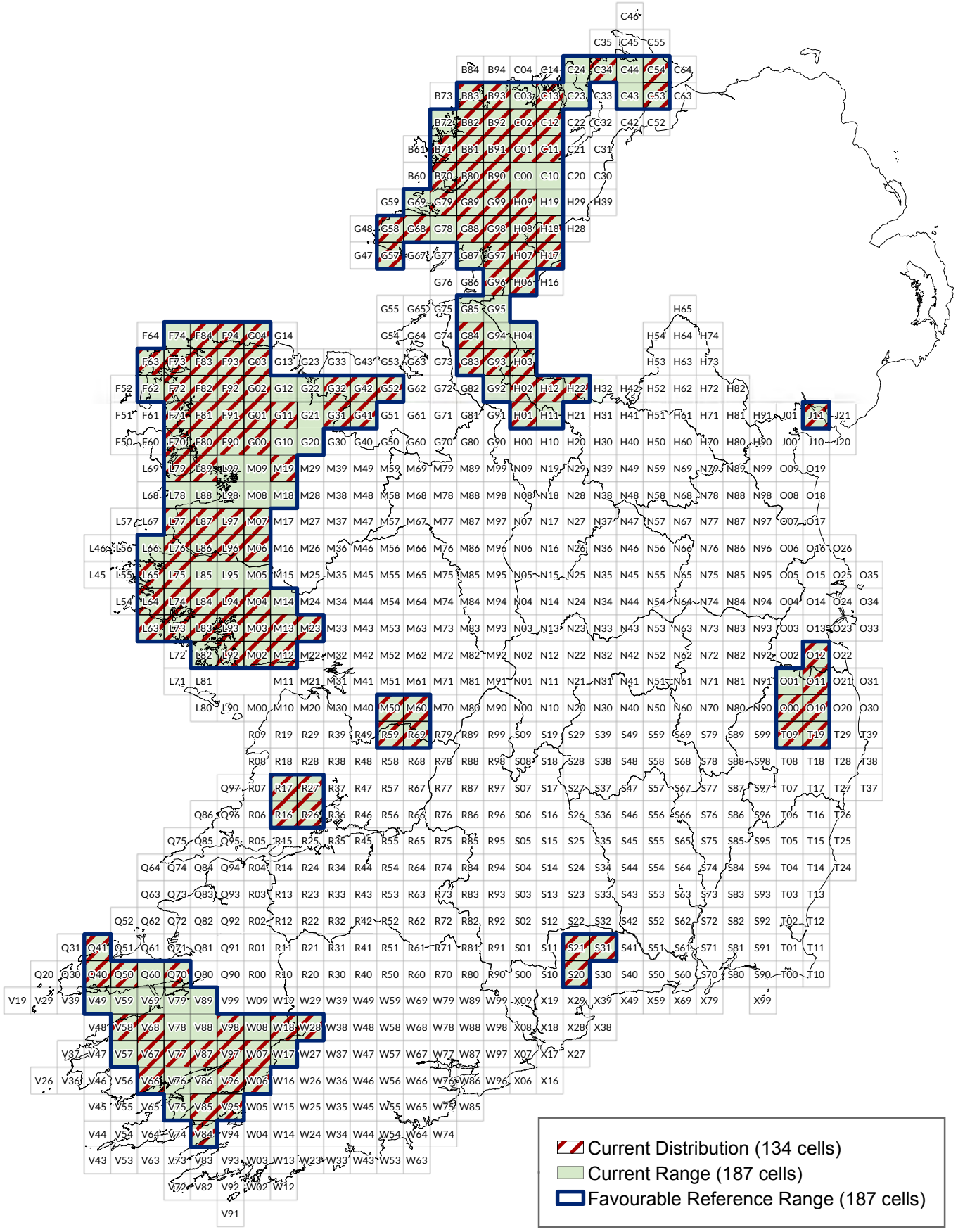
11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	***16.2 km²***
	b) Maximum	***19.5 km²***
	c) Best single value	
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

11.4 Short-term trend of habitat area in good condition within the network **Direction**	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* *stable / increasing / decreasing / uncertain/* ***unknown***
11.5 Short-term trend of habitat area in good condition within network **Method used**	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
11.6 Additional information *Optional*	The distribution was used to estimate the surface area of the habitat type inside the pSCIs, SCIs and SACs network, following the approach employed for the 2007-2012 cycle (NPWS, 2013; O Connor, 2015). Estimates used the surface area of the lake polygons classified as containing the habitat. The minimum estimate summed the surface areas of the lake segments that were classified as containing the habitat and were wholly within SACs designated for the protection of the habitat. The maximum estimate summed the surface areas of all lake segments that were classified as containing the habitat and were wholly within any SAC. As there has been no dedicated monitoring of habitat 3160, no short-term trend of habitat area in good condition within the network could be reported.

12 Complementary information

Acid oligotrophic lake habitat (3160) Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Habitat code / name	**3180 Turloughs***
1.2i Habitat short name	**Turloughs**
1.3i Habitat description	A turlough is a depression in limestone areas that is temporarily flooded by groundwater in most years. Turloughs are usually flooded in winter and dry during summer, though this varies greatly with rainfall and groundwater dynamics. Turloughs are entirely restricted to well-bedded, relatively pure karstified Carboniferous limestone. Areas with turloughs seldom have rivers; instead water flows below the ground, and turloughs can be described as the floodplains of underground rivers. Turloughs typically contain wetland vegetation communities in their lower zones, and communities more characteristic of drier limestone soils in their upper zones. Many turloughs show a distinctive zonation of plants relating to the duration of flooding. Turlough communities can include other Annex I habitats, notably hard water lakes (3140), alkaline fen (7230), Chenopodion vegetation (3270) and limestone pavement (8240). The climax vegetation for the drier parts of turloughs is wet woodland, but owing to grazing practices, turlough woodland is now quite rare. Turloughs contain numerous specialist invertebrates; they also provide important winter feeding grounds for several species of waterfowl and wading birds, with some of these species utilising the habitat for breeding. Most turloughs have ponds and wet areas that are important to aquatic invertebrates such as the characteristic moss-edge water beetles during the dry phase. Bare ground is important to invertebrate groups such as ground beetles, as well as Chenopodion vegetation (3270). Marginal woodland and scrub, as well as fringing limestone pavement and semi-natural grasslands, are also important for terrestrial invertebrates. Hydrology is the key driver of turlough ecology, with flood duration and groundwater contribution important factors. Grazing is also integral to the ecology and it is important that appropriate grazing levels are maintained.

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***2005-2018***
2.2 Distribution map	Submitted

2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution of turloughs in Ireland is based on the 2007-2012 Article 17 distribution map (NPWS, 2013a) and updated with new data for the reporting period from field survey by NPWS staff, and a study to investigate potential turloughs (O'Neill and Martin, 2015). Where available, turlough polygons were used. A 10 km x 10 km distribution was generated based on the combination of point and polygon data. The 2007-2012 distribution contained 103 10 km x 10 km grid cells. This increased to 109 10 km x 10 km grid cells for the 2013-2018 cycle. A total of 11 squares were added to the distribution owing to improved knowledge and more accurate data. Five squares were removed from the distribution as a result of improved knowledge following field survey (O'Neill and Martin, 2015). Three of the four contained areas that were flooded by surface water only and two were permanent water bodies (O'Neill and Martin, 2015). At one of the surface-flooded sites, Ballyadam (W87), field ponds were in-filled for development within the last two reporting cycles, however following examination of historic maps and aerial imagery, it is clear that these did not function as turloughs during the lifetime of the Directive.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
3.2 Sources of information	Allott, N., Coxon, C. and Cunha Pereira, H. (2015) Water chemistry and algal biomass. Chapter 4 in: Waldren, S. (ed.) Turlough hydrology, ecology and conservation. Unpublished report, National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. pp 145-170. NPWS (2013a) The Status of EU Protected Habitats and Species in Ireland. Overview. Volume 1. Unpublished Report, National Parks and Wildlife Services, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. pp. 419-427. O Connor, Á. (2017) Conservation objectives supporting document:

	Turloughs* and Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation. Conservation Objectives Supporting Document Series. National Parks and Wildlife Service, Dublin. O'Neill, F.H. and Martin, J.R. (2015) Summary of findings from the Survey of Potential Turloughs 2015. Volume I: Main Report; Volume II: Site Reports. Unpublished Report for the National Parks and Wildlife Service, Dublin. Waldren, S. (2015) (ed.) Turlough hydrology, ecology and conservation. Unpublished report, National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Waldren, S., Allott, N., Coxon, C., Cunha Pereira, H., Gill, L., Irvine, K., Johnston, P., Kimberley, S., Naughton, O., Porst, G. and Sharkey, N. (2015) Conservation status assessment. Chapter 10 in: Waldren, S. (ed.) Turlough hydrology, ecology and conservation. Unpublished report, National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. pp. 649-716. Wolf, S.M. (2018) Vegetation community, trophic analysis and conservation of Cooloorta-Travaun-Skaghard turlough complex in the Burren, Co. Clare. Unpublished M.Sc. thesis, University of Dublin, Trinity College, Ireland. Wyse Jackson, M., FitzPatrick, Ú., Cole, E., Jebb, M., McFerran, D., Sheehy Skeffington, M. and Wright, M. (2016) Ireland Red List No. 10: Vascular Plants. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin, Ireland.
3.2i Additional information	Conaghan, J., Roden, C. and Fuller, J. (2006) A Survey of Rare and Scarce Vascular Plants in County Galway. Vols 1-3. Unpublished report to National Parks and Wildlife Service, Dublin. Coxon, C. (1986) A study of the geology, hydrology and geomorphology of turloughs. Unpublished Ph.D. thesis, University of Dublin, Trinity College, Ireland. Coxon, C.E. (1987a) The spatial distribution of turloughs. *Irish Geography* 20: 11-23. Coxon, C.E. (1987b) An examination of the characteristics of turloughs using multivariate statistical techniques. *Irish Geography* 20: 24-42. Goodwillie, R.N. (1992) Turloughs over 10ha: Vegetation survey and evaluation. Unpublished report to the National Parks and Wildlife Service. Goodwillie, R.N. (2003) Vegetation of Turloughs. In: M.L. Otte (ed.) *Wetlands of Ireland: Distribution, Ecology, Uses and Economic Value*. University College Dublin Press. Pp 135-144 Goodwillie, R., Heery, S. and Keane, S. (1997) Wetland vegetation on the Gort lowlands. In: *An Investigation of the Flooding Problems in the Gort–Ardrahan Area of South Galway. Ecology Baseline*

Study Vol. I (Southern Water Global and Jennings O'Donovan and Partners eds.). The Office of Public Works, Dublin. pp. 1–131.

Naughton, O. (2011) The hydrology and hydroecology of turloughs. Unpublished Ph.D. thesis. University of Dublin, Trinity College, Ireland.

Naughton, O., Johnston, P.M and Gill, L.W. (2012) Groundwater flooding in Irish karst: The hydrological characterisation of ephemeral lakes (turloughs). *J. Hydrol*. (2012), http://dx.doi.org/10.1016/j.jhydrol.2012.08.012

NPWS (2013b) Conservation Objectives: Galway Bay Complex SAC 000268. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2016a) Conservation Objectives: Lisnageeragh Bog and Ballinastack Turlough SAC 000296. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2016b) Conservation Objectives: Lough Lurgeen Bog/Glenamaddy Turlough SAC 000301. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2016c) Lough Lurgeen Bog/Glenamaddy Turlough SAC (site code: 301) Conservation objectives supporting doc- turloughs and rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation. V1. Conservation Objectives Supporting Document Series. National Parks and Wildlife Service, Dublin.

NPWS (2016d) Conservation Objectives: Ballynamona Bog and Corkip Lough SAC 002339. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

NPWS (2017a) Conservation Objectives: Lough Gash Turlough SAC 000051. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2017b) Conservation Objectives: Coolcam Turlough SAC 000218. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2017c) Conservation Objectives: Croaghill Turlough SAC 000255. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2018a) Conservation Objectives: Caherglassaun Turlough SAC 000238. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2018b) Conservation Objectives: Fortwilliam Turlough SAC 000448. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2018c) Conservation Objectives: Ballinturly Turlough SAC 000588. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2018d) Conservation Objectives: Lisduff Turlough SAC

	000609. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. NPWS (2018e) Conservation Objectives: Lough Croan Turlough SAC 000610. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. NPWS (2018f) Conservation Objectives: Lough Funshinagh SAC 000611. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. NPWS (2018g) Conservation Objectives: Mullygollan Turlough SAC 000612. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. NPWS (2018h) Conservation Objectives: Four Roads Turlough SAC 001637. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. NPWS (2018i) Conservation Objectives: Williamstown Turloughs SAC 002296. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. NPWS (2019) Conservation Objectives: Lough Fingall Complex SAC 000606. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. Roden, C., Conaghan, J., Fuller, J. and Reynolds, S. (2006) A Survey of Rare/Threatened and Scarce Vascular Plants in County Clare. Unpublished report to National Parks and Wildlife Service, Dublin. Sheehy Skeffington, M., Moran, J., O Connor, Á., Regan, E., Coxon, C.E., Scott, N.E. and Gormally, M. (2006) Turloughs – Ireland's unique wetland habitat. *Biological Conservation* 133: 265-290.

4 Range

Range within the biogeographical/marine region concerned		
4.1 Surface area	***16,300 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 16,300 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators A new FRR was generated, based on the current range. The resultant FRR is considered to be the range when the Directive came into force and includes all significant ecological variations of the habitat for Ireland and is sufficiently large to allow the long-term survival of the habitat.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the habitat. A maximum gap distance of two 10 km grid cells was used. The resultant range contained 163 x 10 km cells. Ten squares were added to the range since the last reporting period and five squares were removed. All changes can be attributed to improved knowledge and more accurate data, from field survey	

	during reporting period by NPWS staff and O'Neill and Martin (2015). Trend is assessed as stable as there is no evidence of loss of turloughs since the Directive came into force.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***1992-2018***	
5.2 Surface area *(in km^2)*	**a) Minimum**	***56.8 km^2***
	b) Maximum	***63.4 km^2***
	c) Best single value	
5.3 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
5.10 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude	a) Minimum	
	b) Maximum	

Optional	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km^2 or*	
	b) Operator ≈ (approximately equal to) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
5.15 Additional information *Optional*	The Favourable Reference Area is based on the estimated minimum surface area of 56.8 km^2. This area is considered to be sufficient for the long-term survival of the habitat. The distribution was based on 451 turloughs: 49 turlough polygons and 402 points. Turlough surface area was based on polygon data, where available. Area estimates were also available for 177 turlough points. Following the approach of NPWS (2013a), an average figure of 7.0994 ha was applied to the remaining 225 turlough points, for which no area estimates were provided. The summed area for the 451 turloughs was 63.4 km^2, which was reported as the maximum surface area. 87 of the 451 turloughs are unconfirmed or 'potential' turloughs with a total estimated area of 6.6 km^2. The estimated minimum surface area was based on confirmed turloughs only, which had a total area of 56.8 km^2. The surface area of the habitat and Favourable Reference Area reported in 2013 was 68.87 km^2. Additional site-specific area estimates were available for the 2013-2018 period from field survey by O'Neill and Martin (2015) and NPWS staff, and from polygon data from site-specific conservation objectives, Coillte data and other sources (improved knowledge/more accurate data).	

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***10.9 km²***
		Maximum	***10.9 km²***
	b) Area in not-good condition	**Minimum**	***2.9 km²***
		Maximum	***2.9 km²***
	c) Area where condition is not known	**Minimum**	***43.0 km²***
		Maximum	***49.6 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period?* ***YES****/NO*		
6.7 Typical species Method used *Optional*	The typical species reported in NPWS (2013a) were revised by O Connor (2017) for the purposes of setting site-specific conservation objectives. This review reduced the typical species list to those that are indicative of good condition in turloughs (positive indicator species) and/or are known to be restricted to, or have most occurrences in, the habitat (characteristic species). The list was again updated based on the findings and recommendations of Conaghan and Fuller (2018) on the typical species of Chenopodion rubri p.p. and Bidention p.p. vegetation (3270), when *Chenopodium rubrum* (*Oxybasis rubra*) and *Gnaphalium uliginosum* were reinstated on the list. The full list of typical species for turloughs (3180) is given in 6.8.		
6.8 Additional information *Optional*	***Typical turlough plant species:*** *Alopecurus aequalis* ^{NT} *†* *Callitriche palustris* ^{VU} **†*		

	Carex viridula agg. *Chenopodium rubrum (Oxybasis rubra)* † *Cinclidotus fontinaloides* *Drepanocladus sendtneri* [NT] *Eleocharis acicularis* † *Frangula alnus* (prostrate form*) *Galium boreale* *Gnaphalium uliginosum* † *Limosella aquatica*†* *Ophioglossum vulgatum* *Persicaria minor* † *Plantago maritima* *Potentilla fruticosa** [VU] *Pseudocalliergon lycopodioides* [VU] *Pseudocalliergon trifarium* [VU] *Ranunculus repens* (form with highly dissected leaves*) *Rhamnus cathartica* *Riccia cavernosa* † *Rorippa islandica*†* *Schoenus nigricans* *Teucrium scordium** *Viola persicifolia** [NT] Regional Red List status (Wyse Jackson *et al*., 2016) is given, where relevant, as a superscript. Species indicated by * are considered turlough specialists, though not necessarily restricted to turloughs. † indicates typical species of habitat 3270. O Connor (2017) also provides a list of other widespread plant species commonly found in turloughs, frequently at high abundance. ***Typical aquatic invertebrate species of turloughs:*** *Agabus labiatus** [NT] *Agabus nebulosus* *Alona affinis* *Alona rustica* *Alonella excise* *Alonopsis elongata* *Bagous limosus* [CR] *Berosus signaticollis** [EN] *Diaptomus castor* *Dryops similaris** [NT] *Eurycercus glacialis** *Graptodytes bilineatus** [NT] *Haliplus obliquus*

	Haliplus variegatus [VU] *Helophorus minutus* *Helophorus nanus* [VU] *Hygrotus impressopunctatus* *Laccobius colon* *Laccobius minutus* *Lestes dryas** *Ochthebius minimus* *Polycelis nigra* *Rhantus frontalis* *Sympetrum sanguineum* Those species indicated by * have a strong association with turloughs. Regional Red List status (Foster *et al*., 2009) is given, where relevant, as a superscript. ***Typical other invertebrate species of turloughs:*** *Agonum lugens** *Agonum muelleri* *Agonum piceum* *Bactra furfurana* *Badister meridionalis** *Badister peltatus** *Bembidion aeneum* *Bembidion clarkia* *Blethisa multipunctata* *Carabus granulatus* *Chlaenius nigricornis* *Chorthippus albomarginatus* *Colobaea distincta* *Deltote uncula* *Ilione albiceta* *Loricera pilicornis* *Monochroa lutulentella* *Paraponyx stratiotata* *Pelophila borealis* *Pherbellia nana* *Pherbina coryleti* *Philonthus furcifer* *Platynus livens** *Pterostichus nigrita* *Saldula opacula*

	Tetrix subulata *Thanatophilus dispar* Species indicated by * have a strong association with turloughs. A limited and preliminary dataset was provided by Fabio Delle Grazie, TCD for water chemistry. Soluble reactive phosphorus (SRP) estimates were compared to those reported by Allott *et al*. (2015) and there was no evidence of any significant changes for 10 turloughs across the range. Research undertaken by Wolf (2018) on east Burren turloughs indicates very low levels of total phosphorus (TP) and highly oligotrophic conditions persist. As nutrient enrichment with phosphorus is considered to be the most significant pressure on turloughs, based on these datasets the trend is set as stable. The 2013 assessments for 22 turloughs that were underpinned by Waldren *et al* (2015) were retained. In addition, the site condition assessments undertaken by O'Neill and Martin (2015) for 98 turloughs were utilised to determine the area in good condition. If a turlough was assessed as inadequate, bad, fair or poor, 100% of the area was assigned as not-good condition. 79% of the turlough area of 120 turloughs is in good condition based on these estimations.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A26** Agricultural activities generating diffuse pollution to surface or ground waters (H) **A09** Intensive grazing or overgrazing by livestock (M) **A31** Drainage for use as agricultural land (M)	**A26** Agricultural activities generating diffuse pollution to surface or ground waters (H) **A09** Intensive grazing or overgrazing by livestock (M) **A31** Drainage for use as agricultural land (M)
7.2 Sources of information *Optional*	O'Neill and Martin (2015)	

7.3 Additional information *Optional*	40 of the 98 turloughs surveyed by O'Neill and Martin (2015) reported evidence of nutrient enrichment. Therefore this pressure has been elevated to High importance compared to the 2013 submission. 27 of 98 turloughs surveyed by O'Neill and Martin (2015) reported evidence of drainage for agriculture. Therefore this has been included as a pressure. 13 of the 98 turloughs surveyed by O'Neill and Martin (2015) reported evidence of ecologically unsuitable grazing. This pressure was assigned as medium importance as reported in 2013. These sites are considered to be more marginal examples of the habitat and are likely to be more impacted than the sample assessed in 2013. All pressures are considered to be threats as there are no significant measures planned to counteract these impacts in the immediate future.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* ***a) Measures identified, but none yet taken** or* *b) Measures identified and taken or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-*

	2030) or *c) Long-term results (after 2030)*
8.5 List of main conservation measures	None taken
8.6 Additional information *Optional*	Measures are needed to address nutrient loading from the surrounding catchment, particularly arising from agricultural activities and forestry. Ecologically unsuitable grazing needs to be addressed in certain turloughs. Ongoing drainage works must comply with regulations and be monitored to ensure that they are not negatively impacting this habitat. Measures in the Green, Low-carbon, Agri-environment Scheme (GLAS), particularly the measure related to commonage, may support the positive management of turloughs. Details of participation in the GLAS scheme and of the uptake across relevant measures are not currently available. It is therefore not possible to precisely assess the effects of implementation of these measures in the SAC network or the wider countryside.

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	*Good /* ***Poor*** */ Bad / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of range is assessed as stable. Current range is equal to Favourable Reference Range. Future trend of Range is assessed as stable, as no change in range is expected. Future prospects of Range are therefore good. Short-term trend direction of Area is assessed as stable. Current area is equal to the Favourable Reference Area. Future trend of Area is assessed as stable, as no change in area is expected. Future prospects of Area are therefore good. Current Structure and functions are assessed as Inadequate as 78% of habitat is in “Good” condition. Pollution, ecologically unsuitable grazing and drainage are ongoing pressures. Short-term trend direction is stable (for habitat that is in good condition). Future prospects of Structure and functions are therefore poor.	

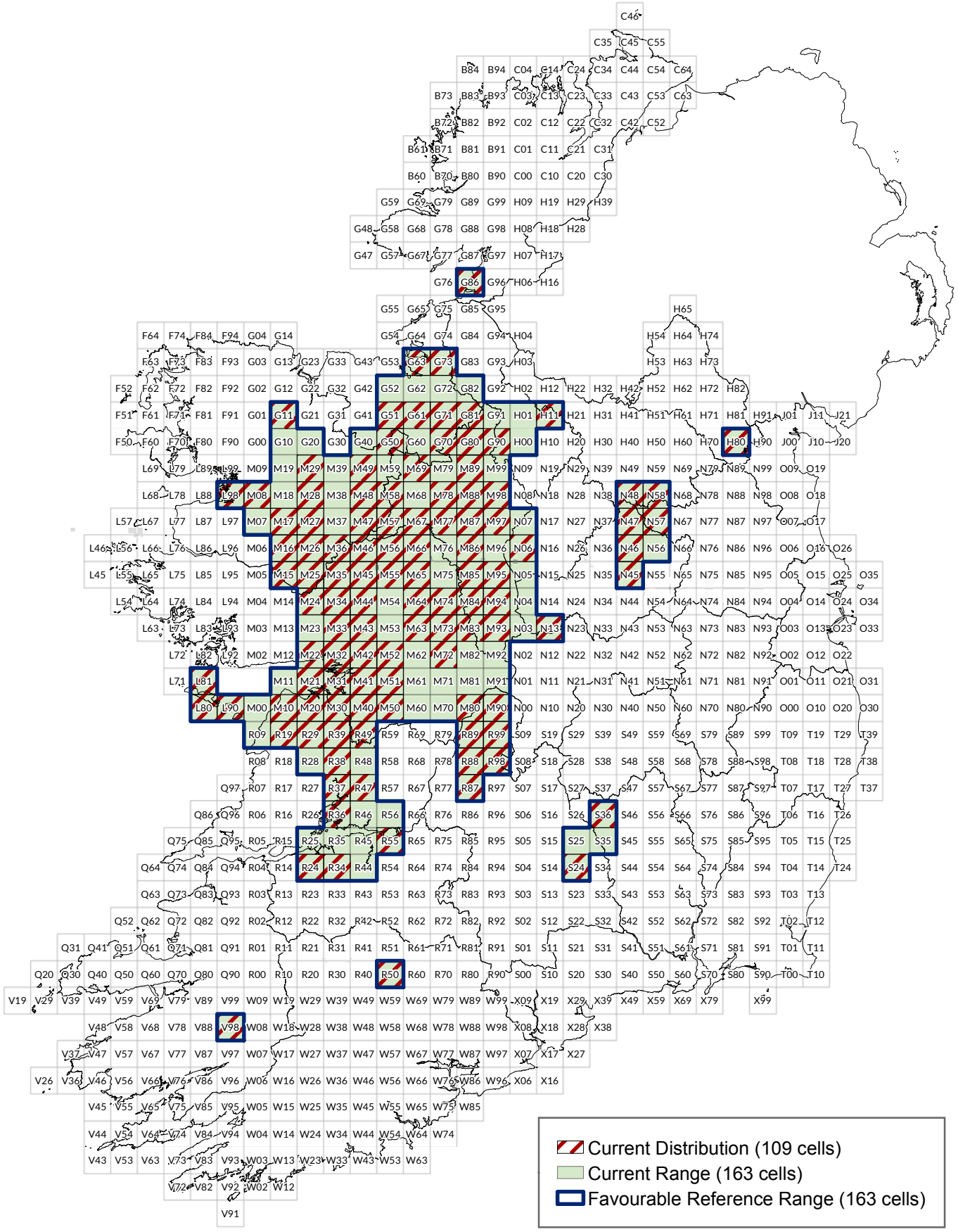
10 Conclusions			
Assessment of conservation status at end of reporting period			
10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/****NO***	*YES/****NO***
	b) yes, due to genuine change	*YES/NO*	*YES/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	*YES/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	The Conservation Status of Range is Favourable in this reporting period, as it was in the previous reporting period. The Conservation Status of Area is Favourable in this reporting period, as it was in the previous reporting period.		

	The Conservation Status of Structure and functions and Future prospects are Unfavourable-Inadequate in this reporting period, as they were in the previous reporting period. The Overall Conservation Status was assessed as Unfavourable-Inadequate, as it was during the last reporting period. The status of Unfavourable-Inadequate during the current reporting period was due to <90% of the area of 3180 habitat being assessed as having Favourable Structure and functions. Trend in Overall Conservation Status was assessed as stable in this reporting period, as it was during the last reporting period.

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***36.6 km²***
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable*** */ increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Based on the evidence in Waldren (2015) and O'Neill and Martin (2015), the condition of turloughs within the SAC network is better than in the wider countryside. Recent assessments of phosphorus in turloughs within the network suggest stable conservation condition. The area of 3180 within the Natura 2000 network where it is listed as a QI is 35.4 km^2.	

12 Complementary information

Turloughs (3180)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Habitat code / name	**3260 Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation**
1.2i Habitat short name	**Vegetation of flowing waters**
1.3i Habitat description	This annexed habitat has a broad definition, covering from upland, flashy, oligotrophic, bryophyte- and algal-dominated rivers, to tidal reaches dominated by higher plants. In Ireland, the highest riverine conservation interest is associated with lowland depositing and tidal rivers and unmodified, fast-flowing, low-nutrient rivers. A number of rare submerged and marginal species are found in the former including opposite-leaved pondweed (*Groenlandia densa*), starworts (e.g. *Callitriche truncata*), triangular club-rush (*Schoenoplectus triqueter*), needle spike rush (*Eleocharis acicularis*) and mud-dwelling mosses (e.g. *Ephemerum* spp.). The low-nutrient, high-velocity river types are associated with high bryophyte diversity, cascades, riffles and riparian woodland. Important communities also occur in groundwater-fed, base-rich oligotrophic rivers. Many Irish rivers have been heavily modified, particularly through arterial drainage and channelisation. These activities have changed channel morphology and introduced larger amounts of fine sediment. Such fines provide a rooting medium for plants and, as a result, crowfoot (*Ranunculus penicillatus*) has increased in abundance. In consequence, the habitat has, erroneously, become synonymous with water crowfoot in Ireland. Crowfoot-dominated reaches frequently have low diversity and are of low conservation value, and an abundance of the species generally indicates poor condition and damage. The main problems for river habitats in Ireland are damage through hydrological and morphological change, eutrophication and other water pollution. The EPA is also continuing to highlight the decline in high quality rivers. While not all variants of the river habitat require low nutrient conditions, this trend is a significant concern. Agriculture and municipal and industrial discharges are the most significant sources of nutrient and organic pollution.

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***2000-2018***
2.2 Distribution map	Submitted

2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution of habitat 3260 in Ireland was based on mapped rivers. All river segments, regardless of stream order, were used. The river segments were intersected with the Irish National 10 km Grid, producing a distribution of 822 10 x 10 km squares. Rivers are distributed across all counties. The only 10 x 10 km squares in which rivers do not occur are those with small areas of coastal land. The distribution is based on the occurrence of rivers, not of a particular type of river vegetation or river habitat.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
3.2 Sources of information	Bradley, C., Byrne, C., Craig, M., Free, G., Gallagher, T., Kennedy, B., Little, R., Lucey, J., Mannix, A., McCreesh, P., McDermott, G., McGarrigle, M., Ní Longphuirt, S., Lucey, J., McGarrigle, M., O'Boyle, S., Plant, C., Tierney, D., Trodd, W., Webster, P., Wilkes, R. and Wynne, C. (2015) *Water Quality in Ireland 2010-2012*. EPA, Wexford. Commission of the European Communities (CEC) (2013) *Interpretation manual of European Union habitats*. Eur 28. European Commission DG Environment, Brussels. Fanning, A., Craig, M., Webster, P., Bradley, C., Tierney, D., Wilkes, R., Mannix, A., Treacy, P., Kelly, F., Geoghegan, R., Kent, T. and Mageean, M. (2017) *2010-2015. EPA Water Quality in Ireland*. Environmental Protection Agency, Wexford. Government of Ireland (2018) *River Basin Management Plan for Ireland 2018 – 2021*. Prepared by the Department of Housing, Planning and Local Government. Hatton-Ellis, T.W. and Grieve, N. (2003) *Ecology of Watercourses Characterised by Ranunculion fluitantis and Callitricho-Batrachion Vegetation*. Conserving Natura 2000 Rivers Ecology Series No. 11. English Nature, Peterborough. Heuff, H. (1987) The Vegetation of Irish Rivers. Unpublished report to the National Parks and Wildlife Service. Lockhart, N., Hodgetts, N. and Holyoak, D. (2012) *Rare and*

threatened Bryophytes of Ireland. National Museums Northern Ireland Publication No. 028, Holywood, Co. Down.

Mainstone, C., Hall, R. and Diack, I. (2016) *A narrative for conserving freshwater and wetland habitats in England*. Natural England Research Reports Number 064.

Ní Chatháin, B., Moorkens, E. and Irvine, K. (2013) *Management Strategies for the Protection of High Status Water Bodies*. 010-W-DS-3. Strive Report Series No. 99. EPA, Wexford.

NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished report, National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Tierney, D. and O'Boyle, S. (2018) Water Quality in 2016: An Indicators Report. EPA, Wexford.

Trodd, W. and O'Boyle, S. (2018) Water Quality in 2017: An Indicators Report. EPA, Wexford.

Weekes, L., Kącki, Z., FitzPatrick, Ú., Kelly, F., Matson, R. and Kelly-Quinn, M. (2018) An Irish national vegetation classification system for aquatic river macrophytes. *Appl. Veg Sci*. DOI: 10.1111/avsc.12336.

Wyse Jackson, M., FitzPatrick, Ú., Cole, E., Jebb, M., McFerran, D., Sheehy Skeffington, M. and Wright, M. (2016) *Ireland Red List No. 10: Vascular Plants*. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin, Ireland.

Published conservation objectives:

NPWS (2011) *Conservation Objectives: Slaney River Valley SAC 000781.* Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2011) *Conservation Objectives: River Barrow and River Nore SAC 002162*. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2012) *Conservation Objectives: Lower River Shannon SAC 002165.* Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2012) *Lower River Shannon SAC (site code 2165) Conservation objectives supporting document- Water courses of plain to montane levels with the* Ranunculion fluitantis *and* Callitricho-Batrachion *vegetation (habitat code 3260).* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2012) *Conservation Objectives: Blackwater River (Cork/Waterford) SAC 002170.* Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2014) Conservation Objectives: Black Head-Poulsallagh Complex SAC 000020. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2014) *Black Head–Poulsallagh Complex SAC (site code 20) Conservation objectives supporting document- Water courses of*

	plain to montane levels with the Ranunculion fluitantis *and* Callitricho-Batrachion *vegetation (habitat code 3260).* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. NPWS (2015) *Conservation Objectives: Connemara Bog Complex SAC 002034*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. NPWS (2016) *Conservation Objectives: The Gearagh SAC 000108*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2016) *Conservation Objectives: The Gearagh SAC 000108* (site code 108). *Conservation objectives supporting document - Water courses of plain to montane levels with the* Ranunculion fluitantis *and* Callitricho-Batrachion *vegetation and Rivers with muddy banks with* Chenopodion rubri *p.p. and* Bidention *p.p.* vegetation. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2017) *Conservation Objectives: Lough Corrib SAC 000297*. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2017) *Conservation Objectives: Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC 000365*. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. NPWS (2017) *Conservation Objectives: Owenduff/Nephin Complex SAC 000534.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2017) *Conservation Objectives: Glanmore Bog SAC 001879.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2017*) Conservation Objectives: Mweelrea/Sheeffry/Erriff Complex SAC 001932*. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. NPWS (2017) *Conservation Objectives: Cloghernagore Bog and Glenveagh National Park SAC 002047.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2017) *Conservation Objectives: Lower River Suir SAC 002137.* Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2018) *Conservation Objectives: Moyree River System SAC 000057.* Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.
3.2i Additional information	EPA (Catchments Science and Management Unit) (2016) *Draft. Version 4. September 2016. Guidance on Characterisation Methodology*. EPA, Dublin. Foster, G. N., Nelson, B. H. and O Connor, Á. (2009) *Ireland Red List No. 1 – Water beetles.* National Parks and Wildlife Service, Department of Environment, Heritage and Local Government,

	Dublin, Ireland. Giavarini, V. (2009) Lichen searches of rivers, loughs, mountains: Cos. Wicklow, Sligo, Mayo and Galway. September 2009. Unpublished report to the National Parks and Wildlife Service, Dublin. Heuff, H. and Horkan, K. (1984) Caragh. In: B.A. Whitton (Ed.) *Ecology of European Rivers*. Blackwell Scientific Publishing. Pp 366-384. Kelly-Quinn, M., Bradley, C., Dodkins, I., Harrington, T.J., Ní Chatháin, B., O'Connor, M., Rippey, B. and Trigg, D. (2005) Water Framework Directive – Characterisation of Reference Conditions and Testing of Typology of Rivers (2002-W-LS-7) Final Report. Environmental Protection Agency, Co. Wexford, Ireland. O Connor, Á. (2016) Incorporating nature conservation objectives and measures into the Water Framework Directive. *Biology and Environment: Proceedings of the Royal Irish Academy*, 116B(3): 329-337. doi:10.3318/bioe.2016.29 Preston, C.D. (2003) *Pondweeds of Great Britain and Ireland*. BSBI Handbook, No. 8, Botanical Society of the British Isles, London. Preston, C.D. and Croft, J.M. (2001) *Aquatic Plants in Britain and Ireland*. Harley Books, Colchester. Rich, T.C.G., Hodd, R.L.I.B., McCosh, D.J., Mhic Daeid, E.C., McVeigh, A., Sawtschuk, J. and Wyse Jackson, M.B. (2008) Conservation of Ireland's biodiversity: A survey and assessment of the current status of three Irish endemic hawkweeds from Kerry, *Hieracium argentatum, H. scullyi* and *H. sparsifrons* (Asteraceae). *Biology and Environment: Proceedings of the Royal Irish Academy* 108B: 143 55; DOI: 10.3318/BIOE.2008.108.3.143

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***82,200 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	

4.6 Long-term trend Period *Optional*	1994–2018	
4.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 82,200 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators There is no evidence of a decline in Range since the Directive came into force. As the range is based on the distribution of rivers, it covers most of the terrestrial grid and all counties. Therefore, the current range includes all Irish ecological variations of the habitat and is sufficiently large to allow the long-term viability of the habitat. As a result, the current range is set as the Favourable Reference Range.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods? YES/**NO*** *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/NO*
	b) yes, due to improved knowledge/more accurate data	*YES/NO*
	c) yes, due to the use of different method	*YES/NO*
	d) yes, but there is no information on the nature of change	*YES/NO*
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data / the use of a different method*	
4.12 Additional information *Optional*	The distribution was used as the range, i.e. the range tool was not used. The resultant range contained 822 x 10 km cells. Little is known about the characteristics or ecology of the habitat (Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation) in Ireland. Weekes *et al*. (2018) described four main categories of river macrophyte communities and found that diversity was highest in bryophyte	

	communities. Further study is needed to describe the high conservation value sub-types (ecological variants) of the habitat, typical species, ecological requirements and responses to anthropogenic pressures, in order to improve knowledge of the habitat's distribution and range. As the range is based on the distribution of rivers, and there is no evidence of a decline in the range of rivers, it is assumed that the Range of habitat 3260 is Stable. Given the poor understanding and limited data on habitat 3260, no long-term trend has been reported.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2000-2018***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***234 km^2***
5.3 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	1994–2018	

5.10 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	***a) 234 km²***	
	b) Indicate if operators were used (≈, >, >>, <) or	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators There is no evidence of a decline in Area since the Directive came into force. The estimated surface area includes all Irish ecological variations as it includes all rivers, and is sufficient to ensure the long-term viability of the habitat type.	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods? YES/**NO*** *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/NO*
	b) yes, due to improved knowledge/more accurate data	*YES/NO*
	c) yes, due to the use of different method	*YES/NO*
	d) yes, but there is no information on the nature of change	*YES/NO*
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data / the use of a different method*	
5.15 Additional information *Optional*	The surface area of habitat 3260 was based on the distribution of rivers. The area reported for the 2007-2012 cycle (234.9 km^2) was used as the estimated 'Best single value' Surface area. This figure was based on the Inland Fisheries Ireland (IFI) Wetted Area data (based, in turn, on predictive modelling completed in 2012) (see NPWS, 2013). Little is known about the characteristics or ecology of the habitat (Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation) in Ireland. Weekes *et al*. (2018) described four main categories of river macrophyte communities and found that diversity was highest in bryophyte communities. Further study is needed to describe the high	

	conservation value sub-types (ecological variants) of the habitat, typical species, ecological requirements and responses to anthropogenic pressures, in order to improve knowledge of the habitat's distribution and area. As the area is based on the distribution of rivers, and there is no evidence of a decline in the area of rivers, it is assumed that the Area of habitat 3260 is stable. Given the poor understanding and limited data on habitat 3260, no long-term trend has been reported.

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***12 km²***
		Maximum	***161 km²***
	b) Area in not-good condition	**Minimum**	***5 km²***
		Maximum	***73 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	*stable / increasing /* ***decreasing*** */ uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/****NO***		
6.7 Typical species Method used *Optional*			
6.8 Additional information *Optional*	Little is known about the characteristics or ecology of the habitat (Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation) in Ireland. Weekes *et al*. (2018) found a rich diversity of bryophyte communities within		

	Irish rivers but lower diversity among vascular plant communities. Further study is needed to fully describe the high conservation value sub-types (ecological variants) of the habitat, their typical species, ecological requirements and responses to anthropogenic pressures, in order to improve knowledge of the habitat's structure and functions. In Ireland, many river communities represent an altered state caused by anthropogenic impacts on habitats, particularly changes in hydrology and morphology. In preparing site-specific conservation objectives for the habitat, efforts have been made to identify the site-specific vegetation and other communities of high conservation value (NPWS, 2011, 2012, 2014, 2015, 2016, 2017 and 2018). High conservation value sub-types are associated with natural hydrological regimes, including functioning floodplains. A natural flow regime is required for both plant communities and channel geomorphology to be in Favourable condition, exhibiting typical dynamics for the river type (Hatton-Ellis and Grieve, 2003). For many sub-types, high flows are required to maintain the substratum necessary for the characteristic species; others are characterised by high groundwater contribution; others by naturally, slow-flow and fine sediment deposition and/or tidal influence. The specific ecological requirements will vary among sub-types. Naturally base-rich and nutrient-poor rivers are likely to be the most threatened. As no dedicated monitoring programme exists for habitat 3260 in Ireland and a standard method for assessing its conservation condition at individual sites has not been developed, data on river water quality have been used to infer the status of the Structure and functions. It must be cautioned that the applicability of WFD tools to assessing the habitat's conservation condition has not yet been tested. The specific water quality targets are likely to vary among sub-types. The assessment used the data from the 2007-2012 cycle (NPWS, 2013), and incorporated EPA WFD data for 2013-2017 (Fanning *et al*., 2018; Tierney and O'Boyle, 2018; Trodd and O'Boyle, 2018). For the 2010-2015 period, 57% of monitored river water bodies were classified as being at high or good ecological status and 69% of the channel length was unpolluted (Fanning *et al*., 2017). The areas of the habitat in good condition were based on the value of 69% channel length. It was assumed that the EPA WFD sample was fully representative and, therefore, that the condition was known for 100% of the habitat area. Minimums were based on the 21 SACs designated for the protection of habitat 3260, which had an estimated surface area of river channel of 17 km^2 (using the IFI Wetted Area data). 69% of 17 km^2 is 12 km^2 in 'good' condition, 31% is 5 km^2 in 'not-good' condition. 69% of the national, 'best estimate' area of 234 km^2 is 161 km^2 in 'good' condition, 31% is 73 km^2 in 'not-good' condition. Although the estimated area in 'not-good' condition/Unfavourable of 31% is greater than 25%, Structure and functions were assessed as Inadequate overall, because confidence in the assessment is low given the poor knowledge of the distribution, ecology, conservation-value and water quality requirements of habitat 3260, including the

	applicability of WFD tools to assessing its conservation condition. The number of high ecological status (Q4-5 and Q5) river water bodies has continued to decline from 31.6% of sites in the 1987-1990 period, to 17.6% in 2013-2015 and 17.0% in 2014-2017 (0.6% = 14 sites) (Fanning *et al*., 2017; Tierney and O'Boyle, 2018; Trodd and O'Boyle, 2018). While there was a minor improvement in the number of the most pristine sites (Q5) from 23 in 2013-2015 to 30 in 2015-2017, the long-term trend is of significant decline, from 13.4% of sites in the 1987-1990 period to just 1.1% in 2015-2017 (Trodd and O'Boyle, 2018). Overall, between 2007-2009 and 2010-2015, 1,227 (57%) river water bodies remained stable, 418 (20%) improved and 499 (23%) declined in status (Fanning *et al*., 2017). Between 2013-2015 and 2016-2018, however, river biological quality fell by 3%, a net decline of 72 water bodies (Trodd and O'Boyle, 2018). As the decline in high status sites is considered most relevant to the assessment of trends in conservation status, the short-term trend was assessed as decreasing. Typical species have not been fully defined but may include higher plants, bryophytes, algae and invertebrates. Further work is required to fully describe the typical and characteristic species of habitat 3260. The list of typical species for habitat 3260 was based on the interpretation manual of EU habitats (CEC, 2013) and is the same as that reported for the 2007-2012 cycle: *Berula erecta*, *Callitriche* spp., *Fontinalis antipyretica*, *Myriophyllum* spp., *Potamogeton* spp., *Ranunculus aquatilis*, *Ranunculus peltatus*, *Ranunculus penicillatus*, *Ranunculus trichophyllus*, *Zannichellia palustris*. Further work is required to incorporate and build upon the work of Weekes *et al*. (2018).

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A26** Agricultural activities generating diffuse pollution to surface or ground waters (H) **A25** Agricultural activities generating point source pollution to surface or ground waters (H) **K04** Modification of hydrological flow (H) **K05** Physical alteration of water bodies (H) **F12** Discharge of urban waste	**A26** Agricultural activities generating diffuse pollution to surface or ground waters (H) **A25** Agricultural activities generating point source pollution to surface or ground waters (H) **K04** Modification of hydrological flow (H) **K05** Physical alteration of water bodies (H) **F12** Discharge of urban waste

	water (excluding storm overflows and/or urban run-offs) generating pollution to surface or ground water (H) **B23** Forestry activities generating pollution to surface or ground waters (M) **F11** Pollution to surface or ground water due to urban run-offs (M) **C05** Peat extraction (M) **F13** Plants, contaminated or abandoned industrial sites generating pollution to surface or ground water (M) **K01** Abstraction from groundwater, surface water or mixed water (M)	water (excluding storm overflows and/or urban run-offs) generating pollution to surface or ground water (H) **B23** Forestry activities generating pollution to surface or ground waters (M) **F11** Pollution to surface or ground water due to urban run-offs (M) **C05** Peat extraction (M) **F13** Plants, contaminated or abandoned industrial sites generating pollution to surface or ground water (M) **K01** Abstraction from groundwater, surface water or mixed water (M)
7.2 Sources of information *Optional*	Fanning, A., Craig, M., Webster, P., Bradley, C., Tierney, D., Wilkes, R., Mannix, A., Treacy, P., Kelly, F., Geoghegan, R., Kent, T. and Mageean, M. (2017) *2010-2015. EPA Water Quality in Ireland*. Environmental Protection Agency, Wexford. Government of Ireland (2018) *River Basin Management Plan for Ireland 2018 – 2021*. Prepared by the Department of Housing, Planning and Local Government. McGarrigle, M., Lucey, J. and Ó Cinnéide M. (2010) *Water Quality in Ireland 2007-2009*. EPA, Wexford. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished report, National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.	
7.3 Additional information *Optional*	Pressures and threats reported for the 2007-2012 cycle were used again for this cycle. NPWS (2013) detailed how these were based largely on the 2007-2009 EPA monitoring period (McGarrigle *et al*., 2010). In addition, reference was made to the 2018-2021 River Basin Management Plan under the Water Framework Directive. This included an assessment of significant pressures impacting on water status for 37% or 1,184 river water bodies considered to be 'at risk' (Government of Ireland, 2018). Agriculture was identified as a significant pressure at 629 river water bodies, or 53% of 'at risk' rivers (Government of Ireland, 2018). Pressure codes A25 and A26 were used to cover agricultural pressures. The other significant pressures identified as impacting on the 'at risk' river water bodies were hydromorphology at 329 (28%) river water bodies (codes K04 and K05 were used), urban waste-water (F12) at 252 (21%), forestry (B23) at 215 (18%), domestic waste-water (F12) at 137 (12%), urban run-off (F11) at 126 (11%), peat extraction (C05) at 115 (10%) and industry (F13) at 78 (7%) (Government of Ireland, 2018). Abstractions from 137 river water bodies have been identified for further assessment to determine if they are having a significant impact. It is also possible that abstractions may become a more significant threat,	

	in combination with predicted droughts owing to climate change. As a result, K01 has also been listed as a pressure. Owing to their likely continuation, all pressures were also listed as threats. No genuine changes in pressures or threats were identified. Both the reporting form and Article 17 pressures and threats list have changed since Article 17 2013.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* ***a) Measures identified, but none yet taken** or* *b) Measures identified and taken or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	None taken
8.6 Additional information *Optional*	Although there has been no dedicated monitoring of habitat 3260, sufficient information is available from EPA river quality and other WFD data and analyses to broadly identify the conservation measures required to maintain or restore the habitat. These include: 1. reversal/rehabilitation of hydro-morphological changes, including in-stream structures and catchment drainage impacts/

	restoration of hydrological regime; and 2. reducing pollution (with dissolved and/or particulate nutrients, humic substances, organic matter and fine sediment/turbidity) from agricultural, forestry, turf-cutting, and domestic and urban waste-water sources. There is on-going substantial investment by Irish Water in urban waste-water treatment and collection systems. Significant progress has also been made with domestic waste-water treatment systems through the inspection regime (under the Domestic Waste-Water Treatment Regulations) and associated grant scheme. Option (a) "*Measures identified, but none yet taken*" was chosen, however, as the majority of the most important measures identified, particularly in relation to agriculture and forestry, have not yet been implemented. No targeted conservation measures are currently being undertaken to restore or enhance areas of 3260 habitat within SACs. As option (a) was used, fields 8.2 to 8.5 were not filled. The Programmes of Measures under the WFD River Basin Management Plan will help to improve water quality generally; however the WFD's default option of "Good ecological status" may account for site-specific variations and, therefore, may not be sufficient to return the habitat (3260) to Favourable conservation status. While further work is needed to identify effective, practical and iterative solutions and to establish interim targets, sub-types of this habitat require oligotrophic or WFD high status in Ireland (NPWS, 2013; O Connor, 2013, 2015). It also requires particular hydrological and morphological conditions (NPWS, 2011, 2012, 2014, 2015, 2016, 2017, 2018). Given the resources invested in the Local Authority Water Programme and the Agricultural Sustainability Support and Advisory Programme, particularly the catchment managers and scientists and agricultural advisors, the WFD should assist in maintaining and improving the conservation condition of Annex I freshwater habitats and Annex II species in SACs. To ensure the correct measures are implemented, consideration must be given to the site-specific conservation objectives and ecological requirements of the habitat/species, as well as specific information on conservation condition and impacting pressures. Changes in the state of aquatic ecosystems, such as nutrient enrichment or hydrological changes, have multiple drivers and sources, especially when, as for Article 17, summarised at regional or national scale. Therefore, a large number of the new standard list of conservation measures are applicable and some measures may have more than one function (e.g. changes to grazing regime to prevent pollution, restore hydrological function, enhance biodiversity, etc.). Based on the assessment of the pressures impacting on habitat 3260, measures are required to address pollution from agriculture (CA10, CA11, CA09, CA15, CA12, CA01, CA03, CA05, CA06, CA08), hydromorphological damage (CJ02, CJ03, CC04, CF10, CA15, CC07, CB14, CE06, CF02), urban waste-water (CF04), forestry (CB10, CB14, CB09, CB11, CB04, CB01), on-site systems (unsewered) (CF05), urban run-off and industry (CF04, CF05), peat extraction (CC08, CC09, CC01, CC02), and abstraction pressures (CF11, CC13).

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	*Good /* ***Poor*** */ Bad / Unknown*
9.2 Additional information *Optional*	The Future prospects of the Range, Area and Structure and functions of habitat 3260 were assessed by reference to pressures and threats and conservation measures, as well as each parameter's 'future trends' and current status: **Pressures and threats:** Five pressures of high importance and five of medium importance were recorded and all were listed as threats, owing to their likely continuation. These pressures and threats result in changes in hydromorphology and water quality and, therefore, have negative influence on the status of the habitat's Structure and functions. **Conservation measures**: No habitat-specific, concrete conservation measures are currently being undertaken to maintain, restore or enhance areas of 3260 habitat, either within SACs or the wider countryside. It will take time to identify conservation measures based on the ecological requirements of the habitat, combined with the site-specific conservation objectives, conditions and significant pressures and threats; and there is likely to be a significant time-lag before conservation measures, once implemented, take effect (e.g. measures to reverse hydrological damage to peat and other organic soils). Therefore, conservation measures cannot halt or reverse the negative influence of the threats in the next 12 years. **Range**: The short-term trend of the Range was assessed as Stable. The current range is equal to the Favourable Reference Range and considered to include 'all significant Irish ecological variations of the habitat' and be sufficiently large to allow the long-term viability of the habitat. Therefore, the Conservation Status of the Range is Favourable. The future trend of the Range is, therefore, likely to remain stable and the Future prospects of the Range have been assessed as Good. **Area**: The short-term trend of the Area was assessed as Stable. The estimated surface area of the habitat is equal to the Favourable Reference Area and is considered sufficient to ensure the long-term viability of the habitat type. Therefore, the Conservation Status of the Area is Favourable. The future trend of the Area is, therefore, likely to remain stable and the Future prospects of the Area have been assessed as Good. **Structure and functions**: The short-term trend in Structure and functions was assessed as decreasing, based on the on-going decline in High Status rivers sites. Although the estimated area in 'not-good' condition/Unfavourable was 31%, Structure and functions were assessed as Inadequate overall, because confidence in the assessment is low. While measures under the WFD RBMP should help improve water quality generally, addressing the loss of High	

	Status sites will be a significant challenge and will involve a time-lag. Therefore, the predicted future trend has been assessed as negative. The Future prospects of the Structure and functions were, therefore, assessed as Poor. As the Future prospects of the Structure and functions were assessed as Poor, the Future prospects for habitat 3260 were assessed as Unfavourable-Inadequate overall.

10 Conclusions

Assessment of conservation status at end of reporting period

10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving /* ***deteriorating*** */ stable / unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/****NO***	*YES/****NO***
	b) yes, due to genuine change	*YES/NO*	*YES/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	*YES/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/NO*

	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	**Range**: As the Range is based on the distribution of rivers, it covers most of the terrestrial grid and all counties. Therefore, the current range includes all Irish ecological variations of the habitat, is sufficiently large to allow the long-term viability of the habitat and is equal to the Favourable Reference Range. The short-term trend of the Range was assessed as stable. Therefore, the Conservation Status of the Range was assessed as Favourable. **Area**: The estimated surface area of the habitat is equal to the Favourable Reference Area and includes all Irish ecological variations and is sufficient to ensure the long-term viability of the habitat type. There is no evidence of a decline in Area since the Directive came into force (stable short-term trend). As a result, Area was assessed as Favourable. **Structure and functions**: Biological and physico-chemical data were available from the WFD for over 2,300 river sites. 56% of water bodies were at High or Good Ecological Status in 2015-2017. 69% of river channel length monitored 2010-2015 was at High or Good Ecological Status, therefore 31% was in 'not-good' status. Although the estimated area in 'not-good' condition/Unfavourable of 31% is greater than 25%, Structure and functions were assessed as Inadequate overall, because confidence in the assessment is low given the poor knowledge of the distribution, ecology, conservation-value and water quality requirements of habitat 3260, including the applicability of WFD tools to assessing its conservation condition. The short-term trend in Structure and functions was assessed as decreasing, based on the on-going decline in High Status rivers sites. 31.6% of sites in the 1987-1990 period were at High Status, 17.6% in 2013-2015 and 17.0% in 2014-2017. Confidence is low in both the condition and trend assessments as general water quality indicators have been used in the absence of habitat-specific indicators and data. **Future prospects**: The Future prospects of Range and Area were assessed as Good. The Future prospects of Structure and functions were assessed as Poor. Therefore, Future prospects were assessed as Unfavourable-Inadequate overall. As Structure and functions and Future prospects were assessed as Unfavourable-Inadequate, the Overall Conservation Status of 3260 was assessed as Unfavourable-Inadequate. As for the 2007-2012 cycle, the overall trend was assessed as deteriorating, based on the identified pressures and lack of conservation measures, leading to a predicted negative future trend in Structure and functions. Further study is needed to fully describe the high conservation value sub-types (ecological variants) of habitat 3260, their typical species, ecological requirements and responses to anthropogenic pressures,		

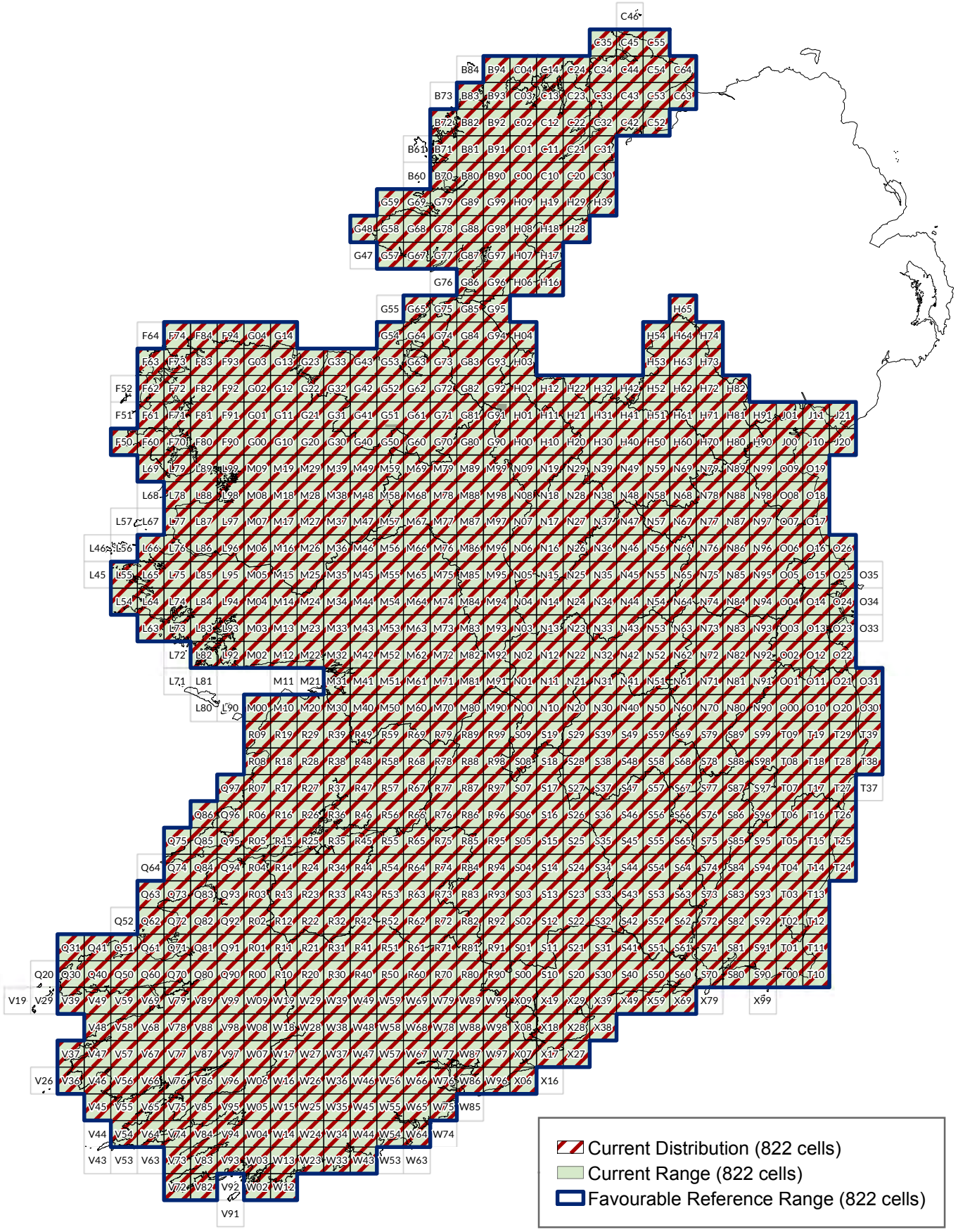
	in order to improve knowledge of the habitat's structure and functions. As well as developing specific conservation condition assessment methods for habitat 3260, the applicability of the WFD elements/metrics used above needs to be tested. Assessing Structure and functions and Overall trends will continue to be a challenge. Even where dedicated and standardised monitoring and assessment methodologies are in use, data will be too temporally infrequent to estimate or quantify the trend magnitude or identify when changes in trend occur. There has been no genuine change or improved knowledge; in fact, 31% of channel length was reported as polluted in both water quality monitoring cycles (2007-2009 and 2010-2015).

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***17 km²***
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* *stable / increasing /* ***decreasing*** */ uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.6 Additional information *Optional*	The surface area of habitat 3260 inside the network was based on the distribution of rivers. The area calculated for the 2007-2012 cycle of 17 km² within the 21 SACs designated for the protection of habitat was reported as the best single value. The trend of the habitat area in good condition within the network was based on the decline in high status sites, from 31.6% of sites in the 1987-1990 period, to 17.6% in 2013-2015 and 17.0% in 2014-2017 (Fanning *et al*., 2017; Tierney and O'Boyle, 2018; Trodd and O'Boyle, 2018). While there was a minor improvement in the number of the most pristine sites (Q5) from 23 in 2013-2015 to 30 in 2015-	

	2017, the long-term trend is of significant decline, from 13.4% of sites in 1987-1990 period to just 1.1% in 2015–2017 (Trodd and O'Boyle, 2018).

12 Complementary information

Floating River Vegetation (3260)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**3270 Rivers with muddy banks with *Chenopodion rubri* p.p. and *Bidention* p.p. vegetation**
1.2i Habitat short name	**Chenopodion rubri**
1.3i Habitat description	In Ireland, Chenopodion rubri habitat occurs in riverine turloughs where it is associated with late recession of flood water and summer flooding. However, the largest known site for Chenopodion vegetation in Ireland is Carrigadrohid Reservoir at the Gearagh, Co. Cork. The habitat is found on damp mineral soils, often fine, alluvial muds, but also stony substratum. Typical species are small, short-lived, fast-growing annuals. These are poor competitors that occupy the habitat because it is exposed for too little time and too late in the growing season to allow perennial species complete their life cycles. The on-going development of this habitat depends on a continuous supply of fine sediment. Most sites receive sediment from external sources via streams or large underground conduits. Wave action can lead to erosion, re-suspension and subsequent deposition of sediment within a basin.

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	Conaghan & Fuller (2018) surveyed 19 sites, including all known sites for the habitat. They confirmed the occurrence of the habitat at 15 sites. Three sites that could not be surveyed in 2018 were retained within the distribution, based on previous survey data (see Goodwillie, 2007; NPWS 2013). The locations for these 18 sites were intersected with the 10km grid. A small area of poorly developed Chenopodion vegetation was found in Kilcolman bog in Cork. Characteristic species were absent or had low cover, therefore this site was not included in the distribution.

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned	
3 Biogeographical and marine regions	
3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Conaghan, J. and Fuller, J. (2018) A survey of the vegetation of the Habitats Directive Annex I habitat Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation (3270), in Ireland (2018). Unpublished Report to the National Parks and Wildlife Service, DCHG, Dublin. Delaney, A. (2018) Botanical survey of the Gearagh, County Cork. September 2018. Unpublished report to ESB Generation and Wholesale Markets (GWM). Goodwillie, R.N. (2007) Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation (3270): Conservation Status Assessment Report. In: The Status of EU protected Habitats and Species in Ireland, Volume 2. Unpublished Report to the National Parks and Wildlife Service. Pp 1330-1342. http://www.npws.ie/publications/euconservationstatus/ NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Overview. Volume 1. Unpublished Report, National Parks and Wildlife Services, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. pp. 419-427. NPWS (2016a) Conservation Objectives: The Gearagh SAC 000108. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. NPWS (2016b) The Gearagh SAC (site code: 108) Conservation Objectives supporting document – 3260 and 3270. V1. Conservation Objectives Supporting Document Series. National Parks and Wildlife Service, Dublin. O Connor, Á. (2017) Conservation objectives supporting document: Turloughs* and Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation. Conservation Objectives Supporting Document Series. National Parks and Wildlife Service, Dublin. Wyse Jackson, M., FitzPatrick, Ú., Cole, E., Jebb, M., McFerran, D., Sheehy Skeffington, M. and Wright, M. (2016) Ireland Red List No. 10: Vascular Plants. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin, Ireland.
3.2i Additional information	Conaghan, J., Roden, C. and Fuller, J. (2006) A Survey of Rare and Scarce Vascular Plants in County Galway. Vols 1-3. Unpublished report to National Parks and Wildlife Service, Dublin. FitzGerald, Lady R. (1984) The Gearagh – a rare habitat in County

Cork. *BSBI News* 36 (April 1984): 8-9.

Goodwillie, R.N. (1992) Turloughs over 10ha: Vegetation survey and evaluation. Unpublished report to the National Parks and Wildlife Service.

Goodwillie, R. (1995) Additions to the Irish range of *Rorippa islandica* (Oeder ex Murray) Borbas. *Irish Naturalists' Journal* 25(2): 57–59.

Goodwillie, R. (1999) *Alopecurus aequalis* Sobol., new to Clare (H9) and S.E. Galway (H15). *Irish Naturalists' Journal* 26(7/8): 286–287.

Goodwillie, R.N. (2003) Vegetation of Turloughs. In: M.L. Otte (ed.) *Wetlands of Ireland: Distribution, Ecology, Uses and Economic Value.* University College Dublin Press. Pp 135-144.

Goodwillie, R., Heery, S. and Keane, S. (1997) Wetland vegetation on the Gort lowlands. In: An Investigation of the Flooding Problems in the Gort–Ardrahan Area of South Galway. Ecology Baseline Study Vol. I (Southern Water Global and Jennings O'Donovan and Partners eds.). The Office of Public Works, Dublin. pp. 1–131.

Louman, E. (1984) The vegetation of the Coole turlough area (Western Ireland). Interne Rapporten Hugo de Vries Laboratorium Nr 184. University of Amsterdam.

McGough, H.N. (1983) Field trip to the Gearagh, Macroom, Co. Cork 19-21 August, 1983. *Bulletin Irish Biogeographical Society* 7: 55-57.

NPWS (2016c) Conservation Objectives: Lough Lurgeen Bog/Glenamaddy Turlough SAC 000301. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2016d) Lough Lurgeen Bog/Glenamaddy Turlough SAC (site code: 301) Conservation Objectives supporting doc- turloughs and rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation. V1. Conservation Objectives Supporting Document Series. National Parks and Wildlife Service, Dublin.

NPWS (2017) Conservation Objectives: Lough Gash Turlough SAC 000051. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2018) Conservation Objectives: Caherglassaun Turlough SAC 000238. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

NPWS (2018) Conservation Objectives: Lough Funshinagh SAC 000611. Version 1. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.

O'Mahony, T. (1986) Some recent additions to the Cork flora. *Irish Naturalists' Journal* 22 (1): 40-43.

O'Mahony, T. (2002) A report on the flora of Cork (v.cc. H3-H5), 2001. *Irish Botanical News* 12: 27-35.

Roden, C., Conaghan, J., Fuller, J. and Reynolds, S. (2006) A Survey of Rare/Threatened and Scarce Vascular Plants in County Clare.

	Unpublished report to National Parks and Wildlife Service, Dublin. Waldren, S. (2015) (ed.) Turlough hydrology, ecology and conservation. Unpublished report, National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. White, J. (1985) *Limosella aquatica* L. and the vegetation of exposed mud at the Gearagh, Co. Cork (H3). *The Irish Naturalists' Journal*. 21 (12): 509-515.

4 Range

Range within the biogeographical/marine region concerned

4.1 Surface area	***1,600 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference	***a) 1,600 km²***	

range	*b) Indicate if operators were used (using symbols ≈, >, >>) or*	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable reference range has been set as the current range as there is no evidence of decline since the Directive came into force. There is also no reason to assume that the area is not large enough to allow the long term survival of the habitat.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods? YES/**NO*** *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/NO*
	b) yes, due to improved knowledge/more accurate data	*YES/NO*
	c) yes, due to the use of different method	*YES/NO*
	d) yes, but there is no information on the nature of change	*YES/NO*
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data / the use of a different method*	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of this habitat. A maximum gap distance of two 10km grid cells was used when running the range tool. Short-term trend was estimated based on comparing data collated for the 2007 Article 17 assessment.	

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2018***	
5.2 Surface area *(in km²)*	**a) Minimum**	***1.18***
	b) Maximum	***1.45***
	c) Best single value	
5.3 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km^2 or*	
	b) Operator ≈ (approximately equal to) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods? YES/**NO*** *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/NO*
	b) yes, due to improved knowledge/more accurate data	*YES/NO*
	c) yes, due to the use of different method	*YES/NO*

	d) yes, but there is no information on the nature of change	*YES/NO*
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data / the use of a different method*	
5.15 Additional information *Optional*	The Favourable Reference Area of 1.24 km^2 reported in 2013 has been retained as it falls within the reported range (min-max: 1.18-1.45) for area. This area is considered to be sufficient for the long-term survival of the habitat. All known sites were surveyed by Conaghan and Fuller (2018). Extent of habitat was estimated in the field. This is a difficult habitat to quantify accurately due to its seasonality and variable water levels. Trends in habitat area are based on comparison of the Conaghan and Fuller (2018) estimate with earlier estimates reported in Goodwillie (2007) and elsewhere. As the area of habitat 3270 is expected to vary significantly, inter-annually, with flooding regime, in the absence of strong evidence to the contrary the area was assumed to be stable.	

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***1.13 km²***
		Maximum	***1.39 km²***
	b) Area in not-good condition	**Minimum**	***0.05 km²***
		Maximum	***0.06 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*		

6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? **YES**/NO*
6.7 Typical species Method used *Optional*	The typical species reported in NPWS (2013) were revised by O Connor (2017) for the purposes of setting site-specific conservation objectives. This review reduced the typical species list to those that are indicative of good condition in Chenopodion vegetation (positive indicator species) and/or are known to be restricted to or have most occurrences in the habitat (characteristic species). The list was again updated based on the findings and recommendations of Conaghan and Fuller (2018), when *Chenopodium rubrum* (*Oxybasis rubra*) and *Gnaphalium uliginosum* were reinstated on the list. The occurrence of typical species is used to determine the condition of the habitat (see O Connor, 2017; Conaghan and Fuller, 2018). The full list of typical species is given in 6.8.
6.8 Additional information *Optional*	The full list of typical species for Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation (3270) for 2013-2018 is as follows: *Callitriche palustris* ^{VU} *Chenopodium rubrum (Oxybasis rubra)* *Gnaphalium uliginosum* *Limosella aquatica* *Persicaria minor* *Rorippa islandica* *Alopecurus aequalis* ^{NT} *Eleocharis acicularis* *Riccia cavernosa* Regional Red List status (Wyse Jackson *et al*., 2016) is given, where relevant, as a superscript. Other species associated with habitat 3270 include *Atriplex prostrata, Rorippa palustris, Persicaria hydropiper, Juncus bufonius* and *Bidens tripartita*. Notes from individual site reports compiled by Conaghan and Fuller (2018) were examined to estimate the area in poor condition. Soil damage (poaching) and the occurrence of 'weedy' species were the only notable pressures, and were associated with heavy livestock grazing and trampling. Four sites were assessed as being in poor condition as a result of damage by livestock (see Lynn and O Connor, Appendix II in Conaghan and Fuller, 2018). The remaining 14 sites were assessed as in good condition. The estimated areas of these 14 sites summed to 1.13-1.39 km^2, or

	approximately 96% of the total minimum and maximum estimated areas. This figure was heavily influenced by three large sites (the Gearagh, Coole Lough, and Lough Funshinagh, which are excellent examples of this habitat. There is no evidence of any major changes in condition since the last reporting period although this was largely based on expert opinion. The non-native plant species, *Cyperus eragrostis*, was widespread at the Gearagh; however, there was no clear evidence of negative impacts on the habitat. The species is known from the Gearagh since at least 2001 and will be monitored for invasive behaviour and impacts on the Chenopodion vegetation.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A09** Intensive grazing or overgrazing by livestock (M)	**A09** Intensive grazing or overgrazing by livestock (M) **I02** Other invasive alien species (other than species of Union concern) (M)

7.2 Sources of information *Optional*	Conaghan, J. and Fuller, J. (2018) A survey of the vegetation of the Habitats Directive Annex I habitat Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation (3270), in Ireland (2018). Unpublished report to the National Parks and Wildlife Service, DCHG, Dublin.
7.3 Additional information *Optional*	Conaghan and Fuller (2018) recorded notable pressures during their site visits. A09 Intensive grazing or overgrazing by livestock resulting in poaching (i.e. damage to integrity of the soil) was reported at 4 of the 18 sites and was severe in 2 of these sites. I02 Other invasive alien species (other than species of Union concern), the non-native *Cyperus eragrostis*, was noted in 3 sites, but there was no clear evidence of negative impacts on the habitat. It is therefore assigned a low importance as a pressure, but has been listed as a threat of medium importance on a precautionary basis. *Cyperus eragrostis* will be monitored at the Gearagh. All of the pressures reported in 2013 were of low importance based largely on expert judgement.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* ***a) Measures identified, but none yet taken** or* *b) Measures identified and taken or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	None taken
8.6 Additional information *Optional*	Livestock, as well as vehicles and people, are excluded from most of the area of the Carrigadrohid Reservoir at the Gearagh. This management contributes significantly to the good condition of the habitat's Structure and functions. The ESB commissioned a 2018 survey of the Chenopodion vegetation at the Gearagh (Delaney, 2018) and is incorporating its findings, and the site-specific conservation objectives for the habitat (NPWS, 2016a,b), into its management of the site. Measures may be required to reduce livestock pressures on other sites for Chenopodion vegetation. These could include reduction of grazing intensity or alteration of the timing of grazing. The development of conservation plans and measures for this marginal and ephemeral habitat must consider its associated habitats, particularly turloughs, and the wider context of each site.

	There may be a need to control the non-native species *Cyperus eragrostis* at the Gearagh if it expands and negatively impacts on the habitat.

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	***Good*** */ Poor / Bad / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as stable. Current range is equal to Favourable Reference Range. Future trend of Range is assessed as stable, as no change in range is expected. Future prospects of Range are therefore good. Short-term trend direction of Area is assessed as stable. Current area is equal to the Favourable Reference Area. Future trend of Area is assessed as stable, as no change in area is expected. Future prospects of Area are therefore good. Current Structure and functions are assessed as Favourable as >90% of habitat is in "Good" condition. There are some minor issues relating to animal stocking and non-native species. Short-term trend direction is stable (for habitat that is in good condition). Future prospects of Structure and functions are therefore good.	

10 Conclusions

Assessment of conservation status at end of reporting period	
10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.3 Specific structure and functions (incl. typical species)	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*

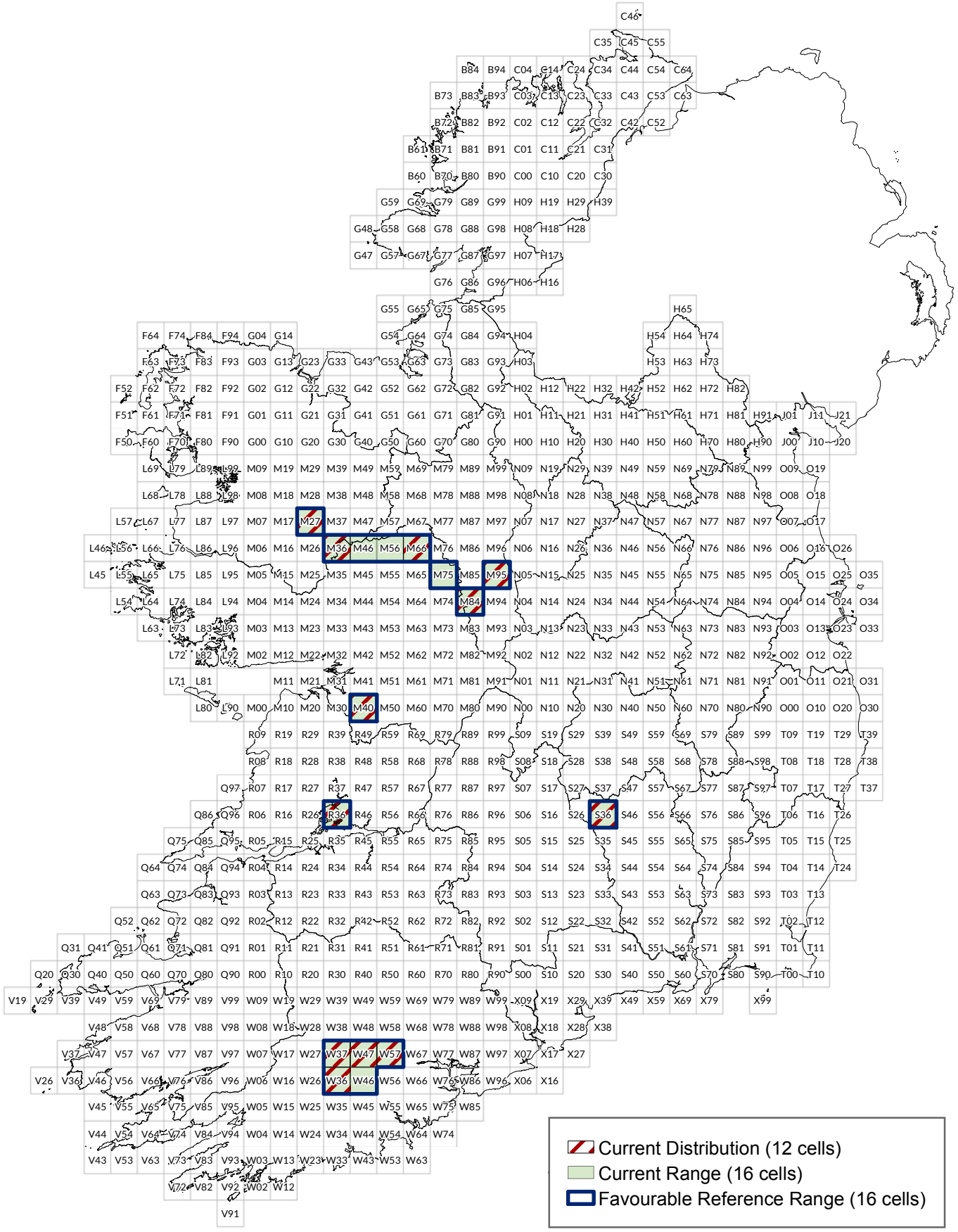
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/**NO***	*YES/**NO***
	b) yes, due to genuine change	*YES/NO*	*YES/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	*YES/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	All attributes are assessed as Favourable and there has been no notable change since the last reporting period.		

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	***1.08 km²***
	b) Maximum	***1.32 km²***
	c) Best single value	
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	

11.3 Surface area of the habitat type inside the network **Method used**	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
11.4 Short-term trend of habitat area in good condition within the network **Direction**	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable** / increasing / decreasing / uncertain/ unknown*
11.5 Short-term trend of habitat area in good condition within network **Method used**	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
11.6 Additional information *Optional*	All SACs that harbour this habitat were surveyed by Conaghan and Fuller (2018). The trend of area in good condition within the network is considered to be the same as the national trend.

12 Complementary information

Chenopodion rubri (3270)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Habitat code / name	**4010 Northern Atlantic wet heaths with *Erica tetralix***
1.2i Habitat short name	**Wet heath**
1.3i Habitat description	Habitat 4010 Wet heath is a highly variable peatland habitat that is intermediate in many regards between dry heath and blanket bog, generally occurring on gently sloping, poorly draining ground on shallow or intermediate peat depths (typically < 50 cm deep). It is characterised by a mixture of *Molinia caerulea, Erica tetralix, Trichophorum germanicum* or *Calluna vulgaris*, and locally *Myrica gale,* although not all of these species must be present for the habitat to qualify as wet heath. Dwarf shrubs may be scarce or absent in degraded examples of wet heath characterised by dominance of *Trichophorum germanicum* or *Molinia caerulea*. Ground cover is variable but *Sphagnum* mosses such as *S. capillifolium*, *S. papillosum, S. compactum, S. tenellum*, *S. subnitens* and pleurocarpous mosses such as *Pleurozium schreberi* and *Hylocomium splendens*, along with lichens of the *Cladonia* genus, would be characteristic. Wet heath may support communities with affinities to the *Ericion tetralicis*, *Oxycocco-Ericion tetralicis*, *Daboecion cantabricae* and *Calluno-Genistion pilosae* associations (Perrin, 2017). According to the Irish Vegetation Classification (Perrin, 2017) most examples of the *Molinia caerulea-Calluna vulgaris-Erica cinerea* heath community (HE2D) and *Molinia caerulea-Calluna vulgaris-Erica tetralix* heath community (HE4E) occur in habitat 4010, and elements of other communities within the *Erica cinerea-Calluna vulgaris* (HE2), *Vaccinium myrtillus-Racomitrium lanuginosum* (HE3), *Molinia caerulea-Polygala serpyllifolia* (HE4) heath groups and *Erica tetralix-Sphagnum capillifolium* (BG2) bog group can also occur.

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***1949-2017***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted

2.5i	The distribution map was derived from a polygon shapefile and a point shapefile. These shapefiles were created by compiling relevant data which referred to habitat 4010 or Fossitt code HH3 (Fossitt 2000) or a relevant NPWS habitat code in their attributes. Sources include Barron & Daly (2015a, 2015b), BEC Consultants (2013), Coillte Biodiversity Dataset (various dates), Daly & Barron (2014, 2015), Daly (2016), Foss *et al.* (2014, 2015), Galway County Council (2017), Hodd (2015a), Hodd & Barron (2015), Martin *et al.* (2018), Moran & Wilson-Parr (2015), O'Neill & Martin (2018), O'Neill *et al.* (2013a), Perrin (2017) which comprises data ranging from 1949 to 2013, Perrin *et al.* (2014a, 2014b), Tubridy *et al.* (2015), Wilson & Duff (2014) and O'Neill *et al.* (in prep.). In addition to these, sources utilised for the distribution map from the last reporting period (NPWS 2013a) were also included: 13 National Survey of Upland Habitats (NSUH) sites (Perrin *et al.*, 2011, 2012, 2013a-e; Roche *et al.*, 2009, 2010a, 2010b, 2011a, 2011b, 2012a), Anon (1998, 2005, 2006, 2010), Barron & Perrin (2010, 2011), Ballycroy, Burren and Connemara National Park Habitat Maps, Cooper *et al.* (2012), Crushell & Foss (2008), Crushell & O'Callaghan (2008), Crushell *et al.* (2012), Foss & Crushell (2012), Foss *et al.* (2012), Hickey & Tubridy (2009), Murphy & Fernández (2009), NPWS (2013b), NPWS Habitat Assignment Project, O'Donoghue *et al.* (2008, 2011), O'Neill *et al.* (2013b) and Wilson & Foss (2011). GIS files from the Ahascragh road AA (Galway County Council), the Carlow Pilot Habitat Mapping Project (Carlow County Council), the Cavan Wetland Survey (Cavan County Council), Dún Laoghaire-Rathdown habitat survey (Dún Laoghaire-Rathdown County Council), the Mayo Local Area Surveys (Mayo County Council), South Clare Habitat Map Cratloe to Parteen (Clare County Council) and Uplands and Peatlands Grazing Survey (NPWS) were also utilised for the distribution map from the last reporting period (NPWS 2013a). All references are detailed below in section 3.2. A certainty rating system was applied to all data that informed the distribution map. This system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1 the lowest. Of the new data sources added since the last round of reporting (NPWS 2013a), the following were all judged to be a high certainty of 3: Barron & Daly (2015a, 2015b), BEC Consultants (2013), Daly & Barron (2014, 2015), Daly (2016), Foss *et al*. (2014, 2015), Galway County Council (2017), Hodd (2015a), Hodd & Barron (2015), Martin *et al*. (2018), O'Neill & Martin (2018), O'Neill *et al*. (2013a), Perrin *et al*. (2014a, 2014b), Wilson & Duff (2014) and O'Neill *et al*. (in prep.). Tubridy *et al.* (2015) 4010 polygons were assigned a certainty of 3 for those which were ground-truthed and a certainty of 2 for those carried out only by aerial photograph interpretation (API). Some polygons were assigned to the vegetation community "TcEangBGca" which has been taken to be a transitional community between wet heath and blanket bog for the purposes of this assessment. These polygons were assigned a certainty of 2 if no other 4010 vegetation community was recorded within these polygons. The Coillte Biodiversity Dataset polygons were assigned a certainty of 1 for those which were not ground-truthed, and a certainty of 2 for those which were. Certainty 3s were not assigned to the Coillte Biodiversity Dataset due to the age of the data

	(surveyed in early 2000s). Data from Perrin (2017) have no habitat data included, only affinities to Annex I habitats. Those with a higher affinity to habitat 4010 over other Annex I habitats were assigned a certainty of 2. Those with a higher affinity to another Annex I habitat over habitat 4010 were assigned a certainty of 1. All sites within Moran & Wilson-Parr (2015) were within SPAs, with all site synopses for these SPAs citing the presence of both wet and dry heath. The type of heath (wet or dry) was not determined within the GIS shapefiles, however, and the majority of work was carried out by API only, therefore data were assigned a certainty of 1. Certainty values from the datasets utilised during the last reporting period were not reassigned for the purposes of the distribution map as the classes within the certainty rating system are fairly broad, and the 4010 habitat itself is relatively stable. All polygons and points with certainty 1 to 3 were used to map the distribution for the 4010 habitat.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Ahascragh road AA. GIS files for this project were made available by Galway County Council. Anon. (1998) Manual for the preparation of Commonage Framework Plans. National Parks and Wildlife Service and Department of Forestry and Food. Ireland. Anon. (2005) Galway City Habitat Inventory. Unpublished report by Natura Environmental Consultants for Galway City Council. Anon. (2006) County Waterford survey of 21 wetlands. Unpublished report by Natura Environmental Consultants for Waterford County Council. Anon. (2010) Pilot ecological study of two Donegal Islands: Inishfree Upper and Inishmeane. Unpublished report for Donegal County Council by Aulino Wann & Associates and Gaia Associates. Ballycroy National Park Habitat Map is an NPWS project which compiled habitat data from available information. Datasets used were from 1991-2009. Barron, S.J. & Daly, O.H. (2015a) Surveys of possible Marsh Fritillary sites and habitat in Cos. Clare (outside the Burren) and Kerry, Final report. Unpublished Report to National Parks and Wildlife Service, Dublin, Ireland. Barron S.J. & Daly O.H. (2015b) Phase 1 of the scientific work to inform a system for the management of turf-cutting in designated blanket bog SACs and NHAs: Phase 1 Over-arching report – DRAFT. Unpublished draft report to National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin

Barron, S. & Perrin, P. (2010) Review and amendment of GIS mapping for blanket bog NHAs. Unpublished report to National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin.

Barron, S. & Perrin, P. (2011) Production of a habitat map for Killarney National Park, Co. Kerry. Unpublished report to National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin.

BEC Consultants (2013) rEIS for Quarry at Knockaunnagat, Dunmore, Co. Galway. Unpublished report for Global Green Consultancy.

Burren National Park Habitat Map is an NPWS habitat mapping project. Habitat information is based on a broad habitat map of the wider Burren area, which was prepared in 2006, together with other maps of varying ages.

Carlow Pilot Habitat Mapping Project. GIS files for this Carlow County Council habitat survey were available.

Cavan Wetland Survey. GIS files for this Cavan County Council habitat survey were available.

COFORD (2016) Land Availability for Afforestation – Exploring opportunities for expanding Ireland's forest resource. COFORD, Dublin. http://www.coford.ie/media/coford/content/publications/coforarticles/LandAvailabAfforestation130116.pdf

Coillte Biodiversity Dataset. GIS files and individual site management plans were made available by Coillte. Datasets used were from 2001 to 2005.

Coll, J., Bourke, D., Gormally, M., Sheehy Skeffington, M. & Sweeney, J. (2012) Winners and Losers: Climate change impacts on biodiversity in Ireland. Report Series No. 19. Environmental Protection Agency, Johnstown Castle, Ireland. https://www.epa.ie/pubs/reports/research/climate/CCRP_19.pdf

Coll, J., Bourke, D.O., Hodd, R.L., Sheehy Skeffington, M., Gormally, M. & Sweeney, J. (2016) Projected climate change impacts on upland heaths in Ireland. *Climate Research* 69(2): 177-191. http://researchonline.ljmu.ac.uk/4208/

Connemara National Park Habitat Map is an NPWS map based on aerial photographic interpretation and field visits conducted by G. Kaule from the University of Stuttgart in 2008.

Cooper, F., Stone, R.E., McEvoy, P., Wilkins, T. & Reid, N. (2012) The conservation status of juniper formations in Ireland. *Irish Wildlife Manuals*, No. 63. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/IWM63.pdf

Crushell, P. & Foss, P.J. (2008) The County Clare Wetlands Survey Desk Survey & GIS Preparation. Report prepared for Clare County Council, Ireland.

Crushell, P. & O'Callaghan, R.J. (2008) A survey of Red Grouse (*Lagopus lagopus*) habitat in Ireland 2007-2008: an assessment of habitat condition and land-use impacts. Unpublished report to

	Birdwatch Ireland and the National Parks and Wildlife Service. Crushell, P., Foss, P.J., O'Loughlin, B. & Wilson, F. (2012) County Kildare Wetland Survey. Part 2: Site Reports. Report prepared for Kildare County Council and The Heritage Council. Daly, O.H. & Barron, S. (2014) Surveys of possible Marsh Fritillary sites and habitat in Cos Louth, Meath & Monaghan, Final report. Unpublished Report to National Parks and Wildlife Service, Dublin, Ireland. Daly, O.H. & Barron, S. (2015) Surveys of possible Marsh Fritillary sites and habitat in Cos. Galway and Mayo, Final report. Unpublished Report to National Parks and Wildlife Service, Dublin, Ireland. Daly, O.H. (2016) Surveys of possible Marsh Fritillary sites and habitat in the mid-west (Roscommon and Longford), Draft report. Unpublished Report to National Parks and Wildlife Service, Dublin, Ireland. Dún Laoghaire-Rathdown habitat survey 2011. GIS files for this Dún Laoghaire-Rathdown County Council habitat survey were made available. European Commission (eip-agri): 'A sustainable agricultural plan for the MacGillycuddy Reeks – Conservation and restoration of upland habitat in the MacGillycuddy Reeks'. https://ec.europa.eu/eip/agriculture/en/find-connect/projects/sustainable-agricultural-plan-macgillycuddy-reeks European Commission (eip-agri): 'Blackstairs farming futures (BFF) Sustainable farming project in the Blackstairs Mountains'. https://ec.europa.eu/eip/agriculture/en/find-connect/projects/blackstairs-farming-futures-bff-sustainable European Commission (eip-agri): 'Sustainable Uplands Agri-environment Scheme (SUAS)'. https://ec.europa.eu/eip/agriculture/en/find-connect/projects/sustainable-uplands-agri-environment-scheme-suas Forest Service, Department of Agriculture, Food and the Marine (2015) Forestry Programme 2014-2020: IRELAND. Submitted in accordance with European Union Guidelines on State aid for agriculture and forestry and in rural areas 2014 to 2020. https://www.agriculture.gov.ie/media/migration/forestry/forestryprogramme2014-2020/IRELANDForestryProgramme20142020230215.pdf Foss, P.J. & Crushell, P. (2012) Wetland Survey County Monaghan II. Report prepared for Monaghan County Council and The Heritage Council. Foss, P.J., Crushell, P., O'Loughlin, B. & Wilson, F. (2012) Louth Wetland Survey II. Part 1: Main Report. Report prepared for Louth County Council and The Heritage Council. Foss, P.J., Crushell, P., Kirwan, B., O'Loughlin, B. & Wilson, F. (2014) Louth Wetland Survey III. Part 1: Main Report. Report prepared for Louth County Council and The Heritage Council. Foss, P.J., Crushell, P. & Kirwan, B. (2015) County Waterford Wetland Survey. Part 1: Main Report. Report prepared for Waterford City & County Council.

Fossitt, J.A. (2000) *A guide to habitats in Ireland*. The Heritage Council, Kilkenny. https://www.npws.ie/sites/default/files/publications/pdf/A%20Guide%20to%20Habitats%20in%20Ireland%20-%20Fossitt.pdf

Galway County Council (2017) Unpublished data collected for the Galway City Transport Project.

Glaves, D.J., Morecroft, M., Fitzgibbon, C., Lepitt, P., Owen, M. & Phillips, S. (2013) Natural England Review of Upland Evidence 2012 – The effects of managed burning on upland peatland biodiversity, carbon and water. Natural England Evidence Review, Number 004.

Habitat Assignment Project. An NPWS spreadsheet noting the qualifying interest of SACs and other habitats which occur in SACs, NHAs and pNHAs. This table was used as a reference for incorporating polygon data for SACs, NHAs and pNHAs.

Hampton, M. (2008) Management of Natura 2000 habitats. 4010 Northern Atlantic wet heaths with *Erica tetralix*. European Commission. http://ec.europa.eu/environment/nature/natura2000/management/habitats/pdf/4010_Atlantic_wet_heaths.pdf

Hickey, B. & Tubridy, M. (2009) Habitats Survey (Phase V) County Laois. Unpublished report by Mary Tubridy and Associates for Laois Heritage Forum.

Hodd, R.L. (2015a) Survey of Flora Protection Order Bryophytes in Cork and Kerry (H1-H5). Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.

Hodd, R.L. (2015b) Survey of Flora Protection Order Bryophytes 2015. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.

Hodd, R.L. (2016) Survey of Flora Protection Order Bryophytes 2016. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.

Hodd, R. & Barron, S. (2015) An assessment of damaged habitat on Sliabh Beagh, Cos Monaghan, Tyrone and Fermanagh, using aerial imagery. Unpublished report for Blackwater Regional Partnership.

JNCC (2009) *Common Standards Monitoring Guidance for Upland Habitats.* Joint Nature Conservation Committee, Peterborough.

Joint Research Centre (2014) Forest Fires in Europe, Middle East and North Africa 2013. Joint report of JRC and Directorate-General Environment. http://effis.jrc.ec.europa.eu/media/cms_page_media/40/FireReport2013_final2pdf_2.pdf

Joint Research Centre (2015) Forest Fires in Europe, Middle East and North Africa 2014. Joint report of JRC and Directorate-General Environment. http://effis.jrc.ec.europa.eu/media/cms_page_media/40/Forest_fires_in_Europe_Middle_east_and_North_Africa_2014_final_pdf_YNHDYbP.pdf

Joint Research Centre (2016) Forest Fires in Europe, Middle East and North Africa 2015. Joint report of JRC and Directorate-General Environment. http://effis.jrc.ec.europa.eu/media/cms_page_media/40/Forest

_fires_in_Europe_Middle_east_and_North_Africa_2015_final_pdf_JkX4Yl3.pdf

Joint Research Centre (2017) Forest Fires in Europe, Middle East and North Africa 2016. Joint report of JRC and Directorate-General Environment. http://effis.jrc.ec.europa.eu/media/cms_page_media/40/Forest_fires_in_Europe_Middle_east_and_North_Africa_2016_final_pdf_JZU7HeL.pdf

Kelly, K., Twamley-Stein, G.T. & Higgins, G.T. (n.d.) Preliminary Report on the Mount Brandon Nature Reserve Grazing Project. Unpublished report submitted to NPWS.

Martin, J.R., O'Neill, F.H. & Daly, O.H. (2018) The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats. *Irish Wildlife Manuals*, No. 102. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin.

Mayo Local Area Surveys. GIS files for this Mayo County Council habitat survey of nine towns in Co. Mayo completed by Atkins Ireland were made available.

Moran, P. & Wilson-Parr, R. (2015) Hen Harrier Special Protection Area (SPA) Habitat Mapping Project 2014. Irish Wildlife Manuals, No. 83. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/IWM83.pdf

Murphy, S. & Fernández, F. (2009) The development of methodologies to assess the conservation status of limestone pavement and associated habitats in Ireland. *Irish Wildlife Manuals*, No. 43. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/IWM43.pdf

NPWS (2013a) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin. https://www.npws.ie/sites/default/files/publications/pdf/Article_17_Print_Vol_2_report_habitats_v1_1_0.pdf

NPWS (2013b) Management Planning Support Unit Maps 2405_imap95 (CPU_Habitats_March_2012.shp).

O'Donoghue, P., O'Hora, K. & Delaney, E. (2008) Blarney Electoral District Habitat Mapping 2008. Atkins (Ecology). Report prepared for Cork County Council. Atkins, Cork.

O'Donoghue, P., Gittings, T., Delaney, E. & O'Hora, K. (2011) Midleton Area Habitat Survey and Mapping Project 2011 (Phase III). Main Report. Prepared for Cork County Council, Atkins, Cork.

O'Neill, F.H. & Martin, J.R. (2018) The Irish Juniper Monitoring Survey 2017. *Irish Wildlife Manuals*, No. 101. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

O'Neill, F.H., Barron, S.J., Smith, G.F. & Brophy, J.T. (2013a) A preliminary habitat corridor map for Co. Waterford. A report for

	Waterford County Council. O'Neill, F.H., Martin, J.R., Devaney, F.M. & Perrin, P.M. (2013b) The Irish semi-natural grasslands survey 2007-2012. *Irish Wildlife Manuals*, No. 78. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. https://www.npws.ie/sites/default/files/publications/pdf/IWM-78-Irish-semi-natural-grassland-survey.pdf O'Neill, F.H., Long, M.P. & Hodd, R.L. (in prep.) Monitoring of the Annex V Clubmoss group (*Lycopodium* spp.) in Ireland 2015-2018. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin. Perrin, P. (2017) Irish Vegetation Classification: Technical Progress Report No. 3. Report submitted to National Biodiversity Data Centre. http://www.biodiversityireland.ie/projects/national-vegetation-database/irish-vegetation-classification/explore/ Perrin, P.M., Roche, J.R. & Barron, S.J. (2011) National Survey of Upland Habitats (Phase 1, 2010 - 2012) Site Report No 1: Mweelrea, Sheeffry, Erriff Complex cSAC (001932), Co. Mayo. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH10_Mweelrea_Sheeffry_Erriff_Report_01c_M.pdf Perrin, P.M., Roche, J.R., Barron, S.J. & Daly, O.H. (2012) National Survey of Upland Habitats (Phase 2, 2011-2012), Site Report No. 7: Mount Brandon cSAC (000375), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH11_Mount_Brandon_Report_01b_M.pdf Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013a) National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 10: Ox Mountains Bogs cSAC (002006), Cos. Mayo and Sligo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Ox_Mountains_Bogs_Report_01b_M.pdf Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013b) National Survey of Upland Habitats (Phase 3, 2012-2013), Draft Site Report No. 11: Ben Bulben, Gleniff and Glenade Complex cSAC (000623), Co. Sligo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013c) National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 12: Arroo Mountain cSAC (001403), Co. Leitrim. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Arroo_Mountain_Report_01b_M.pdf

	Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013d) National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 13: Cuilcagh – Anierin Uplands cSAC (000584), Cos. Cavan and Leitrim. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Cuilcagh_Anierin_Uplands_Report_01b_M.pdf Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013e) National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 14: Slieve League cSAC (000189), Co. Donegal. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Slieve_League_Report_01b_M.pdf Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014a) National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 15: Slieve Mish Mountains cSAC (002185), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH13_Slieve_Mish_Mountains_01b_M.pdf Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014b) National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 16: Caha Mountains cSAC (000093), Cos. Cork and Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH13_Caha_Mountains_01b_M.pdf Perrin, P.M., Barron, S.J., Roche, J.R. & O'Hanrahan, B. (2014c) Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland. Version 2.0. *Irish Wildlife Manuals*, No. 79. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/IWM79.pdf Renou-Wilson, F. & Wilson, D. (2018) Vulnerability assessment of peatlands: exploration of impacts and adaptation options in relation to climate change and extreme events (VAPOR). EPA Research Report No. 250. Environmental Protection Agency, Johnstown Castle, Ireland. http://www.epa.ie/researchandeducation/research/researchpublications/researchreports/Research_Report_250.pdf Roche, J.R., Perrin, P.M. & Barron, S.J. (2009) National Survey of Upland Habitats (Pilot Survey Phase, 2009-2010), Site Report No. 2: Corraun Plateau cSAC (000485), Co. Mayo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/SPEU09_Corraun_Plateau_Report_01b_M.pdf Roche, J.R., Perrin, P.M. & Barron, S.J. (2010a) National Survey of Upland Habitats (Pilot Survey Phase, 2009-2010), Site Report No. 3: Comeragh Mountains cSAC (001952), Co. Waterford. National

	Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/SPEU09_Comeragh_Mountains_Report_01b_M.pdf Roche, J.R., Perrin, P.M. & Barron, S.J. (2010b) National Survey of Upland Habitats (Pilot Survey Phase, 2009-2010), Site Report No. 4: Carlingford Mountain cSAC (000453), Co. Louth. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/SPEU09_Carlingford_Mountain_Report_01b_M.pdf Roche, J.R., Perrin, P.M. & Barron, S.J. (2011a) National Survey of Upland Habitats (Phase 1, 2010 - 2012), Site Report No. 6: Croaghaun / Slievemore cSAC (001955), Co. Mayo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH10_Croaghaun_Slievemore_Report_01b_M.pdf Roche, J.R., Perrin, P.M. & Barron, S.J. (2011b) National Survey of Upland Habitats (Phase 1, 2010 - 2012), Draft Site Report No. 5: Nephin Mountain, Co. Mayo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Roche, J.R., Perrin, P.M., Barron, S.J. & Daly, O.H. (2012a) National Survey of Upland Habitats (Phase 2, 2011-2012), Site Report No. 9: Galtee Mountains cSAC (000646), Cos. Tipperary and Limerick. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH11_Galtee_Mountains_Report_01b_M.pdf Roche, J.R., Perrin, P.M., Barron, S.J. & Daly, O.H. (2012b) National Survey of Upland Habitats (Phase 2, 2011-2012), Draft Site Report No. 8: Killarney National Park, Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. South Clare Habitat Map Cratloe to Parteen. GIS files for this project were made available by Clare County Council. Tubridy, M., Iremonger, S., Hickey, B. & O'Hanrahan, B. (2015) Blackstairs Habitat Mapping and Biodiversity Audit 2015. Report for the Blackstairs Farming Group. Uplands and Peatlands Grazing Survey. GIS files for this NPWS project, completed in 2011, were available. Wilson, F. & Duff, K. (2014) Derrynane National Historic Park dune grassland survey and management recommendations. Unpublished report for The Office of Public Works, Knockreer House, Killarney, Co. Kerry. Wilson, F. & Foss, P. (2011) The County Wicklow Wetland Survey. Report for Wicklow County Council and The Heritage Council.
3.2i Additional information	

4 Range

Range within the biogeographical/marine region concerned		
4.1 Surface area	***60,500 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 60,500 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable Reference Range has been increased since the last reporting period (NPWS, 2013a) to reflect the improved level of knowledge. There is no evidence of loss of range since the Directive came into force and no enlargement of range is deemed necessary to ensure the long-term survival of the habitat.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	

	a) yes, due to genuine change	*YES/**NO***
	b) yes, due to improved knowledge/more accurate data	***YES**/NO*
	c) yes, due to the use of different method	*YES/**NO***
	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 4010 habitat. A maximum gap distance of two 10km grid cells was used when running the range tool. Short-term trend for Range was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013a). Data used for short-term trend dated from 2007 to 2017, while those used for long-term trend dated from 1994 to 2017. There was no loss of range caused by the recorded losses of area in the SACs covered by the NSUH during these two reporting periods. The short-term trend in Range is judged to be stable; however, the NSUH surveyed just two upland SACs within the current reporting period, compared with 13 in the previous reporting period, thus limiting the conclusions that can be made from this data. Due to improved knowledge from additional survey sources in the current reporting period, the number of 10km squares in the range (605) is 34 greater than for the last monitoring period (NPWS, 2013a). The following, all surveyed in this reporting period, added to the range: Dooish Mountain, Donegal (two squares) and Clonmore North, Tipperary (one square) (Coillte Biodiversity Dataset); Ballyglass North, Galway (four squares) (Daly, 2016); Ahasragh, Galway (one square) (Galway County Council, 2017); Stack's to Mullaghareirk Mountains SPA (16 squares) and Slievefelim to Silvermine Mountains SPA (four squares) (Moran & Wilson-Parr, 2015); Slievereagh, Limerick (two squares) (Perrin, 2017); and Blackstairs Mountains SAC (four squares) (Tubridy *et al*., 2015). Favourable Reference Range has been increased since the last reporting period (NPWS, 2013a) to reflect the improved level of knowledge. The Favourable Reference Range is the current range, reported in section 4.1.	

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***1949-2017***	
5.2 Surface area *(in km²)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***1,598.51 km²***

5.3 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator > (more than) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	

<table>
<tr><td rowspan="6">5.14 Change and reason for change in surface area</td><td colspan="2">Is there a change between reporting periods? <u>YES</u>/NO

If yes, provide the nature of that change. More than one option (a to d) can be chosen.</td></tr>
<tr><td>a) yes, due to genuine change</td><td><u>YES</u>/NO</td></tr>
<tr><td>b) yes, due to improved knowledge/more accurate data</td><td><u>YES</u>/NO</td></tr>
<tr><td>c) yes, due to the use of different method</td><td>YES/<u>NO</u></td></tr>
<tr><td>d) yes, but there is no information on the nature of change</td><td>YES/<u>NO</u></td></tr>
<tr><td colspan="2">The change is mainly due to (select one of the reasons above):

genuine change / <u>improved knowledge or more accurate data</u> / the use of a different method</td></tr>
<tr><td>5.15 Additional information

Optional</td><td colspan="2">The period over which the surface area of the habitat was determined begins in 1949 when bog and heath relevés were recorded by Braun-Blanquet and Tüxen (data utilised in Perrin, 2017) and incorporates updates made by surveys between 1959 and 2017 that are listed in section 3.2.

Area was calculated from the polygon shapefile and point shapefile used for distribution. For each point record not intersecting a polygon that was yielding an area, 10 ha of habitat was estimated. This is a conservative expert opinion based on the logic that the 4010 habitat can cover substantial areas, as this habitat along with dry heath (Annex I 4030 habitat), can form the landscape matrix in the uplands. Points within site boundaries of surveys carried out within the current reporting period, but not within 4010 habitat polygons, were examined individually, with four excluded for area due to their proximity to 4010 polygons.

During the current reporting period 21 datasets with 4010 habitat data were utilised; however, Area was only fully assessed by the NSUH datasets (Perrin et al., 2014a, 2014b). The two NSUH sites (Caha Mountains SAC (000093) and Slieve Mish Mountains SAC (002185)) surveyed in the current reporting period represent just 4.5% of the estimated total area of 4010 habitat in Ireland, thus limiting the representativity of the conclusions that can be made.

The default trend periods are presented above and are used to calculate the magnitude of annual loss; however, the data used for short-term trend dated from 2005 to 2018, while those used for long-term trend dated from 1995 to 2018. The assessments of trend thus obtained were assumed to hold also for the default trends. Approximately 4.18 ha of 4010 habitat, within the two NSUH sites (Caha Mountains SAC (000093) and Slieve Mish Mountains SAC (002185)), were determined to be lost since 2005 mainly due to new forestry, paths and tracks, and land clearance (Perrin et al., 2014a, 2014b). Another area of 4010 habitat (approximately 0.09 ha) was also determined to be lost within this reporting period due to tracks and site clearance carried out late 2017/early 2018 within the Corraun Plateau SAC (000485) (J. Fossitt, Divisional Ecologist with NPWS, pers. comm.). The total known area of 4010 habitat loss from SACs since 2005 is approximately 8.03 ha (4.27 ha from Perrin et al.</td></tr>
</table>

	(2014a, 2014b) and J. Fossitt (pers. comm.) and an additional 3.76 ha as reported by previous NSUH surveys). The magnitude of the known loss from SACs is therefore approximately -0.0004% per annum, measured over a period of 12 years; however actual losses are likely to be very significantly greater as c.50% of the 4010 habitat resource lies outside of the SAC network and quantitative data on losses incurred here are limited. Although the magnitude of known loss is < 1% per annum, losses in 4010 habitat were recorded at 13 of the 16 surveyed (NSUH) sites. As only one NSUH site was on undesignated land, this loss is mostly related to that in SACs. However losses in area are likely to be occurring across the geographic spread of 4010 habitat in Ireland as there is limited protection of the c. 50% of the resource which lies outside SACs. There were small reported gains in habitat area (1.2 ha) since 1995 (but none in the current reporting period) in the Slieve Mish Mountains SAC (002185) (Perrin *et al.*, 2014a) due to revegetated tracks and recolonised bare/disturbed peat, however these gains were not enough to counteract losses at either this site or nationally. Short-term trend in Area was therefore deemed to be decreasing. To date there has been no comprehensive survey of habitat 4010 in Ireland, thus more detailed survey work for this habitat is needed. This habitat is not always easily detected from aerial imagery and can also form complex mosaics with dry heath, blanket bog and related habitats. It is thus very likely that the area value listed in section 5.2 will undergo refinement as more in-depth mapping of the 4010 habitat is completed. In particular, any area represented within the dataset by only a point needs to be surveyed in more detail. In addition to refining the areas of known occurrence of 4010 habitat, there are still areas of unmapped 4010 habitat in Ireland, particularly outside of designated sites but also within SACs as yet unmapped by the NSUH. The NSUH is currently incomplete, and still almost entirely confined to SACs, but when it does resume, it is likely that more examples of 4010 habitat will be recorded. The area value entered is therefore considered to be a minimum value. Favourable Reference Area is deemed to be greater (though less than 10% greater) than the current area given that anthropogenic losses have occurred since the Habitats Directive came into force. Based on data from all NSUH sites surveyed to date, there has been a loss of 82.12 ha 4010 habitat since 1995 (0.05% of the total). However data on conservation status of habitat 4010 on undesignated lands is limited as only one of the 16 sites surveyed in the NSUH is not an SAC. Losses of 4010 habitat outside of SACs are likely to be significantly greater due to impacts from a range of pressures including: afforestation; wind farms; agricultural intensification including drainage; vegetation clearance, fertilisation and reseeding for pasture; and inappropriate burning and grazing levels. The difference in habitat extent between this reporting period and the previous one is largely due to the availability of more accurate knowledge on the area of habitat 4010, resulting in refinement of some of the area estimates from the previous reporting period. The majority of this refinement occurred within the Caha Mountains SAC (000093) and Slieve Mish Mountains SAC (002185) in Counties Cork

	and Kerry; however there were also refinements made in other parts of the country. Collectively 107.48 km^2 of 4010 habitat mapped in the last reporting period was replaced by 101.92 km^2 of 4010 habitat in this reporting period. This mapping refinement resulted in a net reduction of 5.56 km^2. Additional surveys in this reporting period resulted in the addition of 174.414 km^2 of previously unmapped 4010 habitat. These mapping refinements, along with the documented loss in area of 0.0009 km^2 from the Corraun Plateau SAC (000485) in the current reporting period, resulted in an area value of 1,598.51 km^2 for 4010 habitat ((1,429.656 – 5.56) + 174.414 – 0.0009 = 1,598.51 km^2).

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***233.93 km²***
		Maximum	***587.40 km²***
	b) Area in not-good condition	**Minimum**	***1,011.11 km²***
		Maximum	***1,364.58 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***		

6.7 Typical species Method used *Optional*	The list of typical species is the same as the last reporting period (NPWS, 2013a). Typical species were assessed as an assemblage at the monitoring stop level within sites surveyed by the NSUH, Galway County Council (2017) and Tubridy *et al.* (2015). As the remit for surveys by O'Neill & Martin (2018) and O'Neill et al. (in prep.) did not include the assessment of 4010 habitat, assessments were done retrospectively using available relevé data. At each monitoring stop, the cover of indicator species needed to be at least 50% to pass the target for this criterion. Trends for the assemblage and for individual species were not assessed as the NSUH was a baseline survey.
6.8 Additional information *Optional*	The NSUH (Perrin *et al.*, 2014c) assess Structure and functions at a monitoring stop level, using criteria to assess vegetation composition (including typical species), vegetation structure and physical structure; all criteria need to pass for a stop to pass. Criteria were adapted from the UK's Common Standards Monitoring (JNCC, 2009) using expert judgement. The NSUH primarily assesses SACs and is currently incomplete. Where NSUH sites include commonage land, comparisons were made between NSUH and commonage station data with respect to a few shared parameters (area of bare peat, cover and height of *Calluna vulgaris*, and sward height). A total of 58 monitoring stops were recorded on 4010 habitat across both NSUH sites surveyed within this reporting period. Fifty of the 58 stops (86.2% of stops) failed one or more of the criteria assessing the vegetation composition, vegetation structure and physical structure of 4010, with criteria assessing the 'cover of ericoid species and *Empetrum nigrum*' (55.2%), 'cover of positive indicator species' (46.6%), and 'total cover of *Cladonia, Sphagnum, Racomitrium lanuginosum* and pleurocarpous mosses' (39.7%) having the highest failure rates. For full details see the NSUH site reports (Perrin *et al.*, 2014a, 2014b). All eight stops recorded in 4010 habitat in Galway County Council (2017) failed the Structure and functions assessment. The criteria used were the same as the NSUH criteria (Perrin *et al.*, 2014c). Again, those assessing 'total cover of *Cladonia, Sphagnum, Racomitrium lanuginosum* and pleurocarpous mosses' (100%), 'cover of ericoid species and *Empetrum nigrum'* (87.5%), and 'cover of positive indicator species' (50%) had the highest failure rates. Seven of the ten stops from Tubridy *et al.* (2015) failed the Structure and functions assessment. Their assessment criteria largely followed the criteria as described in the NSUH (Perrin *et al*., 2014c), though some amendments were made. A cut-off threshold of ≥20% for 'cover of ericoid species' (as opposed to ≥15% in NSUH) was used. The criterion '<66% cover of *Myrica gale* showing signs of browsing' was used in addition to 'cover of palatable dwarf shrubs (*Calluna, Erica cinerea, Vaccinium myrtillus*) collectively showing signs of browsing <33%' (as opposed to 'grazing of ericoids, *Empetrum nigrum* and *Myrica gale* <33%' in NSUH). An additional criterion was added assessing 'area of bare peat (with or without evidence of trampling) <10%'. *Deschampsia flexuosa* was added to the list of negative indicator species and 'neither cover of dwarf shrubs nor graminoids >75%' replaced the criterion 'cover of dwarf shrub species <75%' from NSUH. For full details see supporting

	documentation ('condition assessment of annex habitats in the SAC.xlsx') for Tubridy *et al.* (2015). The criterion assessing the 'presence of *Erica tetralix'* had the highest failure rate (60%), followed by 'total cover of *Cladonia, Sphagnum, Racomitrium lanuginosum* and pleurocarpous mosses' (20%) and 'cover of *Pteridium aquilinum'* (20%). Three relevés (25 m^2) recorded in 4010 habitat as part of the Juniper Monitoring Survey (O'Neill & Martin, 2018), and three relevés (1 m^2) recorded as part of the Rare Plants Monitoring Survey (O'Neill *et al*., in prep.), were also utilised to assess the Structure and functions. These relevés lack details pertaining to criteria which assess vegetation composition and structure, and physical structure, within the local vicinity of stops, and therefore represent a "best case" situation in these areas for Structure and functions of 4010 habitat. All three from O'Neill & Martin (2018) failed the Structure and functions assessment, while two failed from O'Neill *et al.* (in prep.). 'Total cover of *Cladonia, Sphagnum, Racomitrium lanuginosum* and pleurocarpous mosses' (66.6%) was the main criterion which failed from the O'Neill & Martin (2018) data, while criteria assessing the 'cover of ericoid species and *Empetrum nigrum'* (33.3%) and 'cover of positive indicator species' (33.3%) failed from the O'Neill *et al*. (in prep.) data. Equal weighting was given to each of the stops from the NSUH, Galway County Council (2017) and Tubridy *et al.* (2015) as each one assesses a comparable area of habitat. For the relevés from O'Neill & Martin (2018) and O'Neill *et al*. (in prep.), however, only the actual footprint of the relevé (25 m^2 and 1 m^2 respectively) could be used as no data from the local vicinity were recorded. The proportion of the total area (77.57km^2) in good (14.6%) and not-good condition (85.4%) was scaled up to the national estimate (233.93 km^2 in good condition and 1,364.58 km^2 in not-good condition); however, as the area assessed for Structure and functions in this reporting period only represents 4.9% of the national area of habitat 4010, data from the last reporting period were also utilised. During the last reporting period, 36.75% of the 4010 habitat was assessed as Favourable (NPWS, 2013a). This equates to 587.40 km^2 of the current area of 4010 habitat and this figure is used as the maximum area in good condition. 63.25% of the 4010 habitat was assessed as Unfavourable (NPWS, 2013a). This equates to 1,011.11 km^2 of the current area of 4010 habitat and this figure is used as the minimum area that is not in good condition. The most frequent criteria to fail the Structure and functions assessment in the last reporting period were 'cover of ericoid species and *Empetrum nigrum'*, 'total cover of *Cladonia, Sphagnum, Racomitrium lanuginosum* and pleurocarpous mosses' and 'cover of positive indicator species' (NPWS, 2013a). The default short-term trend period is presented above; however the data used for the short-term trend dated from 2007 to 2017. Based on limited data, conclusions could be made that the area in good condition has declined; however, as this is based mainly on data from one part of the country (southwest Ireland: Cork and Kerry) with a poor national sample size, the trend was taken as stable based

	on expert opinion. The most frequent criteria to fail the Structure and functions assessment in this reporting period are the same as those which failed in the last reporting period. Short-term trend of Structure and functions in the previous reporting period was assessed as 'improving' due to the assumption that the reduced grazing brought about by the Commonage Framework Plans (CFPs) would have a positive effect on overgrazed areas of 4010 habitat. As destocking took place almost two decades ago it was decided, using expert judgement, that any improvements to the Structure and functions of 4010 habitat by destocking would have stabilised by the current reporting period. While there may still be improvements (recovery) of 4010 habitat in some areas, other areas are suffering from burning, afforestation, agricultural intensification, wind farm development and erosion. As with the Area assessment, it should be noted that only one of the 16 sites surveyed through the NSUH is not an SAC. The area of 4010 habitat in good condition outside of the NSUH sites is likely to be significantly lower due to impacts such as drainage, overgrazing, burning and agricultural intensification, and at a local level, scrub encroachment from lack of land management. Typical species for 4010 habitat are: *Breutelia chrysocoma, Calluna vulgaris, Carex* spp., *Diplophyllum albicans, Drosera* spp., *Erica erigena, Erica tetralix, Eriophorum angustifolium, Myrica gale, Narthecium ossifragum,* non-crustose lichens, *Pedicularis sylvatica,* pleurocarpous mosses, *Pleurozia purpurea, Polygala serpyllifolia, Potentilla erecta, Rhynchospora* spp., *Salix repens, Schoenus nigricans, Sphagnum* spp., *Succisa pratensis* and *Trichophorum germanicum*.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A09** Intensive grazing or overgrazing by livestock (H) **A11** Burning for agriculture (H) **B01** Conversion to forest from other land uses, or afforestation (excluding drainage) (H) **A27** Agricultural activities generating air pollution (H) **D01** Wind, wave and tidal power, including infrastructure (M)	**A09** Intensive grazing or overgrazing by livestock (H) **A11** Burning for agriculture (H) **B01** Conversion to forest from other land uses, or afforestation (excluding drainage) (H) **A27** Agricultural activities generating air pollution (H) **D01** Wind, wave and tidal power, including infrastructure (M)

	L01 (Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization)) (M)	**L01** Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization) (M) **N01** Temperature changes (e.g. rise of temperature & extremes) due to climate change (M) **N02** Droughts and decreases in precipitation due to climate change (M)
7.2 Sources of information *Optional*	Pressures were sourced from the following reports and accompanying data: Aherne, J., Burton, A., Scott, H., Whitfield, C. & Wolniewicz, M. (2014) Influence of Transboundary Air Pollution on Acid-sensitive Ecosystems. Environmental Protection Agency, Ireland URL: www.epa.ie/pubs/reports/research/air. Baker, M.E. & King, R.S. (2010) A new method for detecting and interpreting biodiversity and ecological community thresholds: Threshold Indicator Taxa ANalysis (TITAN). *Methods in Ecology and Evolution* 1(1): 25–37. Bobbink, R. & Hettelingh, J.P., (eds.) (2011) *Review and revision of empirical critical loads and dose-response relationships*. Coordination Centre for Effects, National Institute for Public Health and the Environment (RIVM). www.rivm.nl/cce. Cathcart, H., Wilkins, K. & Aherne, J. (2018) High spatio-temporal resolution maps of atmospheric dry deposition velocities using the MÉRA dataset. MÉRA Workshop, National Botanic Gardens, Glasnevin May 17, 2018. URL: www.met.ie/science/events/mera-workshop. EPA (2018) Ireland's Transboundary Gas Emissions 1990-2016. URL: www.epa.ie/pubs/reports/air/airemissions. Excel sheet 'Connected22012018.xlsx' provided by Sustainable Energy Authority of Ireland (SEAI) containing the location of connected wind farms as per Eirgrid and ESB Networks. It should be noted that precise accuracy of this coordinate information cannot be assured, that possible stand-alone projects not intended for connection to the Irish electricity grid are not included, and that map locations provided are not necessarily all discrete wind farms (some could be extensions to existing wind farms). FIPS data: PrivateForests2016.shp. Only polygons with a planting year within this reporting period were utilised. Foss, P.J., Crushell, P. & Kirwan, B. (2015) County Waterford Wetland Survey. Part 1: Main Report. Report prepared for Waterford City & County Council. Galway County Council (2017) Unpublished data collected for the Galway City Transport Project. Hodd, R.L. (2015a) Survey of Flora Protection Order Bryophytes in Cork and Kerry (H1-H5). Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.	

	Hodd, R.L. (2015b) Survey of Flora Protection Order Bryophytes 2015. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland. Hodd, R.L. (2016) Survey of Flora Protection Order Bryophytes 2016. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland. Hodd, R. & Barron, S. (2015) An assessment of damaged habitat on Sliabh Beagh, Cos Monaghan, Tyrone and Fermanagh, using aerial imagery. Unpublished report for Blackwater Regional Partnership. NPWS (2013a) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin. NPWS_Approx_Wildfire_Locations_Polygon_2017.shp Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014a). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 15: Slieve Mish Mountains cSAC (002185), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014b). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 16: Caha Mountains cSAC (000093), Cos. Cork and Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Slootweg, J., Posch, M. & Hettelingh, J-P. (2015) Modelling and mapping the impacts of atmospheric deposition of nitrogen and sulphur: CCE Status Report, Coordination Centre for Effects, www.wge-cce.org. Tubridy, M., Iremonger, S., Hickey, B. and O'Hanrahan, B. (2015) Blackstairs Habitat Mapping and Biodiversity Audit 2015. Report for the Blackstairs Farming Group. Wilkins, K., Aherne, J. & Bleasdale, A. (2016) Vegetation community change points suggest that critical loads of nutrient nitrogen may be too high. *Atmospheric Environment* 146: 324–331.
7.3 Additional information *Optional*	Pressures and threats presented in 7.1 were selected and ranked based on intensity (high, medium, low), frequency of occurrence, and area of impact where data were available. Data gathered from the sources listed in section 7.2 are summarised in the backing document 'NSUH17_AR1719_pressures_assessment_01a.xlsx'. For the current reporting period, data on pressures were available for two NSUH sites – Slieve Mish Mountains SAC (002185) and Caha Mountains SAC (000093) (Perrin *et al*., 2014a, 2014b). Data from shapefiles on locations of wildfires which occurred in spring 2017 (provided by NPWS), locations of newly planted forestry within this reporting period (FIPS data) and locations of wind farms (provided by SEAI) were also utilised. Additional data from Foss *et al.* (2015), Galway County Council (2017), Hodd (2015a, 2015b, 2016), Hodd & Barron (2015) and Tubridy *et al.* (2015) were examined, with relevant data extracted and analysed. As the data from the current reporting

	period only represent a small proportion of the data collected to inform NPWS (2013a), the pressures and threats information presented in NPWS (2013a) were also used to inform the current reporting period. In the previous reporting period sheep grazing in the uplands, both undergrazing and overgrazing, was recorded under 'A04.02.02 non-intensive sheep-grazing'. It was recorded as a high-importance pressure and threat for the 4010 habitat (NPWS, 2013a). Using the crosswalk referenced in the backing document 'NSUH17_AR1719_ pressures_assessment_01a.xlsx' to convert old impact recording codes to the new recording scheme, A04.02.02 crosswalks to A10 (Extensive grazing or undergrazing by livestock). However there was no evidence from the NSUH sites surveyed in the previous reporting period, or from this reporting period, that A10 (undergrazing) was a pressure. A10 is therefore not currently considered a pressure for the 4010 habitat. A09 (Intensive grazing or overgrazing by livestock) can lead to erosion and damage to the vegetation of the 4010 habitat. Perrin *et al.* (2014a, 2014b) recorded overgrazing under A04.02.02, with 21.9% and 11.8% of 4010 habitat failing respectively due to excessive levels of grazing. It was stated in NPWS (2013a) that "sheep grazing is widespread within the sites surveyed by the NSUH and, where levels of grazing or trampling are high, is problematic within this habitat", while Hodd (2015a, 2015b, 2016) recorded A09 three times within this reporting period. Based on evidence collected in the previous and current reporting periods and expert opinion, A09 was retained as a high-importance pressure for this reporting period. All remaining high- and medium-importance pressures presented in NPWS (2013a) were reconsidered for the current reporting period, with all five having additional evidence provided for their importance by the data collected during the current reporting period. A11 (Burning for agriculture) was recorded as a medium-importance pressure in NPWS (2013a), but was upgraded to a high-importance pressure for this reporting period. This pressure can lead to widespread loss and degradation of upland habitats (Perrin *et al.*, 2014c). Uncontrolled burning can be particularly damaging to the bryophyte layer within 4010 habitat, and can result in peat erosion, desiccation of the habitat and loss of dwarf shrubs which can result in succession to grassland habitats (Hampton, 2008). In some cases, the dwarf shrubs may become dominant again, but this can take 15-20 years or more (i.e. more than two reporting periods), or may not occur with too frequent or severe burning (Glaves *et al.*, 2013). A11 was recorded within 4010 habitat in the Slieve Mish Mountains SAC (002185) (9.8% of 4010 habitat) (Perrin *et al.*, 2014a), Caha Mountains SAC (000093) (2.3% of 4010 habitat) (Perrin *et al.*, 2014b), as well as within 4010 habitat in the Blackstairs Mountains (Tubridy *et al.*, 2015). It is estimated that approximately 0.8% (12.4 km^2) of the national 4010 habitat area was burnt in the spring of 2017 (using NPWS_Approx_Wildfire_Locations_Polygon_2017.shp in conjunction with the 4010 distribution polygon shapefile). In addition to this, the Joint Research Centre (JRC) of the European Commission provides information on fires in the pan-European region via the European Forest Fire Information System (EFFIS). Through its series of technical

	reports, it has been estimated that over 10,000 ha of open land in Ireland have been affected by fire in 2013, less than 5,000 ha of open land in 2014, approximately 10,000 ha of open land in 2015 and approximately 5,000 ha of open land in 2016 (JRC, 2014, 2015, 2016, 2017 respectively), with the majority of fires taking place in upland habitats (JRC, 2015), which would include 4010 habitat. JRC (2016) states: "There is a strong correlation between the patterns of these fires and established traditional agricultural burning practice in Irish upland areas". B01 (Conversion to forest from other land uses, or afforestation (excluding drainage)) was recorded as a medium-importance pressure in NPWS (2013a) but was upgraded to a high-importance pressure for this reporting period based on expert judgement (C. Douglas, NPWS, pers. comm.). The Environmental Impact Assessment (EIA) threshold for forestry is 50 ha or more (S.I. No. 191 of 2017), which means large areas of unenclosed land can be planted without adequate environmental assessment. In addition to this, there has been recent pressure to increase land availability for afforestation on unenclosed land as planting on agricultural land is not happening at the desired rate in order to reach the target of 18% forest cover by mid-century (C. Douglas, NPWS, pers. comm.); thereby resulting in B01 being listed as a high-importance threat to 4010 habitat. Afforestation can result in direct habitat loss, as well as fragmentation of the 4010 habitat. It was recorded as a pressure for 4010 habitat within the Caha Mountains SAC (000093) (Perrin *et al.*, 2014b). It is estimated that approximately 6% of the national 4010 habitat area (97.4 km^2) is either adjacent to or has some evidence of new forestry (i.e. planted within the current reporting period) within it (using PrivateForests2016.shp in conjunction with the 4010 distribution polygon shapefile). D01 (Wind, wave and tidal power, including infrastructure) was recorded as a medium-importance pressure in NPWS (2013a), and was retained as a medium-importance pressure for this reporting period. Wind farms can result in direct habitat loss and degradation of the 4010 habitat. A review of Irish wind farm developments has indicated that 51.7% of wind farms are located within 2 km of 4010 habitat. As wind farm data were, in general, provided as a single point for each wind farm development the review located wind farms within a 2 km buffer zone around 4010 habitat using the grid references provided by the SEAI (Connected22012018.xlsx) and the 4010 distribution polygon shapefile. Fifteen randomly selected wind farms located in upland areas were mapped in order to get an idea of the footprint of wind farms in upland areas. An average radius of 2 km was calculated based on these mapped areas. L01 (Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization)) was used to record erosion events within 4010 habitat. NPWS (2013a) recorded this as a high-importance pressure, but this was downgraded to a medium-importance pressure for this reporting period due to the relatively small area directly affected by this pressure (typically <2% of the habitat at each of the NSUH sites (Perrin *et al.*, 2014a, 2014b)). Erosion within 4010 habitat was also recorded by Foss *et al.* (2015). Habitat 4010 is prone to erosion where levels of grazing or trampling by sheep are

	excessive, or where burning has occurred. Without remedial action areas of bare peat may continue to erode due to climatic conditions regardless of removal or control of the causal factors (i.e. excessive grazing and burning), and therefore is a standalone pressure. The low-importance pressures J03 (Mixed source air pollution, air-borne pollutants) and L06 (Interspecific faunal and floral relations (competition, predation, parasitism, pathogens)), recorded in NPWS (2013a) but not in this reporting period, were retained as low-importance pressures for the current reporting period. A36 (Agriculture activities not referred to above) (i.e. agricultural intensification – removal of semi-natural vegetation, reseeding and fertilisation for pasture), C01 (Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell)), C05 (Peat extraction), E01 (Roads, paths railroads and related infrastructure (e.g. bridges, viaducts, tunnels)), F07 (Sports, tourism and leisure activities), I02 (Other invasive alien species (other than species of Union concern)), I04 (Problematic native species), K01 (Abstractions from groundwater, surface water or mixed water) and M05 (Collapse of terrain, landslide), were recorded in both the previous and current reporting periods. They have also been retained as low-importance pressures. A06 (Abandonment of grassland management (e.g. cessation of grazing or of mowing)), A14 (Livestock farming (without grazing)), F01 (Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions)), H08 (Other human intrusions and disturbance not mentioned above), J04 (Mixed source soil pollution and solid waste (excluding discharges)), K04 (Modification of hydrological flow) and L02 (Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices)), recorded within the current reporting period only, were also assessed as low-importance pressures for 4010 habitat, largely due to the small footprint of each. Climate change (under two separate codes, N01 and N02) is assessed as a low-importance pressure, but is considered to be a medium-importance threat to 4010. Areas in favourable and unfavourable condition will be impacted by climate-induced disturbances, "including (1) gradual changes (in temperature; in the amount, intensity and seasonal distribution of precipitation) and (2) extreme events (severe drought; increased wildfires; flooding events)" (Renou-Wilson & Wilson, 2018), particularly areas in unfavourable condition as these areas are more susceptible to the impacts of climate change. Climate envelope modelling used to predict climate change-driven shifts in species and habitat distributions predict that under limited dispersal scenarios 4010 habitat will contract in range by 33% (Coll *et al.*, 2012). Results from Coll *et al.* (2016) show that 4010 habitat is regionally sensitive to climate change, particularly in lower-lying areas in the south and west of the country, with projected losses greatest along the western Atlantic seaboard. Modelling also predicted climate space gains for 4010 in the Midlands and north-east, however it was noted that new habitat formation in these areas may not be possible due to factors such as geology and the presence of intensive agriculture (Coll *et al.*, 2016). Concerns relating to prospective seasonal changes include increases

	in winter rainfall leading to enhanced erosion. An increased risk of severe fire events is likely in areas where drought periods increase as a result of climate change. Intense fires can burn away the shallow peat soil or expose it to erosive elements such as extreme rainfall events. Invasive non-native species may also pose a greater risk to 4010 habitat if their growth conditions are more favoured by changes in climate. Species such as *Rhododendron ponticum* as well as conifers *Pinus contorta* (Lodgepole pine) and *Picea sitchensis* (Sitka spruce) (the predominant species of plantation forestry) could conceivably increase their spread on 4010 habitat with temperature rises and/or where more frequent or prolonged drought periods increase habitat desiccation (C. Douglas, NPWS, pers. comm.). Empirical critical loads of nutrient nitrogen have been recommended for a number of European habitats (Bobbink & Hettelingh, 2011). These recommended ranges were refined and extended using plant species diversity for habitat-specific positive indicator species. The influence of nitrogen deposition on plant species diversity was assessed using Threshold Indicator Taxa Analysis (TITAN; Baker & King, 2010) following Wilkins *et al*. (2016) and the Probability of Plant Species occurrence (PROPS-CLF; Slootweg *et al*., 2015). The spatial distribution of total nitrogen deposition was mapped on a 2.5 km x 2.5 km grid resolution using observations of atmospheric nitrogen during the last decade, a period with limited changes in national emissions of nitrogen (EPA, 2018). Total nitrogen deposition included dry ammonia deposition based on network of passive gaseous ammonia samplers and modelled dry deposition velocity (Cathcart *et al*., 2018), and observations of wet deposition for nitrate and ammonium in rainfall (Aherne *et al*., 2014). The observations were mapped using regression kriging which used maps of nitrogen emissions (URL: projects.au.dk/mapeire) and climate (URL: www.met.ie/climate/available-data/mera) as spatial predictors. The proportion of each habitat that exceeded the lower critical load value of the recommended range was calculated. The importance of the impact of Nitrogen Deposition based on this proportion was determined as follows: Low importance pressure/threat: 5-10%; Medium importance pressure: 10-25%; High importance pressure: >25%. Wet heath was assigned a Critical value of 5; 36% of the habitat area exceeded this value. Therefore the pressure *A27 Agricultural activities generating air pollution* was assigned a High importance, as approximately 75 to 80% of total nitrogen deposition can be attributed to agricultural sources nationally. The six high- and medium-importance pressures reported in section 7.1 are also considered to be the main threats to the 4010 habitat in the future, along with climate change.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type** or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* ***a) Short-term results (within the current reporting period, 2013-2018)** or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	**CA03** Maintain existing extensive agricultural practices and agricultural landscape features **CA04** Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures **CA05** Adapt mowing, grazing and other equivalent agricultural activities **CA12** Reduce/eliminate air pollution from agricultural activities **CB01** Prevent conversion of (semi-) natural habitats into forests and of (semi-)natural forests into intensive forest plantation **CF03** Reduce impact of outdoor sports, leisure and recreational activities **CI03** Management, control or eradication of other invasive alien species **CI05** Management of problematic native species
8.6 Additional information	Conservation measures were selected using data gathered from Hodd (2015a, 2015b, 2016) and O'Neill *et al*. (in prep.), and from

Optional	information provided by NPWS (pers. comm.), European Commission (eip-agri agriculture and innovation) and Forest Service (2015). Data from the NSUH, recorded in the previous reporting period, were also utilised where appropriate. The maintenance of extensive grazing (recorded under CA03), particularly that of sheep grazing, as a conservation measure was recorded four times by Hodd (2015a, 2015b, 2016), while non-intensive grazing was recorded six times by O'Neill *et al*. (in prep.) as either a neutral or positive impact on 4010 habitat. It was also recorded as either a neutral or positive impact at four 4010 NSUH sites during the previous reporting period. In some cases the maintenance of extensive sheep grazing is undertaken through the Department of Agriculture's Green, Low Carbon, Agri-Environment Scheme (GLAS), both in regard to Commonage Management Plans and private Natura Management Plans. The main purpose of these sustainable management plans, in regard to upland habitats, is to restore the condition of both commonage and private Natura lands by protecting against both undergrazing and overgrazing (A. Bleasdale, NPWS, pers. comm.). It should be recognised that not all shareholders within the commonages or people who hold private Natura lands have joined up to the aforementioned management plans. The management regimes of most areas of 4010 habitat are driven by the landowner rather than by any formal management plan or policy; therefore the continued operation of the management regimes currently in place is not guaranteed across the entire habitat. In addition for this conservation measure to be relevant to this assessment there would need to be 4010 habitat within the area managed under GLAS; while mapping data are not available for areas managed through GLAS an assumption is made that areas of 4010 are included. Details of participation in the GLAS scheme and of the uptake across various measures are not currently available. It is therefore not possible to precisely assess the effects of implementation of these measures. Consideration may also need to be given to an off-wintering measure for sheep stock on some areas of habitat 4010 if it is clear that the recovery of the dwarf shrub cover is being significantly retarded by winter grazing. Within Ireland's National Parks (NPs), Connemara NP is undertaking Rhododendron control (CI03), maintenance of tracks and trails to prevent damage to sensitive habitats (CF03) and control of trespassing stock (CA05). Killarney NP is also carrying out the aforementioned conservation measures in addition to deer management (CI03 – Sika deer; CI05 – Red deer). CA05 (adapt mowing, grazing and other equivalent agricultural activities) was recorded as a positive impact at one NSUH site during the previous reporting period. This was in relation to the reduction of sheep numbers trespassing within Killarney National Park from adjoining areas through the erection of fences (Roche *et al.*, 2012b). Hunting for the management and control of deer (CI03) was also recorded by Roche *et al.* (2012b). Glenveagh NP carries out Rhododendron control (CI03), maintenance of tracks and trails (CF03) and control of deer numbers (CI05 – Red deer) (D. Duggan, NPWS, pers. comm.). Wicklow Mountains NP also maintain tracks and trails (CF03), control

	trespass of stock (CA05) and deer numbers (CI03 – Sika deer and occasional Fallow deer; CI05 – Red deer). In addition to these conservation measures, they enforce the Ministerial Direction 2010 on the use of All Terrain and Off-Road Vehicles where possible (CF03) and work towards a reduction in small-scale illegal dumping through the PURE project (CJ01), which is an environmental project established to combat illegal dumping in the Wicklow/Dublin uplands (http://www.pureproject.ie/). Finally, Wicklow Mountains NP also control fires where possible (CA05) and have worked closely with local farmers and Teagasc through the Wicklow Uplands Council, with the result of a reduction in farmer-lit fires (E. Mullen, NPWS, pers. comm.). Two Forest Service Circulars (10/2010 and 18/2011) advise against afforestation from large areas of upland sites containing sensitive habitats (CB01), while the Forestry Service (2015) state: "The inappropriate afforestation of sensitive habitats such as peat lands and wetlands will be avoided, as well as the negative effects on areas of ecological value including areas under high natural value farming". It should be noted however that there is no requirement to carry out EIAs on areas below 50 ha, thus relatively large areas can be afforested without adequate environmental assessment. Also, although there has been a documented move of afforestation from peatland and upland areas to wet mineral soils and lower elevations (20% of area planted in 2000 to 4% in 2011) (Forestry Service, 2015), there is now pressure to increase land availability for afforestation on unenclosed land, with 114 ha of unenclosed land afforested in 2012 and 106 ha in 2013 (COFORD, 2016). While unenclosed land is not synonymous with 4010 habitat it is assumed these lands include some areas of this habitat. The Forest Service has been involved in the development of Wildfire Interagency Groups and local-level partnerships in fire-prone counties in order to permit better targeted fire prevention and enforcement (CA05). A number of demonstration prescribed burns were carried out in 2016, one of which was carried out under the supervision of the KerryLIFE Project, while Teagasc arranged a mechanised vegetation management demonstration to demonstrate alternative methods of vegetation management (EFFIS, 2017) (CA05). The EU KerryLIFE Project commenced in 2014 with the aim of improving selected populations of Freshwater Pearl Mussel towards favourable conservation condition through sustainable management of c. 2,500 ha of farmed lands (CA03 and CA05). The proposed sensitive grazing regime is expected to improve cover and height of heathers, while encouraging areas of bare or eroding peat to re-vegetate. If successful, it is likely to have most benefit for the peatland habitats within the catchment area, including 4010 habitat (C. Douglas, NPWS, pers. comm.). Response to measures will not be available until the next reporting period. A total of eight European Innovation Partnership (EIP) projects with peatland focus or actions have been selected and offered financial support through the EIP-Agri budget administered by the Department of Agriculture, Food and the Marine. The total budget for these projects (albeit not entirely dedicated towards peatland

	actions alone) is significant. Three projects have already been initiated, with ecologically sustainable grazing in upland habitats a cross-cutting deliverable (CA03 and CA05). The response to measures will not be apparent until the next reporting period due to the infancy of these projects. The EIP project 'Blackstairs Farming Futures (BFF) Sustainable farming project in the Blackstairs Mountains' aims to maintain and improve peatland habitats and associated semi-natural habitats within the Blackstairs Mountains (CA03 and CA05), with the EIP project 'Sustainable Uplands Agri-environment Scheme (SUAS)' having a similar objective. The EIP project 'A Sustainable Agricultural Plan for the MacGillycuddy Reeks – Conservation and restoration of Upland Habitat in the MacGillycuddy Reeks' proposes to reintroduce suitable cattle breeds to manage upland peatlands (e.g. wet heath, dry heath and blanket bog) and grasslands, with particular interest in their use to manage scrub (CA04). It proposes to clear 85 ha of Rhododendron (CI03) and 85 ha Bracken (CI05), and to manage recreational impacts and provide and maintain trails to prevent damage to upland habitats such as 4010 habitat (CF03). A recent PhD study, which commenced in 2011, is investigating 'Conservation Grazing with Native Irish Cattle in High Nature Value (HNV) Environments' (K. Kelly with the Institute of Technology, Tralee). The aim of this research is to 'develop evidence-based management recommendations for the uplands, specifically with regard to the impact of cattle grazing on upland habitats' (Kelly *et al.* n.d.). The research area was previously heavily grazed by sheep with numbers greatly reduced in recent years. Land managers are now seeking to establish an appropriate grazing regime which will maintain and improve the condition of the habitats on site (including 4010 habitat) (CA05). Results of this research are currently being analysed, therefore the response to cattle grazing will not be apparent until the next reporting period.

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	*Good /* ***Poor*** */ Bad / Unknown*
	c) Structure and functions	*Good / Poor /* ***Bad*** */ Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as stable. Current range is equal to the Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as stable, as no change in range is expected based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Range are therefore good. Short-term trend direction of Area is assessed as decreasing. Current area is less than the Favourable Reference Area (< 10% below FRA). Conservation status of Area is therefore Unfavourable-Inadequate.	

	Future trend of Area is assessed as negative, as the threats of B01 and D01 in particular are expected to have a negative influence on Area, especially for areas of 4010 habitat outside of SACs, even with the conservation measure CB01 in place. Future prospects of Area are therefore poor. Short-term trend direction for Area is deemed to be stable for habitat that is in good condition. Current Structure and functions are assessed as Unfavourable as <90% of habitat is in good condition. A maximum estimate of 85.4% of 4010 habitat is in deemed to be in bad condition, which equates to Unfavourable-Bad Structure and functions. Conservation status of Structure and functions is therefore Unfavourable-Bad. Future trend of Structure and functions is assessed as stable, as although the threats of A09, A11 and L01 are expected to have a negative influence on Structure and functions, their presence is not expected to change the overall status of Structure and functions within the next 12 years. Where the conservation measures CA03, CA05 and CF03 occur they would be expected to balance the threats, however it should be noted that these are not implemented across the national distribution of the habitat, nor are they specifically targeted measures for the 4010 habitat. Future prospects of Structure and functions are therefore bad.

10 Conclusions

Assessment of conservation status at end of reporting period

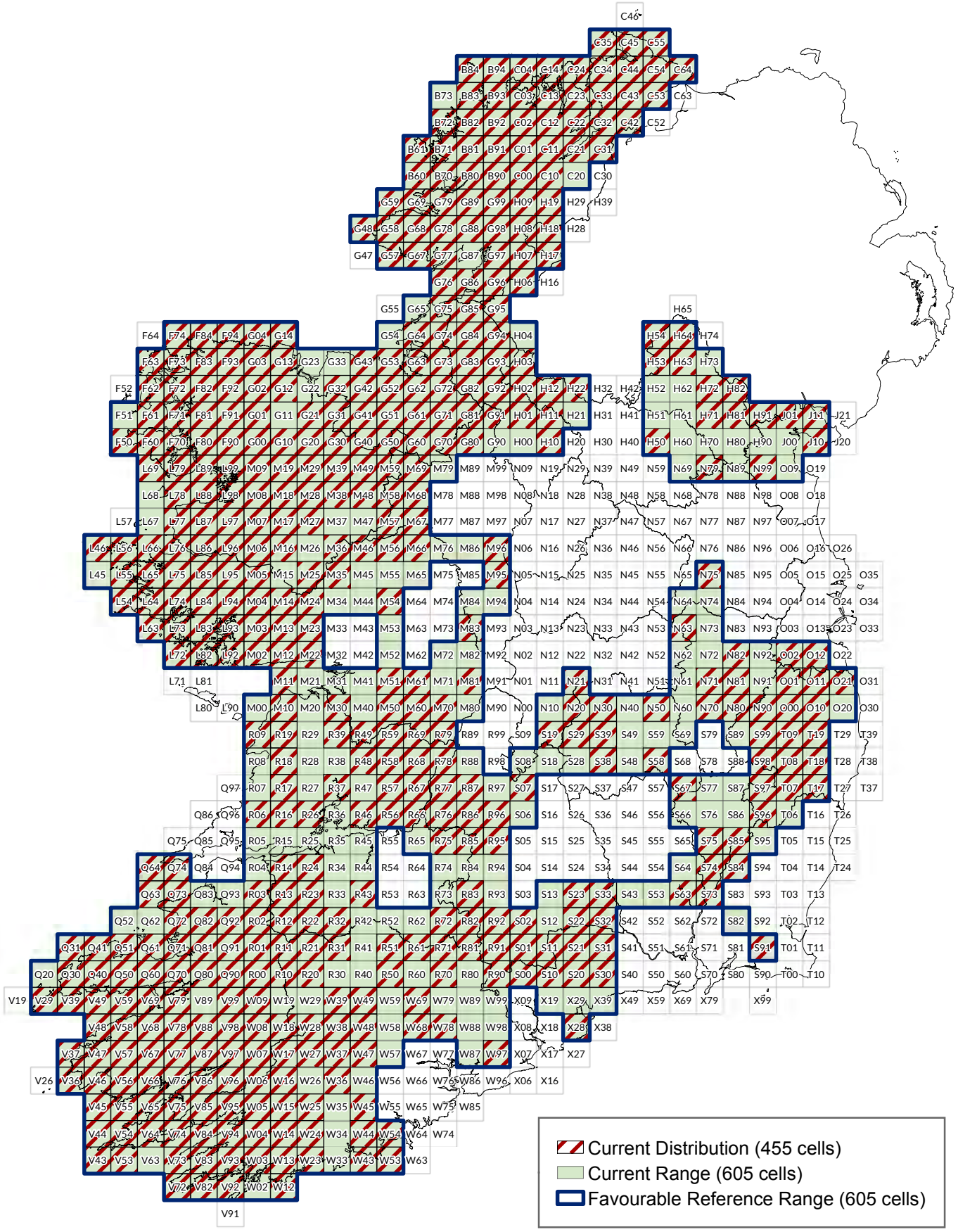
10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2****) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving /* ***deteriorating*** */ stable / unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/****NO***	***YES****/NO*

	b) yes, due to genuine change	*YES/NO*	***YES****/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	*YES/**NO***
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/**NO***
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/**NO***
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	***genuine change** / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	The Conservation Status of Range is Favourable in this reporting period, as it was in the previous reporting period. The Conservation Status of Area is Unfavourable-Inadequate in this reporting period, as it was in the previous reporting period. The Conservation Status of the Structure and functions and Future prospects are Unfavourable-Bad in this reporting period, as they were in the previous reporting period. The Overall Conservation Status is assessed as Unfavourable-Bad, as it was during the last reporting period. The status of Unfavourable-Bad during the current reporting period is due to <25% of the area of 4010 habitat being assessed as having Favourable Structure and functions. Trend in Overall Conservation Status is assessed as 'deteriorating' in this reporting period, but was assessed as 'stable' during the previous reporting period. The known losses of area within the current and previous reporting periods (approx. 0.002% per annum since 1994) resulted in the short-term trend for Area to be assessed as 'decreasing'. However, as the area data are based on two SAC site surveys only, and as c. 50% of the wet heath resource lies outside of SACs, this must be taken as a minimum figure. The trend is the same as that recorded for 4010 Area for the previous reporting period. In the last reporting period the 'decreasing' trend for Area was offset by an 'increasing' trend in Structure and functions, resulting in the trend in Overall Conservation Status being assessed as 'stable'. However, as the short-term trend for Structure and functions is assessed as 'stable' for this reporting period, the 'decreasing' trend in Area cannot be offset, so the trend in Overall Conservation Status is assessed as 'deteriorating'.		

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***811.54 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable** / increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing a union between the distribution polygon shapefile and the SAC shapefile, and an intersect between the distribution point shapefile and SAC shapefile. The area given in section 11.1 is the total area of 4010 habitat in SACs in the country, including some SACs where 4010 is not listed as a qualifying interest (QI). The area of 4010 within the Natura 2000 network where it is listed as a QI is 663.15 km^2. Approximately 0.09 ha was determined to be lost within this reporting period due to tracks and site clearance within the Corraun Plateau SAC (000485) where 4010 is listed as a QI (J. Fossitt, Divisional Ecologist with NPWS, pers. comm.). There were no inconsistencies between the Natura 2000 sites where the 4010 habitat is listed as a QI and the current distribution for the habitat. The short-term trend of the 4010 habitat in good condition within the SAC network is taken to be stable, with the same trend as the 4010 habitat nationally (section 6.4). The surface area of 4010 habitat within the Natura 2000 network has increased since the last reporting period; this is due to improved knowledge lending itself to a refinement of area totals (see section 5.15 for details).	

12 Complementary information

Wet heath (4010)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**4030 European dry heaths**
1.2i Habitat short name	**Dry heath**
1.3i Habitat description	Habitat 4030 Dry heath comprises vegetation dominated by ericaceous dwarf shrubs and usually occurs on well-drained, nutrient-poor and acidic mineral soils or shallow peats (typically < 50 cm deep) on sloping ground. *Calluna vulgaris* is usually the main species but *Erica cinerea, Ulex gallii* and *Vaccinium myrtillus* may also be important components. Dry heaths occur from sea level up to around 400 m, where they start to merge into 4060 Alpine and Boreal heaths. Calcareous dry heaths, where dwarf shrub communities have developed on leached soils over a base-rich substrate (e.g. in the Burren), are also included; these communities tend to contain several species of calcareous grassland. Stands of *Ulex europaeus* are deemed to be scrub communities and are not included. The habitat has affinities to the *Ericion cinereae*, *Daboecion cantabricae*, *Ulicion*, *Kobresio-Dryadion* and *Calluno-Genistion pilosae* associations (Perrin, 2017). According to the Irish Vegetation Classification (Perrin, 2017) most examples of the *Calluna vulgaris-Hypnum jutlandicum* heath community (HE2B) occur in habitat 4030, and elements of other communities within the *Dryas octopetala-Sesleria caerulea* (HE1), *Erica cinerea-Calluna vulgaris* (HE2) and *Vaccinium myrtillus-Racomitrium lanuginosum* (HE3) heath groups, can also occur.

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***1949-2016***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was derived from a polygon shapefile and a point shapefile. These shapefiles were created by compiling relevant data which referred to habitat 4030 or Fossitt code HH1 and HH2 (Fossitt, 2000) or a relevant NPWS habitat code in their attributes. Sources include Barron & Daly (2015a, 2015b), Coillte Biodiversity Dataset (various dates), Curtis & Wilson (2014), Daly & Barron (2014,

	2015), Foss *et al.* (2014, 2015), Galway County Council (2017), Hodd (2012, 2015a, 2015b, 2016), Martin *et al.* (2018), Moran & Wilson-Parr (2015), O'Neill & Martin (2018), O'Neill *et al.* (2013a), Perrin (2017) which comprises data ranging from 1949 to 2011, Perrin *et al.* (2014a, 2014b), Tubridy *et al.* (2015) and Wilson & Duff (2014). In addition to these, sources utilised for the distribution map from the last reporting period (NPWS, 2013a) were also included: 13 National Survey of Upland Habitats (NSUH) sites (Perrin *et al*., 2011, 2012, 2013a-e; Roche *et al.*, 2009, 2010a, 2010b, 2011a, 2011b, 2012a), Anon (1998, 2005, 2007, 2010), Barron & Perrin (2010, 2011), Burren and Glenveagh National Park Habitat Maps, Cooper *et al.* (2012), Crushell & O'Callaghan (2008), Foss & Crushell (2012), Foss *et al.* (2012), Hickey & Tubridy (2009), Murphy & Fernandez (2009), NPWS (2013b), NPWS Habitat Assignment Project, O'Donoghue *et al.* (2008, 2011), O'Neill *et al.* (2013b), Wilson (2009) and Wilson & Foss (2011). GIS files from the Carlow Pilot Habitat Mapping Project (Carlow County Council), the Cavan Wetland Survey (Cavan County Council), Dún Laoghaire-Rathdown habitat survey (Dún Laoghaire-Rathdown County Council), Fingal Local Area Surveys (Fingal County Council), Lough Derg Habitat Survey (Clare County Council), N18 EIS (Galway County Council), South Clare Habitat Map Cratloe to Parteen (Clare County Council) and Uplands and Peatlands Grazing Survey (NPWS) were also utilised for the distribution map from the last reporting period (NPWS, 2013a). All references are detailed below in section 3.2. A certainty rating system was applied to all data that informed the distribution map. This system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1 the lowest. Of the new data sources added since the last round of reporting (NPWS, 2013a), the following were all judged to be a high certainty of 3: Barron & Daly (2015a, 2015b), Daly & Barron (2014, 2015), Foss *et al*. (2014, 2015), Galway County Council (2017), Hodd (2012, 2015a, 2015b, 2016), O'Neill & Martin (2018), O'Neill *et al*. (2013a), Perrin *et al*. (2014a, 2014b) and Wilson & Duff (2014). The majority of data from Martin *et al.* (2018) were assigned a certainty of 3, however for two polygons the type of heath was not defined and therefore these were assigned a certainty of 1. Tubridy *et al.* (2015) 4030 polygons were assigned a certainty of 3 for those which were ground-truthed and a certainty of 2 for those carried out by aerial photograph interpretation (API) only. The Coillte Biodiversity Dataset polygons were assigned a certainty of 1 for those which were not ground-truthed, or where 4030 was not listed as present under the Annex I habitats section but HH1 or HH2 were present, and a certainty of 2 for those which were ground-truthed. Certainty 3s were not assigned to the Coillte Biodiversity Dataset due to the age of the data (surveyed in early 2000s). Data from Perrin (2017) have no habitat data included, only affinities to Annex I habitats. Those with a higher affinity to habitat 4030 over other Annex I habitats were assigned a certainty of 2 while those with a higher affinity to another Annex I habitat over habitat 4030 were assigned a certainty of 1. All sites within Moran & Wilson-Parr (2015) were within SPAs, with all site synopses for these SPAs citing the presence of both wet and dry heath. The type of heath (wet or dry) was not determined within the GIS shapefiles however, and the

	majority of work was carried out by API only, therefore data were assigned a certainty of 1. Certainty values from the datasets utilised during the last reporting period were not reassigned for the purposes of the distribution map as the classes within the certainty rating system are fairly broad, and the 4030 habitat itself is relatively stable. All polygons and points with certainty 1 to 3 were used to map the distribution for the 4030 habitat.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Anon. (1998) Manual for the preparation of Commonage Framework Plans. National Parks and Wildlife Service and Department of Forestry and Food. Ireland. Anon. (2005) Galway City Habitat Inventory. Unpublished report by Natura Environmental Consultants for Galway City Council. Anon. (2007) Survey and mapping of habitats in the Carrigaline Electoral Area. Unpublished report by Compass Informatics for Cork County Council. Anon. (2010) Pilot ecological study of two Donegal Islands: Inishfree Upper and Inishmeane. Unpublished report for Donegal County Council by Aulino Wann & Associates and Gaia Associates. Barron, S.J. & Daly, O.H. (2015a) Surveys of possible Marsh Fritillary sites and habitat in Cos. Clare (outside the Burren) and Kerry, Final report. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland. Barron S.J. & Daly O.H. (2015b) Phase 1 of the scientific work to inform a system for the management of turf-cutting in designated blanket bog SACs and NHAs: Phase 1 Over-arching report – DRAFT. Unpublished draft report to National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin Barron, S. & Perrin, P. (2010) Review and amendment of GIS mapping for blanket bog NHAs. Unpublished report to National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Barron, S. & Perrin, P. (2011) Production of a habitat map for Killarney National Park, Co. Kerry. Unpublished report to National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Burren National Park Habitat Map is an NPWS habitat mapping project. Habitat information is based on a broad habitat map of the wider Burren area, which was prepared in 2006, together with other maps of varying ages. Carlow Pilot Habitat Mapping Project. GIS files for this Carlow County

Council habitat survey were available.

Cavan Wetland Survey. GIS files for this Cavan County Council habitat survey were available.

COFORD (2016) Land Availability for Afforestation – Exploring opportunities for expanding Ireland's forest resource. COFORD, Dublin. http://www.coford.ie/media/coford/content/publications/coforarticles/LandAvailabAfforestation130116.pdf

Coillte Biodiversity Dataset. GIS files and individual site management plans were made available by Coillte. Datasets used were from 2000 to 2005.

Coll, J., Bourke, D., Gormally, M., Sheehy Skeffington, M. & Sweeney, J. (2012) Winners and Losers: Climate change impacts on biodiversity in Ireland. Report Series No. 19. Environmental Protection Agency, Johnstown Castle, Ireland. https://www.epa.ie/pubs/reports/research/climate/CCRP_19.pdf

Cooper, F., Stone, R.E., McEvoy, P., Wilkins, T. & Reid, N. (2012) The conservation status of juniper formations in Ireland. *Irish Wildlife Manuals*, No. 63. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/IWM63.pdf

Crushell, P. & O'Callaghan, R.J. (2008) A survey of Red Grouse (*Lagopus lagopus*) habitat in Ireland 2007-2008: an assessment of habitat condition and land-use impacts. Unpublished report to Birdwatch Ireland and the National Parks and Wildlife Service.

Curtis, T. & Wilson, F. (2014) Orchid Ireland Survey 2014. Report prepared for the National Museum and Galleries of Northern Ireland.

Daly, O.H. & Barron, S. (2014) Surveys of possible Marsh Fritillary sites and habitat in Cos Louth, Meath & Monaghan, Final report. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.

Daly, O.H. & Barron, S. (2015) Surveys of possible Marsh Fritillary sites and habitat in Cos. Galway and Mayo, Final report. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.

Dún Laoghaire-Rathdown habitat survey 2011. GIS files for this Dún Laoghaire-Rathdown County Council habitat survey were made available.

European Commission (eip-agri): 'A sustainable agricultural plan for the MacGillycuddy Reeks – Conservation and restoration of upland habitat in the MacGillycuddy Reeks'. https://ec.europa.eu/eip/agriculture/en/find-connect/projects/sustainable-agricultural-plan-macgillycuddy-reeks

European Commission (eip-agri): 'Blackstairs farming futures (BFF) Sustainable farming project in the Blackstairs Mountains'. https://ec.europa.eu/eip/agriculture/en/find-

connect/projects/blackstairs-farming-futures-bff-sustainable

European Commission (eip-agri): 'Sustainable Uplands Agri-environment Scheme (SUAS)'. https://ec.europa.eu/eip/agriculture/en/find-connect/projects/sustainable-uplands-agri-environment-scheme-suas

Fingal Local Area Surveys. GIS files for this project were made available by Fingal County Council.

Forest Service, Department of Agriculture, Food and the Marine (2015) Forestry Programme 2014-2020: IRELAND. Submitted in accordance with European Union Guidelines on State aid for agriculture and forestry and in rural areas 2014 to 2020. https://www.agriculture.gov.ie/media/migration/forestry/forestryprogramme2014-2020/IRELANDForestryProgramme20142020230215.pdf

Foss, P.J. & Crushell, P. (2012) Wetland Survey County Monaghan II. Report prepared for Monaghan County Council and The Heritage Council.

Foss, P.J., Crushell, P., O'Loughlin, B. & Wilson, F. (2012) Louth Wetland Survey II. Part 1: Main Report. Report prepared for Louth County Council and The Heritage Council.

Foss, P.J., Crushell, P., Kirwan, B., O'Loughlin, B. & Wilson, F. (2014) Louth Wetland Survey III. Part 1: Main Report. Report prepared for Louth County Council and The Heritage Council.

Foss, P.J., Crushell, P. & Kirwan, B. (2015) County Waterford Wetland Survey. Part 1: Main Report. Report prepared for Waterford City & County Council.

Fossitt, J.A. (2000) *A guide to habitats in Ireland*. The Heritage Council, Kilkenny. https://www.npws.ie/sites/default/files/publications/pdf/A%20Guide%20to%20Habitats%20in%20Ireland%20-%20Fossitt.pdf

Galway County Council (2017) Unpublished data collected for the Galway City Transport Project.

Glenveagh National Park Habitat Map is an NPWS map produced in 2010 based on the NHA survey data collected between 1991 and 1994 and on work completed by Lynda Weekes. The map is derived from the best information available at the time, site visits and aerial photograph interpretation.

Habitat Assignment Project (n.d.). An NPWS spreadsheet noting the qualifying interest of SACs and other habitats which occur in SACs, NHAs and pNHAs. This table was used as a reference for incorporating polygon data for SACs, NHAs and pNHAs.

Hickey, B. & Tubridy, M. (2009) Habitats Survey (Phase V) County Laois. Unpublished report by Mary Tubridy and Associates for Laois Heritage Forum.

Hodd, R. (2012) A study of the ecology of the oceanic montane vegetation of western Ireland and its potential response to climate change. PhD Thesis, National University of Ireland, Galway.

Hodd, R.L. (2015a) Survey of Flora Protection Order Bryophytes in Cork and Kerry (H1-H5). Unpublished report to National Parks

and Wildlife Service, Dublin, Ireland.

Hodd, R.L. (2015b) Survey of Flora Protection Order Bryophytes 2015. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.

Hodd, R.L. (2016) Survey of Flora Protection Order Bryophytes 2016. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.

JNCC (2009) *Common Standards Monitoring Guidance for Upland Habitats.* Joint Nature Conservation Committee, Peterborough.

Joint Research Centre (2014) Forest Fires in Europe, Middle East and North Africa 2013. Joint report of JRC and Directorate-General Environment. http://effis.jrc.ec.europa.eu/media/cms_page_media/40/FireReport2013_final2pdf_2.pdf

Joint Research Centre (2015) Forest Fires in Europe, Middle East and North Africa 2014. Joint report of JRC and Directorate-General Environment. http://effis.jrc.ec.europa.eu/media/cms_page_media/40/Forest_fires_in_Europe_Middle_east_and_North_Africa_2014_final_pdf_YNHDYbP.pdf

Joint Research Centre (2016) Forest Fires in Europe, Middle East and North Africa 2015. Joint report of JRC and Directorate-General Environment. http://effis.jrc.ec.europa.eu/media/cms_page_media/40/Forest_fires_in_Europe_Middle_east_and_North_Africa_2015_final_pdf_JkX4Yl3.pdf

Joint Research Centre (2017) Forest Fires in Europe, Middle East and North Africa 2016. Joint report of JRC and Directorate-General Environment. http://effis.jrc.ec.europa.eu/media/cms_page_media/40/Forest_fires_in_Europe_Middle_east_and_North_Africa_2016_final_pdf_JZU7HeL.pdf

Kelly, K., Twamley-Stein, G.T. & Higgins, G.T. (n.d.) Preliminary Report on the Mount Brandon Nature Reserve Grazing Project. Unpublished report submitted to NPWS.

Lough Derg Habitat Survey. GIS files for this project were made available by Clare County Council.

Martin, J.R., O'Neill, F.H. & Daly, O.H. (2018) The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats. *Irish Wildlife Manuals*, No. 102. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin.

Moran, P. & Wilson-Parr, R. (2015) Hen Harrier Special Protection Area (SPA) Habitat Mapping Project 2014. *Irish Wildlife Manuals*, No. 83. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/IWM83.pdf

Murphy, S. & Fernandez, F. (2009) The development of methodologies to assess the conservation status of limestone pavement and associated habitats in Ireland. *Irish Wildlife*

Manuals, No. 43. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/IWM43.pdf

N18 EIS. GIS files for this project were made available by Galway County Council.

Natura (2012) Galway City Council Ardaun Local Area Plan Habitat Assessment. Report prepared for Galway City Council. Natura, Wicklow.

NPWS (2013a) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin. https://www.npws.ie/sites/default/files/publications/pdf/Article_17_Print_Vol_2_report_habitats_v1_1_0.pdf

NPWS (2013b) Management Planning Support Unit Maps 2405_imap95 (CPU_Habitats_March_2012.shp).

O'Donoghue, P., O'Hora, K. & Delaney, E. (2008) Blarney Electoral District Habitat Mapping 2008. Atkins (Ecology). Report prepared for Cork County Council. Atkins, Cork.

O'Donoghue, P., Gittings, T., Delaney, E. and O'Hora, K. (2011) Midleton Area Habitat Survey and Mapping Project 2011 (Phase III). Main Report. Prepared for Cork County Council, Atkins, Cork.

O'Neill, F.H. & Martin, J.R. (2018) The Irish Juniper Monitoring Survey 2017. *Irish Wildlife Manuals*, No. 101. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

O'Neill, F.H., Barron, S.J., Smith, G.F. & Brophy, J.T. (2013a) A preliminary habitat corridor map for Co. Waterford. A report for Waterford County Council.

O'Neill, F.H., Martin, J.R., Devaney, F.M. & Perrin, P.M. (2013b) The Irish semi-natural grasslands survey 2007-2012. Irish Wildlife Manuals, No. 78. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. https://www.npws.ie/sites/default/files/publications/pdf/IWM-78-Irish-semi-natural-grassland-survey.pdf

Perrin, P. (2017) Irish Vegetation Classification: Technical Progress Report No. 3. Report submitted to National Biodiversity Data Centre. http://www.biodiversityireland.ie/projects/national-vegetation-database/irish-vegetation-classification/explore/

Perrin, P.M., Roche, J.R. & Barron, S.J. (2011) National Survey of Upland Habitats (Phase 1, 2010 - 2012) Site Report No 1: Mweelrea, Sheeffry, Erriff Complex cSAC (001932), Co. Mayo. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH10_Mweelrea_Sheeffry_Erriff_Report_01c_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J. & Daly, O.H. (2012) National Survey of Upland Habitats (Phase 2, 2011-2012), Site Report No. 7: Mount Brandon cSAC (000375), Co. Kerry. National Parks and

	Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH11_Mount_Brandon_Report_01b_M.pdf Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013a). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 10: Ox Mountains Bogs cSAC (002006), Cos. Mayo and Sligo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Ox_Mountains_Bogs_Report_01b_M.pdf Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013b). National Survey of Upland Habitats (Phase 3, 2012-2013), Draft Site Report No. 11: Ben Bulben, Gleniff and Glenade Complex cSAC (000623), Co. Sligo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013c). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 12: Arroo Mountain cSAC (001403), Co. Leitrim. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Arroo_Mountain_Report_01b_M.pdf Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013d). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 13: Cuilcagh – Anierin Uplands cSAC (000584), Cos. Cavan and Leitrim. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Cuilcagh_Anierin_Uplands_Report_01b_M.pdf Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013e). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 14: Slieve League cSAC (000189), Co. Donegal. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Slieve_League_Report_01b_M.pdf Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014a). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 15: Slieve Mish Mountains cSAC (002185), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH13_Slieve_Mish_Mountains_01b_M.pdf Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014b). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 16: Caha Mountains cSAC (000093), Cos. Cork and Kerry. National Parks and Wildlife

Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH13_Caha_Mountains_01b_M.pdf

Perrin, P.M., Barron, S.J., Roche, J.R. & O'Hanrahan, B. (2014c) Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland. Version 2.0. *Irish Wildlife Manuals*, No. 79. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/IWM79.pdf

Renou-Wilson, F. & Wilson, D. (2018) Vulnerability assessment of peatlands: exploration of impacts and adaptation options in relation to climate change and extreme events (VAPOR). EPA Research Report No. 250. Environmental Protection Agency, Johnstown Castle, Ireland. http://www.epa.ie/researchandeducation/research/researchpublications/researchreports/Research_Report_250.pdf

Roche, J.R., Perrin, P.M. & Barron, S.J. (2009) National Survey of Upland Habitats (Pilot Survey Phase, 2009-2010), Site Report No. 2: Corraun Plateau cSAC (000485), Co. Mayo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/SPEU09_Corraun_Plateau_Report_01b_M.pdf

Roche, J.R., Perrin, P.M. & Barron, S.J. (2010a) National Survey of Upland Habitats (Pilot Survey Phase, 2009-2010), Site Report No. 3: Comeragh Mountains cSAC (001952), Co. Waterford. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/SPEU09_Comeragh_Mountains_Report_01b_M.pdf

Roche, J.R., Perrin, P.M. & Barron, S.J. (2010b) National Survey of Upland Habitats (Pilot Survey Phase, 2009-2010), Site Report No. 4: Carlingford Mountain cSAC (000453), Co. Louth. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/SPEU09_Carlingford_Mountain_Report_01b_M.pdf

Roche, J.R., Perrin, P.M. & Barron, S.J. (2011a) National Survey of Upland Habitats (Phase 1, 2010 - 2012), Site Report No. 6: Croaghaun / Slievemore cSAC (001955), Co. Mayo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH10_Croaghaun_Slievemore_Report_01b_M.pdf

Roche, J.R., Perrin, P.M. & Barron, S.J. (2011b) National Survey of Upland Habitats (Phase 1, 2010 - 2012), Draft Site Report No. 5: Nephin Mountain, Co. Mayo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Roche, J.R., Perrin, P.M., Barron, S.J. & Daly, O.H. (2012a) National Survey of Upland Habitats (Phase 2, 2011-2012), Site Report No.

	9: Galtee Mountains cSAC (000646), Cos. Tipperary and Limerick. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH11_Galtee_Mountains_Report_01b_M.pdf Roche, J.R., Perrin, P.M., Barron, S.J. & Daly, O.H. (2012b) National Survey of Upland Habitats (Phase 2, 2011-2012), Draft Site Report No. 8: Killarney National Park, Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. South Clare Habitat Map Cratloe to Parteen (n.d.). GIS files for this project were made available by Clare County Council. Tubridy, M., Iremonger, S., Hickey, B. and O'Hanrahan, B. (2015) Blackstairs Habitat Mapping and Biodiversity Audit 2015. Report for the Blackstairs Farming Group. Uplands and Peatlands Grazing Survey. GIS files for this NPWS project, completed in 2011, were available. Wilson, F. (2009) County Sligo Wetland Survey Phase II County Report. Unpublished report for Sligo County Council. Wilson, F. & Duff, K. (2014) Derrynane National Historic Park dune grassland survey and management recommendations. Unpublished report for The Office of Public Works, Knockreer House, Killarney, Co. Kerry. Wilson, F. & Foss, P. (2011) The County Wicklow Wetland Survey. Report for Wicklow County Council and The Heritage Council.
3.2i Additional information	Dwyer, N. (2013) The Status of Ireland's Climate, 2012. EPA, Wexford. http://www.epa.ie/pubs/reports/research/climate/CCRP26%20-%20Status%20of%20Ireland's%20Climate%202012.pdf

4 Range

Range within the biogeographical/marine region concerned

4.1 Surface area	***66,600 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 66,600 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable Reference Range has been increased since the last reporting period (NPWS, 2013a) to reflect the improved level of knowledge. There is no evidence of loss of range since the Directive came into force and no enlargement of range is deemed necessary to ensure the long-term survival of the habitat.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 4030 habitat. A maximum gap distance of two 10km grid cells was used when running the range tool. Short-term trend in Range was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013a). Data used for the short-term trend dated from 2007 to 2016, while those used for the long-term trend dated from 1994 to 2016. There were no recorded losses of area resulting in a loss of range at the sample sites covered by the NSUH during these two reporting	

	periods. The short-term trend is stable. It should be noted that the NSUH surveyed two 4030 habitat sites within this reporting period compared with 13 sites in the last reporting period, thereby limiting the conclusions that can be made. The number of 10km squares in the range (666) is 34 squares higher than the last monitoring period (NPWS, 2013a). These changes are due to improved knowledge within the current reporting period. The following surveys, all with data utilised in this reporting period, added to the range: Slieve Beagh SPA, Monaghan (four squares), Slievefelim to Silvermine Mountain SPA, Limerick (three squares) and Stack's to Mullaghareirk Mountains SPA, Limerick, Cork and Kerry (14 squares) (Moran & Wilson-Parr, 2015); Lemgare Rocks, Monaghan (three squares) (Daly & Barron, 2014); Tara Hill, Wexford (one square), Slieveanard, Tipperary (one square), Killeen and Black Rock, Limerick (two squares) and Carrigatubbrid and Tory Hill, Kilkenny (four squares) (Coillte Biodiversity Dataset); and Ballinlough, Waterford (two squares) (O'Neill *et al.*, 2013a). Favourable Reference Range (FRR) has been increased since the last reporting period (NPWS, 2013a) to reflect the improved level of knowledge. The FRR is the current range, reported in section 4.1.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***1949-2016***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***1,230.01 km^2***
5.3 Type of estimate	*Best estimate / 95% confidence interval /* ***<u>minimum</u>***	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***<u>b) Based mainly on extrapolation from a limited amount of data</u>*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	*stable / increasing /* ***<u>decreasing</u>*** */ uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator > (more than) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	***YES****/NO*
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 1949 when bog and heath relevés were recorded by Braun-Blanquet and Tüxen (data utilised in Perrin, 2017) and incorporates updates made by surveys between 1959 and 2017 that are listed in section 3.2. Area was calculated from the polygon shapefile and point shapefile	

	used for distribution. For each point record not intersecting a polygon that was yielding an area, 10 ha of habitat was estimated. This is a conservative expert opinion based on the logic that the 4030 habitat can cover substantial areas as this, along with wet heath (Annex I 4010 habitat), can form the landscape matrix in the uplands. Points within site boundaries of surveys carried out within the current reporting period, but not within 4030 habitat polygons, were examined individually, with ten excluded for area due to their proximity to 4030 polygons. During the current reporting period 21 datasets with 4030 habitat recorded within them were utilised; two of these datasets were sites assessed for Area as part of the NSUH. The two NSUH sites (Caha Mountains SAC (000093) and Slieve Mish Mountains SAC (002185)) contain only 1.0% of the total area of 4030 habitat recorded in Ireland, thus limiting the conclusions that can be made. The default trend periods are presented above and are used to calculate the magnitude of annual loss; however the data used for the short-term trend dated from 2005 to 2014, while those used for the long-term trend dated from 1995 to 2014. Approximately 0.09 ha of 4030 habitat, within the NSUH site Slieve Mish Mountains SAC (002185), was determined to be lost since 2005 mainly due to a landslide (Perrin *et al.*, 2014a). In addition to this, J. Fossitt, Divisional Ecologist with NPWS, reported a loss of limestone pavement, calcareous heath and calcareous grassland from within the Ardaun Local Area Plan (LAP) lands, County Galway. In an ecological survey carried out by Natura (2012) for the purposes of the LAP, it was estimated that the area of calcareous grassland/heath was approximately 1 ha. As per J. Fossitt's correspondence, this area was subsequently lost due to excavation and land reclamation sometime between 2012 and 2014. It is assumed for the purposes of this report that the calcareous heath mentioned is synonymous with the Annex I habitat 4030, with 1 ha taken as the maximum area of 4030 habitat lost. The total known area of 4030 habitat lost since 2005 is approximately 2.27 ha (1.09 ha from Perrin *et al.* (2014a) and J. Fossitt (pers. comm.) and an additional 1.18 ha as reported by previous NSUH surveys). The magnitude of the known loss is therefore approximately -0.0002% per annum, measured over a period of 12 years, but actual losses are likely to be significantly higher. There were small reported gains in area (3.1 ha) since 1995 in the Slieve Mish Mountains SAC (002185) (Perrin *et al*. 2014a), Comeragh Mountains SAC (001952), Carlingford Mountain SAC (000453) and Croaghaun/Slievemore SAC (001955) due to succession (revegetation of bare ground), with 0.29 ha of this area gained since 2005 in the Comeragh Mountains SAC (001952). These gains were not enough to counteract losses on a national scale, however. Short-term trend in Area was deemed to be decreasing. There has not been a comprehensive survey of this habitat in Ireland, with more detailed survey work of the 4030 habitat needed. It is expected that the area listed in section 5.2 will be refined as more in-depth mapping of the 4030 habitat is completed. In particular, any area represented within the dataset by only a point needs to be surveyed in more detail. In addition to refining the areas of 4030

	habitat currently known, there are probably still areas of unmapped 4030 habitat within the country, particularly outside designated sites. The NSUH is currently incomplete and more examples of the 4030 habitat are likely to be found. The area value entered is therefore a minimum. Favourable Reference Area is deemed to be more than the current area, but less than 10% more, given that anthropogenic losses have occurred since the Directive came into force. Based on all NSUH sites surveyed to date, there has been a loss of 12.8 ha of 4030 habitat since 1995 (0.01% of the total). It should be noted that only one of the 16 sites surveyed through the NSUH is not an SAC. Losses of 4030 habitat due to impacts such as scrub encroachment, inappropriate burning, afforestation and agricultural reclamation and intensification outside of the SACs are likely to be significantly higher. The difference in habitat extent between this reporting period and the last is largely due to the availability of more accurate knowledge of the area of habitat 4030, resulting in the refinement of some area estimates from the last reporting period. The majority of this refinement occurred within the Caha Mountains SAC (000093), Slieve Mish Mountains SAC (002185) in Counties Cork and Kerry and in the Blackstairs Mountains in Counties Carlow and Wexford; however there were also refinements made in other parts of the country. Collectively 103.60 km^2 of 4030 habitat mapped in the last reporting period was replaced by 83.41 km^2 of 4030 habitat in this reporting period, resulting in a net reduction of 20.19 km^2. Additional surveys in this reporting period resulted in the addition of 155.98 km^2 of 4030 habitat which was previously unmapped. This refinement along with the documented loss in area of 0.01 km^2 from the Ardaun LAP lands, Co. Galway, in this reporting period resulted in an area of 1,230.01 km^2 of 4030 habitat ((1,094.223 – 20.19) + 155.984 – 0.01 = 1,230.01 km^2).

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***549.11 km²***
		Maximum	***857.28 km²***
	b) Area in not-good condition	**Minimum**	***372.73 km²***
		Maximum	***680.90 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		

6.3 Short-term trend of habitat area in good condition Period	***2007–2018***
6.4 Short-term trend of habitat area in good condition Direction	***stable** / increasing / decreasing / uncertain/ unknown*
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***
6.7 Typical species Method used *Optional*	The list of typical species is the same as the last reporting period (NPWS, 2013a). Typical species were assessed as an assemblage at the monitoring stop level within sites surveyed by the NSUH. At each monitoring stop a minimum of two indicator species were required, together with a cover of positive indicator species ≥ 50% for siliceous heaths and 50%-75% for calcareous heaths. The methodology used in Tubridy *et al.* (2015) was similar, in that at each monitoring stop a minimum of two indicator species were required, together with 25-75% cover of positive indicator species for species-rich 4030 heath, and ≥ 60% for other 4030 heath. The NSUH and Tubridy *et al.* (2015) criteria were used to assess the Structure and functions of the upland 4030 habitat, while the criteria used by Galway County Council (2017) were used to assess the Structure and functions of 4030 habitat associated with limestone pavement. For Galway County Council (2017) a minimum of seven indicator species were required. As all surveys were baseline surveys, trends for the assemblage and for individual species were not assessed.
6.8 Additional information *Optional*	The NSUH (Perrin *et al.*, 2014c) assessed Structure and functions at a monitoring stop level, using criteria to assess vegetation composition (including typical species), vegetation structure and physical structure; all criteria needed to be passed for a stop to pass. Criteria were adapted from the UK's Common Standards Monitoring (JNCC 2009) using expert judgement. The NSUH primarily assessed SACs and is currently incomplete in that habitat mapping and baseline plot data are still required for many upland areas. Where NSUH sites include commonage land, comparisons were made between NSUH and commonage station data with respect to a few shared parameters (area of bare peat, cover and height of *Calluna vulgaris*, and sward height). A total of 16 monitoring stops were recorded across the two NSUH sites surveyed within this reporting period. Five of the 15 stops (33.3% of stops) failed one or more of the criteria assessing the vegetation composition, vegetation structure and physical structure of 4030, with the following criteria having the highest failure rates: 'no signs of burning within sensitive areas in local vicinity' (20%); 'all growth phases of *Calluna vulgaris* throughout the local vicinity'

	(20%); 'cover of *Pteridium aquilinum'* (13.3%); 'number of positive species present' (13.3%); and 'cover of non-native species in relevé' (13.3%) and 'cover of non-native species in local vicinity' (13.3%). For full details see the NSUH site reports (Perrin *et al.*, 2014a, 2014b). Three of the seven stops recorded in 4030 habitat in Galway County Council (2017) failed the Structure and functions assessment. The criteria used were different from those described by Perrin *et al.* (2014c), with criteria including 'number of positive indicator species ≥ 7'; 'cover of herbaceous negative indicator species ≤ 10%'; 'cover of non-native species ≤ 1%'; 'cover of trees and scrub (excluding *Juniperus communis*) ≤ 25%'; and 'cover of disturbed bare ground (not including rocks/stones) ≤ 10%'. Those assessing 'cover of positive indicator species' (28.6%) and 'cover of trees and scrub (excluding *Juniperus communis*)' (28.6%) had the highest failure rates. Twenty-three of the 33 stops from Tubridy *et al.* (2015) failed the Structure and functions assessment. Their assessment criteria largely followed the criteria as described in the NSUH (Perrin *et al*., 2014c), however they used a cut-off threshold of ≥2 for 'number of bryophyte or non-crustose lichen species present' (as opposed to ≥3 in NSUH), 25-75% for 'cover of positive indicator species for species-rich heaths' (as opposed to 50-75% for calcareous heaths), ≥60% for 'cover of positive indicator species for other heath' (as opposed to ≥50% for siliceous heaths') and added the criterion of '≥25% cover for indicator dwarf shrubs' (as opposed to 'proportion of dwarf shrub cover composed of *Myrica gale, Salix repens, Ulex gallii* collectively <50%' in addition to 'area of bare peat (with or without evidence of trampling) <10%'. For full details see supporting documentation ('condition assessment of annex habitats in the SAC.xlsx') for Tubridy *et al.* (2015). The criteria assessing 'no signs of burning within sensitive areas in local vicinity' (36.4%) and 'cover of *Pteridium aquilinum'* (33.3%) had the highest failure rates. Of the area of 4030 habitat (~33.84 km^2) assessed for Structure and functions within this reporting period, 44.6% of the area was assessed as being in good condition (Favourable). Equal weighting was given to each of the stops as each one assesses a comparable area of habitat. The proportion in good (44.6%) and not-good condition (55.4%) was scaled up to the national estimate (549.11 km^2 in good condition and 680.90 km^2 in not-good condition); however, as the area assessed for Structure and functions in this reporting period only represents 2.8% of the national area of habitat 4030, data from the last reporting period were also utilised. During the last reporting period 69.7% of the 4030 habitat was assessed as Favourable (NPWS, 2013a). This equates to 857.28 km^2 of the current area of 4030 habitat and this figure is used as the maximum area in good condition. 30.3% of the 4030 habitat was assessed as Unfavourable (NPWS, 2013a). This equates to 372.73 km^2 of the current area of 4030 habitat and this figure is used as the minimum area that is not in good condition. The most frequent criteria to fail the Structure and functions assessment in the last reporting period were 'cover of positive indicator species for calcareous heaths', 'browsing of ericoids and *Empetrum nigrum* collectively' and 'all growth phases of *Calluna*

	vulgaris throughout the local vicinity' (NPWS, 2013a). The default short-term trend period is presented above; however the data used for the short-term trend dated from 2007 to 2016. Based on limited data, conclusions could be made that the area in good condition has declined; however, as this is based mainly on data from one part of the country (southwest Ireland: Cork and Kerry) with a poor national sample size, the trend was taken as stable based on expert opinion. Short-term trend of Structure and functions in the previous reporting period was assessed as 'improving' due to the expectation that the reduced grazing brought about by the Commonage Framework Plans (CFPs) after 1998 would have a positive effect on overgrazed areas of 4030 habitat. While there are still gradual improvements (recovery) of 4030 habitat in areas on many commonages and SACs, recovery in other areas is being retarded by grazing and/or uncontrolled burning. As with the Area assessment, it should be noted that only one of the 16 sites surveyed through the NSUH is not an SAC. The area of 4030 habitat in good condition outside the SACs is likely to be significantly lower due to activities such as afforestation, land reclamation and also uncontrolled burning. There was no evidence from the NSUH sites surveyed in the previous reporting period, or from this reporting period, that A10 (undergrazing) was a pressure. Typical indicator species from the NSUH for 4030 habitat are: *Arctostaphylos uva-ursi, Calluna vulgaris, Daboecia cantabrica, Empetrum nigrum, Erica cinerea, Ulex gallii, Vaccinium myrtillus* and *Vaccinium vitis-idaea.* Typical indicator species from Galway County Council (2017) for 4030 habitat are: *Breutelia chrysocoma, Calluna vulgaris, Campanula rotundifolia, Carex flacca, Carex pulicaris, Dicranum scoparium, Erica cinerea, Festuca ovina, Festuca rubra, Galium verum, Hypericum pulchrum, Lotus corniculatus, Molinia caerulea, Potentilla erecta, Scleropodium purum, Sesleria caerulea, Succisa pratensis* and *Thymus polytrichus*. Typical indicator species from Tubridy *et al.* (2015) for 4030 habitat were not listed.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A09** Intensive grazing or overgrazing by livestock (H) **A11** Burning for agriculture (H) **B01** Conversion to forest from	**A09** Intensive grazing or overgrazing by livestock (H) **A11** Burning for agriculture (H) **B01** Conversion to forest from

	other land uses, or afforestation (excluding drainage) (M) **D01** Wind, wave and tidal power, including infrastructure (M)	other land uses, or afforestation (excluding drainage) (M) **D01** Wind, wave and tidal power, including infrastructure (M) **N01** Temperature changes (e.g. rise of temperature & extremes) due to climate change (M) **N02** Droughts and decreases in precipitation due to climate change (M)
7.2 Sources of information *Optional*	Pressures were sourced from the following reports and accompanying data: Excel sheet 'Connected22012018.xlsx' provided by Sustainable Energy Authority of Ireland (SEAI) containing the location of connected wind farms as per Eirgrid and ESB Networks. It should be noted that precise accuracy of this coordinate information cannot be assured, that possible stand-alone projects not intended for connection to the Irish electricity grid are not included, and that map locations provided are not necessarily all discrete wind farms (some could be extensions to existing wind farms). FIPS data: PrivateForests2016.shp. Only polygons with a planting year within this reporting period were utilised. Foss, P.J., Crushell, P., Kirwan, B., O'Loughlin, B. & Wilson, F. (2014) Louth Wetland Survey III. Part 1: Main Report. Report prepared for Louth County Council and The Heritage Council. Foss, P.J., Crushell, P. & Kirwan, B. (2015) County Waterford Wetland Survey. Part 1: Main Report. Report prepared for Waterford City & County Council. Galway County Council (2017) Unpublished data collected for the Galway City Transport Project. Hodd, R.L. (2015a) Survey of Flora Protection Order Bryophytes in Cork and Kerry (H1-H5). Unpublished report to National Parks and Wildlife Service, Dublin, Ireland. Hodd, R.L. (2015b) Survey of Flora Protection Order Bryophytes 2015. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland. Hodd, R.L. (2016) Survey of Flora Protection Order Bryophytes 2016. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland. Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014a) National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 15: Slieve Mish Mountains cSAC (002185), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014b) National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 16: Caha Mountains cSAC (000093), Cos. Cork and Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin,	

	Ireland. NPWS (2013a) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin. NPWS_Approx_Wildfire_Locations_Polygon_2017.shp and NPWS_Approx_Wildfire_Locations_Points_2017_IG.shp Tubridy, M., Iremonger, S., Hickey, B. & O'Hanrahan, B. (2015) Blackstairs Habitat Mapping and Biodiversity Audit 2015. Report for the Blackstairs Farming Group.
7.3 Additional information *Optional*	Pressures and threats presented in 7.1 were selected and ranked based on intensity (high, medium, low), frequency of occurrence, and area of impact where data were available. Data gathered from the sources listed in section 7.2 are summarised in the backing document 'NSUH17_AR1719_pressures_assessment_01a.xlsx'. For the current reporting period data on pressures were available for two NSUH sites – Slieve Mish Mountains SAC (002185) and Caha Mountains SAC (000093) (Perrin *et al*., 2014a, 2014b). Data from shapefiles on locations of wildfires which occurred in spring 2017 (provided by NPWS), locations of newly planted forestry within this reporting period (FIPS data) and locations of windfarms (provided by SEAI) were also utilised. Additional data from Foss *et al.* (2014, 2015), Galway County Council (2017), Hodd (2015a, 2015b, 2016) and Tubridy *et al.* (2015) were examined, with relevant data extracted and analysed. As the data from the current reporting period only represent a small proportion of the data collected to inform NPWS (2013a), the pressures and threats information presented in NPWS (2013a) were also used to inform the current reporting period. In the previous reporting period sheep grazing in the uplands, both undergrazing and overgrazing, was recorded under 'A04.02.02 non-intensive sheep-grazing'. It was recorded as a high importance pressure and threat for the 4030 habitat (NPWS, 2013a). Using the crosswalk referenced in the backing document 'NSUH17_AR1719_pressures_assessment_01a.xlsx' to convert old impact codes to the new recording system, A04.02.02 crosswalks to A10 (Extensive grazing or undergrazing by livestock). However there was no evidence from the NSUH sites surveyed in the previous reporting period, or from this reporting period, that A10 (undergrazing) was a pressure. It was recorded once by Foss *et al*. (2014). A10 is therefore currently considered a low-importance pressure for the 4030 habitat. A09 (Intensive grazing or overgrazing by livestock) can lead to damage to the vegetation, conversion of the heath to grassland and to soil erosion of the 4030 habitat. Perrin *et al.* (2014a) recorded overgrazing under A04.02.02, with 8.3% of 4030 habitat failing due to excessive levels of grazing. It was stated in NPWS (2013a) that "sheep grazing is widespread within the sites surveyed by the NSUH and, where levels of grazing are high, is problematic within this habitat". Hodd (2015a, 2015b, 2016) recorded A09 eleven times and Foss *et al.* (2015) recorded it once within this reporting period. Based on evidence collected in the previous and current reporting periods and expert opinion, A09 was retained as a high-importance pressure

	for this reporting period. All remaining high- and medium-importance pressures presented in NPWS (2013a) were reconsidered for the current reporting period, with nine having additional evidence provided for their importance by the data collected during the current reporting period. A11 (Burning for agriculture) was recorded as a high-importance pressure in NPWS (2013a), and was retained as a high-importance pressure for this reporting period. This pressure can lead to widespread loss and degradation of upland habitats (Perrin *et al.*, 2014c). A11 was recorded within 4030 habitat in the Slieve Mish Mountains SAC (002185) (15.6% of 4030 habitat) (Perrin *et al.*, 2014a), Caha Mountains SAC (000093) (0.04% of 4030 habitat) (Perrin *et al.*, 2014b), as well as within 4030 habitat in the Blackstairs Mountains (Tubridy *et al.*, 2015), and at Clermont (Foss *et al.*, 2014), Lachtnafrankee and Knocknanask (Foss *et al.*, 2015). It is estimated that a maximum of 0.8% (9.36 km^2) of the known national 4030 habitat area was burnt in the spring of 2017 (using NPWS_Approx_Wildfire_Locations_Polygon_2017.shp in conjunction with the 4030 distribution polygon shapefile). In addition to this, the Joint Research Centre (JRC) of the European Commission provides information on fires in the pan-European region via the European Forest Fire Information System (EFFIS). Through its series of technical reports, it has been estimated that over 10,000 ha of open land have been affected by fire in 2013, less than 5,000 ha of open land in 2014, approximately 10,000 ha of open land in 2015 and approximately 5,000 ha of open land in 2016 (JRC, 2014, 2015, 2016, 2017 respectively), with the majority of fires taking place in upland habitats (JRC, 2015), which would include 4030 habitat. JRC (2016) states: “There is a strong correlation between the patterns of these fires and established traditional agricultural burning practice in Irish upland areas.” B01 (Conversion to forest from other land uses, or afforestation (excluding drainage)) was recorded as a medium-importance pressure in NPWS (2013a), and was retained as a medium-importance pressure for this reporting period. The Environmental Impact Assessment (EIA) threshold for forestry is 50 ha or more (S.I. No. 191 of 2017), which means large areas of unenclosed land can be planted without adequate environmental assessment. In addition to this, there has been recent pressure to increase land availability for afforestation on unenclosed land as planting on agricultural land is not happening at the desired rate in order to reach the target of 18% forest cover by mid-century (C. Douglas, pers. comm.); thereby resulting in B01 being listed as a medium-importance threat to 4030 habitat. Afforestation can result in direct habitat loss, as well as fragmentation of the 4030 habitat. It was not recorded as a pressure for 4030 habitat within either of the NSUH sites (which are SACs) surveyed within this reporting period (Perrin *et al.*, 2014a, 2014b). However, it is estimated that approximately 2% (22.9 km^2) of the national 4030 habitat area is either adjacent to or has some evidence of new forestry (i.e. planted within the current reporting period) within it, using the most up-to-date forestry data available (PrivateForests2016.shp) in conjunction with the 4030 distribution polygon shapefile.

	D01 (Wind, wave and tidal power, including infrastructure) was recorded as a medium-importance pressure in NPWS (2013a), and was retained as a medium-importance pressure for this reporting period. Wind farms can result in direct habitat loss and degradation of the 4030 habitat. A review of Irish wind farm developments has indicated that 7.1% of wind farms are located within 2 km of 4030 habitat. As wind farm data were, in general, provided as a single point for each wind farm development the review located wind farms within a 2 km buffer zone around 4030 habitat using the grid references provided by the SEAI (Connected22012018.xlsx) and the 4030 distribution polygon shapefile. Fifteen randomly selected wind farms located in upland areas were mapped in order to get an idea of the footprint of wind farms in upland areas. An average radius of 2 km was calculated based on these mapped areas. The low-importance pressures A06 (Abandonment of grassland management (e.g. cessation of grazing or of mowing)), A36 (Agriculture activities not referred to above) (i.e. agricultural intensification), C01 (Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell)), E01 (Roads, paths railroads and related infrastructure (e.g. bridges, viaducts, tunnels)), F01 (Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions)), H06 (Closure or restrictive access to site/habitat) (i.e. fencing), J03 (Mixed source air pollution, air-borne pollutants) and L06 (Interspecific faunal and floral relations (competition, predation, parasitism, pathogens)), recorded in NPWS (2013a) but not in this reporting period, were retained as low-importance pressures for the current reporting period. F07 (Sports, tourism and leisure activities), I02 (Other invasive alien species (other than species of Union concern)), I04 (Problematic native species), L01 (Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization), L02 (Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices)), and M05 (Collapse of terrain, landslide), were recorded in both the previous and current reporting periods. They have also been retained as low-importance pressures. Climate change (under two separate codes, N01 and N02) is assessed as a low-importance pressure, but is considered to be a medium-importance threat to 4030. Areas in favourable and unfavourable condition will be impacted by climate-induced disturbances, “including (1) gradual changes (in temperature; in the amount, intensity and seasonal distribution of precipitation) and (2) extreme events (severe drought; increased wildfires; flooding events)” (Renou-Wilson & Wilson, 2018), particularly areas in unfavourable condition as these areas are more susceptible to the impacts of climate change. Climate envelope modelling used to predict climate change-driven shifts in species and habitat distributions predict that under limited dispersal scenarios 4030 habitat will contract in range by 15% (Coll *et al.*, 2012). Concerns relating to prospective seasonal changes include increases in winter rainfall leading to enhanced erosion. An increased risk of severe fire events is likely in areas where drought periods increase as a result of climate change.

	Intense fires can burn away the shallow peat soil or expose it to erosive elements such as extreme rainfall events. Invasive non-native species may also pose a greater risk to 4030 habitat if their growth conditions are more favoured by changes in climate. Species such as *Rhododendron ponticum* as well as conifers *Pinus contorta* (Lodgepole pine) and *Picea sitchensis* (Sitka spruce) (the predominant species of plantation forestry) could conceivably increase their spread on 4030 habitat with temperature rises and/or where more frequent or prolonged drought periods increase habitat desiccation (C. Douglas, pers. comm.). The four high- and medium-importance pressures reported in section 7.1 are also considered to be the main threats to the 4030 habitat in the future, along with climate change.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type** or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* ***a) Short-term results (within the current reporting period, 2013-2018)** or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*

8.5 List of main conservation measures	**CA03** Maintain existing extensive agricultural practices and agricultural landscape features **CA04** Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures **CA05** Adapt mowing, grazing and other equivalent agricultural activities **CB01** Prevent conversion of (semi-) natural habitats into forests and of (semi-) natural forests into intensive forest plantation **CF03** Reduce impact of outdoor sports, leisure and recreational activities **CI03** Management, control or eradication of other invasive alien species **CI05** Management of problematic native species
8.6 Additional information *Optional*	Conservation measures were selected using data gathered from Hodd (2015a, 2015b, 2016), Perrin *et al.* (2014b) and from information provided by NPWS (pers. comm.), European Commission (eip-agri agriculture and innovation) and Forest Service (2015). Data from the NSUH, recorded in the previous reporting period, were also utilised where appropriate. The maintenance of extensive grazing (recorded under CA03), particularly sheep grazing, as a conservation measure was recorded fifteen times by Hodd (2015a, 2015b, 2016), while non-intensive grazing was recorded as either a neutral or positive impact at six 4030 NSUH sites during the previous reporting period, and at Caha Mountains SAC (000093) (Perrin *et al.*, 2014b). In some cases the maintenance of extensive sheep grazing is undertaken through the Department of Agriculture's Green, Low Carbon, Agri-Environment Scheme (GLAS), both in regard to Commonage Management Plans and private Natura Management Plans. The main purpose of these sustainable management plans, in regard to upland habitats, is to restore the condition of both commonage and private Natura lands by protecting against both undergrazing and overgrazing (A. Bleasdale, NPWS, pers. comm.). It should be recognised that not all shareholders within the commonages or people who hold private Natura lands have joined up to the aforementioned plans. The management regimes of most areas of 4030 habitat are driven by the landowner rather than by any formal management plan or policy; therefore the continued operation of the management regimes currently in place is not guaranteed across the entire habitat. In addition, for this conservation measure to be relevant to this assessment there would need to be 4030 habitat within the area managed under GLAS; while mapping data are not available for areas managed through GLAS an assumption is made that areas of 4030 are included. Details of participation in the GLAS scheme and of the uptake across various measures are not currently available. It is therefore not possible to precisely assess the effects of implementation of these measures. Within Ireland's National Parks (NPs), Connemara NP is undertaking Rhododendron control (CI03), maintenance of tracks and trails to prevent damage to sensitive habitats (CF03) and control of

	trespassing stock (CA05). Killarney NP is also carrying out the aforementioned conservation measures in addition to deer management (CI03 – Sika deer; CI05 – Red deer) (C. Douglas, NPWS, pers. comm.). CA05 (adapt mowing, grazing and other equivalent agricultural activities) was recorded as a positive impact at one NSUH site during the previous reporting period. This was in relation to the reduction of sheep numbers, trespassing within Killarney National Park from adjoining areas, through the erection of fences (Roche *et al.*, 2012b). Hunting for the management and control of deer (CI03) was also recorded by Roche *et al.* (2012b). Glenveagh NP carries out Rhododendron control (CI03), maintenance of tracks and trails (CF03) and control of deer numbers (CI05 – Red deer) (D. Duggan, NPWS, pers. comm.). Wicklow Mountains NP also maintain tracks and trails (CF03), control trespass of stock (CA05) and deer numbers (CI03 – Sika deer and occasional Fallow deer; CI05 – Red deer). In addition to these conservation measures, they enforce the Ministerial Direction 2010 on the use of All Terrain and Off-Road Vehicles where possible (CF03). Finally, Wicklow Mountains NP also control fires where possible (CA05) and have worked closely with local farmers and Teagasc through the Wicklow Uplands Council, with the result of a reduction in farmer-lit fires (E. Mullen, NPWS, pers. comm.). Two Forest Service Circulars (10/2010 and 18/2011) advise against afforestation from large areas of upland sites containing sensitive habitats (CB01), while the Forestry Service (2015) state: "The inappropriate afforestation of sensitive habitats such as peat lands and wetlands will be avoided, as well as the negative effects on areas of ecological value including areas under high natural value farming." It should be noted, however, that there is no requirement to carry out EIAs on areas below 50 ha, thus relatively large areas can be afforested without adequate environmental assessment. Also, although there has been a documented move of afforestation from peatland and upland areas to wet mineral soils and lower elevations (20% of area planted in 2000 to 4% in 2011) (Forestry Service, 2015), there is now pressure to increase land availability for afforestation on unenclosed land, with 114 ha of unenclosed land afforested in 2012 and 106 ha in 2013 (COFORD, 2016). While unenclosed land is not synonymous with 4030 habitat it is assumed these lands include areas of this habitat. The DAFM Forest Service has been involved in the development of Wildfire Interagency Groups and local-level partnerships in fire-prone counties in order to permit better targeted fire prevention and enforcement (CA05). A number of demonstration prescribed burns were carried out in 2016, one of which was carried out under the supervision of the KerryLIFE Project, while Teagasc arranged a mechanised vegetation management demonstration to demonstrate alternative methods of vegetation management (EFFIS, 2017) (CA05). The EU KerryLIFE Project commenced in 2014 with the aim of improving selected populations of Freshwater Pearl Mussel towards favourable conservation condition through sustainable management of c. 2500 ha of farmed lands (CA03 and CA05). The proposed sensitive grazing regime is expected to improve cover and height of

	heathers, while encouraging areas of bare or eroding peat to re-vegetate. If successful, it is likely to have most benefit for the upland habitats within the catchment area, including 4030 habitat (C. Douglas, NPWS, pers. comm.). Response to measures will not be available until the next reporting period. A total of eight European Innovation Partnership (EIP) projects with peatland focus or actions have been selected and offered financial support through the EIP-Agri budget administered by the Department of Agriculture, Food and the Marine. The total budget for these projects (albeit not entirely dedicated towards peatland actions alone) is significant. Three projects have already been initiated, with ecologically sustainable grazing in upland habitats a cross-cutting deliverable (CA03 and CA05). The response to measures will not be apparent until the next reporting period due to the infancy of these projects. The EIP project 'Blackstairs Farming Futures (BFF) Sustainable farming project in the Blackstairs Mountains' aims to maintain and improve peatland habitats and associated semi-natural habitats within the Blackstairs Mountains (CA03 and CA05), with the EIP project 'Sustainable Uplands Agri-environment Scheme (SUAS)' having a similar objective. The EIP project 'A Sustainable Agricultural Plan for the MacGillycuddy Reeks – Conservation and restoration of Upland Habitat in the MacGillycuddy Reeks' proposes to reintroduce suitable cattle breeds to manage upland peatlands (e.g. wet heath, dry heath and blanket bog) and grasslands, with particular interest in their use to manage scrub (CA04). It proposes to clear 85 ha of Rhododendron (CI03) and 85 ha Bracken (CI05), and manage recreational impacts and provide and maintain trails to prevent damage to upland habitats such as 4030 habitat (CF03). A recent PhD study, which commenced in 2011, is investigating 'Conservation Grazing with Native Irish Cattle in High Nature Value (HNV) Environments' (K. Kelly with the Institute of Technology, Tralee). The aim of this research is to "develop evidence-based management recommendations for the uplands, specifically with regard to the impact of cattle grazing on upland habitats" (Kelly *et al.* n.d.). The research area was previously heavily grazed by sheep with numbers greatly reduced in recent years. Land managers are now seeking to establish an appropriate grazing regime which will maintain and improve the condition of the habitats on site (including 4030 habitat) (CA05). Results of this research are currently being analysed, therefore the response to cattle grazing will not be apparent until the next reporting period.

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	***Good*** / *Poor / Bad / Unknown*
	b) Area	*Good /* ***Poor*** */ Bad / Unknown*
	c) Structure and functions	*Good / Poor /* ***Bad*** */ Unknown*
9.2 Additional information	Short-term trend direction of Range is assessed as stable.	

Optional	Current range is equal to Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as stable, as no change in range is expected within the next two reporting periods based on the balancing of the threats and conservation measures that are currently in place. It is likely that Range (and Area) will decline in the longer term due to the threat of climate change. Future prospects of Range are therefore good. Short-term trend direction of Area is assessed as decreasing. Current area less than the Favourable Reference Area (< 10% below FRA). Conservation status of Area is therefore Unfavourable-Inadequate. Future trend of Area is assessed as negative, as the threats of A09, B01 and D01 in particular are expected to have a negative influence on Area, especially for areas of 4030 habitat outside SACs, even with the conservation measures CA03 and CB01 in place. Future prospects of Area are therefore poor. Short-term trend direction of Structure and functions is stable for habitat that is in good condition. Current Structure and functions are assessed as Unfavourable as <90% of habitat is in good condition. A maximum estimate of 55.4% of 4030 habitat is in bad condition which equates to Unfavourable-Bad Structure and functions. Conservation status of Structure and functions is therefore Unfavourable-Bad. Future trend of Structure and functions is assessed as stable, as although the threats of A09 and A11 are expected to have a negative influence on Structure and functions, their presence is not expected to change the overall status of Structure and functions within the next 12 years. Where the conservation measures CA03 and CA05 occur they would be expected to balance the threats, however it should be noted that these are not implemented across the national distribution of the habitat, nor are they specifically targeted measures for the 4030 habitat. Future prospects of Structure and functions are therefore bad.

10 Conclusions

Assessment of conservation status at end of reporting period	
10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.2 Area	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*
10.4 Future prospects	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*
10.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*

<table>
<tr><td>10.6 Overall trend in Conservation Status</td><td colspan="3">Indicate the trend (qualifier) for FV, U1 and U2:

improving / deteriorating / <u>stable</u> / unknown</td></tr>
<tr><td rowspan="8">10.7 Change and reasons for change in conservation status and conservation status trend</td><td colspan="3">Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.</td></tr>
<tr><td></td><td>Overall assessment of conservation status (10.5)</td><td>Overall trend in conservation status (10.6)</td></tr>
<tr><td>a) no, there is no difference</td><td>YES/<u>NO</u></td><td>YES/<u>NO</u></td></tr>
<tr><td>b) yes, due to genuine change</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>c) yes, due to improved knowledge/more accurate</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>d) yes, due to the use of different methods (including use of different thresholds)</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>e) yes, but there is no information on nature of change</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>The change is mainly due to (select one of the reasons above):</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td></tr>
<tr><td>10.8 Additional information

Optional</td><td colspan="3">The Conservation Status of Range is Favourable in this reporting period, as it was in the previous reporting period.
The Conservation Status of Area is Unfavourable-inadequate in this reporting period, as it was in the previous reporting period.
The Conservation Status of Structure and functions and Future prospects are Unfavourable-Bad in this reporting period, as they were in the previous reporting period.
The Overall Conservation Status was assessed as Unfavourable-Bad, as it was during the last reporting period. The status of Unfavourable-Bad during the current reporting period was due to <25% of the area of 4030 habitat being assessed as having Favourable Structure and functions.
Trend in Overall Conservation Status was assessed as stable in this reporting period. There have been recorded losses of area within the current reporting period and within the last reporting period (approx. 0.001% per annum since 1994), resulting in the short-term trend for Area to be recorded as decreasing. In the last reporting period the decreasing trend of Area was offset by an increasing trend in Structure and functions, which resulted in the trend in Overall</td></tr>
</table>

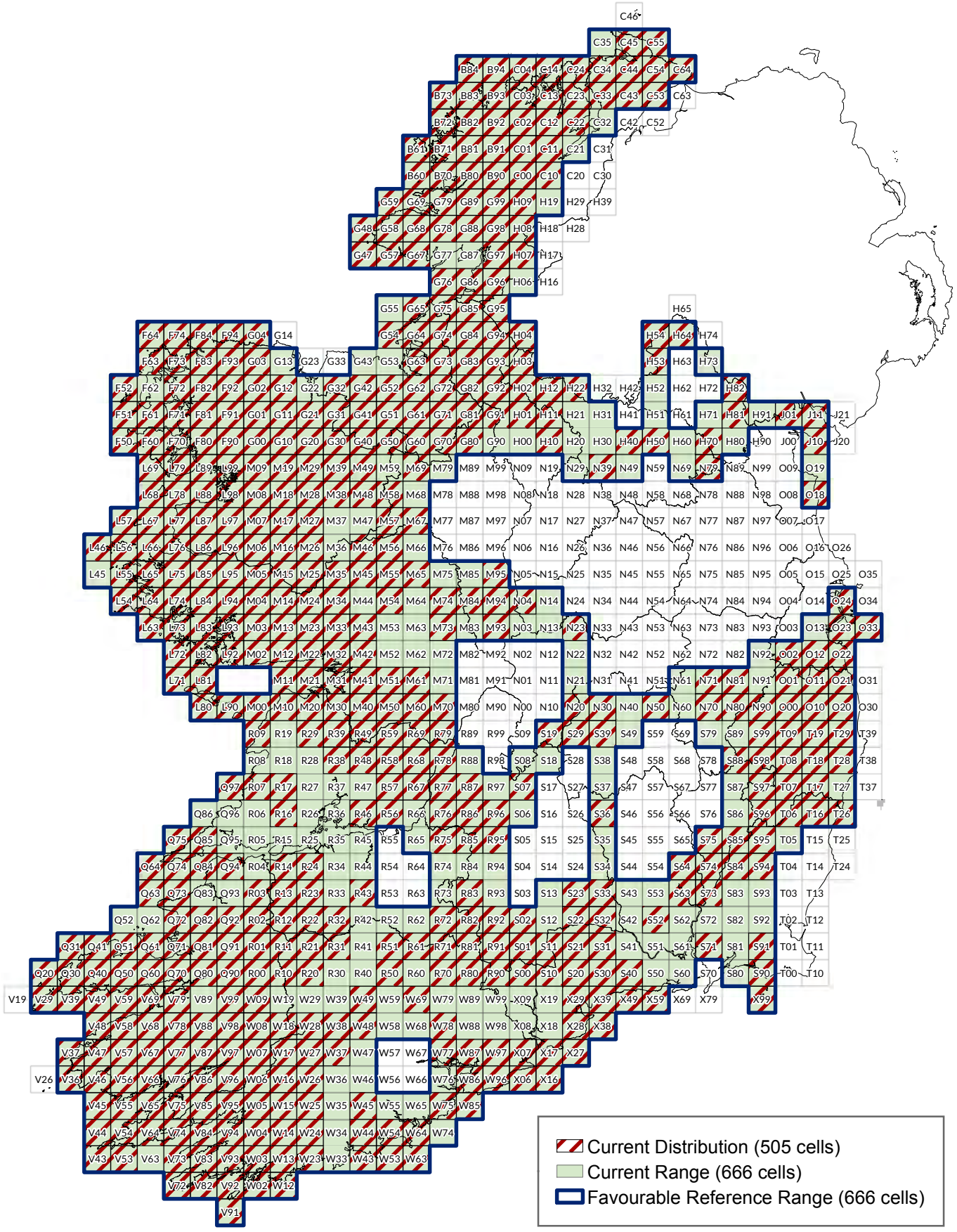
	Conservation Status being assessed as stable. Although the Structure and functions short-term trend was assessed as stable for this reporting period, the decreasing trend in Area was considered too small to trigger an overall deteriorating trend.

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***621.63 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable** / increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing a union between the distribution polygon shapefile and the SAC shapefile, and an intersect between the distribution point shapefile and SAC shapefile. The area given in section 11.1 is the total area of 4030 habitat in SACs in the country, including some SACs where 4030 is not listed as a qualifying interest (QI). The area of 4030 within the Natura 2000 network where it is listed as a QI is 430.55 km^2. There was one inconsistency between the Natura 2000 sites where the 4030 habitat is listed as a QI and the current distribution for the habitat. 4030 is listed as a QI for the Screen Hills SAC (000708). A relevé recorded in 1977 indicates that 4030 was present within the Screen Hills SAC (000708), however evidence suggests that the 4030 habitat was gone before the Habitats Directive came into force and this relevé was therefore not used to calculate current distribution, range or FRR. The evidence includes a review of the site synopsis for the SAC written in 1999 which states that the 4030 habitat has a "virtual absence of Heather" and comprises "a diverse range of annual species". This description of 4030 habitat is not satisfactory	

	and the site was omitted on these grounds. An AP review of the area was also carried out, with no obvious changes in the landscape between 1995 and 2000; this would suggest that any loss of 4030 habitat must have occurred before 1995. The short-term trend of the 4030 habitat in good condition within the SAC network is taken to be stable, with the same trend as the 4030 habitat nationally (section 6.4). The reported surface area of 4030 habitat within the Natura 2000 network has decreased since the last reporting period; this is due to improved knowledge lending itself to a refinement of area totals (see section 5.15 for details).

12 Complementary information	
12.1 Justification of % thresholds for trends *Optional*	The declining trend in Area, estimated to be c 0.001% per annum since 1994, is considered too small to trigger a deteriorating trend in the Overall status.
12.2 Other relevant information *Optional*	

Dry heaths (4030)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Habitat code / name	**4060 Alpine and Boreal heaths**
1.2i Habitat short name	**Alpine and subalpine heath**
1.3i Habitat description	Habitat 4060 Alpine and Boreal heath consists of two distinct subtypes in Ireland: i) The upland subtype occurs on the exposed summits and upper slopes of mountains on acidic substrate. It typically occurs from around 350-400 m upwards, but can occur at lower altitudes in more exposed locations. The vegetation is characterised by low-growing, wind-clipped dwarf shrubs, with *Calluna vulgaris* typically the most frequent, and by the abundance of the bryophyte *Racomitrium lanuginosum*. Whilst the presence of arctic-alpine species indicates high quality examples of this variant, it is not deemed a requisite. ii) The lowland subtype comprises *Dryas* heath on limestone. The vegetation is characterised by mats of *Dryas octopetala* accompanied by species typical of calcareous grassland. Habitat 4060 may include communities with affinities to the *Loiseleurio procumbentis-Vaccinion, Calluno-Genistion pilosae, Ericion-tetralicis* and *Kobresio-Dryadion* associations (Perrin, 2017). According to Perrin (2017) most examples of Irish Vegetation Classification (IVC) heath communities *Calluna vulgaris-Nardus stricta* (HE3C), *Calluna vulgaris-Racomitrium lanuginosum* (HE3D) and *Racomitrium lanuginosum-Festuca vivipara* (HE3E) occur in habitat 4060, and elements of other communities within IVC heath groups *Vaccinium myrtillus-Racomitrium lanuginosum* (HE3), *Dryas octopetala-Sesleria caerulea* (HE1) and *Erica cinerea-Calluna vulgaris* (HE2) can also occur.

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***1959-2017***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was derived from a polygon shapefile and a point shapefile. These shapefiles were created by compiling relevant

	data which referred to habitat 4060 or Fossitt code HH4 (Fossitt 2000) or a relevant NPWS habitat code in their attributes. Sources include Barron & Daly (2015), Coillte Biodiversity Dataset (various dates), Curtis & Wilson (2014), Galway County Council (2017), Hodd (2015, 2016), Martin *et al.* (2018), O'Neill & Martin (2018), Perrin (2017) which comprises data ranging from 1959 to 2014, Perrin *et al.* (2014a, 2014b), Tubridy *et al.* (2015) and O'Neill *et al*. (in prep.). In addition to these, sources utilised for the distribution map from the last reporting period (NPWS 2013a) were also included: 13 National Survey of Upland Habitats (NSUH) sites (Perrin *et al.* 2011, 2012, 2013a-e; Roche *et al.* 2009, 2010a, 2010b, 2011a, 2011b, 2012a), Barron & Perrin (2011), Ballycroy, Connemara and Glenveagh National Park Habitat Maps, Crushell & O'Callaghan (2008), Murphy & Fernandez (2009), NPWS (2007, 2013b), NPWS Habitat Assignment Project, and Parr *et al.* (2009). GIS files from the Uplands and Peatlands Grazing Survey (NPWS) were also utilised for the distribution map from the last reporting period (NPWS, 2013a). All references are detailed below in section 3.2. A certainty rating system was applied to all data that informed the distribution map. This system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1 the lowest. Of the new data sources added since the last round of reporting (NPWS, 2013a), the following were all judged to be a high certainty of 3: Barron & Daly (2015), Galway County Council (2017), Hodd (2015, 2016), O'Neill & Martin (2018), Perrin *et al*. (2014a, 2014b) and Tubridy *et al.* (2015). The majority of data from Martin *et al.* (2018) were assigned a certainty of 3, however for two polygons the type of heath was not defined and therefore these were assigned a certainty of 1 (they were directly adjacent to other 4060/4030 polygons recorded at the same site). Polygon data from Curtis & Wilson (2014) were assigned a certainty of 3, while locations of 4060 based solely on information from site reports were represented by waypoints and were assigned a certainty of 2 where the 10km grid square was certain, and a certainty of 1 where the location of habitat 4060 could be in one of two 10km grid squares. Data from O'Neill *et al*. (in prep.) were assigned a certainty of 3 where habitat 4060 was recorded in the field, and a certainty of 2 where habitat information was not recorded but the species *Diphasiastrum alpinum* was located (83% of relevés containing this species from this project at time of analysis were recorded within habitat 4060). A certainty of 1 was assigned to unsurveyed sites from O'Neill *et al*. (in prep.) where there are old records of *D. alpinum*. The Coillte Biodiversity Dataset polygons were assigned a certainty of 1 for those which were recorded as HH4 but were not listed as habitat 4060, and a certainty of 2 for those which were. Certainty 3s were not assigned to the Coillte Biodiversity Dataset due to the age of the data (surveyed in early 2000s). Data from Perrin (2017) have no habitat data included, only affinities to Annex I habitats. Those with a higher affinity to habitat 4060 over other Annex I habitats were assigned a certainty of 2 while those with a higher affinity to another Annex I habitat over habitat 4060 were assigned a certainty of 1. Certainty values from the datasets utilised during the last reporting period were not reassigned for the

	purposes of the distribution map as the classes within the certainty rating system are fairly broad, and the 4060 habitat itself is relatively stable. Data from NPWS (2007) refers to data carried over from the 2001-2006 reporting period, where areas above an elevation of 350 m were mapped as 4060 habitat. These polygons were given a certainty of 1 in the previous reporting period (NPWS, 2013a), with only 5% of the area of these polygons used for calculating 4060 habitat area. It should be noted here that although these polygons were also utilised for area, distribution and range calculations for this reporting period, the data at best overestimates the distribution at a site level and is of low reliability. All polygons and points with certainty 1-3 were used to map the distribution for the 4060 habitat.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Anon. (2013) Burren Farming for Conservation Programme: Programme Report No. 3 (May 1st 2012 to April 30th 2013). Report submitted to the National Parks and Wildlife Service, Department of Arts Heritage and the Gaeltacht, Dublin. Ballycroy National Park Habitat Map. An NPWS project which compiled habitat data from available information. Datasets used were from 1991-2009. Barron S.J. & Daly O.H. (2015) Phase 1 of the scientific work to inform a system for the management of turf-cutting in designated blanket bog SACs and NHAs: Phase 1 Over-arching report – DRAFT. Unpublished draft report to National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin Barron, S. & Perrin, P. (2011) Production of a habitat map for Killarney National Park, Co. Kerry. Unpublished report to National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. COFORD (2016) Land Availability for Afforestation – Exploring opportunities for expanding Ireland's forest resource. COFORD, Dublin. http://www.coford.ie/media/coford/content/publications/coforarticles/LandAvailabAfforestation130116.pdf Coillte Biodiversity Dataset. GIS files and individual site management plans were made available by Coillte. Datasets used were from 2001 to 2005. Connemara National Park Habitat Map is an NPWS map based on aerial photographic interpretation and field visits conducted by G. Kaule from the University of Stuttgart in 2008.

Crushell, P. & O'Callaghan, R.J. (2008) A survey of Red Grouse (*Lagopus lagopus*) habitat in Ireland 2007-2008: an assessment of habitat condition and land-use impacts. Unpublished report to Birdwatch Ireland and the National Parks and Wildlife Service.

Curtis, T. & Wilson, F. (2014) Orchid Ireland Survey 2014. Report prepared for the National Museum and Galleries of Northern Ireland.

EPA (2017) A Summary of the State of Knowledge on Climate Change Impacts for Ireland: Report 11 (2010-2016). Prepared for the Environmental Protection Agency by MaREI Centre, Environmental Research Institute, University College Cork. M. Desmond, P. O'Brien and F. McGovern. EPA, Wexford.

European Commission (eip-agri): 'A sustainable agricultural plan for the MacGillycuddy Reeks – Conservation and restoration of upland habitat in the MacGillycuddy Reeks'. https://ec.europa.eu/eip/agriculture/en/find-connect/projects/sustainable-agricultural-plan-macgillycuddy-reeks

European Commission (eip-agri): 'Blackstairs farming futures (BFF) Sustainable farming project in the Blackstairs Mountains'. https://ec.europa.eu/eip/agriculture/en/find-connect/projects/blackstairs-farming-futures-bff-sustainable

European Commission (eip-agri): 'Sustainable Uplands Agri-environment Scheme (SUAS)'. https://ec.europa.eu/eip/agriculture/en/find-connect/projects/sustainable-uplands-agri-environment-scheme-suas

Forest Service, Department of Agriculture, Food and the Marine (2015) Forestry Programme 2014-2020: IRELAND. Submitted in accordance with European Union Guidelines on State aid for agriculture and forestry and in rural areas 2014 to 2020. https://www.agriculture.gov.ie/media/migration/forestry/forestryprogramme2014-2020/IRELANDForestryProgramme20142020230215.pdf

Fossitt, J.A. (2000) *A guide to habitats in Ireland*. The Heritage Council, Kilkenny. https://www.npws.ie/sites/default/files/publications/pdf/A%20Guide%20to%20Habitats%20in%20Ireland%20-%20Fossitt.pdf

Galway County Council (2017) Unpublished data collected for the Galway City Transport Project.

Glenveagh National Park Habitat Map. An NPWS map produced in 2010 based on the NHA survey data collected between 1991 and 1994 and on work completed by Lynda Weekes. The map is derived from the best information available at the time, site visits and aerial photograph interpretation.

Habitat Assignment Project. An NPWS spreadsheet noting the qualifying interest of SACs and other habitats which occur in SACs, NHAs and pNHAs. This table was used as a reference for incorporating polygon data for SACs, NHAs and pNHAs.

Hodd, R.L., Bourke, D. & Sheehy Skeffington, M. (2014) Projected

Range Contractions of European Protected Oceanic Montane Plant Communities: Focus on Climate Change Impacts is Essential for Their Future Conservation. *PLoS ONE*, 9(4): e95147.

Hodd, R.L. (2015) Survey of Flora Protection Order Bryophytes 2015. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.

Hodd, R.L. (2016) Survey of Flora Protection Order Bryophytes 2016. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.

JNCC (2009) *Common Standards Monitoring Guidance for Upland Habitats.* Joint Nature Conservation Committee, Peterborough.

Joint Research Centre (2017) Forest Fires in Europe, Middle East and North Africa 2016. Joint report of JRC and Directorate-General Environment. http://effis.jrc.ec.europa.eu/media/cms_page_media/40/Forest_fires_in_Europe_Middle_east_and_North_Africa_2016_final_pdf_JZU7HeL.pdf

Martin, J.R., O'Neill, F.H. & Daly, O.H. (2018) The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats. *Irish Wildlife Manuals*, No. 102. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin.

Murphy, S. & Fernandez, F. (2009) The development of methodologies to assess the conservation status of limestone pavement and associated habitats in Ireland. *Irish Wildlife Manuals*, No. 43. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/IWM43.pdf

NPWS (2007) The status of EU protected species and habitats in Ireland, Volume 3, National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2007_Cons_Ass_Backing_V3.pdf

NPWS (2013a) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin. https://www.npws.ie/sites/default/files/publications/pdf/Article_17_Print_Vol_2_report_habitats_v1_1_0.pdf

NPWS (2013b) Management Planning Support Unit Maps 2405_imap95 (CPU_Habitats_March_2012.shp).

O'Neill, F.H. & Martin, J.R. (2018) The Irish Juniper Monitoring Survey 2017. *Irish Wildlife Manuals*, No. 101. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

Parr, S., O'Donovan, G., Ward, S. & Finn, J.A. (2009) Vegetation analysis of upland Burren grasslands of conservation interest.

Biology and Environment 109b: 11-33.

Perrin, P. (2017) Irish Vegetation Classification: Technical Progress Report No. 3. Report submitted to National Biodiversity Data Centre. http://www.biodiversityireland.ie/projects/national-vegetation-database/irish-vegetation-classification/explore/

Perrin, P.M., Roche, J.R. & Barron, S.J. (2011) National Survey of Upland Habitats (Phase 1, 2010 - 2012) Site Report No 1: Mweelrea, Sheeffry, Erriff Complex cSAC (001932), Co. Mayo. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH10_Mweelrea_Sheeffry_Erriff_Report_01c_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J. & Daly, O.H. (2012) National Survey of Upland Habitats (Phase 2, 2011-2012), Site Report No. 7: Mount Brandon cSAC (000375), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH11_Mount_Brandon_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013a) National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 10: Ox Mountains Bogs cSAC (002006), Cos. Mayo and Sligo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Ox_Mountains_Bogs_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013b) National Survey of Upland Habitats (Phase 3, 2012-2013), Draft Site Report No. 11: Ben Bulben, Gleniff and Glenade Complex cSAC (000623), Co. Sligo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013c) National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 12: Arroo Mountain cSAC (001403), Co. Leitrim. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Arroo_Mountain_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013d) National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 13: Cuilcagh – Anierin Uplands cSAC (000584), Cos. Cavan and Leitrim. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Cuilcagh_Anierin_Uplands_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013e) National Survey of Upland

Habitats (Phase 3, 2012-2013), Site Report No. 14: Slieve League cSAC (000189), Co. Donegal. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Slieve_League_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014a) National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 15: Slieve Mish Mountains cSAC (002185), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH13_Slieve_Mish_Mountains_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., & Devaney, F.M. (2014b) National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 16: Caha Mountains cSAC (000093), Cos. Cork and Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH13_Caha_Mountains_01b_M.pdf

Perrin, P.M., Barron, S.J., Roche, J.R. & O'Hanrahan, B. (2014c) Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland. Version 2.0. *Irish Wildlife Manuals*, No. 79. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/IWM79.pdf

O'Neill, F.H., Long, M.P. & Hodd, R.L. (in prep.) Monitoring of the Annex V Clubmoss group (*Lycopodium* spp.) in Ireland 2015-2018. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin.

Roche, J.R., Perrin, P.M. & Barron, S.J. (2009) National Survey of Upland Habitats (Pilot Survey Phase, 2009-2010), Site Report No. 2: Corraun Plateau cSAC (000485), Co. Mayo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/SPEU09_Corraun_Plateau_Report_01b_M.pdf

Roche, J.R., Perrin, P.M. & Barron, S.J. (2010a) National Survey of Upland Habitats (Pilot Survey Phase, 2009-2010), Site Report No. 3: Comeragh Mountains cSAC (001952), Co. Waterford. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/SPEU09_Comeragh_Mountains_Report_01b_M.pdf

Roche, J.R., Perrin, P.M. & Barron, S.J. (2010b) National Survey of Upland Habitats (Pilot Survey Phase, 2009-2010), Site Report No. 4: Carlingford Mountain cSAC (000453), Co. Louth. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland.

	https://www.npws.ie/sites/default/files/publications/pdf/SPEU09_Carlingford_Mountain_Report_01b_M.pdf Roche, J.R., Perrin, P.M. & Barron, S.J. (2011a) National Survey of Upland Habitats (Phase 1, 2010 - 2012), Site Report No. 6: Croaghaun / Slievemore cSAC (001955), Co. Mayo. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH10_Croaghaun_Slievemore_Report_01b_M.pdf Roche, J.R., Perrin, P.M. & Barron, S.J. (2011b) National Survey of Upland Habitats (Phase 1, 2010 - 2012), Draft Site Report No. 5: Nephin Mountain, Co. Mayo. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland. Roche, J.R., Perrin, P.M., Barron, S.J. & Daly, O.H. (2012a) National Survey of Upland Habitats (Phase 2, 2011-2012), Site Report No. 9: Galtee Mountains cSAC (000646), Cos. Tipperary and Limerick. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH11_Galtee_Mountains_Report_01b_M.pdf Roche, J.R., Perrin, P.M., Barron, S.J. & Daly, O.H. (2012b) National Survey of Upland Habitats (Phase 2, 2011-2012), Draft Site Report No. 8: Killarney National Park, Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Tubridy, M., Iremonger, S., Hickey, B. and O'Hanrahan, B. (2015) Blackstairs Habitat Mapping and Biodiversity Audit 2015. Report for the Blackstairs Farming Group. Uplands and Peatlands Grazing Survey. GIS files for this NPWS project, completed in 2011, were available. Wilson, S. & Fernandez, F. (2013) National Survey of Limestone Pavement and Associated Habitats in Ireland. *Irish Wildlife Manuals*, No. 73, National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Wyse Jackson, P.S. (2007) The potential impact of climate change on native plant diversity in Ireland. https://www.bgci.org/resources/article/0571/ (accessed 03/05/2018). Zaghi, D. (2008) Management of Natura 2000 habitats. 4060 Alpine and Boreal heaths. European Commission.
3.2i Additional information	

4 Range

Range within the biogeographical/marine region concerned

4.1 Surface area	***36,500 km²***

4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 36,500 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable reference range has been increased since the last reporting period (NPWS, 2013a) to reflect the improved level of knowledge. There is no evidence of loss of range since the Directive came into force and no enlargement of range is deemed necessary to ensure the long-term survival of the habitat.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***

	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 4060 habitat. A maximum gap distance of two 10km grid cells was used when running the range tool. Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013a). Data used for the short-term trend dated from 2007 to 2017, while those used for the long-term trend dated from 1994 to 2017. The trends thus obtained were assumed to hold also for the default trend periods. There were no recorded losses of area resulting in a loss of range at the sample sites covered by the NSUH during these two reporting periods. The short-term trend is stable. It should be noted that the NSUH surveyed two 4060 habitat sites within this reporting period compared with 13 sites in the last reporting period, therefore limiting the conclusions that can be made. The number of 10km squares in the range (365) is two squares higher than the last monitoring period (NPWS 2013a). These changes are due to improved knowledge within the current reporting period. North of Coolagh, Galway (two squares) (Galway County Council, 2017), surveyed in this reporting period, added to the range. Favourable Reference Range has been increased since the last reporting period (NPWS, 2013a) to reflect the improved level of knowledge. The Favourable Reference Range is the current range, reported in section 4.1.	

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***1959-2017***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***150.74 km^2***
5.3 Type of estimate	*Best estimate / 95% confidence interval / **minimum***	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	*stable / increasing / **decreasing** / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator ≈ (approximately equal to) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods? **YES**/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	***YES**/NO*
	b) yes, due to improved knowledge/more accurate data	***YES**/NO*
	c) yes, due to the use of different method	*YES/**NO***
	d) yes, but there is no information on the nature of change	*YES/**NO***

	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 1959 (data utilised in Perrin, 2017) and incorporates updates made by surveys between 1965 and 2017 that are listed in section 3.2. Area was calculated from the polygon shapefile and point shapefile used for distribution. For SACs for which 4060 is a Qualifying Interest (QI), and where a localised point was recorded, the habitat area from the Natura 2000 Standard Data Form was used (if multiple points were recorded within the SAC, area was assigned to one point only (this resulted in 77 points excluded for area)). If points coincided with polygons yielding an area within SACs for which 4060 is a QI, no area was assigned to the points (this resulted in an additional 93 points excluded for area). Outside of SACs for which 4060 is a QI, for each point record not intersecting a polygon that was yielding an area, 0.94 ha of habitat was assigned. This is the average area of 4060 based on 4060 habitat recorded from the NSUH. Prior to area assignment, each of these points was examined individually, with fifteen excluded for area due to their proximity to 4060 polygons. During the current reporting period, 13 datasets with 4060 habitat recorded within them were utilised; two of these datasets were sites assessed for Area as part of the NSUH. The two NSUH sites (Caha Mountains SAC (000093) and Slieve Mish Mountains SAC (002185)) represent 3.0% of the total area of 4060 habitat recorded in Ireland, limiting the conclusions that can be made. The default trend periods are presented above and are used to calculate the magnitude of annual loss; however the data used for the short-term trend dated from 2005 to 2011, while those used for the long-term trend dated from 1995 to 2011. Approximately 0.04 ha of 4060 habitat, within the Slieve Mish Mountains SAC (002185)), were determined to be lost since 2005 due to a landslide (Perrin *et al.*, 2014a). The magnitude of known loss is approximately -0.00002% per annum, measured over a period of 12 years, but actual losses are likely to be higher. Although the loss could be considered to be insignificant at a national scale, small losses in area at the site level may be important and conservation measures should be implemented to counteract these losses. A decline equivalent to a loss of less than 1% per year results in an assessment of Unfavourable-Inadequate for Area. Short-term trend for Area is declining. There has not been a comprehensive survey of this habitat in Ireland, with more detailed survey work of the 4060 habitat needed. It is expected that the area listed in section 5.2 will be refined as more in-depth mapping of the 4060 habitat is completed. In particular, any area represented within the dataset by only a point needs to be surveyed in more detail, while data from the NPWS (2007) dataset needs to be validated. In addition to refining the areas of 4060 habitat currently known, there are probably still areas of unmapped

	4060 habitat within the country, particularly outside designated sites. The NSUH is currently incomplete and more examples of the 4060 habitat are likely to be found. The area value entered is therefore a minimum. FRA is deemed to be approximately equal to the current area. There is no information showing that an enlarged area is necessary for either typical species to reach favourable conservation status or for the necessary structure and functions to exist, therefore the surface area of the habitat when the Directive came into force in 1994 is taken to be the FRA. Whilst this figure is unknown it is deemed to be approximately equal to the current area as there is no evidence of significant declines since this time. It should be noted that only one of the 16 sites surveyed through the NSUH is not an SAC. Losses of 4060 habitat due to impacts such as recreational activities (e.g. hill-walking), afforestation, wind farms and overgrazing outside of the SACs may be higher. The difference in habitat extent between this reporting period and the last is largely due to the availability of more accurate knowledge of the area of habitat 4060, resulting in the refinement of some area estimates from the last reporting period. The majority of this refinement occurred within the Caha Mountains SAC (000093) and Slieve Mish Mountains SAC (002185) in Counties Cork and Kerry, the Blackstairs Mountains in Counties Carlow and Wexford, and the Knockmealdown Mountains in Counties Tipperary and Waterford. Collectively 28.43 km^2 of 4060 habitat mapped in the last reporting period was replaced by 8.28 km^2 4060 habitat in this reporting period resulting in a net reduction of 20.15 km^2. Additional surveys in this reporting period resulted in an addition of 0.795 km^2 4060 habitat which was previously unmapped. This resulted in an area of 150.74 km^2 4060 habitat ((170.095 – 20.15) + 0.795 = 150.74 km^2).

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***89.73 km²***
		Maximum	***104.72 km²***
	b) Area in not-good condition	**Minimum**	***46.02 km²***
		Maximum	***61.01 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		

6.3 Short-term trend of habitat area in good condition Period	***2007–2018***
6.4 Short-term trend of habitat area in good condition Direction	*stable / **increasing** / decreasing / uncertain/ unknown*
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***
6.7 Typical species Method used *Optional*	The list of typical species is the same as the last reporting period (NPWS, 2013a). Typical species were assessed as an assemblage at the monitoring stop level within sites surveyed by the NSUH and Galway County Council (2017). As the remit for O'Neill & Martin (2018) and O'Neill *et al*. (in prep.) did not include the assessment of 4060 habitat, assessments were done retrospectively using available relevé data. For the upland 4060 community, cover of indicator species needed to be at least 66% at each monitoring stop, while for the lowland 4060 community the number of positive indicator species needed to be at least seven. Trends for the assemblage and for individual species were not assessed as the NSUH was a baseline survey.
6.8 Additional information *Optional*	The NSUH (Perrin *et al.*, 2014c) assesses Structure and functions at a monitoring stop level, using criteria to assess vegetation composition (including typical species), vegetation structure and physical structure; all criteria need to pass for a stop to pass. Criteria were adapted from the UK's Common Standards Monitoring (JNCC, 2009) using expert judgement. The NSUH primarily assesses SACs and is currently incomplete. Where NSUH sites include commonage land, comparisons were made between NSUH and commonage station data with respect to a few shared parameters (area of bare peat, cover and height of *Calluna vulgaris*, and sward height). A total of 11 monitoring stops were recorded across both NSUH sites surveyed within this reporting period. None of the stops failed any of the criteria assessing the vegetation composition, vegetation structure and physical structure of 4060. For full details see the NSUH site reports (Perrin *et al.*, 2014a, 2014b). None of the three stops recorded in 4060 habitat by Galway County Council (2017) failed the Structure and functions assessment. The criteria used were the same as the NSLP criteria (Wilson & Fernandez 2013), which are used to assess the 4060 lowland community (*Dryas* heath on limestone). One relevé (25 m^2) recorded in 4060 habitat as part of the Juniper Monitoring Survey (O'Neill & Martin, 2018) and 27 relevés (1 m^2) recorded as part of the Rare Plants Monitoring Survey (O'Neill *et al.*,

	in prep.) were also utilised to assess the Structure and functions. These relevés lack details pertaining to criteria that assess vegetation composition and structure, and physical structure, within the local vicinity of stops, and therefore represent a "best case" situation in these areas for Structure and functions of 4060 habitat. The relevé from O'Neill & Martin (2018) passed the Structure and functions assessment, while 17 of the 27 relevés from O'Neill *et al*. (in prep.) failed the assessment. 'Cover of negative species' (44.4%) and 'cover of dwarf shrubs' (40.7%) were the main criteria which failed in the data from O'Neill *et al*. (in prep.). Of the area of 4060 habitat (c. 4.50 km^2) assessed for Structure and functions in this reporting period, 59.5% of the area was assessed as being in good condition (Favourable). Equal weighting was given to each of the stops as each one assesses a comparable area of habitat. For the relevés from O'Neill & Martin (2018) and O'Neill *et al*. (in prep.), however, only the actual footprint of the relevé (25 m^2 and 1 m^2 respectively) could be used as no data from the local vicinity were recorded. The proportion in good (59.5%) and not-good condition (40.5%) was scaled up to the national estimate (89.73 km^2 in good condition and 61.01 km^2 in not-good condition); however, as the area assessed for Structure and functions in this reporting period only represents 3.0% of the national area of 4060 habitat, data from the last reporting period were also utilised. During the last reporting period 69.47% of the 4060 habitat was assessed as Favourable (NPWS, 2013a). This equates to 104.72 km^2 of the current area of 4060 habitat and this figure is used as the maximum area in good condition. 30.53% of the 4060 habitat was assessed as Unfavourable (NPWS, 2013a). This equates to 46.02 km^2 of the current area of 4060 habitat and this figure is used as the minimum area that is not in good condition. The most frequent criteria to fail the Structure and functions assessment in the last reporting period were 'cover of positive indicator species' and 'cover of negative indicator species' for the upland 4060 community, while there were no failures of any criteria for the lowland 4060 community (NPWS, 2013a). The default short-term trend period is presented above; however, the data used for the short-term trend dated from 2007 to 2017. Based on limited data, conclusions could be made that the area in good condition has declined; however, as this is based mainly on data with a poor national sample size (and from a survey whose remit did not include the condition assessment of 4060 habitat), the trend was taken as improving based on review of the NSUH 4060 habitat condition data sample for the current reporting cycle and the reduced sheep numbers in upland areas brought about by the Commonage Framework Plans (CFPs). There was also evidence that the Burren Farming for Conservation Programme (Anon., 2013) was starting to have a positive effect in the areas where it had been implemented (NPWS, 2013a). While there may still be improvements (recovery) of 4060 habitat in some areas, other areas continue to experience impacts from overgrazing and hill-walking. As with the Area assessment, it should be noted that only one of the 16 sites surveyed through the NSUH is not an SAC. The area of 4060 habitat

	in good condition outside of the SACs may be lower due to impacts mentioned above. Typical indicator species from the NSUH (Perrin *et al*., 2014c) for upland 4060 habitat are: *Arctostaphylos uva-ursi, Calluna vulgaris, Carex bigelowii, Cetraria islandica, Cladonia arbuscula, Cladonia portentosa, Cladonia rangiferina, Cladonia uncialis, Diphasiastrum alpinum, Diplophyllum albicans, Empetrum nigrum, Erica cinerea, Erica tetralix, Herbertus aduncus, Juniperus communis* spp. *nana, Persicaria vivipara, Racomitrium lanuginosum, Salix herbacea, Scapania gracilis, Solidago virgaurea, Vaccinium myrtillus, Vaccinium vitis-idaea.* Note that *Dryas octopetala* was listed an indicator species for the upland subtype of 4060 in the 2013 NCA report (NPWS, 2013a) though not included on the list in the NSUH Manual (Perrin *et al*., 2014c). Typical indicator species from the NSLP (Wilson & Fernandez 2013) for lowland 4060 habitat are: *Arctostaphylos uva-ursi, Breutelia chrysocoma, Calluna vulgaris Campanula rotundifolia, Carex caryophyllea, Carex flacca, Carex pulicaris, Cladonia rangiformis, Ctenidium molluscum, Dicranum scoparium, Dryas octopetala, Empetrum nigrum, Erica cinerea, Festuca* spp., *Helianthemum oelandicum, Hylocomium splendens, Hypericum pulchrum, Juniperus communis, Linum catharticum, Lotus corniculatus, Molinia caerulea, Polygala vulgaris, Potentilla erecta, Scleropodium purum, Sesleria caerulea, Solidago virgaurea, Succisa pratensis, Thymus polytrichus, Viola* spp.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A09** Intensive grazing or overgrazing by livestock (H) **A27** Agricultural activities generating air pollution (H) **F07** Sports, tourism and leisure activities (M)	**A09** Intensive grazing or overgrazing by livestock (H) **A27** Agricultural activities generating air pollution (H) **F07** Sports, tourism and leisure activities (M) **N01** Temperature changes (e.g. rise of temperature & extremes) due to climate change (M) **N02** Droughts and decreases in precipitation due to climate change (M)
7.2 Sources of information	Pressures were sourced from the following reports and	

Optional	accompanying data: Aherne, J., Burton, A., Scott, H., Whitfield, C. & Wolniewicz, M. (2014) Influence of Transboundary Air Pollution on Acid-sensitive Ecosystems. Environmental Protection Agency, Ireland URL: www.epa.ie/pubs/reports/research/air. Baker, M.E. & King, R.S. (2010) A new method for detecting and interpreting biodiversity and ecological community thresholds: Threshold Indicator Taxa ANalysis (TITAN). *Methods in Ecology and Evolution* 1(1): 25–37. Bobbink, R. & Hettelingh, J.P., (eds.) (2011) *Review and revision of empirical critical loads and dose-response relationships*. Coordination Centre for Effects, National Institute for Public Health and the Environment (RIVM). www.rivm.nl/cce. Cathcart, H., Wilkins, K. & Aherne, J. (2018) High spatio-temporal resolution maps of atmospheric dry deposition velocities using the MÉRA dataset. MÉRA Workshop, National Botanic Gardens, Glasnevin May 17, 2018. URL: www.met.ie/science/events/mera-workshop. EPA (2018) Ireland's Transboundary Gas Emissions 1990-2016. URL: www.epa.ie/pubs/reports/air/airemissions. Excel sheet 'Connected22012018.xlsx' provided by Sustainable Energy Authority of Ireland (SEAI) containing the location of connected wind farms as per Eirgrid and ESB Networks. It should be noted that precise accuracy of this coordinate information cannot be assured, that possible stand-alone projects not intended for connection to the Irish electricity grid are not included, and that map locations provided are not necessarily all discrete wind farms (some could be extensions to existing wind farms). FIPS data: PrivateForests2016.shp. Only polygons with a planting year within this reporting period were utilised. Hodd, R.L. (2015) Survey of Flora Protection Order Bryophytes 2015. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland. Hodd, R.L. (2016) Survey of Flora Protection Order Bryophytes 2016. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland. NPWS (2013a) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin. NPWS_Approx_Wildfire_Locations_Polygon_2017.shp O'Neill, F.H., Long, M.P. & Hodd, R.L. (in prep.) Monitoring of the Annex V Clubmoss group (*Lycopodium* spp.) in Ireland 2015-2018. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin. Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014a) National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 15: Slieve Mish Mountains

	cSAC (002185), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Slootweg, J., Posch, M. & Hettelingh, J-P. (2015) Modelling and mapping the impacts of atmospheric deposition of nitrogen and sulphur: CCE Status Report, Coordination Centre for Effects, www.wge-cce.org. Wilkins, K., Aherne, J. & Bleasdale, A. (2016) Vegetation community change points suggest that critical loads of nutrient nitrogen may be too high. *Atmospheric Environment* 146: 324–331.
7.3 Additional information *Optional*	Pressures and threats presented in 7.1 were selected and ranked based on intensity (high, medium, low), frequency of occurrence, and area of impact where data were available. Data gathered from the sources listed in section 7.2 are summarised in the backing document 'NSUH17_AR1719_pressures_assessment_01a.xlsx'. For the current reporting period data on pressures were available for the Slieve Mish Mountains SAC (002185) NSUH site (Perrin *et al*., 2014a); no negative pressures were recorded for habitat 4060 from the Caha Mountains SAC (000093) (Perrin *et al.*, 2014b). Data from shapefiles on locations of wildfires that occurred in spring 2017 (provided by NPWS), locations of newly planted forestry within this reporting period (FIPS data) and locations of windfarms (provided by SEAI) were also utilised. Additional data from Hodd (2015, 2016) and O'Neill *et al.* (in prep.) were examined, with relevant data extracted and analysed. As the data from the current reporting period only represent a small proportion of the data collected to inform NPWS (2013a), the pressures and threats information presented in NPWS (2013a) were also used to inform the current reporting period. In the previous reporting period sheep grazing in the uplands, both undergrazing and overgrazing, was recorded under 'A04.02.02 non-intensive sheep-grazing'. It was recorded as a high-importance pressure and threat for the 4060 habitat (NPWS, 2013a). Using the crosswalk referenced in the backing document 'NSUH17_AR1719_pressures_assessment_01a.xlsx' to convert impact codes from the old reporting scheme to the new, A04.02.02 crosswalks to A10 (Extensive grazing or undergrazing by livestock). However there was no evidence from the NSUH sites surveyed in the previous reporting period, or from this reporting period, that A10 (undergrazing) was a pressure. A09 (Intensive grazing or overgrazing by livestock) can lead to erosion and damage to the vegetation of the 4060 habitat. It was stated in NPWS (2013a) that "sheep grazing is widespread within the sites surveyed by the NSUH and, where levels of grazing are high, is problematic within this habitat", while Hodd (2015, 2016) recorded A09 twice within this reporting period. The NSUH did not record A09 at either the Slieve Mish Mountains SAC (002185) or the Caha Mountains SAC (000093) (Perrin *et al.*, 2014a, 2014b). Based on evidence collected in the previous and current reporting periods and expert opinion, A09 was retained as high-importance pressure for this reporting period. F07 (Sports, tourism and leisure activities) was recorded as a medium-importance pressure in the previous reporting period

	(NPWS, 2013a), and was retained as a medium-importance pressure for this reporting period. It refers to hill walking, which is often concentrated on the ridges and summits where this habitat is found. It was recorded four times during the current reporting period by O'Neill *et al.* (in prep.), impacting on 100% of the 4060 habitat in each case, once at medium intensity and the rest at low intensity. D01 (Wind, wave and tidal power) was recorded as a low importance pressure in the previous reporting period. A review of Irish wind farm developments has indicated that 40.3% of wind farms are located within 2 km of 4060 habitat. As wind farm data were, in general, provided as a single point for each wind farm development, the review located wind farms within a 2 km buffer zone around 4060 habitat using the grid references provided by the SEAI (Connected22012018.xlsx) and the 4060 distribution polygon shapefile. Fifteen randomly selected wind farms located in upland areas were mapped in order to get an idea of the footprint of wind farms in upland areas. An average radius of 2 km was calculated based on these mapped areas. It should be noted that the majority of 4060 polygons within the 4060 distribution shapefile that were within 2 km of a wind farm were from the NPWS (2007) data which mapped areas above 350 m as 4060 habitat (97.9% of the polygons). It should be noted that, although these polygons were also utilised for area, distribution and range calculations for this reporting period, they overestimate the distribution of 4060 at a site level. For this reason, D01 is retained as a low-importance pressure for this reporting period. Areas represented by this NPWS (2007) dataset will need to be validated to get a more accurate estimate of the impact of D01 on 4060 habitat for future reporting periods. Empirical critical loads of nutrient nitrogen have been recommended for a number of European habitats (Bobbink & Hettelingh, 2011). These recommended ranges were refined and extended using plant species diversity for habitat-specific positive indicators species. The influence of nitrogen deposition on plant species diversity was assessed using Threshold Indicator Taxa Analysis (TITAN; Baker & King, 2010) following Wilkins *et al*. (2016) and the Probability of Plant Species occurrence (PROPS-CLF; Slootweg *et al*., 2015). The spatial distribution of total nitrogen deposition was mapped on a 2.5 km x 2.5 km grid resolution using observations of atmospheric nitrogen during the last decade, a period with limited changes in national emissions of nitrogen (EPA, 2018). Total nitrogen deposition included dry ammonia deposition based on network of passive gaseous ammonia samplers and modelled dry deposition velocity (Cathcart *et al*., 2018), and observations of wet deposition for nitrate and ammonium in rainfall (Aherne *et al*., 2014). The observations were mapped using regression kriging which used maps of nitrogen emissions (URL: projects.au.dk/mapeire) and climate (URL: www.met.ie/climate/available-data/mera) as spatial predictors. The proportion of each habitat that exceeded the lower critical load value of the recommended range was calculated. The importance of the impact of Nitrogen Deposition based on this proportion was determined as follows: Low-importance pressure/threat: 5-10%; Medium-importance pressure: 10-25%; High-importance pressure:

	>25%. Alpine heath was assigned a Critical value of 5; 26% of the habitat area exceeded this value. Therefore the pressure *A27 Agricultural activities generating air pollution* was assigned a High importance, as approximately 75 to 80% of total nitrogen deposition can be attributed to agricultural sources nationally. The low-importance pressures A11 (Burning for agriculture) and erosion, recorded under L01 (Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization)), were recorded as low-importance pressures in the previous reporting period and were retained as low-importance pressures for the current reporting period. It is estimated that up to 0.2% of the national 4060 habitat area (0.26 km^2) was burnt in the spring of 2017 (using NPWS_Approx_Wildfire_Locations_Polygon_2017.shp in conjunction with the 4060 distribution polygon shapefile). As this pressure impacted on a relatively small reported area of the national resource of 4060 habitat, the ranking of low importance was retained. L01 was recorded at two locations within this reporting period, both as high intensity. Due to the low frequency of this pressure, L01 was retained as low importance. The low-importance pressures A06 (Abandonment of grassland management (e.g. cessation of grazing or of mowing)), I02 (Other invasive alien species (other than species of Union concern)), I04 (Problematic native species) and J03 (Mixed source air pollution, air-borne pollutants), recorded in NPWS (2013a) but not in this reporting period, were retained as low-importance pressures for the current reporting period. B01 (Conversion to forest from other land uses, or afforestation (excluding drainage)), E01 (Roads, paths railroads and related infrastructure (e.g. bridges, viaducts, tunnels)) and M05 (Collapse of terrain, landslide), recorded in the current reporting period only, were assessed as low-importance pressures. Approximately 0.01% of the known national 4060 habitat area (0.02 km^2) is either adjacent to or has some evidence of new forestry (i.e. planted within the current reporting period) within it (using PrivateForests2016.shp in conjunction with the 4060 distribution polygon shapefile). It is assessed as a low-importance pressure for this reporting period due to the relatively small area of known 4060 habitat impacted, but actual areas impacted are likely to be higher, particularly outside of designated sites. E01 and M05 were assessed as low-importance pressures due to the fact that they occurred just once each, both with a small footprint on the 4060 habitat. The three high- and medium-importance pressures reported in section 7.1 are also considered to be threats to the 4060 habitat in the future. Climate change (under two separate codes, N01 and N02) was assessed as a low-importance threat to 4060 habitat in the previous reporting period (NPWS, 2013a), and has been upgraded to medium importance for the current reporting period. Habitat 4060 has been highlighted as particularly sensitive to climate change (Zaghi, 2008), with climate change predicted to impact on the occurrence of arctic-alpine plants in Ireland (EPA, 2017; Wyse Jackson, 2007). The results of a recent study, based on predictive

	modelling, on potential impacts of climate change on oceanic montane plant communities suggest that there will be a reduction in area of all true montane habitats in Ireland, as defined by their characteristic species (Hodd *et al.*, 2014). This study, which largely focused on montane heath habitats, reports that many of the plant communities potentially impacted occur within a number of the habitats listed under Annex I of the EU Habitats Directive including significant elements of 4060. Arctic-montane species in particular are reported in this study to see areas of suitable climate shift northwards or contract to higher elevations, while internationally important bryophyte communities are also considered to be under threat. The study points to a possible need to review current distribution of protected areas in the light of potential impacts of climate change on species geographic distribution. Climate change (under two separate codes, N01 and N02) has been deemed a significant threat and has been upgraded to medium importance. It can also impact indirectly, for example, through increasing the likely frequency of more intense fires. It needs further focused studies to elucidate its likely effect and to devise appropriate conservation strategies in sufficient time to minimise impacts.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type** or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*

8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* ***a) Short-term results (within the current reporting period, 2013-2018)*** *or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	**CA03** Maintain existing extensive agricultural practices and agricultural landscape features **CA04** Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures **CA05** Adapt mowing, grazing and other equivalent agricultural activities **CB01** Prevent conversion of (semi-) natural habitats into forests and of (semi-)natural forests into intensive forest plantation **CF03** Reduce impact of outdoor sports, leisure and recreational activities **CI03** Management, control or eradication of other invasive alien species **CI05** Management of problematic native species **CH03** Reduce impact of other specific human activities
8.6 Additional information *Optional*	Conservation measures were selected using data gathered from Hodd (2016), Perrin *et al.* (2014a, 2014b) and O'Neill *et al*. (in prep.), and from information provided by NPWS (pers. comm.), European Commission (eip-agri agriculture and innovation) and Forest Service (2015). Data from the NSUH, recorded in the previous reporting period, were also utilised where appropriate. The maintenance of extensive grazing (recorded under CA03), particularly that of sheep grazing, as a conservation measure was recorded twice by Hodd (2016), while non-intensive grazing was recorded three times by O'Neill *et al*. (in prep.) as a neutral impact on 4060 habitat. It was also recorded as a neutral impact at four 4060 NSUH sites during the previous reporting period, and within the Slieve Mish Mountains SAC (002185) and the Caha Mountains SAC (000093) (Perrin *et al*., 2014a, 2014b). In some cases the maintenance of extensive sheep grazing is undertaken through the Department of Agriculture's Green, Low Carbon, Agri-Environment Scheme (GLAS), both in regard to Commonage Management Plans and private Natura Management Plans. The main purpose of these sustainable management plans, in regard to upland habitats, is to restore the condition of both commonage and private Natura lands by protecting against both undergrazing and overgrazing (A. Bleasdale, NPWS, pers. comm.). It should be recognised that not all shareholders within the commonages or people who hold private Natura lands have joined up to the aforementioned plans. It should also be noted that GLAS measures can sometimes result in an increase in stock numbers on land that had not recovered sufficiently despite Commonage

	Framework Plan (CFP) measures. It is also true that recovery of vegetation on seriously degraded areas is extremely slow in mountain areas and is not guaranteed, as peat erosion once instigated can continue until bedrock is exposed. The management regimes of most areas of 4060 habitat are driven by the landowner rather than by any formal management plan or policy; therefore the continued operation of the management regimes currently in place is not guaranteed across the entire habitat. In addition, for this conservation measure to be relevant to this assessment there would need to be 4060 habitat within the area managed under GLAS; while mapping data are not available for areas managed through GLAS, an assumption is made that some areas of 4060 are included. Details of participation in the GLAS scheme and of the uptake across various measures are not currently available. It is therefore not possible to precisely assess the effects of implementation of these measures. Within Ireland's National Parks (NPs), Connemara NP is undertaking maintenance of tracks and trails to prevent damage to sensitive habitats (CF03) and control of trespassing stock (CA05). Killarney NP is also carrying out the aforementioned conservation measures in addition to deer management (CI03 – Sika deer; CI05 – Red deer) (C. Douglas, NPWS, pers. comm.). CI03 (Management, control or eradication of other invasive alien species) was recorded as a positive impact at one NSUH site during the previous reporting period (Roche *et al.*, 2012b), while CA05 (adapt mowing, grazing and other equivalent agricultural activities) was recorded as a positive impact at two NSUH sites during the previous reporting period. CA05 was in relation to the reduction of sheep numbers, trespassing within Killarney National Park and a Nature Reserve on Masatiompan, from adjoining areas, through the erection of fences (Roche *et al.*, 2012b and Perrin *et al.*, 2012 respectively). Glenveagh NP carries out maintenance of tracks and trails (CF03) and control of deer numbers (CI05 – Red deer) (D. Duggan, NPWS, pers. comm.). Wicklow Mountains NP also maintain tracks and trails (CF03), control trespass of stock (CA05) and deer numbers (CI03 – Sika deer and occasional Fallow deer; CI05 – Red deer). In addition to these conservation measures, they enforce the Ministerial Direction 2010 on the use of All Terrain and Off-Road Vehicles where possible (CF03) and work towards a reduction in small-scale illegal dumping through the PURE project (CH03), which is an environmental project established to combat illegal dumping in the Wicklow/Dublin uplands (http://www.pureproject.ie/). Finally, Wicklow Mountains NP also control fires where possible (CA05) and have worked closely with local farmers and Teagasc through the Wicklow Uplands Council, with the result of a reduction in farmer-lit fires (E. Mullen, NPWS, pers. comm.). Two Forest Service Circulars (10/2010 and 18/2011) advise against afforestation from large areas of upland sites containing sensitive habitats (CB01), while the Forest Service (2015) states: "The inappropriate afforestation of sensitive habitats such as peat lands and wetlands will be avoided, as well as the negative effects on areas of ecological value including areas under high natural value farming". It should be noted however that there is no requirement to carry out

	EIAs on areas below 50 ha, thus relatively large areas can be afforested without adequate environmental assessment. Also, although there has been a documented move of afforestation from peatland and upland areas to wet mineral soils and lower elevations (20% of area planted in 2000 to 4% in 2011) (Forest Service 2015), there is now pressure to increase land availability for afforestation on unenclosed land, with 114 ha of unenclosed land afforested in 2012 and 106 ha in 2013 (COFORD, 2016), though this may not threaten 4060 habitat to the same extent as the other upland Annex I habitats. The Forest Service has been involved in the development of Wildfire Interagency Groups and local-level partnerships in fire-prone counties in order to permit better targeted fire prevention and enforcement (CA05). A number of demonstration prescribed burns were carried out in 2016, one of which was carried out under the supervision of the KerryLIFE Project, while Teagasc arranged a mechanised vegetation management demonstration to demonstrate alternative methods of vegetation management (Joint Research Centre, 2017) (CA05). The EU KerryLIFE Project commenced in 2014 with the aim of improving selected populations of Freshwater Pearl Mussel towards favourable conservation condition through sustainable management of c. 2500 ha of farmed lands (CA03 and CA05). The proposed sensitive grazing regime is expected to improve cover and height of heathers, while encouraging areas of bare or eroding peat to re-vegetate. If successful, it is likely to have most benefit for the upland habitats within the catchment area, including 4060 habitat (C. Douglas, NPWS, pers. comm.). Response to measures will not be available until the next reporting period. A total of eight European Innovation Partnership (EIP) projects with peatland focus or actions have been selected and offered financial support through the EIP-Agri budget administered by the Department of Agriculture, Food and the Marine. The total budget for these projects (albeit not entirely dedicated towards peatland actions alone) is significant. Three projects have already been initiated, with ecologically sustainable grazing in upland habitats a cross-cutting deliverable (CA03 and CA05). The response to measures will not be apparent until the next reporting period due to the infancy of these projects. The EIP project 'Blackstairs Farming Futures (BFF) Sustainable farming project in the Blackstairs Mountains' aims to maintain and improve peatland habitats and associated semi-natural habitats within the Blackstairs Mountains (CA03 and CA05), with the EIP project 'Sustainable Uplands Agri-environment Scheme (SUAS)' having a similar objective. The EIP project 'A Sustainable Agricultural Plan for the MacGillycuddy Reeks – Conservation and restoration of Upland Habitat in the MacGillycuddy Reeks' proposes to reintroduce suitable cattle breeds to manage upland peatlands (e.g. wet heath, dry heath and blanket bog) and grasslands, with particular interest in their use to manage scrub (CA04). It proposes to clear 85 ha of Rhododendron (CI03) and 85 ha Bracken (CI05), and to manage recreational impacts and provide and maintain trails to prevent damage to upland habitats

	such as 4060 habitat (CF03).

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	*Good /* ***Poor*** */ Bad / Unknown*
	c) Structure and functions	*Good / Poor /* ***Bad*** */ Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as stable. Current range is equal to Favourable Reference Range. Conservation status of Range is therefore Favourable. Without further focused studies to clarify the likely effect of climate change on 4060 habitat with regard to the Future prospects of Range, future trend of Range is assessed as stable. No change in range is expected based on the balancing of the other threats (i.e. A09 and F07) and conservation measures that are currently in place. Future prospects of Range are therefore good. Short-term trend direction of Area is assessed as decreasing. Current area is approximately equal to the Favourable Reference Area (FRA). Conservation status of Area is therefore Unfavourable-Inadequate. Future trend of Area is assessed as stable, as although the threats of A09 and F07 are expected to have a negative influence on Area (small, localised area loss) their presence is not expected to change the overall status of Area within the next 12 years. Future prospects of Area are therefore poor. Short-term trend direction for Structure and functions is improving for habitat that is in good condition. Current Structure and functions are assessed as Unfavourable as <90% of habitat is in good condition. A maximum estimate of 40.5% of 4060 habitat is in bad condition, which equates to Unfavourable-Bad Structure and functions. Conservation status of Structure and functions is therefore Unfavourable-Bad. Future trend of Structure and functions is assessed as stable, as although the threats of A09 and F07 are expected to have a negative influence on Structure and functions, their presence is not expected to change the overall status of Structure and functions within the next 12 years. Where the conservation measures CA03, CA05 and CF03 occur they would be expected to balance the threats; however it should be noted that these are not implemented across the national distribution of the habitat, nor are they specifically targeted measures for the 4060 habitat. Future prospects of Structure and functions are therefore bad.	

<table>
<tr><th colspan="4">10 Conclusions</th></tr>
<tr><td colspan="4">Assessment of conservation status at end of reporting period</td></tr>
<tr><td>10.1 Range</td><td colspan="3"><u>Favourable (FV)</u> / Inadequate (U1) / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>10.2 Area</td><td colspan="3">Favourable (FV) / <u>Inadequate (U1)</u> / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>10.3 Specific structure and functions (incl. typical species)</td><td colspan="3">Favourable (FV) / Inadequate (U1) / <u>Bad (U2)</u> / Unknown (XX)</td></tr>
<tr><td>10.4 Future prospects</td><td colspan="3">Favourable (FV) / Inadequate (U1) / <u>Bad (U2)</u> / Unknown (XX)</td></tr>
<tr><td>10.5 Overall assessment of Conservation Status</td><td colspan="3">Favourable (FV) / Inadequate (U1) / <u>Bad (U2)</u> / Unknown (XX)</td></tr>
<tr><td>10.6 Overall trend in Conservation Status</td><td colspan="3">Indicate the trend (qualifier) for FV, U1 and U2:
<u>improving</u> / deteriorating / stable / unknown</td></tr>
<tr><td rowspan="8">10.7 Change and reasons for change in conservation status and conservation status trend</td><td colspan="3">Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.</td></tr>
<tr><td></td><td>Overall assessment of conservation status (10.5)</td><td>Overall trend in conservation status (10.6)</td></tr>
<tr><td>a) no, there is no difference</td><td>YES/<u>NO</u></td><td>YES/<u>NO</u></td></tr>
<tr><td>b) yes, due to genuine change</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>c) yes, due to improved knowledge/more accurate</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>d) yes, due to the use of different methods (including use of different thresholds)</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>e) yes, but there is no information on nature of change</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>The change is mainly due to (select one of the reasons above):</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td></tr>
<tr><td>10.8 Additional information

Optional</td><td colspan="3">The Conservation Status of Range is Favourable in this reporting period, as it was in the previous reporting period.
The Conservation Status of Area is Unfavourable-Inadequate in this reporting period, but was Favourable in the previous reporting period. There was a decline equivalent to a loss of less than 1% per year within this reporting period (0.04 ha) resulting in the</td></tr>
</table>

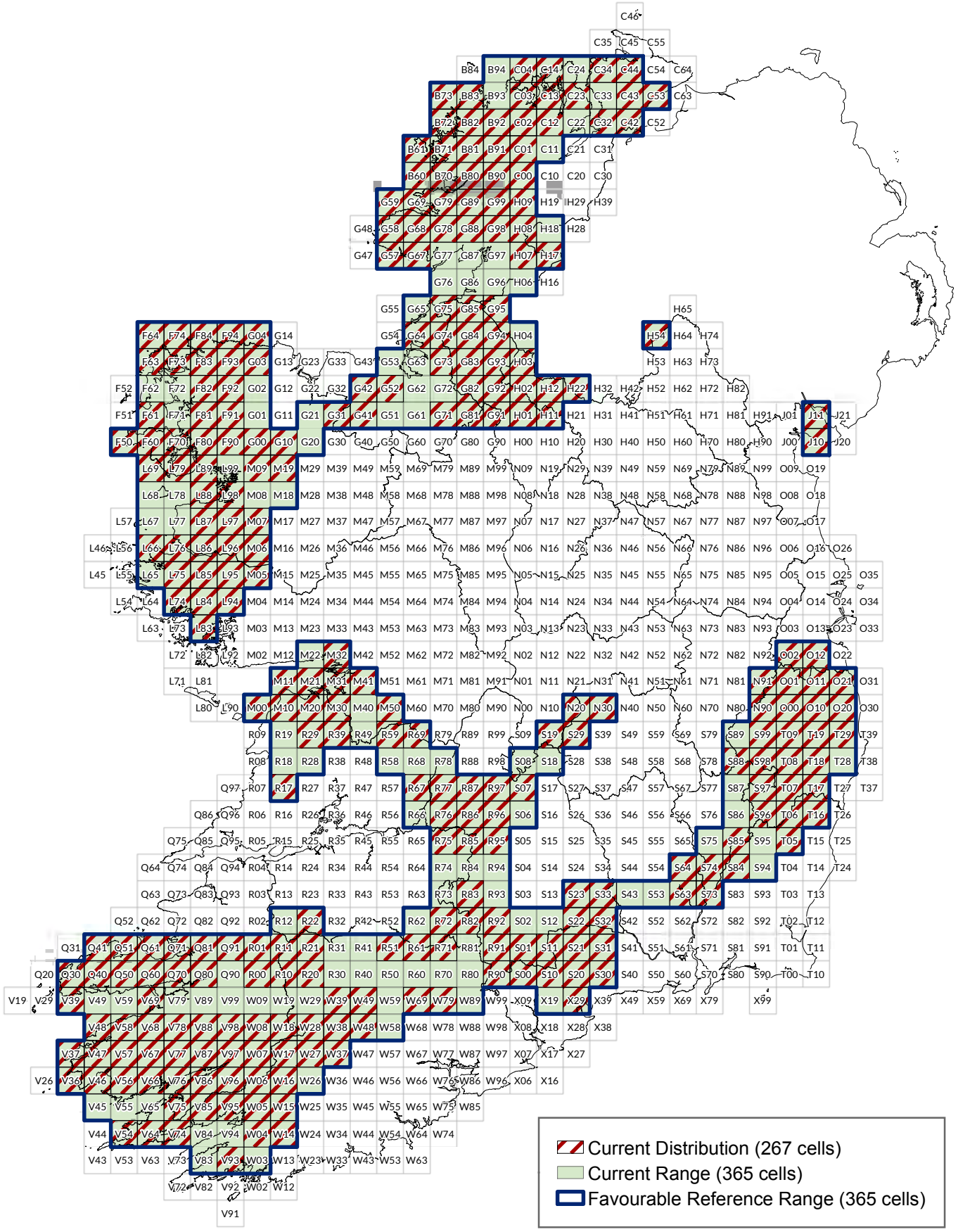
	Conservation Status of Area being assessed as Unfavourable-Inadequate. The Conservation Status of the Structure and Functions and Future prospects are Unfavourable-Bad in this reporting period, as they were in the previous reporting period. The Overall Conservation Status was assessed as Unfavourable-Bad, as it was during the last reporting period. The status of Unfavourable-Bad during the current reporting period was due to less than 25% of the area of 4060 habitat being assessed as having Favourable Structure and functions. Trend in Overall Conservation Status was assessed as improving in this reporting period due to the assumption that the reduced grazing brought about by the CFPs continues to have a positive effect on this habitat. The short-term trend for Area was assessed as decreasing in this reporting period (from stable in the previous reporting period) due to loss of area. However, this loss is considered to be negligible and therefore the ongoing improvements to condition dictate the overall improving trend.

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***116.25 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* *stable /* ***increasing*** */ decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing a union between the distribution polygon shapefile and the SAC shapefile, and an intersect between the distribution point	

	shapefile and SAC shapefile. The area given in section 11.1 is the total area of 4060 habitat in SACs in the country, including some SACs where 4060 is not listed as a qualifying interest (QI). The area of 4060 within the Natura 2000 network where it is listed as a QI is 106.55 km^2. There was one inconsistency between the Natura 2000 sites where the 4060 habitat is listed as a QI and the current distribution for the habitat. 4060 is listed as a QI for the Inishmore Island SAC (000213); however, on review of the notes accompanying the Natura 2000 Standard Data Form for the previous reporting period it was deemed that the habitat does not occur there (NPWS, 2013a). *Dryas octopetala* is conspicuously absent from the Aran Island flora and the description of 4060 habitat for Inishmore Island SAC is essentially identical to the description of 4030 Dry heath. Habitat 4060 is retained as a QI for this SAC, however, until this absence is confirmed on the ground. The short-term trend of the 4060 habitat in good condition within the SAC network is taken to be increasing, with the same trend as the 4060 habitat nationally (section 6.4). The reported surface area of 4060 habitat within the Natura 2000 network has decreased since the last reporting period; this is due to improved knowledge lending itself to a refinement of area totals (see section 5.15 for details).

12 Complementary information	
12.1 Justification of % thresholds for trends *Optional*	The declining trend in Area is considered too small to influence the trend in the Overall status.
12.2 Other relevant information *Optional*	

Alpine and Boreal heaths (4060)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Habitat code / name	**5130 *Juniperus communis* formations on heaths or calcareous grasslands**
1.2i Habitat short name	**Juniper scrub**
1.3i Habitat description	In Ireland a juniper formation is defined as a discrete area supporting 50 or more juniper plants where no plant is more than 20 m from another. In practice this means that, in addition to reaching the 50-plant threshold, juniper plants should achieve a minimum density of 25 plants per hectare to qualify as a formation. Juniper formations are mostly associated with lowland dry calcareous and neutral grassland, exposed calcareous rock, dry siliceous heath, exposed siliceous rock and dry calcareous heath; however, formations can also occur on coastal dunes and at higher altitudes (Cooper *et al*., 2012). Both upland and lowland juniper formations in Ireland are dominated almost exclusively by prostrate or spreading forms of *Juniperus communis*. A total of 148 formations make up the current national resource of 5130 habitat.

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***2007-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was compiled from 5130 polygons digitised for the 2017 Juniper Monitoring Survey (JMS; O'Neill & Martin, 2017), polygons from the NPWS 2015 survey (NPWS, 2015), and two additional 5130 areas recorded in 2017 (while surveying a different Annex I habitat), for which approximate boundaries were digitised. The polygons surveyed in 2017, including those recorded during the grassland monitoring survey, were judged to be good-quality data, known to represent 5130 habitat (certainty=3). The only exception was JMS site KY02 Derrynane, in which the plants were intermeshed and difficult to count and the tally of 50 plants may have been an overestimate. This was assigned a certainty value of 2.

	The NPWS 2015 shapefile was checked against aerial photographs on a polygon-by-polygon basis, using the notes that had been added from the 2015 survey, to assess the probability that each of them contained juniper plants of sufficient numbers and density to qualify as 5130. The source shapefile field "F2015_Rev_" contained codes that indicated whether a formation was confirmed by rangers as being present (codes beginning with "CF" for confirmed formation) or absent ("CNF" = Confirmed non-formation). For formations confirmed by rangers in 2015, the certainty was not as high as for the 2017 polygons because the determination of 5130 was made before the definition was revised in 2017. In most cases the presence of sufficient juniper plants was confirmed, but the density was not described, so a certainty value of 2 was assigned to these polygons. Where greater uncertainty existed but probability was still weighted in favour of a formation being present, a certainty value of 1-2 was assigned. Three polygons from the National Survey of Uplands Habitats (Site 1 - Mweelrea / Sheeffry / Erriff Complex) containing the vegetation community MH4 - *Calluna vulgaris-Juniperus communis* subsp. *nana* montane heath (Perrin *et al.*, 2014) were considered to correspond to the revised definition of the 5130 habitat and were added to the distribution.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Cooper, F., Stone, R.E., McEvoy, P., Wilkins, T. and Reid, N. (2012) The conservation status of juniper formations in Ireland. *Irish Wildlife Manuals*, No. 63. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. https://www.npws.ie/sites/default/files/publications/pdf/IWM63.pdf. JNCC (Joint Nature Conservation Committee) (2007) Second Report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006. Peterborough: JNCC. Available from: www.jncc.gov.uk/article17. JNCC (Joint Nature Conservation Committee) (2009) Common Standards Monitoring Guidance for Upland habitats, Version July 2009. Joint Nature Conservation Committee, Peterborough, UK. Long, D. and Williams, J. (2007) Juniper in the British Uplands: the Plantlife juniper survey results. Unpublished report by Plantlife. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin.

	NPWS (2015) ArcGIS polygons shapefile annotated with results of 2015 survey by NPWS field staff. O'Neill, F.H. and Martin, J.R. (2018) The Irish Juniper Monitoring Survey 2017. *Irish Wildlife Manuals*, No. 101. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin. Perrin, P.M., Barron, S.J., Roche, J.R. and O'Hanrahan, B. (2014) Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland. Version 2.0. *Irish Wildlife Manuals*, No. 79. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. Perrin, P.M., O'Hanrahan, B., Roche, J.R. and Barron, S.J. (2009) Scoping study and pilot survey for a national survey and conservation assessment of upland habitats and vegetation in Ireland. Unpublished report for National Parks and Wildlife Service, Dublin. Plantlife (2015) The state of Scotland's juniper in 2015. Report published by Plantlife Scotland. Thomas, P.A., El-Barghathi, M. and Polwart, A. (2007) Biological flora of the British Isles: *Juniperus communis* L. *Journal of Ecology* 95: 1404–1440. Ward, L.K. and Shellswell, C.H. (2017) Looking after Juniper: Ecology, Conservation and Folklore. Plantlife, Salisbury. http://www.plantlife.org.uk/uk/our-work/publications/looking-after-juniper. Accessed October 2017.
3.2i Additional information	

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***5,600 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

<table>
<tr><td>4.6 Long-term trend Period
Optional</td><td colspan="2">1994–2018</td></tr>
<tr><td>4.7 Long-term trend Direction
Optional</td><td colspan="2"><u>stable</u> / increasing / decreasing / uncertain / unknown</td></tr>
<tr><td rowspan="2">4.8 Long-term trend Magnitude
Optional</td><td>a) Minimum</td><td></td></tr>
<tr><td>b) Maximum</td><td></td></tr>
<tr><td>4.9 Long-term trend Method used
Optional</td><td colspan="2">Select one of the following methods:
a) Complete survey or a statistically robust estimate
b) Based mainly on extrapolation from a limited amount of data
<u>c) Based mainly on expert opinion with very limited data</u>
d) Insufficient or no data available</td></tr>
<tr><td rowspan="4">4.10 Favourable reference range</td><td colspan="2">a) 5,600 km^2</td></tr>
<tr><td colspan="2">b) Indicate if operators were used (using symbols ≈, >, >>) or</td></tr>
<tr><td colspan="2">c) If favourable reference range is unknown, indicate by using ‘x’</td></tr>
<tr><td colspan="2">d) Indicate method used to set reference value if other than operators
The Favourable Reference Range has been set as the current range as there is no evidence of decline since the Directive came into force. The distribution of juniper formations is scattered across the distribution of juniper species records, indicating that all geographical variation has been accounted for. There is also no reason to assume that the area is not large enough to allow the long-term survival of the habitat.</td></tr>
<tr><td rowspan="6">4.11 Change and reason for change in surface area of range</td><td colspan="2">Is there a change between reporting periods? <u>YES</u>/NO
If yes, provide the nature of that change. More than one option (a to d) can be chosen</td></tr>
<tr><td>a) yes, due to genuine change</td><td>YES/<u>NO</u></td></tr>
<tr><td>b) yes, due to improved knowledge/more accurate data</td><td><u>YES</u>/NO</td></tr>
<tr><td>c) yes, due to the use of different method</td><td><u>YES</u>/NO</td></tr>
<tr><td>d) yes, but there is no information on the nature of change</td><td>YES/<u>NO</u></td></tr>
<tr><td colspan="2">The change is mainly due to (select one of the reasons above):
genuine change / <u>improved knowledge or more accurate data</u> / the use of a different method</td></tr>
<tr><td>4.12 Additional information
Optional</td><td colspan="2">Range was calculated using the range tool, based on the current known distribution of juniper formations. A maximum gap distance of two 10km grid cells was used when running the range tool.
Short-term trend was estimated based on comparing data from the 2015 and 2017 surveys (NPWS, 2015; O’Neill & Martin, 2017) with data from the 2007-2012 reporting period (Cooper et al., 2012). No genuine losses in area leading to range contraction were noted. Any</td></tr>
</table>

	changes are due to a change in the interpretation of what constitutes a juniper formation (a minimum density of juniper was introduced) and because of more accurate mapping of the habitat since the previous reporting period. Favourable Reference Range was deemed to be the same as the current range as there is no evidence of decline since the Directive came into force and there is also no reason to assume that the area of the current range is not large enough to allow the long-term survival of the habitat.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2009-2017***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***17.69 km^2***
5.3 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	

5.10 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator ≈ (approximately equal to) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data /* ***the use of a different method***	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 2009 when the baseline survey was carried out (Cooper *et al*., 2012) and incorporates updates made by surveys in 2015 (NPWS, 2015) and 2017 (O'Neill & Martin, 2017). Favourable Reference Area is deemed to be approximately equal to the current area. Some area losses of anthropogenic origin (e.g. road and housing construction) have occurred since the Directive came into force but the current area is considered to be large enough to allow the long-term survival of the habitat. In 2017, 27 juniper formation sites were surveyed to determine if they were still extant formations (O'Neill & Martin, 2017). One was not relocated, thought to be due to inaccurate GPS coordinates, two others were deemed not to have enough shrubs to qualify as formations, and two more sites were merged into one due to proximity. Formations in the 23 remaining sites were accurately remapped. Some sites contained more than one formation and a	

	total of 82 individual formations were mapped across the 23 sites. These were added to other formations mapped during the baseline juniper survey (Cooper *et al*., 2012), many of which were resurveyed and remapped as part of an NPWS survey (NPWS, 2015). Approximate areas were mapped for two further areas identified while surveying a different Annex I habitat (unpublished data, BEC Consultants, 2017). There may be other undiscovered formations in the country. Hence, the value entered for the current area of the habitat is a minimum. The short-term trend in Area was deemed to be stable. Two formations located outside the Natura 2000 network were reduced in area by a total of 0.55 ha due to anthropogenic factors (motorway construction and juniper scrub removal) but at a national level the loss equates to -0.003% per annum in the 12-year period over which this loss is measured, which is considered to be negligible. The magnitude of the loss was calculated by expressing the area lost as a per-annum percentage of the original area. Losses due to prolonged natural flooding were ascribed to natural fluctuations rather than a genuine downward trend. The large difference in habitat extent between this reporting period and the last is primarily due to a change in how the habitat was defined (a minimum density has been introduced in this monitoring period) and how the habitat was mapped (formations have been very accurately mapped in this reporting period, rather than using the less accurate minimum convex polygon method).

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***16.31 km²***
		Maximum	***16.31 km²***
	b) Area in not-good condition	**Minimum**	***1.42 km²***
		Maximum	***1.42 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*		

6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? **YES**/NO* Updated list is provided as an additional spreadsheet. See section 6.7 for outline of changes. More details are provided in section 6.8.
6.7 Typical species Method used *Optional*	Apart from *Juniperus communis*, typical species were not assessed in this reporting period. However, the list used in the previous reporting period for the most part represents the main species that occur in juniper formations. Some amendments were made. For example, species indicative of agricultural intensification or abandonment, and of flushed habitats, have been removed. Orchids are now included under the family Orchidaceae, rather than listing individual species. The changes are detailed in section 6.8. It should be noted that juniper formations occur across a wide range of ecological situations, and the list is comprised of species that occur across this range. Thus it should not be expected that all of those species will be found in any one situation; rather, a sub-set of these species will occur, depending on the ecology of the habitat.
6.8 Additional information *Optional*	A 5130 Juniper formation in Favourable condition is characterised by having a good proportion of fruiting female bushes, evidence of successful seedling formation, or suitable conditions for seedlings to establish (e.g. patches of bare ground or grikes in limestone rock), and generally healthy bushes with few dead or browning individuals and little or no damage from grazing and browsing animals. The habitat should retain any features of local distinctiveness recorded in a previous monitoring period (e.g. presence of juniper shield bug) and should not be subject to high-intensity damaging impacts such as overgrazing, impacts from non-native invasive species, or succession to another habitat such as overtopping scrub. Changes between reporting periods are due to use of a different method. Different assessment criteria have been used in this reporting period (see O'Neill & Martin, 2017). The main reason that sites failed the Structure and functions assessment in the previous period was poor recruitment (low numbers of seedlings). In this reporting period, account has been taken of the fact that juniper seedling recruitment occurs at a slow rate. While seedling recruitment was also low in this reporting period, the criterion was allowed to pass at sites where micro-sites existed for germination (e.g. on bare soil or peat). The rate of juniper reproduction is not constant, with the most extensive and successful populations of juniper occurring where there have been short periods of intense disturbance interspersed with little or no disturbance and low grazing and browsing pressure (JNCC, 2009). Therefore a more long-term view over several decades may need to be taken when assessing regeneration in 5130 Juniper

	formations, and it may be appropriate to take into account young mature bushes as well as seedlings. The issue of seedling recruitment is discussed further in O'Neill & Martin (2017). Area of the habitat in good condition was estimated by calculating the area of sites surveyed in 2017 that were assessed as being in good condition in relation to their structure and functions, based on 2017 assessments. A similar exercise was carried out to calculate area in not-good condition. As the sample is considered representative of the national resource the proportion in good and not good condition were scaled up to the national estimate for Area. Some revisions were made to the list of typical species. The following species were removed: species indicative of agricultural intensification, disturbance or abandonment (*Trifolium repens*, *Senecio jacobaea*, *Holcus lanatus*, *Cynosurus cristatus*, *Arrhenatherum elatius*, *Dactylis glomerata* and *Fraxinus excelsior*); species of wetter habitats (*Eriophorum angustifolium*, *Carex viridula*, *Pedicularis palustris*, *Juncus articulatus*); species of mobile dunes (*Ammophila arenaria*); and species not represented across a wide range of sites in baseline or 2017 surveys (*Jasione montana*, *Plantago coronopus*). *Hypericum perforatum* was changed to *H. pulchrum* on the basis of 2017 surveys. Individual orchid species were consolidated under the single family Orchidaceae, as several species not included in the previous list were found to occur frequently. All taxa included in the current list are as follows: *Agrostis canina, Agrostis stolonifera, Anagallis tenella, Anthoxanthum odoratum, Anthyllis vulneraria, Briza media, Calluna vulgaris, Campanula rotundifolia, Carex arenaria, Carex binervis, Carex flacca, Carex nigra, Carex panicea, Danthonia decumbens, Daucus carota, Dryas octopetala, Empetrum nigrum, Erica cinerea, Erica tetralix, Festuca rubra, Galium verum, Geranium robertianum, Geranium sanguineum, Hypericum pulchrum, Hypochaeris radicata, Juniperus communis, Koeleria macrantha, Linum catharticum, Lotus corniculatus, Luzula multiflora, Molinia caerulea, Mycelis muralis, Nardus stricta, Narthecium ossifragum,* Orchidaceae*, Pilosella officinarum, Plantago lanceolata, Polygala serpyllifolia, Polygala vulgaris, Potentilla erecta, Prunella vulgaris, Ranunculus bulbosus, Schoenus nigricans, Succisa pratensis, Teucrium scorodonia, Thymus polytrichus, Trifolium pratense, Viola riviniana.* Some issues identified in the previous reporting period (e.g. sheep overgrazing) appear to have improved; however, other sites which achieved excellent conservation ratings in the previous period appear to have declined in condition, due to factors such as erosion (perhaps caused by overgrazing or burning) and juniper scrub removal. Because these changes in condition appear to balance each other out, and because of the change in methodology between the two reporting periods in assessing the status of structure and functions, the short-term trend of habitat area in good condition is taken to be stable.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**Xxp** No pressures	**Xxt** No threats
7.2 Sources of information *Optional*	Pressures and threats were recorded during 2017 field surveys (O'Neill & Martin, 2017).	
7.3 Additional information *Optional*	Pressures and threats were ranked from data gathered during the 2017 monitoring programme and further information on the occurrence and frequency of pressures can be found in O'Neill & Martin (2017). No pressures were identified as being of high or medium importance nationally. Any high or medium-impact pressures recorded during surveys usually affected only small areas of the habitat, or occurred at a low frequency across the sites surveyed. Pressures that affected relatively large areas of the sites where they occurred, but which occurred at a low frequency across the sites surveyed, include A09 Intensive grazing or overgrazing by livestock and A06 Abandonment of grassland management (e.g. cessation of grazing or of mowing). In most cases where grazing was recorded, it was regarded as either beneficial or not damaging to the habitat. The issue of grazing is complex and a balance needs to be maintained between the beneficial effects (e.g. creating bare patches for seedling recruitment and prevention of unwanted scrub encroachment) and the negative effects (such trampling or browsing of developing seedlings). Grazing is discussed in more detail in O'Neill & Martin (2017). Erosion was recorded at several sites but was not listed as a pressure nationally. Juniper formations surveyed in 2017 were seen to persist even in the presence of severe erosion, and juniper density was often found to be highest in areas where outcropping rock was freely interspersed through bare peat or heathy vegetation. In some cases the cause of erosion was not clear and could have been either natural (through exposure) or because of past overgrazing. Future monitoring surveys should help to elucidate the long-term effects of erosion on juniper formations. Erosion in the context of 5130 habitat is discussed further in O'Neill & Martin (2017). Pressures that were high-impact but which affected only a small area of the habitat at a local level include A05 Removal of small landscape features for agricultural land parcel consolidation (in the form of juniper scrub removal), A11 Burning for agriculture, I02 Other invasive alien species (other than species of Union concern), and F01	

	Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions). One formation was reduced in area by road construction, so the pressure E01 Roads, paths railroads and related infrastructure (e.g. bridges, viaducts, tunnels) operated locally but the area affected was of a low significance nationally. Periodic flooding from turloughs or lakes (which led to the death of juniper shrubs and some area loss) is not listed as an impact. It is difficult to quantify the long-term effect of this occurrence as it is likely to be one that the juniper habitat has had to adapt to over many decades. Further monitoring and research will be required to determine if such episodic occurrences are damaging or, in fact, ultimately beneficial by invigorating the formation through the creation of seed germination niches and thus promoting seedling recruitment. Climate change has not been added as an impact but it is likely to affect the altitudinal and latitudinal range of 5130 in Ireland in decades to come if average temperatures continue to rise (juniper seed germination is linked to cold temperatures, and juniper seedlings are susceptible to drought; Thomas *et al.,* 2007).

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (YES/**NO**)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* *b) Measures identified and taken or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*

8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	None taken
8.6 Additional information *Optional*	It should be recognised that the management regimes of most juniper formations are driven by the landowner rather than by any formal management plan or policy; therefore the continued operation of the management regimes currently in place is not guaranteed. Other conservation measures that are not currently being implemented, but whose implementation would improve the Structure and functions of the habitat at the local level, include the cessation of juniper scrub removal (and reinstatement if necessary), the control or removal of non-native species, particularly invasive species such as *Cotoneaster* spp., and the cessation of burning, particularly in the vicinity of small juniper formations.

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	***Good*** */ Poor / Bad / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as Stable. Current range is equal to Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as Stable, as no change in range is expected. Future prospects of Range are therefore Good. Short-term trend direction of Area is assessed as Stable. Current area is approximately equal to the Favourable Reference Area. Conservation status of Area is therefore Favourable. Future trend of Area is assessed as Stable, as no change in Area is expected. Future prospects of Area are therefore Good. Current Structure and functions are assessed as Favourable as >90% of habitat is in “Good” condition. Fragmentation or other conditions are not impacting significantly on ecological processes. Short-term trend direction is Stable (for habitat that is in “good”	

	condition). Conservation status of Structure and functions is therefore Favourable. Future prospects of Structure and functions are therefore Good.

10 Conclusions

Assessment of conservation status at end of reporting period

10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	***YES****/NO*	*YES/****NO***
	b) yes, due to genuine change	*YES/****NO***	*YES/NO*
	c) yes, due to improved knowledge/more accurate	***YES/****NO*	*YES/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	***YES****/NO*	*YES/NO*
	e) yes, but there is no information on nature of change	*YES/****NO***	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data /* ***the use of a different method***	*genuine change / improved knowledge or more accurate data / the use of a different method*

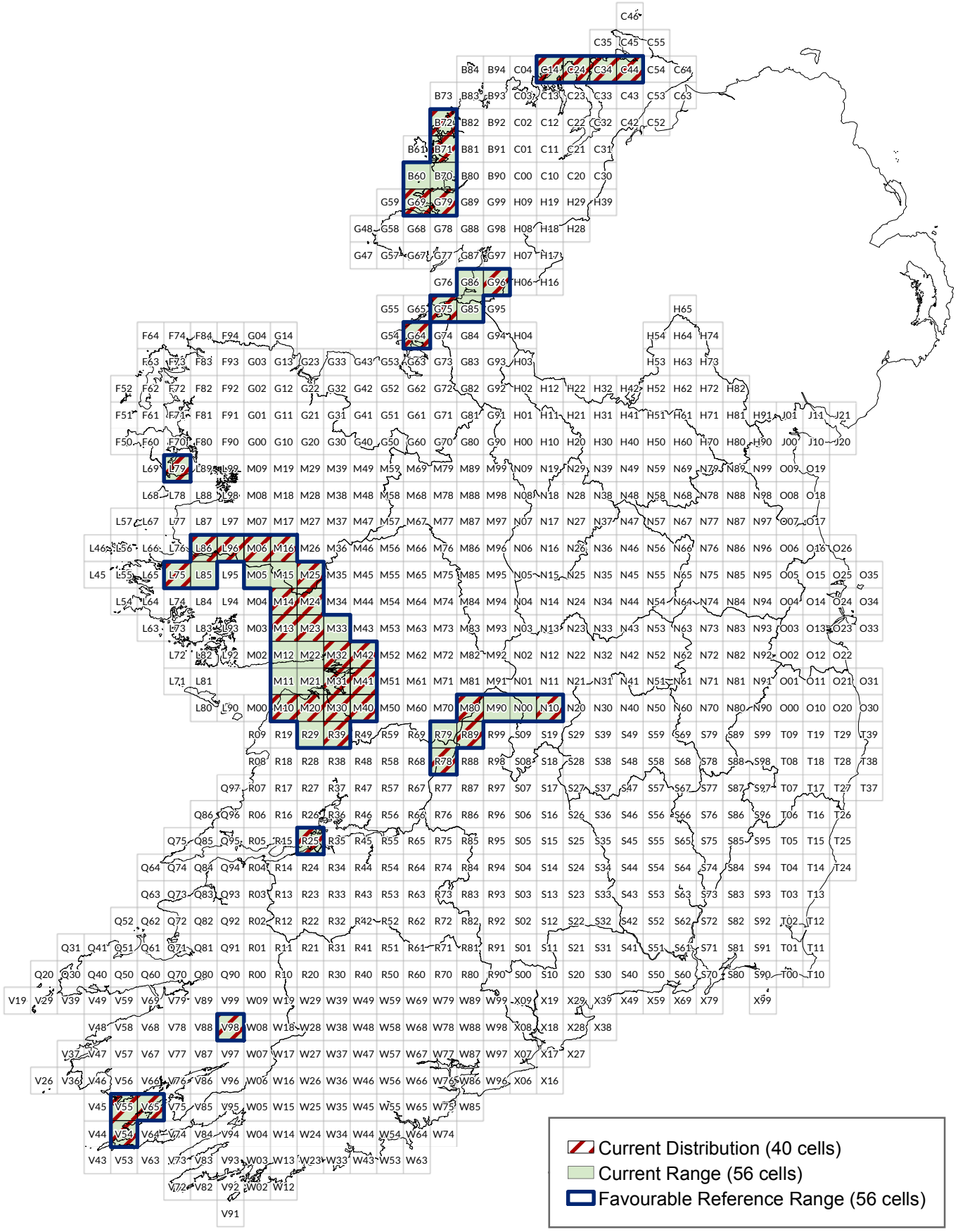
10.8 Additional information *Optional*	There were some area losses (0.55 ha) of 5130 habitat since the previous reporting period but the losses occurred outside the Natura 2000 network and the magnitude was classed as insignificant at a national level. As in the previous reporting period, the favourable reference area (FRA) is considered to be approximately equal to the current extent of the habitat. However, the current extent, and therefore the FRA, is different from the previous reporting period because more accurate mapping was used to delimit formations during the 2017 survey (O'Neill & Martin, 2017), which significantly reduced the total mapped area of 5130 habitat. Structure and functions were assessed as predominantly Favourable, with the largest formations found to be in good condition. No decline is expected in the immediate future provided the current management regimes remain in place. Therefore the trend is stable. The Structure and functions parameter in the previous reporting period was assessed as Unfavourable-Inadequate but in the current reporting period it was assessed as Favourable; this change is largely due to use of a different method to assess the parameter. Because Area and Structure and functions were both assessed as Favourable and no negative pressures were identified that seriously impacted on the habitat at a national level, the Future prospects of the habitat were also assessed as Favourable. Researching appropriate grazing levels in the aftermath of disturbance to bring about improved levels of seedling recruitment could further improve the future prospects of the habitat. Range was assessed as Favourable, as in the previous reporting period.

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***15.40 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable** / increasing / decreasing / uncertain/ unknown*	

11.5 Short-term trend of habitat area in good condition within network **Method used**	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing a union between the distribution shapefile and the SAC shapefile. The area given in section 11.1 is the total area of 5130 habitat in SACs in the country, including some SACs where 5130 is not listed as a qualifying interest (QI). The area of 5130 within the Natura 2000 network where it is listed as a QI is 13.53 km^2. The site in which motorway construction caused minor losses of 5130 habitat is not within an SAC. There are a number of SACs where 5130 is listed as a QI but the habitat is not mapped as present. These are Moneen Mountain SAC (000054), Glenamoy Bog Complex SAC (000500), Owenduff/Nephin Complex SAC (000534), Ben Bulben, Gleniff and Glenade Complex SAC (000623) and Slyne Head Peninsula SAC (002074). These were not surveyed during the current reporting period; however, they were surveyed during the previous monitoring period by Cooper et al. (2012) and were found not to contain sufficient Juniper for the habitat to be classed as 5130.

12 Complementary information

Juniper scrub (5130)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Habitat code / name	**6130 Calaminarian grasslands of the *Violetalia calaminariae***
1.2i Habitat short name	**Calaminarian grassland**
1.3i Habitat description	Calaminarian grassland vegetation is characterised by the presence of metallophyte plants, i.e. plants that can tolerate high levels of heavy metals. In Ireland, this habitat is restricted to artificial habitats on spoil heaps in the vicinity of old mine workings (Holyoak & Lockhart, 2011). Of particular note is a suite of rare bryophyte species which are tolerant of heavy metal-rich conditions and are restricted to ground with high concentrations of Cu, Pb and Zn. These species include *Cephaloziella nicholsonii, C. integerrima, C. massalongi, Ditrichum cornubicum, D. plumbicola, Scopelophila cataractae* and *Pohlia andalusica*, all of which are listed as threatened in the Irish red data list (Lockhart *et al.,* 2012) and four of which are protected under the Flora (Protection) Order, 2015. Holyoak (2008) identified very few vascular plant indicators of Calaminarian grassland, the exception being *Minuartia verna*, which grows at one Calaminarian grassland site in Ireland, and inland, lowland stands of *Armeria maritima* and *Silene uniflora*.

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***2008-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The source used in the creation of this dataset was a polygon shapefile created as part of a national survey of the habitat carried out by Hodd & Hodgetts (2019). Only a proportion of the entire area of each polygon contains the habitat.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Hodd, R. & Hodgetts, H. (2019) Results of a survey to monitor the EU Annex I habitat Calaminarian grassland, 2018. *Irish Wildlife Manuals*, No. 105. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland. Holyoak, D. T. (2008) *Bryophytes and metallophyte vegetation on metalliferous mine-waste in Ireland*. National Parks and Wildlife Service Unpublished Report. Holyoak, D.T. & Lockhart, N.D. (2011) A survey of bryophytes and metallophyte vegetation of metalliferous mine spoil in Ireland. *Journal of the Mining Heritage Trust of Ireland* 11:3-16. Lockhart, N., Hodgetts, N. & Holyoak, D. (2012) *Rare and Threatened Bryophytes of Ireland*. National Museums Northern Ireland, Belfast.
3.2i Additional information	Callaghan, D.A. (2013) *A bryophyte survey of Mountain Mine and Dooneen Mine (Allihies, West Cork).* Unpublished report to Allihies Copper Mine Museum, Co. Cork. Callaghan, D.A. (2017) *Bryophytes and Calaminarian grassland at Avoca Mines, Co. Wicklow*. Unpublished report to CDM Smith, Dublin. Callaghan, D.A. (2018) Status, conservation and ecology of the exceptionally rare metallophyte Cornish Path-moss (*Ditrichum cornubicum* Paton). *Journal of Bryology*. DOI: 10.1080/03736687.2018.1480695 Callaghan, D. & Bowyer, H. (2011) Chemical characteristics of the soil occupied by *Cephaloziella massalongi* and *C. nicholsonii* in Cornwall (UK). *Journal of Bryology* 33(2): 170-173. Campbell, C., Kelly, D. L., Smyth, N., Lockhart, N. & Holyoak, D. T. (2017) Genetic variation in the Red-Listed moss *Ditrichum cornubicum* Paton (Ditrichaceae) and implications for its conservation. *Journal of Bryology* 39(2): 141-151. Cole, G.A.J. (1922) *Memoir of Localities of Minerals of Economic Importance and Metalliferous Mines in Ireland*. 3rd ed., reprinted 1998, Dublin: The Mining Heritage Society of Ireland; available from Geological Survey of Ireland, Dublin. Doyle, J. (1982) Minuartio-Thaspietum alpestris (Violetea calaminariae) in Ireland, *Journal of Life Sciences, Royal Dublin Society* 3:143-146. Fox, H. (1999) Lichens of three mine sites in Co. Wicklow, Ireland. *Biology and Environment, Proceedings of the Royal Irish Academy* 99B (1): 67-71. Giavarini, V. (2011a) *Lichen Ireland Surveys of Selected Sites for cRDB Species: Allihies Copper Mines*. Unpublished Report for Lichen

	Ireland and National Parks and Wildlife Service, Dublin. Giavarini, V. (2011b) *Lichen Ireland Surveys of Selected Sites for cRDB Species: Wicklow Mountains*. Unpublished Report for Lichen Ireland and National Parks and Wildlife Service, Dublin. Holyoak, D.T., Clements, R., Coleman, M.R.J. & MacPherson, K.S. (2000) Appendix 2. *Notes on the status and ecology of* Ditrichum cornubicum. English Nature Research Reports No. 328: 40–50. Holyoak, D.T. & Lockhart, N. (2009) Notes on some rare and newly recorded bryophytes of metalliferous mine sites in Ireland. *Journal of Bryology* 31:267-282. Lötschert, W. (1982) The heavy metal content of some Irish plants. *Journal of Life Sciences, Royal Dublin Society* 3:261-266. Purvis, O.W. (1993) The botanical interest of mine spoil heaps – the lichen story. *Journal of the Russell Society* 5(1): 45-48. Purvis, O.W. & Halls, C. (1996) A review of lichens in metal-enriched environments. *Lichenologist* 28 (6):571-601.

4 Range

Range within the biogeographical/marine region concerned		
4.1 Surface area	***1,900 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*		
4.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	

4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 2,000 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The distribution and consequential range value derived from the 2008 field survey (Holyoak, 2008) is considered to be the Calaminarian grassland baseline. One site (Lackamore), which is not within the Natura network, has been lost since 2008 but it was considered to be small in extent (ca. 0.07ha), with no rare bryophytes species and of low priority for conservation.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	***YES****/NO*
	b) yes, due to improved knowledge/more accurate data	*YES/****NO***
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): ***genuine change*** */ improved knowledge or more accurate data / the use of a different method*	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of Calaminarian grassland sites. A maximum gap distance of two 10 km grid cells was used when running the range tool. Expert judgement considered that two 10 km squares (cells R38 and V63) should be removed from the range generated by the tool as they are unlikely to contain suitable habitat. The range map consists of 19 current range cells, including 16 current distribution cells and a further 3 cells derived from the range tool that could potentially support the habitat. Short-term trend was estimated based on comparing data from the 2018 survey (Hodd & Hodgetts, 2019) with data from the 2007–2012 reporting period (Holyoak, 2008). Genuine loss (Lackamore, in cell R76) has led to a range contraction. Favourable reference range (20 cells) is not the same as the current range (19 cells). This difference is due to the loss of a small (0.07 ha), poor quality site, not included in the Natura network. Despite this loss, there is no reason to assume that the area of the current range	

	is not large enough to allow the long-term survival of the habitat.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2018***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***0.06169 km^2***
5.3 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*		
5.10 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	

5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator ≈ (approximately equal to) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	***YES****/NO*
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
5.15 Additional information *Optional*	In the last reporting period (2008–2012), a total area of 13.58 ha was derived from field survey (Holyoak, 2008) using best estimates from paper maps. The favourable reference area was set at 14 ha to account for any minor losses since the Directive came into force. Holyoak (2008) estimated that there might be a further 2 ha of Calaminarian grassland present at lead mines in Co. Wicklow, in the upper Glendasan valley, Glendalough and Glenmalure, which had not been surveyed. There are also mines on a number of islands in Roaringwater Bay in Co. Cork with potential areas of Calaminarian grassland. A more recent survey (Hodd & Hodgetts, 2019) visited all sites previously surveyed in 2008 and delimited the extent of Calaminarian grassland using hand-held GPS devices. A total area of 6.169 ha, calculated from ESRI Shapefiles, is a more accurate estimate of the area of Calaminarian grassland. This figure should be taken as a minimum area, rather than as an absolute area, although the total area of Calaminarian grassland in Ireland is still likely to be less than 10 ha. The area of Calaminarian grassland within each polygon was calculated by multiplying the percentage of Calaminarian grassland listed by the 2018 survey as occurring in the polygon by the entire area of the polygon. Although the difference in total area of Calaminarian grassland	

	between 2008 and 2018 is mostly accounted for by more accurate mapping, there has also been a small but genuine decline. Declines in area were noted at Tankardstown, Co. Waterford, Shallee, Co. Tipperary and Muckross Peninsula, Co. Kerry, and one small site at Lackamore, Co. Tipperary has been lost due to reclamation. The area of the majority of sites, however, including the largest and more important sites at Allihies, Co. Cork and Glendasan, Co. Wicklow, is regarded as relatively stable. An increase in area was recorded at one site, Keeldrum, Co. Donegal, due to the scraping back of soil with a digger. Favourable reference area is deemed to be approximately equal to the current area. Some area losses of anthropogenic origin (e.g. reclamation) have occurred since the Directive came into force but the current area is considered to be large enough to allow the long-term survival of the habitat. Short-term trend in Area is deemed to be decreasing, although the decrease is difficult to quantify due to the differences in mapping accuracy between the two reporting periods. The actual loss in area is thought to be relatively small. Of the 29 sites surveyed in 2018, 21 sites were assessed as favourable for the Area parameter, 6 sites as unfavourable-inadequate and 2 sites as unfavourable-bad.

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***0.04695 km²***
		Maximum	***0.04695 km²***
	b) Area in not-good condition	**Minimum**	***0.01472 km²***
		Maximum	***0.01472 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	*stable / increasing / **decreasing** / uncertain/ unknown*		

6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***
6.7 Typical species Method used *Optional*	The list of indicators is based on those identified by Holyoak (2008) as being indicative of Calaminarian grassland habitat: i.e. rare metallophyte bryophytes (*Cephaloziella nicholsonii, C. integerrima, C. massalongi, Ditrichum cornubicum, D. plumbicola, Scopelophila cataractae* and *Pohlia andalusica*) and some vascular plants: *Minuartia verna*, which grows at one Calaminarian grassland site in Ireland, and inland, lowland stands of *Armeria maritima* and *Silene uniflora*. These species are not consistent in their occurrence between sites, and do not form a consistent plant community, so the presence of only one indicator species is required to pass the assessment based on indicator species. The rare specialist bryophytes were not used as the sole indicators, as many of the monitoring sites do not, and have never had, any of these rare species present, so would never be able to pass on this criterion, regardless of the actual condition of the site. Therefore, the rare species can be considered as indicators of added value of a site, and a measure of the overall conservation value of a site, as opposed to indicators of the condition of a site, and have little bearing on whether a site passes or fails the assessment.
6.8 Additional information *Optional*	There are a number of reasons why it is inadvisable for the presence or absence of rare species to have a direct bearing on the assessment of a site. Identifiable specimens of these species can be very difficult to find, particularly *Cephaloziella* species, with weather conditions and time of year influencing how easy they are to locate and whether or not fertile plants suitable for identification can be located. The taxonomy of *Cephaloziella* species is also complex and uncertain, and there seems to be much variation within species, with material collected from the same location being identified as different species by different bryologists. Therefore, whether or not any species of *Cephaloziella* has been located from a site cannot be used as a reliable indicator of site condition, and the absence of confirmed specimens of any particular *Cephaloziella* species from a site should not be taken as a sign that the site is in poor condition. If there is a genuine loss of a species, it is likely that this will be accompanied by an associated loss of habitat or clear impact, which will be accounted for elsewhere in the assessment. The other criteria for Structure and functions were based on physical attributes of the habitat, namely the amount of scrub encroachment present, and the percentage of the Calaminarian vegetation impacted negatively by human activities. The threshold for both of these was set at 20% of the habitat affected. In order for the Structure and functions to be assessed as favourable, it was necessary for all three criteria to be passed.

	Area of the habitat in good condition was estimated by calculating the area of sites surveyed in 2018 that were assessed as being in good condition in relation to their structure and functions. Of the total area of Calaminarian grassland in Ireland, 76% was deemed to be in good condition, while 24% was considered in not-good condition. Direction of short-term trend of habitat area in good condition is based upon expert opinion because previous survey data from 2008 did not differentiate between area of Calaminarian grassland in good condition and area in not-good condition. Direction of short-term trend of habitat area in good condition is inferred to be decreasing. Calaminarian grassland vegetation in Ireland only occurs on artificial soils created from past mining activities and these are likely to decline in soil toxicity due to abiotic natural processes (leaching of metals), leading to natural succession in vegetation.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**L01** Abiotic natural processes (H) **L02** Natural succession resulting in species composition change (H) **F07** Sports, tourism and leisure activities (M)	**L01** Abiotic natural processes (H) **L02** Natural succession resulting in species composition change (H) **F07** Sports, tourism and leisure activities (M)

7.2 Sources of information *Optional*	Pressures and threats were recorded during 2018 field survey (Hodd & Hodgetts, 2019).
7.3 Additional information *Optional*	Pressures were ranked from data gathered during the 2018 monitoring programme and further information on the occurrence and frequency of pressures can be found in Hodd & Hodgetts (2019). Pressures are likely to continue into the future and therefore all pressures are regarded as threats. The main pressures acting on Calaminarian grassland, recorded from 29 sites surveyed in 2018, were L01 Abiotic natural processes (17 sites), L02 Natural succession (14 sites), F07 Sports, tourism and leisure activities (13 sites), A10 Extensive grazing (11 sites) and F09 Deposition of waste (10 sites). Impact intensity ranged from low to high for these five pressures. The most widespread pressure was abiotic natural processes, which was an impact at seventeen sites. This was a negative impact in most

	instances, at medium to high intensity. This pressure includes leaching of metal toxicity from soils and natural erosion. The latter is a particularly significant impact at coastal sites, with spoil at a number of sites, including Dooneen and Polleenateada, eroding into the sea. Another widespread negative pressure is natural succession and is closely linked to the abiotic natural process of leaching of metal toxicity. This was noted at 14 sites and is likely to accelerate as the toxicity of the mine spoil continues to decrease. Scrub encroachment is a particular problem at three sites: Muckross, Shallee and Garryard West, and may become an issue at a further number of sites in the future. Activities associated with tourism and recreation are also an issue at a number of sites, particularly those located within the Killarney (Ross Island, Muckross) and Wicklow (Glendasan) National Parks, where walking routes pass through or close to the areas of Calaminarian grassland and information boards are in place to draw visitors to the abandoned mine sites. Although evidence that grazing is taking place was seen at a number of sites, it is not a significant pressure in most cases, and at low to moderate levels may be beneficial to the habitat as it assists in keeping the spoil open and disturbs the surface. At one site, at Brockagh in the Wicklow Mountains National Park, grazing is having a significant negative impact, as a ring feeder for sheep has been placed on the Calaminarian grassland. This has resulted in much eutrophication, trampling and churning by tractor tyres. Other negative pressures recorded include dumping of waste, removal and excavation of spoil and pollution from agricultural and urban sources. Urban pollution is a significant and pressing threat at Knockmahon Village, an important site that supports populations of four rare metallophyte species, and is also showing signs of encroachment by gorse scrub.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* ***a) Measures identified, but none yet taken** or* *b) Measures identified and taken or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or*

	d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	None taken
8.6 Additional information *Optional*	There are no current conservation measures being undertaken. Conservation measures that are not currently being implemented, but whose implementation would improve the structure and functions of Calaminarian grassland sites include: CL01 Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes; CC07 Habitat restoration/creation from resources, exploitation areas or areas damaged due to installation of renewable energy infrastructure; CA04 Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures; CF04 Reduce/eliminate point source pollution to surface or ground waters from industrial, commercial, residential and recreational areas and activities. The measures listed below are mainly preventative, rather than restorative: Several sites are within National Parks and are protected from development (Glendasan [1.27 ha], Foxrock Mine [0.27 ha], Brockagh [0.11 ha], E. of L. Nahanagan [0.03 ha] – all in Wicklow Mountains National Park; Muckross Lake [0.027 ha] and Ross Island [0.055 ha] – both in Killarney National Park) or are in state ownership (e.g. Nr Connary Hall) and fenced off from disturbance. Allihies Mountain Mine, the largest and perhaps most important Calaminarian grassland site in Ireland [1.32 ha], together with smaller sites nearby (N. of Caminches [0.026 ha], NE of Caminches [0.007 ha] and Dooneen [0.226 ha]) are preserved and presented by the Allihies Copper Mine Museum. A total of 12 of the 29 sites surveyed in 2008 and 2018 contain one or more bryophyte species that are legally protected under the Flora (Protection) Order, 2015 and thus subject to planning controls (*Cephaloziella massalongi*, *C. nicholsonii*, *Ditrichum cornubicum*, *D. lineare*, *D. plumbicola*).

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	*Good / **Poor** / Bad / Unknown*
	b) Area	*Good / **Poor** / Bad / Unknown*
	c) Structure and functions	*Good / **Poor** / Bad / Unknown*
9.2 Additional information *Optional*	Section 8.6 lists conservation measures that are recommended, but which are not currently being implemented. If the recommendations were to be implemented, the future trend of Area could be assessed as stable or even improving. The future trend is currently assessed as decreasing. Short-term trend direction of Range is assessed as decreasing. Current range is less than the favourable reference range. Conservation status of Range is therefore unfavourable-inadequate. Future trend of Range is assessed as decreasing, as a change in range is expected based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Range are therefore poor (negative). Short-term trend direction of Area is assessed as decreasing. Current area is approximately equal to the favourable reference area. Conservation status of Area is therefore unfavourable-inadequate. Future trend of Area is assessed as decreasing, as a change in area is expected based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Area are therefore poor (negative). Current Structure and functions are assessed as unfavourable-inadequate because the area of habitat with unfavourable (not-good) condition is 24% (i.e. less than 25%) and the area of habitat with good condition is 76% (i.e. less than 90%). Short-term trend direction is decreasing (for habitat that is in good condition). Conservation status of Structure and functions is therefore unfavourable-inadequate. Future prospects of Structure and functions are therefore poor (negative).	

10 Conclusions	
Assessment of conservation status at end of reporting period	
10.1 Range	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*
10.2 Area	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*
10.4 Future prospects	*Favourable (FV) / **Inadequate (U1) /** Bad (U2) / Unknown (XX)*

<table>
<tr><td>10.5 Overall assessment of Conservation Status</td><td colspan="3">Favourable (FV) / <u>Inadequate (U1)</u> / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>10.6 Overall trend in Conservation Status</td><td colspan="3">Indicate the trend (qualifier) for FV, U1 and U2:

improving / <u>deteriorating</u> / stable / unknown</td></tr>
<tr><td rowspan="8">10.7 Change and reasons for change in conservation status and conservation status trend</td><td colspan="3">Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.</td></tr>
<tr><td></td><td>Overall assessment of conservation status (10.5)</td><td>Overall trend in conservation status (10.6)</td></tr>
<tr><td>a) no, there is no difference</td><td>YES/<u>NO</u></td><td><u>YES</u>/NO</td></tr>
<tr><td>b) yes, due to genuine change</td><td>YES/NO</td><td><u>YES</u>/NO</td></tr>
<tr><td>c) yes, due to improved knowledge/more accurate</td><td>YES/NO</td><td><u>YES</u>/NO</td></tr>
<tr><td>d) yes, due to the use of different methods (including use of different thresholds)</td><td>YES/NO</td><td><u>YES</u>/NO</td></tr>
<tr><td>e) yes, but there is no information on nature of change</td><td>YES/NO</td><td>YES/<u>NO</u></td></tr>
<tr><td>The change is mainly due to (select one of the reasons above):</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td><td>genuine change / <u>improved knowledge or more accurate data</u> / the use of a different method</td></tr>
<tr><td>10.8 Additional information

Optional</td><td colspan="3">The conservation status of Calaminarian grassland at the end of the 2013–2018 reporting period is the same as the previous 2007–2012 reporting period.
There are changes in the trend in conservation status due to genuine changes, improved knowledge/more accurate data and use of different methods.
Short-term trend direction for Range is decreasing due to loss of one small area, which reduced the number of 10 km squares by one.
Short-term trend direction for Area is decreasing, although the decrease is difficult to quantify due to the differences in mapping accuracy between the two reporting periods. The actual loss in area is thought to be relatively small.
Direction of short-term trend of national habitat area in good condition is inferred to be decreasing. Calaminarian grassland vegetation in Ireland only occurs on artificial soils created from past mining activities and these are likely to decline in soil toxicity due to</td></tr>
</table>

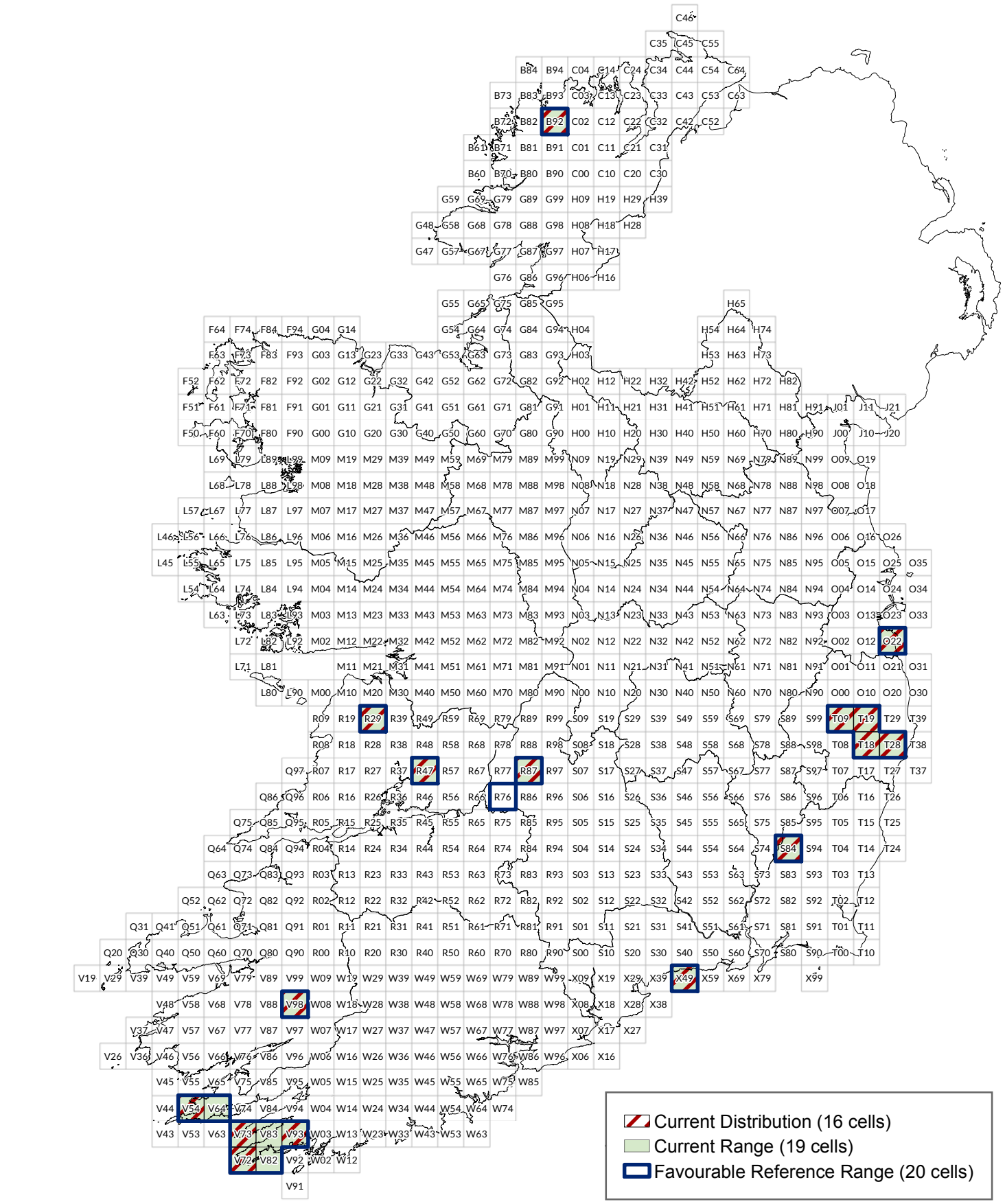
	abiotic natural processes (leaching of metals), leading to natural succession in vegetation.

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***0.0343km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable** / increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing a union between the distribution shapefile and the SAC shapefile. The area given in section 11.1 is the total area of Calaminarian grassland in SACs in the country. Over 99% of Calaminarian grassland within SACs is listed as a qualifying interest (QI). A small area (0.005659 km2) is within an SAC for which it is not listed as a QI. An estimated 55.66% of the national area of Calaminarian grassland is within the SAC network. Short-term trend of habitat area in good condition within network is inferred to be stable, as the 2018 survey assessed the trend in area of 9 of the 11 sites within SACs to be stable. Short-term trend of habitat area in good condition within the network is based upon expert opinion because previous survey data from 2008 did not differentiate between area of Calaminarian grassland in good condition and area in not-good condition.	

12 Complementary information

Calaminarian grasslands (6130)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Habitat code / name	**6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)**
1.2i Habitat short name	**Calcareous grassland (*orchid-rich)**
1.3i Habitat description	The Annex I habitat 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) comprises species-rich plant communities found on shallow, well-drained calcareous substrates. It is considered a priority habitat only if it is an important orchid site. The Annex I habitat includes a mixture of grasses and herbs, with calcicole species typically frequent. It usually occurs on obvious geological features such as eskers, outcropping limestone rock and in association with limestone pavement. The Burren and Aran Islands (Clare/Galway) and Dartry Mountains (Sligo/Leitrim) are particularly important areas within the State for this Annex I habitat. The 6210 habitat is comprised of a diverse group of plant communities belonging to the Bromion-erecti, including GL3A *Briza media-Thymus polytrichus* grassland (Perrin, 2018) and CG1/CG2 (Rodwell, 1992).

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***2004-2017***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was compiled from 6210 or orchid-rich *6210 (referred to as 6210/*6210 for the remainder of the document) polygons digitised for the 2015-17 Grassland Monitoring Survey (GMS; Martin *et al.*, 2018) and from the 2007-12 Irish Semi-natural Grasslands Survey (ISGS; O'Neill *et al*., 2013). Tubridy & Meehan (2006), Dwyer *et al*. (2007), Hickey & Tubridy (2008), Muyllaert & Jennings (2009), Perrin *et al.* (2011), Perrin *et al*. (2013a), Perrin *et al.* (2013b), Wilson and Valverde (2013), O'Neill & Martin (2015), and Galway County Council (2017), also provided polygons for the

	distribution map. In addition to the sources listed above the distribution map also utilised points digitised from NPWS (2004), Conaghan & Fuller (2005), Conaghan *et al.* (2006), Reynolds *et al.* (2006), Moran (2007), Parr *et al.* (2009), Long (2011), Perrin (2018), the AranLIFE project (Browne, in prep.), and polylines digitised by Roche (2013). Data sources listed in Section 3.2 that are known to represent the 6210/*6210 habitat were assigned a high certainty=3, utilising the range of 1 to 3 for low to high certainty. Those data sources that probably include the 6210/*6210 habitat were assigned a certainty=2, while those sources that possibly include the 6210/*6210 habitat were assigned a low certainty=1. No dataset that is over 10 years old was assigned a certainty=3 due to the uncertainty that the grassland habitat recorded over 10 years ago is still present. All data sources with a certainty of 1 to 3 were used to map the distribution of the 6210/*6210 habitat. As detailed in NPWS (2013), grassland relevés collected by Austin O'Sullivan between 1962 and 1972 were also analysed against the 6210/*6210 Structure and functions criteria utilised by O'Neill *et al.* (2013) and 68 of the relevés were considered to represent the 6210/*6210 habitat. As the O'Sullivan data are over 40 years old they were not utilised in calculating the current area or current range of the Annex I habitat.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Bourke, D., Hochstrasser, T., Nolan, S. & Schulte, R. (2007) Historical Grassland Turboveg Database Project: 2067 Relevés Recorded by Austin O'Sullivan 1962-1982. Database reference Nos: 25604-28543. Unpublished report for the National Parks and Wildlife Service, Dublin. Browne, A. (in prep.) AranLIFE project. Conaghan, J. & Fuller, J. (2005) A Survey of Rare and Threatened Vascular Plants in County Leitrim. Unpublished Report for the National Parks and Wildlife Service, Dublin. Conaghan, J., Roden, C. & Fuller, J. (2006) A survey of rare and scarce vascular plants in County Galway. Volumes 1, 2 and 3. Unpublished report for the National Parks and Wildlife Service, Dublin. Curtis, T. & Wilson, F. (2014) Orchid Ireland Survey 2014. Report prepared for the National Museum and Galleries of Northern Ireland. Dwyer, R., Crowley, W. & Wilson, F. (2007) Grassland Monitoring Project 2006. Unpublished Report, National Parks and Wildlife

Service, Department of Environment, Heritage and Local Government, Dublin.

EPA (2017) A Summary of the State of Knowledge on Climate Change Impacts for Ireland: Report 11 (2010-2016). Prepared for the Environmental Protection Agency by MaREI Centre, Environmental Research Institute, University College Cork. M. Desmond, P. O'Brien and F. McGovern. EPA, Wexford.

Galway County Council (2017) Unpublished data collected for the Galway City Transport Project.

Hickey, B. & Tubridy, M. (2008) Laois Habitats Survey 2008. Part I: Survey Report and Results. Report prepared for Laois Heritage Forum: An action of the Laois Heritage Plan 2007-2011. Heritage Council and Laois County Council. Ireland.

Long, M. P. (2011). Plant and snail communities in three habitat types in a limestone landscape in the west of Ireland, and the effects of exclusion of large grazing animals. PhD Thesis, Botany Department, Trinity College, Dublin.

Martin, J.R., O'Neill, F.H. & Daly, O.H. (2018) The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats. *Irish Wildlife Manuals*, No. 102. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin.

Moran, J. (2007) Unpublished relevés from The Burren Co. Clare of Winterages as part of the BurrenLIFE Project, Clare.

Muyllaert, M. & Jennings, R. (2009) Heritage Audit of the Northern River Nore. An action of the draft Kilkenny Heritage Plan 2007-2011. Volume 3 National Heritage. Heritage Council, Kilkenny.

NPWS (2004) Coole-Garryland Complex SAC (000252) Site Synopsis. National Parks and Wildlife Service, Dublin.

NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin.

O'Neill, F.H. & Martin, J.R. (2015) Summary of findings from the survey of potential turloughs 2015. Volume I: Main Report. Unpublished Report for National Parks and Wildlife Service, Dublin.

O'Neill, F.H., Martin, J.R., Devaney, F.M. & Perrin, P.M. (2013) The Irish semi-natural grasslands survey 2007-2012. *Irish Wildlife Manuals*, No. 78. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

Parr, S., O'Donovan, G., Ward, S. & Finn, J. A. (2009) Vegetation analyses of upland Burren grasslands of conservation interest. *Biology and Environment: Proceedings of the Royal Irish Academy* 109B (1): 11-33.

Perrin, P.M. (2018) Irish Vegetation Classification: Community synopsis *Briza media -Thymus polytrichus* grassland. http://www.biodiversityireland.ie/wordpress/wp-content/uploads/GL3A.pdf. Accessed January 15th 2018.

Perrin, P.M., Roche, J.R. & Barron, S.J. (2011) National Survey of Upland Habitats, Site Report No 1: Mweelrea, Sheeffry, Erriff

	Complex cSAC (001932) Co. Mayo. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin. Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013a) National Survey of Upland Habitats, Site Report No. 12: Arroo Mountain SAC (001403), Co. Leitrim. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin. Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013b) National Survey of Upland Habitats, Site Report No. 11: Ben Bulben, Gleniff and Glenade Complex cSAC (000623), Cos. Leitrim and Sligo. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin. Reynolds, S., Conaghan, J. & Fuller, J. (2006) A survey of rare and scarce vascular plants in County Limerick. Unpublished report for the National Parks and Wildlife Service, Dublin. Roche, J. (2013) Athlone to Mullingar Cycleway Habitat Survey. Unpublished report by BEC Consultants Ltd., Dublin. Rodwell, J.S. (ed.) (1992). *British plant communities Volume 3: Grasslands and montane communities*. Cambridge Community Press, Cambridge. Tubridy, M. & Meehan, R. (2006) County Offaly Esker Survey 2006. Report for Offaly County Council and Heritage Council, Kilkenny. Wilson, S. & Valverde, F. (2013) National survey of limestone pavement and associated habitats in Ireland. *Irish Wildlife Manuals*, No. 73. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.
3.2i Additional information	

4 Range

Range within the biogeographical/marine region concerned

4.1 Surface area	***22,300 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 22,300 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable Reference Range has been increased since the last reporting period (NPWS, 2013) due to improved knowledge. There is no evidence of loss of range since the Directive came into force and the geographic spread is considered sufficient for the long-term survival of the habitat.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 6210/*6210 habitat. A maximum gap distance of two 10km grid cells was used when running the range tool. Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013). None of the area losses recorded during these two reporting periods led to a contraction in the range. The Favourable reference range has been increased since the last	

	reporting period (NPWS, 2013) due to improved knowledge.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2004-2017***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***14.16 km²***
5.3 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator >> (much greater than)	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods? **YES**/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	***YES**/NO*
	b) yes, due to improved knowledge/more accurate data	***YES**/NO*
	c) yes, due to the use of different method	*YES/**NO***
	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): ***genuine change** / improved knowledge or more accurate data / the use of a different method*	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 2004 and incorporates updates made during the last reporting period (NPWS, 2013) and surveys that have taken place during the current reporting period: 2015-17 GMS, Roche (2013), O'Neill & Martin (2015), Galway County Council (2017) and the AranLIFE project (Browne, in prep.). There are probably still areas of unmapped 6210/*6210 habitat within the country, particularly within the Burren (Clare/Galway), hence the area value entered is a minimum. Favourable Reference Area was not determined exactly. However, it is deemed to be >10% greater than the current area, given that anthropogenic losses have occurred since the Directive came into force and subsequent increases in area have not offset these losses. The 2015-17 GMS visited 55 of the 137 6210/*6210 sites that had been previously surveyed by the 2007-12 ISGS (O'Neill *et al.,* 2013). Three of the sites had been agriculturally improved to the extent that no further survey work was undertaken there; the remaining 52 sites were surveyed to determine the extant area of 6210/*6210 and to monitor the Structure and functions. At 19 of the 55 surveyed sites areas of 6210/*6210 had been lost due to impacts such as agricultural intensification and undergrazing. The total recorded area of 6210/*6210 lost to impacts such as agricultural improvement was 1.09 km^2, which represents 31% of the surveyed area. Short-term trend in Area was deemed to be "decreasing" because	

	the area of 6210/*6210 had been reduced at 19 of the 55 surveyed sites due to anthropogenic factors, such as agricultural intensification. The magnitude of the known loss is approximately -4.7% per annum, measured over a period of 7 years between this monitoring period and the previous, calculated by estimating the area lost and expressing this as a per-annum percentage of the original area. At two sites the area of 6210/*6211 was recorded as increasing, but these increases in area are small when compared to the overall loss. This area loss is taken to be the minimum, with other undocumented losses likely to have taken place in sites not surveyed since the previous monitoring period. Also as monitoring for the current reporting period focused on "primary areas" of Annex I grassland (i.e., those areas representing the best examples of the 6210/*6210 habitat), as recommended by O'Neill *et al*. (2013), it is likely that losses would have been higher if a more representative sample of sites had been surveyed. If the 31% loss in area is applied to the 6210/*6210 area of 14.29 km^2 reported in NPWS (2013) the total reported loss in area nationally during the current reporting period would be 4.43 km^2. The difference in habitat extent between this reporting period and the last is primarily due to anthropogenic impacts such as agricultural intensification. The current area of 14.16 km^2 reported in Section 5.2 is smaller than the 14.29 km^2 reported in NPWS (2013), but the difference between the two reporting periods is much smaller than the 1.09 km^2 of lost 6210/*6210 reported above. Primarily this is due to the fact that some areas of 6210/*6210 habitat that had not been mapped during the previous reporting period (NPWS, 2013), such as areas of 6210 mapped during the AranLIFE project, have now been added to the dataset. There were six points from O'Neill *et al.* (2013) where the habitat was found but was below the minimum mapping area. A value of 0.02 ha was assigned to these points. To allow other point files, such as AranLIFE, to contribute to the total area of 6210/*6210 calculated for the current reporting period, a review of the datasets was carried out using remote imagery and following this review a mean value of 0.35 ha was assigned to each of these points. For the one polyline file (Roche, 2013) the total length of 6210/*6210 habitat was calculated and this was multiplied by a width of 3 m to provide an area.

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***11.75 km²***
		Maximum	***11.75 km²***
	b) Area in not-good condition	**Minimum**	***2.41 km²***
		Maximum	***2.41 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***

6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***
6.4 Short-term trend of habitat area in good condition Direction	**stable** / increasing */ decreasing / uncertain/ unknown*
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? **YES**/NO* *Updated list is provided as an additional spreadsheet. See section 6.7 for outline of changes. More details are provided in section 6.8.*
6.7 Typical species Method used *Optional*	The species *Sesleria caerulea, Ranunculus bulbosus* and *Trisetum flavescens* were added to the list of typical species since the previous reporting period. The list of orchid species that are used to define the orchid-rich priority habitat *6210 was refined since the last reporting period. With the exception of the relatively common *Dactylorhiza fuchsii* and *Dactylorhiza maculata* the 6210 habitat should be considered for the orchid-rich priority habitat *6210 if one or more of the following less common orchid species are present: *Anacamptis pyramidalis, Coeloglossum viride, Dactylorhiza fuchsii* v. *okellyi, Epipactis atrorubens, Gymnadenia conopsea, Listera ovata, Neotinea maculata, Ophrys apifera, Ophrys insectifera, Orchis mascula, Orchis morio, Platanthera bifolia, Platanthera chlorantha, Spiranthes spiralis*. For upland examples of the 6210/*6210 habitat that tend to be more bryophyte-rich, the four bryophyte species *Ditrichum gracile, Hypnum lacunosum, Scapania aspera* and *Tortella tortuosa* were assessed as typical species.
6.8 Additional information *Optional*	Changes between the percentage of the habitat in good condition reported by NPWS (2013) and the current reporting period are due to the use of different methods, with modified assessment criteria used in this reporting period (see Martin *et al.,* 2018). The area of 6210/*6210 habitat in good condition was estimated for each of the 52 surveyed sites based on the percentage of monitoring stops at each site that were assessed to have Favourable Structure and functions. As the sample of 52 GMS sites is considered representative of the national resource the proportion in good and

	not-good condition were scaled up to estimate the national area. The plots recorded by AranLIFE (Browne, in prep.) were not utilised as they were not associated with mapped areas of 6210/*6210 habitat. The percentage of the 6210/*6210 habitat with Favourable Structure and functions has increased from 22% in the last reporting period (NPWS, 2013) to 83% in the current reporting period. However, trend is reported as stable as the assessment criteria have been modified (e.g. high-quality indicator species within a 20 m vicinity of the stop were taken into consideration during the current reporting period) and the nature of the assessed areas has changed (e.g. most areas that were surveyed during the current reporting period were >1 ha). Also the methodology for calculating the percentage of the habitat nationally that is in good condition was changed. In the previous reporting period (NPWS, 2013), only sites where the total area of 6210/*6210 was assessed to have Favourable Structure and functions were included within the percentage in good condition. In this reporting period the approximate area of each site with Favourable Structure and functions was calculated based on the percentage of monitoring stops that were assessed to have Favourable Structure and functions. All taxa included in the current list of typical species, except the orchid species and upland moss species listed in Section 6.7 above, are as follows: *Antennaria dioica, Anthyllis vulneraria, Arabis hirsuta, Asperula cynanchica, Blackstonia perfoliata, Brachypodium pinnatum, Briza media, Bromopsis erecta, Campanula rotundifolia, Carex caryophyllea, Carex flacca, Carlina vulgaris, Centaurea scabiosa, Ctenidium molluscum, Daucus carota, Filipendula vulgaris, Galium verum, Gentiana verna, Gentianella amarella, Gentianella campestris, Geranium sanguineum, Helictotrichon pubescens, Homalothecium lutescens, Knautia arvensis, Koeleria macrantha, Leontodon hispidus, Leontodon saxatilis, Linum catharticum, Lotus corniculatus, Origanum vulgare, Pilosella officinarum, Primula veris, Ranunculus bulbosus, Sanguisorba minor, Sesleria caerulea, Thymus polytrichus, Trisetum flavescens.*

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A02** Conversion from one type of agricultural land use to another (H) **A10** Extensive grazing or	**A02** Conversion from one type of agricultural land use to another (H) **A10** Extensive grazing or

	undergrazing by livestock (H) **C01** Extraction of minerals (H) **A09** Intensive grazing or overgrazing by livestock (M) **I02** Other invasive alien species(M) **I04** Problematic native species (M)	undergrazing by livestock (H) **C01** Extraction of minerals (H) **A09** Intensive grazing or overgrazing by livestock (M) **I02** Other invasive alien species(M) **I04** Problematic native species (M)
7.2 Sources of information *Optional*	Pressures were recorded during the 2015-17 field surveys for the GMS (Martin *et al*., 2018) and by Curtis & Wilson (2014).	
7.3 Additional information *Optional*	Pressures and threats were selected and ranked based on intensity (high, medium or low), frequency of occurrence and area of impact, using the data gathered during the 2015-17 GMS and presented in Martin *et al*. (2018) The three pressures reported in Table 4 of Martin *et al.* (2018) that contributed to the largest areas of 6210/*6210 loss are listed above in Section 7.1 as the three high-importance pressures. Two of the three high-importance pressures were also frequently recorded impacts within extant areas of the habitat (Table 9 of Martin *et al*., 2018), with A02 recorded in Table 9 under 'agricultural intensification' and A10 recorded under 'species composition change' and 'abandonment, lack of grazing'. The two medium-importance pressures I02 and I04 listed above in Section 7.1 were the only other impacts within Table 9 that were recorded more than once with a high/medium intensity, and based on expert opinion both are considered to be medium-importance pressures at a national scale. Curtis & Wilson (2014) recorded pressures at an additional twelve 6210/*6210 sites and A10 recorded under 'abandonment, lack of grazing' was the most frequently recorded pressure, recorded as high intensity at six sites and medium intensity at two sites. In addition to the GMS data presented on I02 and I04 these pressures were also each recorded at one site by Curtis & Wilson (2014), with I02 recorded once as a high-intensity pressure and I04 once as a medium-intensity pressure. Although intensive grazing or overgrazing by livestock (A09) was not recorded within the 6210/*6210 habitat by the GMS it was recorded by Curtis & Wilson (2014) at two sites, once as a high-intensity pressure and once as a medium-intensity pressure, and it has therefore been included as a third medium-importance pressure. The problematic native species listed under I04 was *Pteridium aquilinum* (Bracken) and the most commonly recorded invasive species listed under I02 was *Cotoneaster integrifolius*. Further research on the impacts of climate change on this habitat is required. Impacts may affect the range and species composition of the habitat in the future but it is difficult to determine what level of importance should be assigned at this stage (EPA, 2017). The six pressures presented in Section 7.1 are also considered to be the six main threats in the future.	

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type** or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* ***a) Short-term results (within the current reporting period, 2013-2018)** or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	**CA03** Maintain existing extensive agricultural practices and agricultural landscape features **CA05** Adapt mowing, grazing and other equivalent agricultural activities
8.6 Additional information *Optional*	Conservation measures were selected and ranked based on the frequency of occurrence, using the data gathered during the 2015-17 GMS (Martin *et al*., 2018) and information provided on the Burren Programme and AranLIFE project (see below). The maintenance of extensive cattle grazing (recorded under CA03) is the most frequent conservation measure applied for the habitat, with extensive horse, sheep and mixed animal grazing also important (Table 10 in Martin *et al*., 2018). In some cases the maintenance of extensive cattle grazing is undertaken through the Department of Agriculture's Green, Low-Carbon, Agri-Environment Scheme (GLAS). The adaptation of agricultural activities (CA05) was also recorded, with scrub clearance noted at five GMS sites as a positive measure for the 6210/*6210 habitat (Table 10 in Martin *et al.*, 2018). Scrub clearance is also a frequently applied conservation measure within the Burren Programme, which covers approximately 25,000 ha of

	farmland (Andy Bleasdale, pers. comm.) within one of the most important areas in the State for the habitat. 20 ha of scrub clearance has also been used by the AranLIFE project to control encroachment within the 6210/*6210 habitat (Amanda Browne, pers. comm.). It should be recognised that the management regimes of most 6210/*6210 grassland habitats are driven by the landowner rather than by any formal management plan or policy; therefore the continued operation of the management regimes currently in place is not guaranteed. Other conservation measures that are not currently being widely implemented, outside the Burren Programme, but whose implementation would improve the Structure and functions of the habitat, include CA04 (Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures), CA05 (Adapt mowing, grazing and other equivalent agricultural activities), and the control or removal of non-native species, particularly invasive species such as *Cotoneaster* spp. The Burren Programme reported that the conservation measures they have applied have improved the Structure and functions of 6210/*6210 within the areas covered by the scheme (Sharon Parr, pers. comm.).

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	*Good / **Poor** / Bad / Unknown*
	b) Area	*Good / Poor / **Bad** / Unknown*
	c) Structure and functions	*Good / **Poor** / Bad / Unknown*
9.2 Additional information *Optional*	Section 8.5 lists conservation measures that are currently being implemented. Section 8.6 lists additional conservation measures that are recommended, but which are not currently being implemented. If the recommendations were to be implemented, the future trend of Area could be assessed as stable rather than very negative. However, because it is impossible to be certain that any such recommended measures will in fact be carried out over the next monitoring period, the future trend must be assessed as very negative. Short-term trend direction of Range is assessed as Stable. Current range is equal to the Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as negative, as the range is expected to decrease based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Range are therefore Poor. Short-term trend direction of Area is assessed as Decreasing. Current Area is >10% less than Favourable Reference Area. Conservation status of Area is therefore Unfavourable-Bad with the magnitude of the known loss -4.7% per annum.	

	Future trend of Area is assessed as very negative, as Area is expected to decrease based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Area are therefore Bad. Current Structure and functions are assessed as Unfavourable-Inadequate as >75% but <90% of habitat is in "good" condition. Short-term trend direction is Stable (for habitat that is in "good" condition). The Burren Programme and AranLIFE programmes are counterbalancing negative trends outside these areas. Conservation status of Structure and functions is therefore Unfavourable-Inadequate. Future prospects of Structure and functions are therefore Poor.

10 Conclusions

Assessment of conservation status at end of reporting period

10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving /* ***deteriorating*** */ stable / unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/****NO***	***YES****/NO*
	b) yes, due to genuine change	*YES/NO*	*YES/****NO***
	c) yes, due to improved knowledge/more accurate	*YES/NO*	***YES****/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/****NO***

	e) yes, but there is no information on nature of change	*YES/NO*	*YES/**NO***
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / **improved knowledge or more accurate data** / the use of a different method*
10.8 Additional information *Optional*	The Overall Conservation Status was assessed as Unfavourable-Bad, as it had been during the last reporting period. The status of Unfavourable-Bad during the current reporting period was due to the loss in area of -4.7% per annum. Overall trend in Conservation Status was assessed as deteriorating during the current reporting period, as large areas of the habitat had been lost due to impacts such as agricultural intensification. These impacts are expected to continue into the future. During the previous reporting period the overall trend had been assessed as stable, as there had been very little data available for assessing the area of the 6210/*6210 habitat that had been lost. The change in Structure and functions from Unfavourable-Bad, reported during the last reporting period, to Unfavourable-Inadequate is mainly due to the use of a different method. However, it should be noted that improvements in the condition of the habitat are ongoing through the Burren programme and AranLIFE project.		

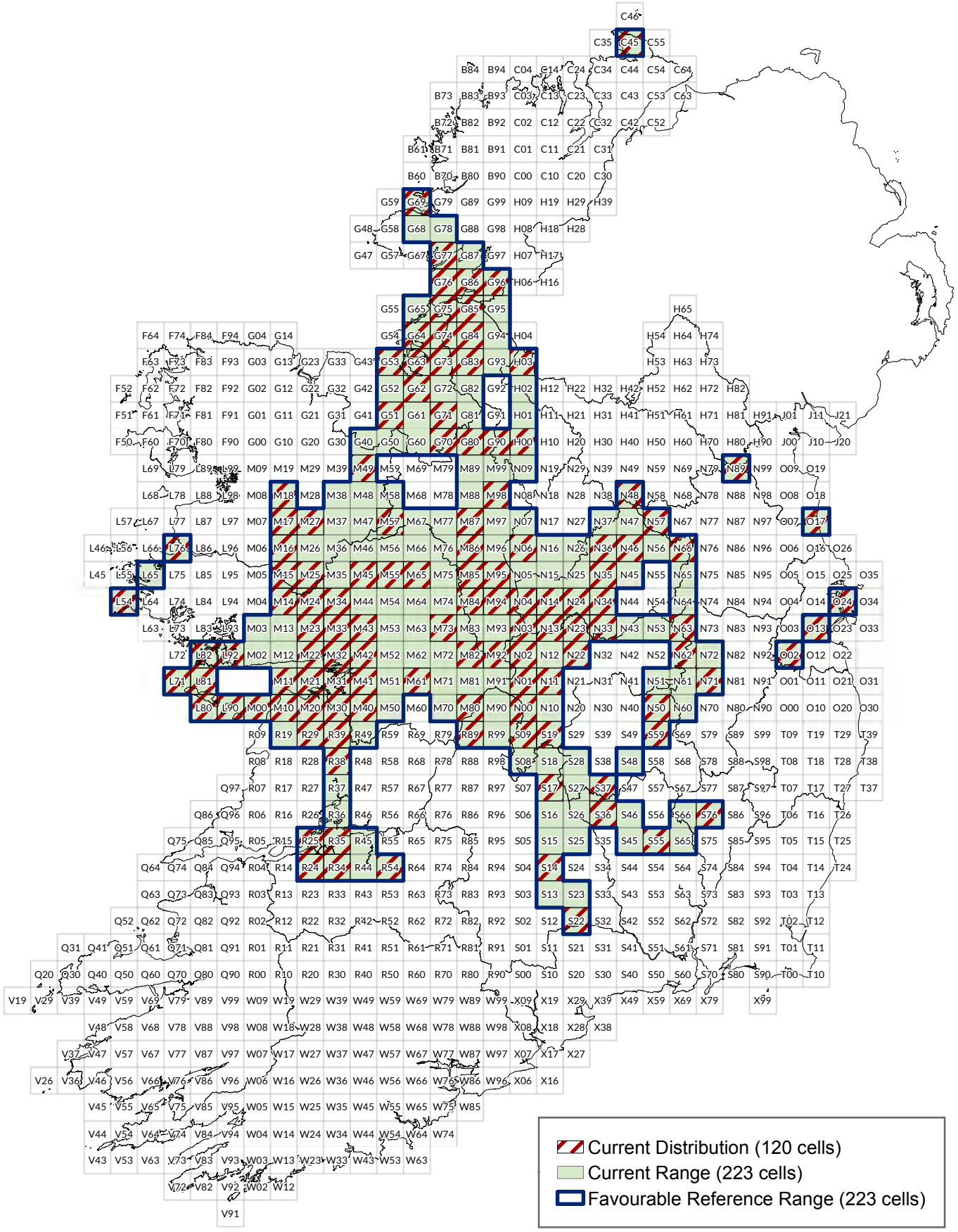
11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***10.04 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval / **minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable** /* increasing */ decreasing / uncertain/ unknown*	

11.5 Short-term trend of habitat area in good condition within network **Method used**	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing an intersect between the distribution shapefile and the SAC shapefile. The area given in section 11.1 is the total area of the 6210/*6210 habitat in SACs in the country, including some SACs where the habitat is not listed as a qualifying interest (QI). The area of 6210/*6210 within the N2000 network where it is listed as a QI is 9.53 km^2. A total of 32% of the 1.09 km^2 of the 6210/*6210 habitat lost during the current reporting period was within SACs and there was a loss of 1.42 ha of 6210/*6210 habitat from two SACs where the habitat is a QI. The short-term trend of the habitat area in good condition within the SAC network is taken to be stable, with the same trend as the 6210/*6210 habitat nationally. As stated in Section 6.8 the percentage of the 6210/*6210 habitat with Favourable Structure and functions has increased, however trend is reported as stable as the assessment criteria and methodology used have been significantly modified since the last reporting period.

12 Complementary information

Orchid-rich calcareous grassland (6210) Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Habitat code / name	**6230 Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)***
1.2i Habitat short name	**Species-rich *Nardus* upland grassland**
1.3i Habitat description	Habitat 6230 "Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)" is restricted to siliceous substrates in upland areas (montane and sub-montane zone), usually near the upper limit of enclosed farmland. It has probably always been a rare habitat within Irish uplands and it relies on extensive grazing, usually by sheep, to maintain the habitat over almost all of its range. Habitat 6230 often occurs in a mosaic with heath. Mineral flushing is usually required to create a habitat that supports a more species-rich community. Both calcareous (calcareous flushing) and non-calcareous sub-communities of 6230 habitat have been identified in Ireland. The habitat has an affinity to the *Violion caninae* association (Perrin, 2015), and according to the Irish Vegetation Classification, relevant communities include the *Nardus stricta-Potentilla erecta* (GL4B) and *Agrostis capillaris-Potentilla erecta* (GL4C) grassland communities (Perrin, 2015).

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***1994-2014***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was derived from a polygon shapefile. This shapefile was created by compiling relevant data which referred to habitat 6230 or Fossitt code GS3 (Fossitt, 2000). Two geological datasets (Fealy *et al.*, 2006; GSI, 2006) were used to confirm that all areas of 6230 were on, or in a few cases adjacent or surrounded by, acid bedrock or substrate. Sources include Coillte Biodiversity Dataset (various dates), Galway County Council (2017) and Perrin *et al.* (2014a, 2014b). In addition to these, sources utilised for the distribution map from the last reporting period (NPWS, 2013) were also included: eight National

	Survey of Upland Habitats (NSUH) sites (Perrin *et al.*, 2011, 2012, 2013a-c; Roche *et al.*, 2010a, 2010b, 2011), Burke (2001) utilised in O'Donovan (2007), Coillte Biodiversity Dataset, Dwyer *et al.* (2007), Martin *et al.* (2007, 2008), O'Neill *et al.* (2009, 2010, 2013) and the GIS shapefile for Connemara National Park. SAC files and a combination of Aerial Photograph Interpretation (API) and ISGS relevés added an additional four polygons for the distribution map from the last reporting period (NPWS, 2013). All references are detailed below in Section 3.2. A certainty rating system was applied to all data that informed the distribution map. This system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1 the lowest. Of the new data sources added since the last round of reporting (NPWS, 2013), Galway County Council (2017) and Perrin *et al.* (2014a, 2014b) were all judged to be a high certainty of 3. Certainty 3s were not assigned to the Coillte Biodiversity Dataset due to the age of the data (surveyed in early 2000s) and the fact that the current indicator species lists were not developed until after this dataset was completed. The Coillte Biodiversity Dataset polygons which were assigned a certainty of 2 had 6230 habitat recorded as present, along with a list of species, so the call of 6230 could be confirmed. The Coillte Biodiversity Dataset polygons which were assigned a certainty of 1 also had 6230 habitat recorded as present but there was no additional information on species within these areas. Certainty values from the datasets utilised during the last reporting period were not reassigned for the purposes of the distribution map as the classes within the certainty rating system are fairly broad. All polygons and points with certainty 1 to 3 were used to map the distribution for the 6230 habitat.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Aerial Photograph Interpretation. Areas of 6230 were mapped within the Blackstairs Mountains SAC (000770) based on 2005 aerial photos. These two areas are expected to contain 6230 due to the presence of a relevé recorded at the base of the mountain during the Irish Semi-natural Grasslands Survey that included >6 high quality and general typical species for the 6230 habitat. Coillte Biodiversity Dataset. GIS files and individual site management plans were made available by Coillte. Datasets used were from 2001 to 2005. Connemara National Habitat Map shapefile. Based on vegetation map produced in 2008 by G. Kaule *et al.*, Institute of Landscape Planning and Ecology. University of Stuttgart. Dwyer, R., Crowley, W. & Wilson, F. (2007) Grassland Monitoring

Project 2006. Unpublished Report, National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

European Commission (eip-agri): 'A sustainable agricultural plan for the MacGillycuddy Reeks – Conservation and restoration of upland habitat in the MacGillycuddy Reeks'. https://ec.europa.eu/eip/agriculture/en/find-connect/projects/sustainable-agricultural-plan-macgillycuddy-reeks

European Commission (eip-agri): 'Blackstairs farming futures (BFF) Sustainable farming project in the Blackstairs Mountains'. https://ec.europa.eu/eip/agriculture/en/find-connect/projects/blackstairs-farming-futures-bff-sustainable

European Commission (eip-agri): 'Sustainable Uplands Agri-environment Scheme (SUAS)'. https://ec.europa.eu/eip/agriculture/en/find-connect/projects/sustainable-uplands-agri-environment-scheme-suas

Fealy, R., Loftus, M. & Meehan, R. (2006) EPA soil and subsoil mapping project: Summary Methodology Description for Subsoils, Land Cover, Habitat and Soils Mapping/Modelling. Version 1.2. Teagasc, Dublin.

Forest Service, Department of Agriculture, Food and the Marine (2015) Forestry Programme 2014-2020: IRELAND. Submitted in accordance with European Union Guidelines on State aid for agriculture and forestry and in rural areas 2014 to 2020. https://www.agriculture.gov.ie/media/migration/forestry/forestryprogramme2014-2020/IRELANDForestryProgramme20142020230215.pdf

Fossitt, J.A. (2000) *A guide to habitats in Ireland*. The Heritage Council, Kilkenny.https://www.npws.ie/sites/default/files/publications/pdf/A%20Guide%20to%20Habitats%20in%20Ireland%20-%20Fossitt.pdf

Galway County Council (2017) Unpublished data collected for the Galway City Transport Project.

GSI (2006) Bedrock_100 geological dataset. Geological Survey of Ireland (GSI), Dublin.

Martin, J.R., Gabbett, M., Perrin, P.M. and Delaney, A. (2007) Semi-natural grassland survey of Counties Roscommon and Offaly. Unpublished report for NPWS. https://www.npws.ie/sites/default/files/publications/pdf/Martin_et_al_2007_ISGS.pdf

Martin, J.R., Perrin, P.M., Delaney, A.M., O'Neill, F.H. & McNutt, K.E. (2008) Irish Semi-natural grasslands survey. Annual Report No. 1: Counties Cork and Waterford.

https://www.npws.ie/sites/default/files/publications/pdf/Martin_et_al_2008_ISGS.pdf

Martin, J.R., O'Neill, F.H. & Daly, O.H. (2018) The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats. *Irish Wildlife Manuals*, No. 102. National Parks and

Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin.

NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin.

https://www.npws.ie/sites/default/files/publications/pdf/Article_17_Print_Vol_2_report_habitats_v1_1_0.pdf

O'Donovan, G. (2007) Vegetation and habitat survey of Wicklow Uplands SAC. Unpublished Report, National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

O'Neill, F.H., Martin, J.R., Perrin, P.M., Delaney, A., McNutt, K.E. & Devaney, F.M. (2009) Irish Semi-natural grasslands survey. Annual Report No. 2: Counties Cavan, Leitrim, Longford & Monaghan. Unpublished report for NPWS.

https://www.npws.ie/sites/default/files/publications/pdf/ONeill_et_al_2009_ISGS.pdf

O'Neill, F.H., Martin, J.R., Devaney, F.M., McNutt, K.E., Perrin, P.M. & Delaney, A. (2010) Irish Semi-natural grasslands survey. Annual Report No. 3: Counties Donegal, Dublin, Kildare & Sligo. Unpublished report for NPWS.

https://www.npws.ie/sites/default/files/publications/pdf/ONeill_et_al_2010_ISGS.pdf

O'Neill, F.H., Martin, J.R., Devaney, F.M. & Perrin, P.M. (2013) The Irish Semi-natural Grasslands Survey 2007-2012. *Irish Wildlife Manuals*, No. 78. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

https://www.npws.ie/sites/default/files/publications/pdf/IWM-78-Irish-semi-natural-grassland-survey.pdf

Perrin, P. (2015) Irish Vegetation Classification: Technical Progress Report No. 1. Report submitted to National Biodiversity Data Centre. http://www.biodiversityireland.ie/wordpress/wp-content/uploads/IVC_Technical-Progress-Report-No.1.pdf

Perrin, P.M., Roche, J.R. & Barron, S.J. (2011) National Survey of Upland Habitats (Phase 1, 2010-2012) Site Report No 1: Mweelrea, Sheeffry, Erriff Complex cSAC (001932), Co. Mayo. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

https://www.npws.ie/sites/default/files/publications/pdf/NSUH10_Mweelrea_Sheeffry_Erriff_Report_01c_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J. & Daly, O.H. (2012) National Survey of Upland Habitats (Phase 2, 2011-2012), Site Report No. 7: Mount Brandon cSAC (000375), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin,Ireland.https://www.npws.ie/sites/default/files/publications/pdf/NSUH11_Mount_Brandon_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013a). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 10: Ox Mountains Bogs cSAC (002006), Cos. Mayo and Sligo. National Parks and Wildlife

Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Ox_Mountains_Bogs_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013b). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 13: Cuilcagh – Anierin Uplands cSAC (000584), Cos. Cavan and Leitrim. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin,Ireland.https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Cuilcagh_Anierin_Uplands_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013c). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 14: Slieve League cSAC (000189), Co. Donegal. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Slieve_League_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014a). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 15: Slieve Mish Mountains cSAC (002185), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH13_Slieve_Mish_Mountains_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014b). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 16: Caha Mountains cSAC (000093), Cos. Cork and Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH13_Caha_Mountains_01b_M.pdf

Perrin, P.M., Barron, S.J., Roche, J.R. & O'Hanrahan, B. (2014c) Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland. Version 2.0. *Irish Wildlife Manuals*, No. 79. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.https://www.npws.ie/sites/default/files/publications/pdf/IWM79.pdf

Roche, J.R., Perrin, P.M. & Barron, S.J. (2010a) National Survey of Upland Habitats (Pilot Survey Phase, 2009-2010), Site Report No. 3: Comeragh Mountains cSAC (001952), Co. Waterford. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/SPEU09_Comeragh_Mountains_Report_01b_M.pdf

Roche, J.R., Perrin, P.M. & Barron, S.J. (2010b) National Survey of Upland Habitats (Pilot Survey Phase, 2009-2010), Site Report No. 4: Carlingford Mountain cSAC (000453), Co. Louth. National Parks

	and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/SPEU09_Carlingford_Mountain_Report_01b_M.pdf Roche, J.R., Perrin, P.M. & Barron, S.J. (2011) National Survey of Upland Habitats (Phase 1, 2010 - 2012), Site Report No. 6: Croaghaun / Slievemore cSAC (001955), Co. Mayo. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH10_Croaghaun_Slievemore_Report_01b_M.pdf SAC files. The data utilised from the Natura 2000 forms and associated NPWS documents included general locations and lists of vascular plant species that were found in these locations. These data helped define two areas of 6230 habitat within the Connemara Bog Complex SAC (002034).
3.2i Additional information	

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***12,700 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	

4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*
4.10 Favourable reference range	***a) 12,700 km²***
	b) Indicate if operators were used (using symbols ≈, >, >>) or
	c) If favourable reference range is unknown, indicate by using 'x'
	d) Indicate method used to set reference value if other than operators The Favourable Reference Range has been increased since the last reporting period (NPWS, 2013) to reflect the improved level of knowledge. There is no evidence of loss of range since the Directive came into force and the geographic spread is considered sufficient for the long-term survival of the habitat.
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods? **YES**/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*
	a) yes, due to genuine change — *YES/**NO***
	b) yes, due to improved knowledge/more accurate data — ***YES**/NO*
	c) yes, due to the use of different method — *YES/**NO***
	d) yes, but there is no information on the nature of change — *YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 6230 habitat. A maximum gap distance of two 10km grid cells was used when running the range tool. Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013). Data used for the short-term trend dated from 2007 to 2014, while those used for the long-term trend dated from 1994 to 2014. The trends are assumed to be valid for the default trends for this reporting period. There were no recorded losses of area resulting in a loss of range at the sample sites covered by the NSUH during these two reporting periods. The short-term trend is stable. It should be noted that the NSUH surveyed two 6230 habitat sites within this reporting period compared with eight sites in the last reporting period, therefore limiting the conclusions that can be made. The number of 10km squares in the range (127) is 10 squares higher than the last monitoring period (NPWS, 2013). These changes are due to improved knowledge within the current reporting period from new datasets utilised for this reporting period. Stoneparkbrogan,

	Mayo (one square) (from Coillte Biodiversity Dataset); Carrach, Galway (one square) (from Galway County Council, 2017); and Slieve Mish Mountains, Kerry (six squares) and Caha Mountains (two squares) (from Perrin *et al*., 2014a, 2014b) added to the range. Favourable Reference Range has been increased since the last reporting period (NPWS, 2013) to reflect the improved level of knowledge. The Favourable Reference Range is the current range, reported in Section 4.1.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***1994-2014***	
5.2 Surface area *(in km²)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***6.11 km²***
5.3 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007-2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994-2018***	
5.10 Long-term trend Direction *Optional*	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	

5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator >> (much more than) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 1994 when NPWS data for Connemara Bog Complex SAC (002034) were collected and incorporates updates made by surveys between 2000 and 2014 that are listed in Section 3.2. Area was calculated from the polygon shapefile used for distribution. During the current reporting period eight datasets with 6230 habitat recorded within them were utilised; two of these datasets were sites assessed for Area as part of the NSUH. The two NSUH sites (Caha Mountains SAC (000093) and Slieve Mish Mountains SAC (002185)) represent 2.3% of the total area of 6230 habitat recorded in Ireland limiting the conclusions that can be made. More detailed survey work of the 6230 habitat is needed, and it is expected that the area listed in Section 5.2 will be refined as more in-depth mapping of the 6230 habitat is completed. In addition to refining the areas of 6230 habitat currently known, there are probably still areas of unmapped 6230 habitat within the country, particularly outside designated sites. The area value entered is therefore a minimum.	

	The default trend periods are presented above and are used to calculate the magnitude of annual loss; however the data used for the short-term trend dated from 2005 to 2011, while those used for the long-term trend dated from 1991 to 2011. Short-term trend in Area was deemed to be stable. At the sample of sites covered by the NSUH there is no apparent loss of habitat since 2005. Favourable Reference Area (FRA) is deemed to be much greater than the current area, given that anthropogenic losses have occurred since the Directive came into force. There was a loss of approximately 0.43 km^2 6230 habitat between 1991 and 2006 at Kilduff, Devilsbit Mountain SAC (000934) due to agricultural improvement (NPWS, 2013). This was the most significant reported loss of area of 6230 habitat, representing over 6% of the current known area of 6230 habitat. In addition to this, the ISGS (O'Neill *et al.*, 2013) recorded a loss of 0.36 ha since 2000 due to scrub and heath encroachment, while the NSUH (Perrin *et al.*, 2011) recorded a loss of 0.03 ha since 1995 due to a landslide (combined area loss of 0.4339 km^2 or 6.4% of the current area). It is likely that the actual percentage loss is significantly higher due to additional unknown losses outside of the ISGS and NSUH sites due to impacts such as afforestation and agricultural improvement in more accessible sites and agricultural abandonment (scrub and heath encroachment) in inaccessible upland sites. These known losses combined with the small fragmented areas of 6230 habitat remaining resulted in the assessment that the FRA should be at least 110% of the current area. The difference in habitat extent between this reporting period and the last is due to the availability of more accurate data of the area of habitat 6230. Martin *et al.* (2018) revisited some areas which were previously mapped as 6230 habitat. Two polygons were reassigned as non-Annex GS3 grassland due to changes in the interpretation of 6230 habitat since the original survey was undertaken. This resulted in a reduction of 0.034 km^2 6230 habitat from the area reported in the previous reporting period. A calculation error in one of the datasets utilised in the previous reporting period was detected in this reporting period, and resulted in an additional reduction of the previously reported area by 0.66 ha. Additional surveys in this reporting period resulted in an addition of 0.38 km^2 6230 habitat which was previously unmapped. There is no evidence of genuine change in area of 6230 habitat during the current reporting period ((6.42-0.03 – 0.66) + 0.38 = 6.77 km^2).

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***0.55 km²***
		Maximum	***1.53 km²***
	b) Area in not-good condition	**Minimum**	***4.58 km²***
		Maximum	***5.56 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***

6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***
6.7 Typical species Method used *Optional*	The list of typical species is the same as the last reporting period (NPWS, 2013). Typical species were assessed as an assemblage at the monitoring stop level within sites surveyed by the NSUH (Perrin *et al*., 2014a, 2014b). At each monitoring stop the number of indicator species needed to be at least seven. Within the seven species there had to be a minimum of two high-quality species for the calcareous sub-community, or one high-quality species for the acidic sub-community. Trends for the assemblage and for individual species were not assessed as the NSUH was a baseline survey.
6.8 Additional information *Optional*	The NSUH (Perrin *et al.*, 2014c) assess Structure and functions at a monitoring stop level, using criteria to assess vegetation composition (including typical species), vegetation structure and physical structure; all criteria need to pass for a stop to pass. Criteria were adopted from O'Neill *et al.* (2013). The NSUH primarily assesses SACs and is currently incomplete. A total of four monitoring stops were recorded across both NSUH sites surveyed within this reporting period. Three of the four stops (75% of stops) failed either one or more of the criteria assessing 'cover of scrub, bracken and heath' (25%); 'proportion of sward height between 5-50 cm tall' (50%); and 'area of the habitat showing signs of serious grazing or disturbance' (25%) failing. For full details see the NSUH site reports (Perrin *et al.*, 2014a, 2014b). Of the area of 6230 habitat (0.14 km^2) assessed for Structure and functions in this reporting period, 25% of the area was assessed as being in good condition (Favourable). Equal weighting was given to each of the stops as each one assesses a comparable area of habitat. The proportion in good (25%) and not-good condition (75%) was scaled up to the national estimate (1.53 km^2 in good condition and 4.58 km^2 in not-good condition), however as the area assessed for

	Structure and functions in this reporting period only represents 2.3% of the national area of habitat 6230, data from the last reporting period were also utilised. During the last reporting period 9% of the 6230 habitat was assessed as Favourable (NPWS, 2013). This equates to 0.55 km^2 of the current area of 6230 habitat and this figure is used as the minimum area in good condition. 91% of the 6230 habitat was assessed as Unfavourable (NPWS, 2013). This equates to 5.56 km^2 of the current area of 6230 habitat and this figure is used as the maximum area that is in not-good condition. The most frequent criteria to fail the Structure and functions assessment from the ISGS in the last reporting period were 'species richness', 'forb component of forb : graminoid ratio' and 'cover of positive indicator species' (O'Neill *et al.*, 2013). The most frequent criteria to fail the Structure and functions assessment from the NSUH in the last reporting period were 'forb component of forb : graminoid ratio' and 'number of high quality species present' (Perrin *et al.*, 2011, 2012, 2013a-c; Roche *et al.*, 2010a, 2010b, 2011). The default short-term trend period is presented above; however the data used for the short term trend dated from 2007 to 2014. Based on limited data, conclusions could be made that the area in good condition has improved; however, as this is based on data with a poor national sample size and distribution, the short-term trend was taken to be the same as that reported in the previous reporting period. Short-term trend of Structure and functions in the previous reporting period was assessed as stable. Typical species for 6230 habitat are: *Agrostis capillaris, Anthoxanthum odoratum, Carex binervis, Festuca ovina, Galium saxatile, Hylocomium splendens, Luzula multiflora / L. campestris* (count as one), *Nardus stricta, Polygala serpyllifolia, Potentilla erecta, Rhytidiadelphus loreus, Rhytidiadelphus squarrosus* and *Veronica officinalis.* High-quality species for the calcareous sub-community are: *Alchemilla glabra, Antennaria dioica, Campanula rotundifolia, Conopodium majus, Ctenidium molluscum, Linum catharticum, Lotus corniculatus, Lysimachia nemorum, Primula vulgaris, Prunella vulgaris* and *Thymus polytrichus*. High-quality species for the acidic sub-community are: *Breutelia chrysocoma, Carex caryophyllea, Carex pilulifera, Danthonia decumbens, Lathyrus linifolius, Pseudorchis albida, Viola canina* and *Viola riviniana*.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*

	Pressure	Threat
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**I04** Problematic native species (M) **L02** Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices (M)	**I04** Problematic native species (M) **L02** Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices (M)
7.2 Sources of information *Optional*	Pressures were sourced from the following reports and accompanying data: NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin. Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014a). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 15: Slieve Mish Mountains cSAC (002185), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014b). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 16: Caha Mountains cSAC (000093), Cos. Cork and Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.	
7.3 Additional information *Optional*	Pressures and threats presented in 7.1 were selected and ranked based on intensity (high, medium, low), frequency of occurrence, and area of impact where data were available. Data gathered from the sources listed in Section 7.2 are summarised in the backing document 'NSUH17_AR1719_pressures_assessment_01a.xlsx'. For the current reporting period, data on pressures were available for two NSUH sites – Slieve Mish Mountains SAC (002185) and Caha Mountains SAC (000093) (Perrin *et al*., 2014a, 2014b). As the data from the current reporting period only represent a small proportion of the data collected to inform NPWS (2013), the pressures and threats information presented in NPWS (2013) were also used to inform the current reporting period. Only two pressures were ranked as either high or medium importance for 6230 habitat in the previous reporting period (NPWS, 2013) – I04 (Problematic native species) and L02 (Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices)). Both I04 and L02 have additional evidence for their importance provided by the data collected during the current reporting period. I04 (Problematic native species) was recorded as a high-importance pressure in NPWS (2013), recorded at 24% of ISGS sites. *Pteridium aquilinum* (Bracken) is a common invader of upland grassland, and if not managed, can change the nature of the habitat (in this case from a priority Annex I grassland habitat to a non-Annex closed habitat). It is often associated with grassland habitats which are undergrazed. As	

	I04 was recorded at 24% of ISGS sites in the previous reporting period, and from one NSUH site within this reporting period (Perrin *et al*., 2014b) with low intensity, this pressure was assessed as acting over a moderate part of the 6230 area and was therefore downgraded from high to medium importance for this reporting period. L02 (Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices)) was recorded as a medium-importance pressure in NPWS (2013), recorded at 24% of ISGS sites. Similar to I04 above, L02 is often an indication of undergrazing of the 6230 habitat, and can result in the loss of 6230 habitat. It was recorded from one NSUH site within this reporting period (Perrin *et al*., 2014b) with low intensity. As this pressure was acting over a moderate part of the 6230 area, it was retained as a medium-importance pressure for this reporting period. Pressures which were ranked as low importance in the previous reporting period, and which have further evidence for their importance provided by the data collected during the current reporting period, include sheep grazing (A09 and A10) and other invasive alien species (other than species of Union concern) (I02). In the previous reporting period sheep grazing in the uplands, both undergrazing and overgrazing, was recorded under 'A04.02.02 non-intensive sheep-grazing'. Using the crosswalk referenced in the backing document 'NSUH17_AR1719_pressures_assessment_01a.xlsx' to convert the old impact codes to the new impact recording scheme, A04.02.02 crosswalks to A10 (Extensive grazing or undergrazing by livestock). However at times the recorded impact should be considered under A09 (Intensive grazing or overgrazing by livestock). As 6230 habitat is not a climax community, it relies on extensive agricultural practices, usually sheep grazing, to maintain the habitat over almost all of its range. A09 (Intensive grazing or overgrazing by livestock) can lead to eutrophication, erosion and damage to the vegetation of the 6230 habitat, while A10 can result in bracken and scrub encroachment and/or succession to another habitat (typically heath). Perrin *et al.* (2014a, 2014b) attribute A04.02.02 to overgrazing (A09), with 50% of 6230 habitat at both sites failing due to excessive levels of grazing (medium intensity). Perrin *et al.* (2014b) also attribute A04.02.02 to undergrazing (A10) with the remaining 50% of 6230 habitat at this site failing due to this pressure. A04.02.02 was assessed as a low-importance pressure in the previous reporting period, and was retained as low importance for both A09 and A10 for this reporting period due to expert opinion and a deficiency of data from this current reporting period to warrant a change. Other invasive alien species (other than species of Union concern) (I02) was also ranked as low importance in the previous reporting period, and was retained as low importance in this reporting period. It was recorded at both NSUH sites surveyed within this reporting period (Perrin *et al.*, 2014a, 2014b), but at a low intensity, impacting on <1% of the 6230 habitat. B01 (Conversion to forest from other land uses, or afforestation (excluding drainage), E01 (Roads, paths railroads and related infrastructure (e.g. bridges, viaducts, tunnels) and F07 (Sports,

	tourism and leisure activities), recorded within the previous reporting period only, were retained as low-importance pressures of 6230 habitat for this reporting period. A02 (Conversion from one type of agricultural land use to another) was added as a low-importance pressure for 6230 habitat for this reporting period based on expert judgement. It refers to the conversion of 6230 habitat into more intensively managed grassland areas. Fertilisation (A02) was added as a low importance threat to 6230 in the previous reporting period as "the improvement of marginal land through fertilisation and reseeding continues to have an impact on the 6230 habitat" (NPWS, 2013a). NPWS (2013a) also listed B01 as a low importance threat "due to the continued trend in Ireland of planting conifer plantations on marginal agricultural land and the technical difficulties associated with the foresters and ecologists involved with planting recognising the 6230 habitat". The Environmental Impact Assessment (EIA) threshold for forestry is 50 ha or more (S.I. No. 191 of 2017), which means large areas of unenclosed land can be planted without adequate environmental assessment. In addition to this, there has been recent pressure to increase land availability for afforestation on unenclosed land as planting on agricultural land is not happening at the desired rate in order to reach the target of 18% forest cover by mid-century (C. Douglas, NPWS, pers. comm.). While unenclosed land is not synonymous with 6230 habitat it is assumed that these lands include some areas of this habitat. It is likely that both A02 and B01 are medium-importance pressures and threats; however due to a paucity of monitoring data for 6230 habitat, there is currently no evidence to support this assumption. Both impacts are therefore assessed as low-importance pressures and threats for this reporting period. The two medium-importance pressures reported in Section 7.1 are also considered to be the main threats to the 6230 habitat in the future.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type** or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical*

	species (related to 'Specific structure and functions')
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000*** *or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* ***a) Short-term results (within the current reporting period, 2013-2018)*** *or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	**CA03** Maintain existing extensive agricultural practices and agricultural landscape features **CA04** Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures **CA05** Adapt mowing, grazing and other equivalent agricultural activities **CB01** Prevent conversion of (semi-) natural habitats into forests and of (semi-)natural forests into intensive forest plantation **CF03** Reduce impact of outdoor sports, leisure and recreational activities **CH03** Reduce impact of other specific human actions **CI03** Management, control or eradication of other invasive alien species **CI05** Management of problematic native species
8.6 Additional information *Optional*	Though no conservation measures targeted specifically to 6230 habitat have been identified there are a number of measures applied broadly to upland habitat which, if 6230 habitat is present, may contribute positively to the habitat. Conservation measures were selected from information provided by NPWS (pers. comm.), European Commission (EIP-AGRI website) and Forest Service (2015). Data from the NSUH, recorded in the previous reporting period, were also utilised where appropriate. The maintenance of extensive grazing (CA03) (recorded as non-intensive grazing as either a positive or neutral impact), particularly that of sheep grazing, was recorded three times by the NSUH during the previous reporting period. In some cases the maintenance of extensive sheep grazing (CA03) is undertaken through the Department of Agriculture's Green, Low Carbon, Agri-Environment Scheme (GLAS), both in regards to Commonage Management Plans and private Natura Management Plans. The main purpose of these sustainable management plans, in regards to upland habitats, is to restore the condition of both commonage and private Natura lands by protecting against both undergrazing and overgrazing (A. Bleasdale, NPWS, pers. comm.). It should be recognised that not all shareholders within the

	commonages or people who hold private Natura lands have joined these schemes. The management regimes of most areas of 6230 habitat are driven by the landowner rather than by any formal management plan or policy; therefore the continued operation of the management regimes currently in place is not guaranteed across the entire habitat. In addition to this, 6230 habitat must be present within an area managed under GLAS for it to be relevant to this habitat. GLAS would not necessarily include a targeted measure specific to this habitat but management prescriptions might be included for the broader upland area which includes 6230 habitat. Details of participation in the GLAS scheme and of the uptake across various measures are not currently available. It is therefore not possible to precisely assess the effects of implementation of these measures. Within Ireland's National Parks (NPs) which contain 6230 habitat, Connemara NP is undertaking maintenance of tracks and trails to prevent damage to sensitive habitats (CF03) and control of trespassing stock (CA05). Wicklow Mountains NP also maintains tracks and trails (CF03) and controls trespass of stock (CA05). In addition to these conservation measures, Wicklow Mountains NP enforces the Ministerial Direction 2010 on the use of All Terrain and Off-Road Vehicles where possible (CF03) and work towards a reduction in small-scale illegal dumping through the PURE project (CH03), which is an environmental project established to combat illegal dumping in the Wicklow/Dublin uplands (http://www.pureproject.ie/). Wicklow Mountains NP also controls fires where possible (CA05) and has worked closely with local farmers and Teagasc through the Wicklow Uplands Council, with the result of a reduction in farmer-lit fires (E. Mullen, NPWS, pers. comm.). Two Forest Service Circulars (10/2010 and 18/2011) advise against afforestation of large areas of upland sites containing sensitive habitats (CB01), while the Forestry Service (2015) states 'The inappropriate afforestation of sensitive habitats such as peat lands and wetlands will be avoided, as well as the negative effects on areas of ecological value including areas under high natural value farming'. It should be noted however that there is no requirement to carry out EIAs on areas below 50 ha, thus relatively large areas can be afforested without adequate environmental assessment. Also, although there has been a documented move of afforestation from peatland and upland areas to wet mineral soils and lower elevations (20% of area planted in 2000 to 4% in 2011) (Forestry Service, 2015), there is now pressure to increase land availability for afforestation on unenclosed land, with 114 ha of unenclosed land afforested in 2012 and 106 ha in 2013 (COFORD, 2016). While unenclosed land is not synonymous with 6230 habitat it is assumed these lands include some areas of this habitat. The Forest Service has been involved in the development of Wildfire Interagency Groups and local level partnerships in fire-prone counties in order to permit better targeted fire prevention and enforcement (CA05). A number of demonstration prescribed burns were carried out in 2016, one of which was carried out under the supervision of the KerryLIFE Project, while Teagasc arranged a

	mechanised vegetation management demonstration to demonstrate alternative methods of vegetation management (EFFIS, 2017) (CA05). A total of five European Innovation Partnership (EIP) projects with upland grassland focus or actions have been selected and offered financial support through the EIP-Agri budget administered by the Department of Agriculture, Food and the Marine. The total budget for these projects (albeit not entirely dedicated towards grassland actions alone) is significant. Three projects have already been initiated, with ecologically sustainable grazing in upland habitats a cross-cutting deliverable (CA03 and CA05). These projects are in their infancy, so the response to measures will not be apparent until the next reporting period. The EIP project 'Blackstairs Farming Futures (BFF) Sustainable farming project in the Blackstairs Mountains', aims to maintain and improve peatland habitats and associated semi-natural habitats within the Blackstairs Mountains (CA03 and CA05), with the EIP project 'Sustainable Uplands Agri-environment Scheme (SUAS)' having a similar objective. The EIP project 'A Sustainable Agricultural Plan for the MacGillycuddy Reeks – Conservation and restoration of Upland Habitat in the MacGillycuddy Reeks' proposes to reintroduce suitable cattle breeds to manage upland peatlands and grasslands with particular interest in their use to manage scrub (CA04). It proposes to clear 85 ha of Rhododendron (CI03) and 85 ha of Bracken (CI05), and manage recreational impacts and provide and maintain trails (CF03) to prevent damage to upland habitats such as 6230 habitat.

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	*Good / Poor /* ***Bad*** */ Unknown*
	c) Structure and functions	*Good / Poor /* ***Bad*** */ Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as Stable. Current range is equal to Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as Stable, as no change in Range is expected within the next 12 years based on the current listed threats to 6230 habitat. Future prospects of Range are therefore Good. Short-term trend direction of Area is assessed as Stable. Current area is much less than the Favourable Reference Area (>10% below FRA). Conservation status of Area is therefore Unfavourable-Bad. Future trend of Area is assessed as Negative, as the threats of I04 and L02 are expected to have a negative influence on Area, especially for areas of 6230 habitat outside of Natura sites, even with the conservation measures CA03, CA04 and CA05 in place. These conservation measures are not targeted measures for 6230 habitat, nor are they implemented across the national distribution of the	

	habitat. In NPWS (2013) future trend was also assessed as declining, stating that "it is the view of the NPWS that the area of 6230 within the State is declining" and "in the future the problems of agricultural improvement, afforestation and succession must be tackled to prevent further losses in area". Future prospects of Area are therefore Bad. Short-term trend direction is Stable for habitat that is in Good condition. Current Structure and functions are assessed as Unfavourable as <90% of habitat is in Good condition. A maximum estimate of 91% of 6230 habitat is in Bad condition which equates to Unfavourable-Bad Structure and functions. Conservation status of Structure and functions is therefore Unfavourable-Bad. Future trend of Structure and functions is assessed as Stable, as although the threats of I04 and L02 are expected to have a negative influence on Structure and functions, irrespective of the conservation measures CA03, CA04 and CA05, no real change in the current status of the Structure and functions would be expected (i.e. 6230 habitat which is already failing due to bracken encroachment and succession will continue to fail until these areas no longer represent 6230 habitat, thus having a negative future trend for Area, but no real change for Structure and functions). Future prospects of Structure and functions are therefore Bad.

10 Conclusions

Assessment of conservation status at end of reporting period

10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/****NO***	***YES****/NO*

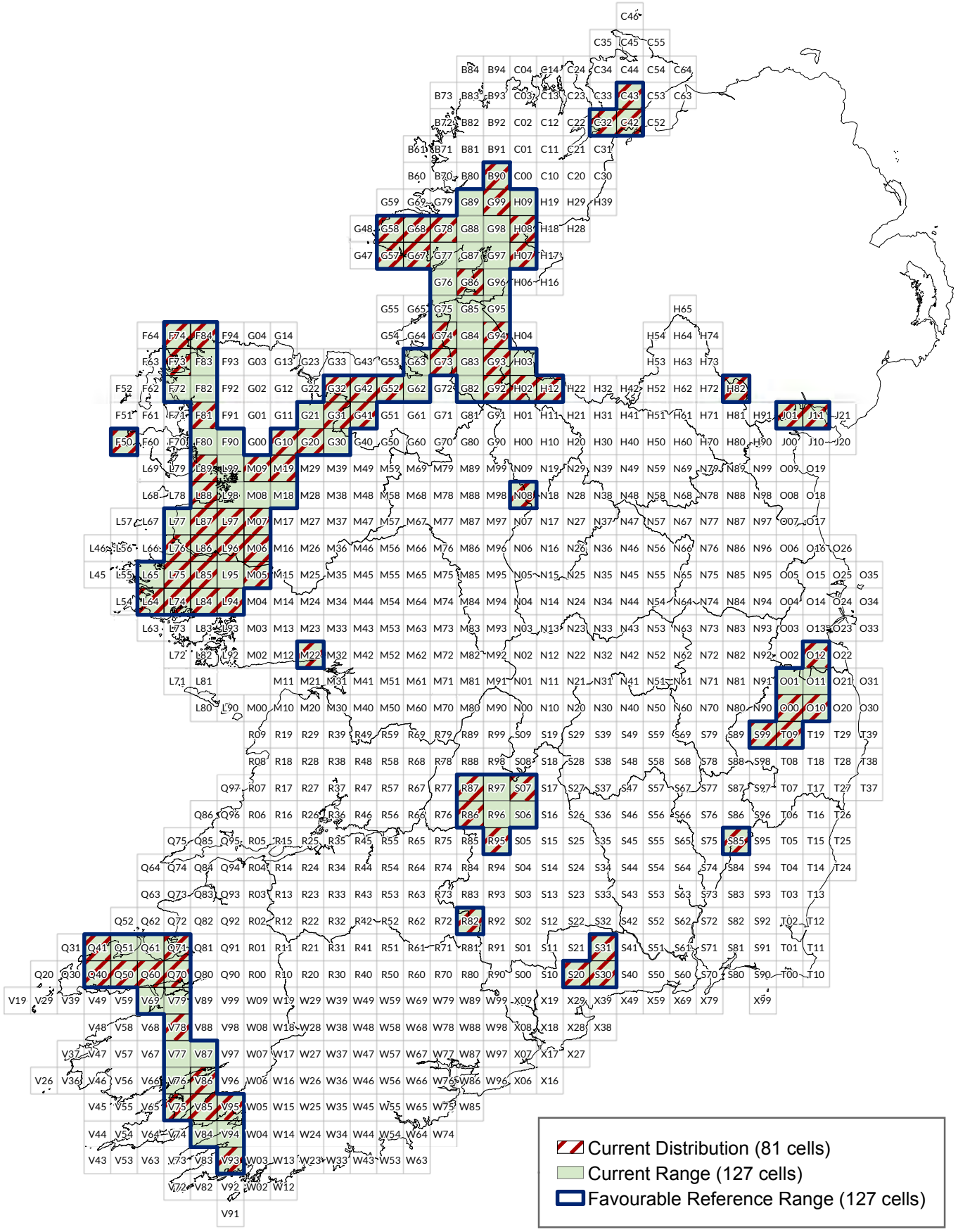
	b) yes, due to genuine change	*YES/NO*	***YES**/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	*YES/**NO***
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/**NO***
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/**NO***
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	***genuine change** / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	The Conservation Status of Range is Favourable in this reporting period, as it was in the previous reporting period. The Conservation Status of Area, Structure and functions and Future prospects are Unfavourable-Bad in this reporting period, as they were in the previous reporting period. The Overall Conservation Status was assessed as Unfavourable-Bad, as it was during the last reporting period. The status of Unfavourable-Bad during the current reporting period was due to <25% of the area of 6230 habitat being assessed as having Favourable Structure and functions, in addition to the current area of 6230 habitat being more than 10% below the FRA. Overall Trend in Conservation Status was assessed as stable in this reporting period, but as declining in the last reporting period. Overall Trend in Conservation Status is based on the short-term trends of Range, Area and Structure and functions, which were all stable for this reporting period. In the previous reporting period the short-term trend for Area was declining due to an observable loss in area of 0.06% (between 2000 and no later than 2009). There is a slight possibility that this loss occurred between 2007 and 2009 (i.e. within this reporting period's short-term period), however the exact year of loss was not determined during the ISGS (O'Neill *et al*., 2013). Short-term trend for Area was based on the NSUH data only for this reporting period, which it should be noted is just 2.3% of the total area of 6230 habitat recorded in Ireland. The change in Overall Trend in Conservation Status was determined to be due to genuine change; however it should be noted that this is based on extrapolation from a limited amount of data.		

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat	**a) Minimum**	

type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**b) Maximum**	
	c) Best single value	***4.19 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable** / increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing a union between the distribution polygon shapefile and the SAC shapefile. The area given in section 11.1 is the total area of 6230 habitat in SACs in the country, including some SACs where 6230 is not listed as a qualifying interest (QI). The area of 6230 within the Natura 2000 network where it is listed as a QI is 3.17 km^2. No anthropogenic loss of 6230 habitat was reported in the current reporting period. There is one inconsistency between 6230 habitat distribution and SACs in which the habitat is listed as a QI: Bolingbrook Hill SAC (002124) lists 6230 as a QI but there is no record of 6230 habitat here. The short-term trend of the 6230 habitat in good condition within the SAC network is taken to be stable, with the same trend as the 6230 habitat nationally (Section 6.4). The surface area of 6230 habitat within the Natura 2000 network has increased since last reporting period; this is due to improved knowledge lending itself to a refinement of area totals (0.26 km^2 of the 0.38 km^2 previously unmapped 6230 habitat was within the Natura 2000 network (see Section 5.15 for details).	

12 Complementary information

Species-rich *Nardus* upland grassland * (6230) Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Habitat code / name	**6410 *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)**
1.2i Habitat short name	***Molinia* meadows**
1.3i Habitat description	The Annex I habitat 6410 *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) is represented in Ireland by both fen and grassland communities on nutrient-poor soils. The 6410 habitat is either managed as traditional hay meadows (cut only once a year in late summer or autumn with the hay crop removed) or more usually by extensive pasture. Within Ireland *Molinia* meadows occur in lowland plains on neutral to calcareous gleys, sometimes with a marl layer beneath the surface, or on peaty soils both in lowland and upland situations. *Molinia* meadows generally have a central to north-western distribution in Ireland that follows the distribution of *Cirsium dissectum*, one of the key indicator species for the habitat. The Annex I habitat is very rare in the east of the country with only one site recorded within the five eastern counties that border the Irish Sea. The 6410 habitat is comprised of a few distinct communities belonging to the Junco-Molinion. These communities can be classified within GL1C: *Molinia caerulea-Succisa pratensis* grassland (Perrin, 2018), the *Carex panicea-Festuca rubra* community (Heery, 1991) and M24: *Molinia caerulea-Cirsium dissectum* fen meadow (Rodwell, 1991).

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***1995-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted

2.5i	The distribution map was compiled from 6410 polygons digitised for the 2015-17 Grassland Monitoring Survey (GMS; Martin *et al*., 2018) and from the 2007-12 Irish Semi-natural Grasslands Survey (ISGS; O'Neill *et al*., 2013). Heery and Keane (1999), Browne *et al.* (2002), Anon. (2008), Daly and Barron (2014), O'Neill and Martin (2015), Daly (2016) and Galway County Council (2017) also provided polygons for the distribution map. In addition to the sources listed above the distribution map also utilised points digitised by Bleasdale (1995), Conaghan (1995), Conaghan and Fuller (2005), Lynch (2005), Moran (2005), Long (2011), Perrin (2018), and field survey notes provided by Mike Wyse Jackson (pers. comm.). Data sources listed in Section 3.2 that are known to represent the 6410 habitat were assigned a high certainty=3, utilising the range of 1 to 3 for low to high certainty. Those data sources that probably include the 6410 habitat were assigned a certainty=2, while those sources that possibly include the 6410 habitat were assigned a low certainty=1. No dataset that is over 10 years old was assigned a certainty=3 due to the uncertainty that the grassland habitat recorded over 10 years ago is still present. All data sources with certainty 1 to 3 were used to map the distribution of the 6410 habitat. As detailed in NPWS (2013) grassland relevés collected by Austin O'Sullivan between 1962 and 1972 were also analysed against the 6410 Structure and functions criteria utilised by O'Neill *et al.* (2013) and 20 of the relevés were considered to represent the 6410 habitat. As the O'Sullivan data are over 40 years old they were not utilised in calculating the current area or current range of the Annex I habitat, but they were utilised when calculating the Favourable reference range.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Anon. (2008) Limerick Northern Distributor Road: Supplementary Constraints Information. Unpublished report by Roughan and O'Donovan for Clare County Council. Barron, S. and Perrin, P. (2011) Production of a habitat map for Killarney National Park, Co. Kerry. Unpublished report, National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Bleasdale, A. (1995) The vegetation and ecology of the Connemara Uplands, with particular reference to sheep grazing. Unpublished Ph.D. Thesis, National University of Ireland, Galway. Bourke, D., Hochstrasser, T., Nolan, S., Schulte, R. (2007) Historical

Grassland Turboveg Database Project: 2067 Relevés recorded by Austin O'Sullivan 1962-1982. Database reference nos: 25604-28543. Unpublished report for the National Parks and Wildlife Service, Dublin.

Browne, Dunne, Roche (2002) A preliminary study of the Upper Shannon floodplain. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin.

Conaghan, J. (1995) Ecological studies of two rare bog cottons, *Eriophorum gracile* and *Eriophorum latifolium*. Ph.D. Thesis, National University of Ireland, Galway.

Conaghan, J. and Fuller, J. (2005) A survey of rare and threatened vascular plants in County Roscommon. Unpublished report to the National Parks and Wildlife Service, Dublin.

Daly, O.H. and Barron, S. (2014) Surveys of possible Marsh Fritillary sites and habitat in Cos Louth, Meath and Monaghan, Final report. Unpublished report to National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

Daly, O.H. (2016) Surveys of possible Marsh Fritillary sites and habitat in the mid-west (Roscommon and Longford), Draft report. Unpublished Report to National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

Galway County Council (2017) Unpublished data collected for the Galway City Transport Project.

Heery, S. and Keane, S. (1999) Shannon Callows Management Plan. MPSU. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin.

Long, M. P. (2011). Plant and snail communities in three habitat types in a limestone landscape in the west of Ireland, and the effects of exclusion of large grazing animals. Ph.D. Thesis, Botany Department, Trinity College, Dublin.

Lynch, R. (2005) The vegetation of the Ballyhoura Mountains, Co. Limerick. Unpublished report for the Heritage Council, Kilkenny.

Martin, J.R., O'Neill, F.H. and Daly, O.H. (2018) The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats. *Irish Wildlife Manuals*, No. 102. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin.

Moran, J. (2005) Skealoghan Turlough, Co. Mayo: Implications of grazing and flooding regimes for plant and carabid beetle communities with reference to turlough farming systems in the region. Ph.D. Thesis, National University of Ireland, Galway.

O'Neill, F.H., Martin, J.R., Devaney, F.M. and Perrin, P.M. (2013) The Irish Semi-natural Grasslands Survey 2007-2012. *Irish Wildlife Manuals*, No. 78. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

O'Neill, F.H. and Martin, J.R. (2015) Summary of findings from the Survey of Potential Turloughs 2015. Volume I: Main Report. Unpublished Report for National Parks and Wildlife Service, Dublin.

Perrin (2018) Irish Vegetation Classification: Community synopsis

	Molinia caerulea – Succisa pratensis grassland. http://www.biodiversityireland.ie/wordpress/wp-content/uploads /GL1C.pdf. Accessed January 15th 2018. EPA (2017) A Summary of the State of Knowledge on Climate Change Impacts for Ireland: Report 11 (2010-2016). Prepared for the Environmental Protection Agency by MaREI Centre, Environmental Research Institute, University College Cork. M. Desmond, P. O'Brien and F. McGovern. EPA, Wexford. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks & Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin. Rodwell, J.S. (ed.) (1991) *British plant communities Volume 2: Mires and heaths*. Cambridge Community Press, Cambridge.
3.2i Additional information	

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***20,700 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	*stable / increasing / **decreasing** / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	

4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 21,600 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable Reference Range has been increased since the last reporting period (NPWS, 2013) due to improved knowledge.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	***YES****/NO*
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 6410 habitat. A maximum gap distance of two 10km grid cells was used when running the range tool. Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013). In the south of the range, counties Cork and Waterford, the area losses recorded during the current reporting period led to a contraction in the range by nine 10km squares. These losses were due to the anthropogenic pressures of agricultural intensification, forestry, and abandonment. Due to these losses from the south of the range the short-term trend direction is decreasing Overall, the number of 10km squares in the range (207) is 11 squares higher than the last monitoring period and these changes are mostly due to improved knowledge and more accurate mapping of the habitat since the previous reporting period. The Favourable Reference Range (FRR) has been increased since the last reporting period (NPWS, 2013) due to improved knowledge. The current range is 4% below the FRR.	

5 Area covered by habitat		
Area covered by the habitat type within the range in the biogeographical/marine region concerned		
5.1 Year or period	***1995-2017***	
5.2 Surface area *(in km²)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***5.86 km²***
5.3 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

<table>
<tr><td>5.12 Long-term trend
Method used

Optional</td><td colspan="2">Select one of the following methods:

a) Complete survey or a statistically robust estimate
<u>b) Based mainly on extrapolation from a limited amount of data</u>
c) Based mainly on expert opinion with very limited data
d) Insufficient or no data available</td></tr>
<tr><td rowspan="4">5.13 Favourable reference area</td><td colspan="2">a) In km² or</td></tr>
<tr><td colspan="2"><u>b) Operator >> (much greater than)</u></td></tr>
<tr><td colspan="2">c) If favourable reference area is unknown indicate by using ‘x’</td></tr>
<tr><td colspan="2">d) Indicate method used to set reference value if other than operators</td></tr>
<tr><td rowspan="6">5.14 Change and reason for change in surface area</td><td colspan="2">Is there a change between reporting periods? <u>YES</u>/NO

If yes, provide the nature of that change. More than one option (a to d) can be chosen.</td></tr>
<tr><td>a) yes, due to genuine change</td><td><u>YES</u>/NO</td></tr>
<tr><td>b) yes, due to improved knowledge/more accurate data</td><td><u>YES</u>/NO</td></tr>
<tr><td>c) yes, due to the use of different method</td><td>YES/<u>NO</u></td></tr>
<tr><td>d) yes, but there is no information on the nature of change</td><td>YES/<u>NO</u></td></tr>
<tr><td colspan="2">The change is mainly due to (select one of the reasons above):

genuine change / <u>improved knowledge or more accurate data</u> / the use of a different method</td></tr>
<tr><td>5.15 Additional information

Optional</td><td colspan="2">The period over which the surface area of the habitat was determined begins in 1995 and incorporates updates made during the last reporting period (NPWS, 2013) and surveys that have taken place during the current reporting period: 2015-17 GMS, Daly and Barron (2014), O’Neill and Martin (2015), Daly (2016), and Galway County Council (2017).

There are probably still areas of unmapped 6410 habitat within the country, hence the area value entered is a minimum.

Favourable Reference Area was not determined exactly. However, it is deemed to be >10% greater than the current area, given that anthropogenic losses have occurred since the Directive came into force (assuming that no corresponding increases took place since then).

The 2015-17 GMS visited 33 of the 113 6410 sites that had been previously surveyed by the 2007-12 ISGS (O’Neill et al., 2013). Four sites no longer contained a significant area of 6410, one site had been agriculturally improved, one site had been planted with forestry, one was abandoned and scrubbed over, and at one site the habitat had been misidentified as 6410. The remaining 29 sites were surveyed to determine the extant area of 6410 and to monitor the Structure and functions. At five of the 33 surveyed sites, areas of 6410 had been lost due to impacts such as forestry, agricultural intensification and undergrazing. The total recorded area of 6410 lost to impacts such as agricultural improvement was 0.12 km^2, which</td></tr>
</table>

	represents 7% of the surveyed area. Short-term trend in Area was deemed to be "decreasing" because the area of 6410 had been reduced at 5 of the 33 surveyed sites due to anthropogenic factors, such as undergrazing. The magnitude of the known loss is -1.0% per annum, measured over a period of 7 years between this monitoring period and the previous, calculated by estimating the area lost and expressing this as a per-annum percentage of the original area. This area loss is taken to be the minimum with other undocumented losses likely to have taken place in sites not surveyed since the previous monitoring period. If the 7% loss in area is applied to the 6410 area of 5.64 km^2 reported in NPWS (2013), the total reported loss in area nationally during the current reporting period would be 0.39 km^2. The difference in habitat extent between this reporting period and the last is primarily due to anthropogenic impacts such as forestry, agricultural intensification and abandonment. However, the current area of 5.86 km^2 reported in Section 5.2 is larger than the 5.64 km^2 reported in NPWS (2013), even with the known losses of 0.39 km^2. Primarily this is due to the fact that some areas of 6410 habitat that had not been mapped during the previous reporting period (NPWS, 2013) have now been added to the dataset. There were two points from O'Neill *et al.* (2013) and one from Martin *et al.* (2018) where the habitat was found but the area was below the minimum mapping area. A value of 0.02 ha was assigned to these three points. To allow point files to contribute to the total area of 6410 calculated for the current reporting period, a review of the point datasets was carried out using remote imagery, and following this review a mean value of 0.35 ha was assigned to each of the remaining points.

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***3.69 km²***
		Maximum	***3.69 km²***
	b) Area in not-good condition	**Minimum**	***2.17 km²***
		Maximum	***2.17 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		

6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***
6.7 Typical species Method used *Optional*	The typical species from NPWS (2013) were used and are listed in Section 6.8 below.
6.8 Additional information *Optional*	Changes between the percentage of the habitat in good condition reported by NPWS (2013) and the current reporting period are due to the use of different methods with modified assessment criteria used in this reporting period (see Martin *et al.,* 2018). The area of 6410 habitat in good condition was estimated for each of the 29 surveyed sites based on the percentage of monitoring stops at each site that were assessed to have Favourable Structure and functions. As the sample of 29 GMS sites is considered representative of the national resource the proportion in good and not-good condition was scaled up to estimate the national area. The percentage of the 6410 habitat with Favourable Structure and functions has increased from 15% in the last reporting period (NPWS, 2013) to 63% in the current reporting period. However, trend is reported as stable as the assessment criteria have been modified (e.g. high quality indicator species within a 20 m vicinity of the stop were taken into consideration during the current reporting period) and the nature of the assessed areas have changed (e.g. most areas that were surveyed during the current reporting period were >1 ha). Also the methodology for calculating the percentage of the habitat nationally that is in good condition was changed. In the previous reporting period (NPWS, 2013) only sites where the total area of 6410 was assessed to have Favourable Structure and functions were included within the percentage in good condition. In this reporting period the approximate area of each site with Favourable Structure and functions was calculated based on the percentage of monitoring stops that were assessed to have Favourable Structure and functions. All taxa included in the current list of typical species are as follows: *Achillea ptarmica, Carex echinata, Carex flacca, Carex nigra, Carex panicea, Carex pulicaris, Carex viridula, Carum verticillatum, Cirsium dissectum, Crepis paludosa, Equisetum palustre, Filipendula ulmaria, Galium palustre, Galium uliginosum, Juncus acutiflorus, Juncus articulatus, Juncus conglomeratus, Lathyrus palustris, Ophioglossum vulgatum, Lotus pedunculatus, Luzula multiflora, Mentha aquatica, Molinia caerulea, Potentilla anglica, Potentilla erecta, Ranunculus flammula, Succisa pratensis, Viola palustris, Viola persicifolia.*

	The orchid species included within the list of typical species for the 6410 habitat also includes the two common species *Dactylorhiza fuchsii* and *Dactylorhiza maculata* and the rarer *Dactylorhiza majalis*.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A02** Conversion from one type of agricultural land use to another (H) **A06** Abandonment of grassland management (e.g. cessation of grazing or of mowing) (H) **A10** Extensive grazing or undergrazing by livestock (H) **B01** Conversion to forest from other land uses, or afforestation (excluding drainage) (H) **A14** Livestock farming (without grazing) (M) **A31** Drainage for use as agricultural land (M)	**A02** Conversion from one type of agricultural land use to another (H) **A06** Abandonment of grassland management (e.g. cessation of grazing or of mowing) (H) **A10** Extensive grazing or undergrazing by livestock (H) **B01** Conversion to forest from other land uses, or afforestation (excluding drainage) (H) **A14** Livestock farming (without grazing) (M) **A31** Drainage for use as agricultural land (M)
7.2 Sources of information *Optional*	Pressures were recorded during 2015-2017 field surveys for the GMS (Martin *et al*., 2018).	
7.3 Additional information *Optional*	Pressures and threats were selected and ranked based on intensity (high, medium or low), frequency of occurrence, and area of impact, using the data gathered during the 2015-17 GMS and presented in Martin *et al*. (2018). The three pressures reported in Table 14 of Martin *et al.* (2018) that contributed to the largest areas of 6410 loss, A02, A10 and B01, are listed above in Section 7.1 as three of the four high-importance pressures. Abandonment (A06) only contributed to a small loss in 6410 area but due to the fact that 'abandonment, lack of grazing' (recorded under A06 and A10) and 'abandonment, lack of mowing' (recorded under A06) are two of the most frequently recorded impacts in extant areas of the habitat (Table 18 in Martin *et al*., 2018), abandonment was also included as a high-importance pressure. The most frequently recorded impact within Table 18 was 'species composition change (succession)' (recorded under A10), but it was recorded as a low-intensity pressure at most sites. The two medium-importance pressures A14 and A31 listed above in Section 7.1 were the only other impacts within Table 18 that were recorded	

	with a high intensity. A14 was recorded at a high intensity at two sites under 'stock feeding', using ring feeders, but it should be noted that the area of impact at both these sites was small. A31 was recorded only once at a high intensity under 'drainage ditches', but based on expert opinion drainage of land is considered to be a medium-importance pressure on the 6410 habitat nationally. Conversely, the lack of maintenance of drainage ditches can also be a problem if the 6410 habitat becomes too waterlogged, which impacts on species composition and the types of management regimes that can be used (e.g. heaving machinery cannot be used to mow waterlogged land). Intensive grazing or overgrazing by livestock (A09) was recorded as a medium pressure and threat during the previous reporting period. It was only recorded at one site within the 6410 habitat surveyed during the current reporting period (Table 18 in Martin *et al*., 2018) and based on expert opinion it is currently judged to be a low-importance pressure. This difference is considered to be due to an interpretative change rather than any actual change in the occurrence of intensive grazing within the 6410 habitat. Further research on the impacts of climate change on this habitat is required. Impacts may affect the range and species composition of the habitat in the future but it is difficult to determine what level of importance should be assigned at this stage (EPA, 2017). The six pressures recorded during the 2015-17 GMS field survey are also considered to be the six main threats in the future.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type** or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*

8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* ***a) Short-term results (within the current reporting period, 2013-2018)*** *or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	**CA03** Maintain existing extensive agricultural practices and agricultural landscape features **CA15** Manage drainage and irrigation operations and infrastructures in agriculture
8.6 Additional information *Optional*	Conservation measures were selected and ranked based on the frequency of occurrence, using the data gathered during the 2015-2017 GMS (Martin *et al*., 2018). The measures listed mainly take the form of maintaining the management practices currently in place that benefit the 6410 habitat. The maintenance of extensive cattle grazing (recorded under CA03) is the most frequent conservation measure applied to the 6410 habitat, with extensive horse and sheep grazing and non-intensive mowing also important (Table 19 in Martin *et al*., 2018). In some cases the maintenance of extensive cattle grazing is undertaken through the Department of Agriculture's Green, Low-Carbon, Agri-Environment Scheme (GLAS). Managing drainage (CA15) through the maintenance of traditional or long-established drainage systems was also recorded as a positive conservation measure. Although CA15 was only recorded within one site during the current reporting period, under a positive impact of drainage ditches (Table 19 in Martin *et al*., 2018), based on expert opinion this conservation measure is considered to be important nationally. It should be recognised that the management regimes of most 6410 grassland habitats are driven by the landowner rather than by any formal management plan or policy; therefore the continued operation of the management regimes currently in place is not guaranteed. Conservation measures not currently being widely implemented, but the implementation of which would improve the Structure and functions of the habitat, are CA04 (Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures) and CA05 (Adapt mowing, grazing and other equivalent agricultural activities). It should be noted that the Results-based Agri-environment Pilot Scheme (RBAPS) has improved the Structure and functions of areas of 6410 habitat through targeted management interventions (Dolores Byrne, pers. comm.), such as conservation measures CA04 and CA05.

9 Future prospects		
9.1 Future prospects of	**a) Range**	*Good / **Poor** / Bad / Unknown*

parameters	**b) Area**	*Good / Poor / **Bad** / Unknown*
	c) Structure and functions	*Good / Poor / **Bad** / Unknown*
9.2 Additional information *Optional*	Section 8.5 lists conservation measures that are currently being implemented. Section 8.6 lists additional conservation measures that are recommended, but which are not currently being implemented. If the recommendations were to be implemented, the future trend of Area could be assessed as stable rather than negative. However, because it is impossible to be certain that any such recommended measures will in fact be carried out over the next monitoring period, the future trend must be assessed as negative. Short-term trend direction of Range is assessed as Decreasing. Current range is 4% less than the Favourable Reference Range. Conservation status of Range is therefore Unfavourable-Inadequate. Future trend of Range is assessed as Negative, as the range is expected to decrease based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Range are therefore Poor. Short-term trend direction of Area is assessed as Decreasing. Current area is >10% less than Favourable Reference Area. Conservation status of Area is Unfavourable-Bad with the magnitude of the known loss -1.0% per annum. Future trend of Area is assessed as Negative as the area is expected to decrease based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Area are therefore Bad. Current Structure and functions are assessed as Unfavourable-Bad as >25% of habitat is in “Unfavourable” condition. Short-term trend direction is Stable (for habitat that is in Good condition). Conservation status of Structure and functions is therefore Unfavourable-Bad. Future prospects of Structure and functions are therefore Bad.	

10 Conclusions

Assessment of conservation status at end of reporting period	
10.1 Range	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*
10.2 Area	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*
10.4 Future prospects	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*
10.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*

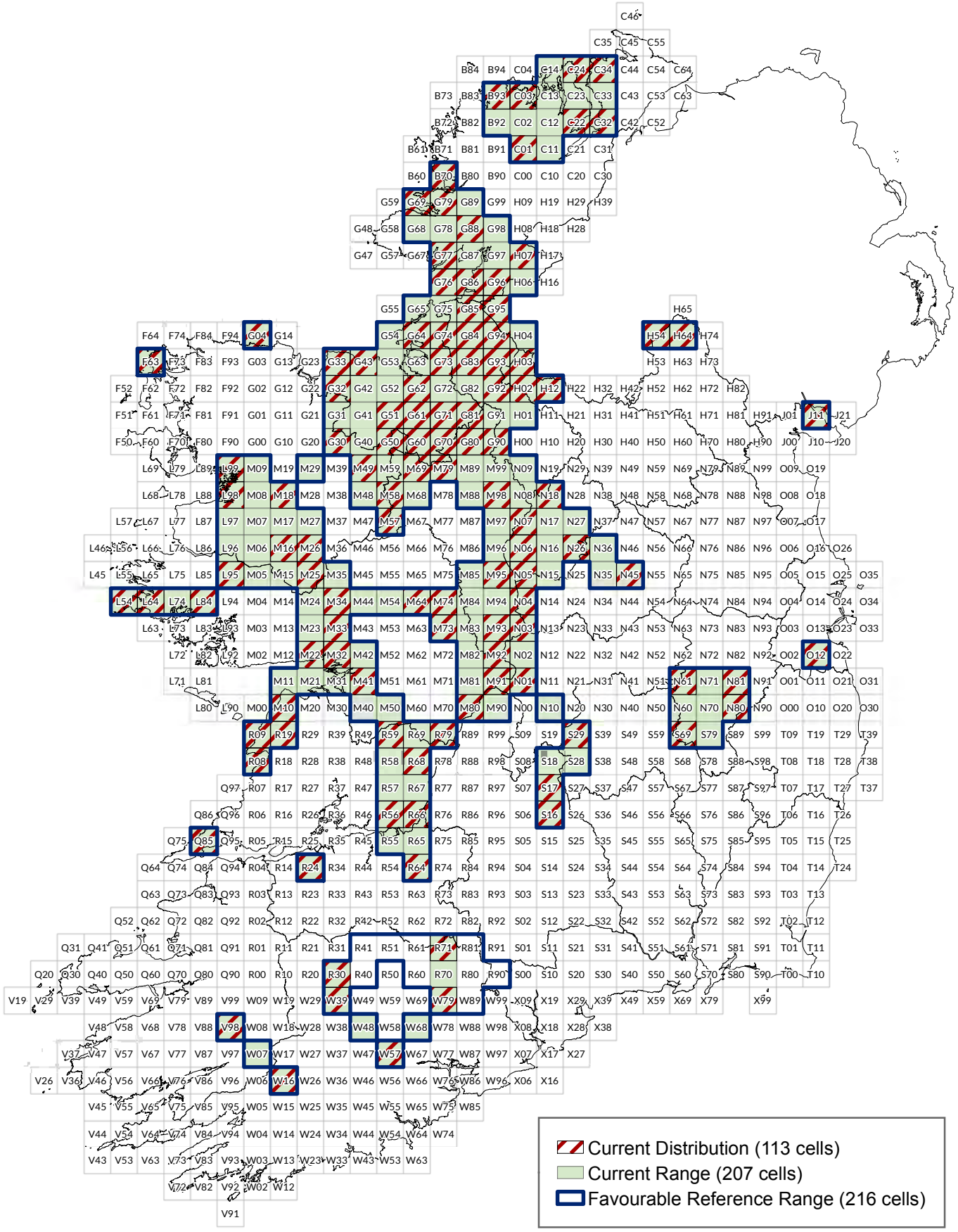
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / **deteriorating** / stable / unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/**NO***	*YES/**NO***
	b) yes, due to genuine change	*YES/NO*	*YES/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	*YES/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	The Overall Conservation Status was assessed as Unfavourable-Bad, as it had been during the last reporting period. The status of Unfavourable-Bad during the current reporting period was due to the current area being >10% less than the Favourable Reference Area, and the fact that >25% of the surveyed area had Structure and functions that were unfavourable. Overall trend in Conservation Status was assessed as deteriorating during the current reporting period, as some areas of the habitat had been lost due to impacts such as agricultural intensification, undergrazing and forestry. These impacts are expected to continue into the future. During the previous reporting period the overall trend had been assessed as decreasing. Although the range has been increased since the last reporting period, due to improved knowledge, there have been losses due to anthropogenic pressures.		

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***2.12 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable** / increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing an intersect between the distribution shapefile and the SAC shapefile. The area given in section 11.1 is the total area of the 6410 habitat in SACs in the country, including some SACs where the habitat is not listed as a qualifying interest (QI). The area of 6410 within the N2000 network where it is listed as a QI is 1.91 km². None of the 0.12 km² of the 6410 habitat lost during the current reporting period was within SACs. The 6410 habitat is listed as a QI, representativity C, for Tralee Bay and Magharees Peninsula West Cloghane SAC (site code 002070), but there is no evidence for the habitat currently being present within this site. The habitat occurs just outside the SAC boundary in Glenasmole Valley SAC (0001209) and there are historic point records for this habitat in Cloghernagore Bog and Glenveagh National Park SAC (002047). The short-term trend of the habitat area in good condition within the SAC network is taken to be stable, with the same trend as the 6410 habitat nationally. As stated in Section 6.8, the percentage of the 6410 habitat with Favourable Structure and functions has increased, however trend is reported as stable as the assessment criteria have been significantly modified since the last reporting period.	

12 Complementary information

Molinia meadows (6410)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels**
1.2i Habitat short name	**Hydrophilous tall-herb swamp**
1.3i Habitat description	Three distinct communities can be considered for the habitat 6430 "Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels" in Ireland: i) In the lowlands, the 6430 habitat occurs as a community of watercourses, particularly unmanaged edges of slow-moving rivers and the margins of lakes. Nutrient levels may be naturally high. The community is dominated by tall hydrophilous herbs, for example *Angelica sylvestris, Filipendula ulmaria, Iris pseudacorus, Lysimachia vulgaris, Lythrum salicaria* and *Valeriana officinalis*. Horsetails such as *Equisetum fluviatile* and *E. palustre* are a common feature, but monospecific stands of horsetails should not be included. Reed beds, large sedge swamps, large areas of fallow wet meadow and neophyte communities (e.g. with *Impatiens glandulifera*) are also not included. This community largely falls within the *Filipendulion* alliance which is listed under this habitat in the Interpretation Manual of EU habitats (European Commission, 2013). It has an affinity to the GL1B *Agrostis stolonifera-Filipendula ulmaria* marsh-grassland community of the Irish Vegetation Classification (IVC) (Perrin, 2015). ii) In the uplands, the 6430 habitat occurs as a community of ungrazed or lightly grazed cliff ledges. These occur on calcareous cliffs and on wet siliceous cliffs where there is some base enrichment from the water. Individual patches of the community are typically small (< 1 m across). Floristically, there may be some overlap with communities of habitats 8210 and 8220, but in this community hydrophilous herbs are characteristic rather than ferns. Such species include *Alchemilla* spp., *Angelica sylvestris, Crepis paludosa, Filipendula ulmaria, Geum rivale* and *Thalictrum minus. Luzula sylvatica* may be present but ledges strongly dominated by this species are not included. This community corresponds with the U17 *Luzula sylvatica-Geum rivale* tall herb community of the British NVC which is listed under this habitat in the Interpretation Manual (European Commission, 2013), and it has an affinity to the RH2D *Angelica sylvestris-Breutelia chrysocoma* ledge community of the IVC (Perrin, 2017). iii) In the lowlands, the habitat also possibly occurs as a nitrophilous tall herb community of woodland borders, referred to as a saum community. This habitat has been little studied in Ireland (see Wilmanns & Brun-Hool, 1982) but typical species are likely to include *Alliaria petiolata, Anthriscus sylvestris, Eupatorium cannabinum, Geranium robertianum, Geum urbanum, Petasites hybridus* and *Vicia sepium*. Archaeophytes such as *Artemisia vulgaris* and *Lamium album* may occur. Whilst *Urtica dioica* and *Aegopodium podagraria* may occur, species-poor stands dominated by these species should

	probably not be included. This community would fall within the *Glechoma hederaceae* order which is listed under this habitat in the Interpretation Manual (European Commission, 2013). Only the first two communities are included in the present assessment for 2013-2018. The third community is not included; further investigation and discussion is required to determine if Ireland supports examples of this community which should be considered under this habitat category.

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***1995-2016***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was derived from a polygon shapefile, a polyline shapefile and a point shapefile. These shapefiles were created by compiling relevant data which referred to habitat 6430 or Fossitt code FS2 or GM1 (Fossitt, 2000) or a relevant NPWS habitat code in their attributes. Sources include Brophy & D'Arcy (2016), Brophy & Devaney (2013), Brophy & Martin (2015), Coillte Biodiversity Dataset (various dates), Crushell *et al.* (2015), Foss *et al.* (2015a, 2015b), Galway County Council (2017), Martin *et al.* (2018), O'Neill & Martin (2015), Perrin (2017) and Perrin *et al.* (2014a, 2014b). In addition to these, sources utilised for the distribution map from the last reporting period (NPWS, 2013a) were also included: eight National Survey of Upland Habitats (NSUH) sites (Perrin *et al.*, 2011, 2012, 2013a-e; Roche *et al.*, 2012), Anon. (2012), the Carlow Pilot Habitat Mapping Project, the Clare Vulnerable Landscapes Survey, the Fingal Habitat Survey, Foss *et al.* (2012), Hickey & Tubridy (2009), Kearney (2010), Lough Derg Habitat Survey, NPWS (2007, 2013b (original survey work for the CPU Habitats commenced in 1995)), O'Neill *et al*. (2013a), the South Clare Habitat Survey: Cratloe to Parteen, and Wilson (2009). All references are detailed below in Section 3.2. A certainty rating system was applied to all data that informed the distribution map. This system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1 the lowest. The new data sources added since the last round of reporting (NPWS, 2013a) – Brophy & D'Arcy (2016), Brophy & Devaney (2013), Brophy & Martin (2015), Crushell *et al.* (2015), Foss *et al.* (2015a), Galway County Council (2017), Martin *et al.* (2018), Perrin (2017) and Perrin *et al.* (2014a,

	2014b) – were all judged to be a high certainty of 3. O'Neill & Martin (2015) were given a certainty of 2 because the exact location, extent and composition of the 6430 habitat were estimated based on aerial photograph interpretation (API) *post hoc*, while Foss *et al.* (2015b) were assigned either certainty 1 or 2 depending on how much information was provided for the presence of the 6430 habitat (i.e. no mapping but location identified within a single 10km grid square using information in site reports (certainty 2) or no mapping but location identified to be in one of two potential 10km grid squares (certainty 1)). The Coillte Biodiversity Dataset polygons were assigned a certainty of 2 for those which were ground-truthed and a certainty of 1 for those where 6430 was not listed as present under the Annex I habitats section in the shapefile but 6430 was listed as present within the biomanagement plans. Certainty 3s were not assigned to the Coillte Biodiversity Dataset due to the age of the data (surveyed in early 2000s). Certainty values from the datasets utilised during the last reporting period were not reassigned for the purposes of the distribution map as the classes within the certainty rating system are fairly broad. However, all 6430 lowland community certainty 3 polygons were briefly reviewed using aerial photographs to assess whether the habitat appeared extant. All polygons and points with certainty 1 to 3 were used to map the distribution of the 6430 habitat.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Anon. (2012) Limerick northern distributor road supplementary constraints information. Draft report prepared by Roughan & O'Donovan Consulting Engineers for Clare County Council. Brophy, J.T. & D'Arcy, D. (2016) Baseline Ecological Survey of the Old Roosky Canal, Towpath and Adjacent Lands. Unpublished Report by BEC Consultants Ltd. Brophy, J. & Devaney, F. (2013) Ecological Study of the Royal Canal between Talbot Bridge and Maynooth Train Station. A report for the National Transport Authority. Brophy, J.T. & Martin, J.R. (2015) Drumshanbo to Battlebridge Blueway. Unpublished Report by BEC Consultants Ltd. Carlow Pilot Habitat Mapping Project. GIS files for this Carlow County Council habitat survey were available and utilised for the previous reporting period, with data carried through to inform the current reporting period. Clare survey of vulnerable landscapes. GIS files for this Clare County Council habitat survey were available and utilised for the previous reporting period, with data carried through to inform the current reporting period. Coillte Biodiversity Dataset. GIS files and individual site management

plans were made available by Coillte. Datasets used were from 2001 to 2003.
Crushell, P., Foss, P.J. & Kirwan, B. (2015) Kerry Wetland Survey II. Report prepared for Kerry County Council.
Daly, O.H. & Barron, S. (2014) Surveys of possible Marsh Fritillary sites and habitat in Cos. Louth, Meath & Monaghan, Final report. Unpublished Report to National Parks and Wildlife Service, Dublin, Ireland.
Dwyer, R., Crowley, W. & Wilson, F. (2007) Grassland monitoring project 2006. Unpublished report for National Parks and Wildlife Service, Dublin.
European Commission (2013) Interpretation manual of European Union habitats EUR 28, European Commission, DG Environment.
Fingal habitat survey. GIS files for this project were made available by Fingal County Council and were utilised for the previous reporting period, with data carried through to inform the current reporting period.
Foss, P. & Crushell, P. (2014) County Kildare Wetland Survey III. Part 1: Main Report. Report prepared for Kildare County Council and The Heritage Council.
Foss, P.J., Crushell, P., O'Loughlin, B. & Wilson, F. (2012) Louth Wetland Survey II. Part 1: Main Report. Report prepared for Louth County Council and The Heritage Council.
Foss, P.J., Crushell, P. & Kirwan, B. (2015a) County Waterford Wetland Survey. Part 1: Main Report. Report prepared for Waterford City & County Council.
Foss, P.J., Crushell, P. & Kirwan, B. (2015b) County Waterford Wetland Survey. Part 2: Site Reports. Report prepared for Waterford City and County Council.
Fossitt, J.A. (2000) *A guide to habitats in Ireland*. The Heritage Council, Kilkenny. https://www.npws.ie/sites/default/files/publications/pdf/A%20Guide%20to%20Habitats%20in%20Ireland%20-%20Fossitt.pdf
Galway County Council (2017) Unpublished data collected for the Galway City Transport Project.
Hickey, B. & Tubridy, M. (2009) Habitats Survey (Phase V) County Laois. Unpublished report by Mary Tubridy and Associates for Laois Heritage Forum.
JNCC (2004) UK guidance on conservation objectives for monitoring designated sites. Joint Nature Conservation Committee, Peterborough.
JNCC (2009) Common Standards Monitoring Guidance for Upland Habitats. Joint Nature Conservation Committee, Peterborough.
Kearney, P. (2010) Habitat mapping of habitats in County Cavan, survey findings report. Unpublished report by RPS Group for Cavan County Council.
Lough Derg Habitat Survey. GIS files for this project were made available by Clare County Council and were utilised for the previous reporting period, with data carried through to inform the current reporting period.
Martin, J.R., O'Neill, F.H. & Daly, O.H. (2018) The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats. *Irish Wildlife Manuals*, No. 102. National Parks and Wildlife Service, Department of Culture, Heritage and the

Gaeltacht, Dublin.
NPWS (2007) Nominal points for each hectad included in the previous distribution of 6430 were included in the previous reporting period, and were carried through to inform the current reporting period.
NPWS (2013a) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin. https://www.npws.ie/sites/default/files/publications/pdf/Article_17_Print_Vol_2_report_habitats_v1_1_0.pdf
NPWS (2013b) Management Planning Support Unit Maps 2405_imap95 (CPU_Habitats_March_2012.shp)
NPWS_Approx_Wildfire_Locations_Polygon_2017.shp. An NPWS derived shapefile based on data received from NPWS field staff on wildfires which occurred in Spring 2017.
O'Neill, F.H., Barron, S.J., Smith, G.F. & Brophy, J.T. (2013b) A preliminary habitat corridor map for Co. Waterford. A report for Waterford County Council.
O'Neill, F.H. & Martin, J.R. (2015). Summary of findings from the Survey of Potential Turloughs 2015. Unpublished Report for National Parks and Wildlife Service. Volume I: Main Report.
O'Neill, F.H., Martin, J.R., Devaney, F.M. & Perrin, P.M. (2013a) The Irish Semi-natural Grasslands Survey 2007-2012. *Irish Wildlife Manuals*, No. 78. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. https://www.npws.ie/sites/default/files/publications/pdf/IWM-78-Irish-semi-natural-grassland-survey.pdf
Perrin, P. (2015) Irish Vegetation Classification: Technical Progress Report No. 1. Report submitted to National Biodiversity Data Centre. http://www.biodiversityireland.ie/wordpress/wp-content/uploads/IVC_Technical-Progress-Report-No.1.pdf
Perrin, P. (2017) Irish Vegetation Classification: Technical Progress Report No. 3. Report submitted to National Biodiversity Data Centre. http://www.biodiversityireland.ie/projects/national-vegetation-database/irish-vegetation-classification/explore/
Perrin, P.M., Roche, J.R. & Barron, S.J. (2011) National Survey of Upland Habitats (Phase 1, 2010 - 2012) Site Report No 1: Mweelrea, Sheeffry, Erriff Complex cSAC (001932), Co. Mayo. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH10_Mweelrea_Sheeffry_Erriff_Report_01c_M.pdf
Perrin, P.M., Roche, J.R., Barron, S.J. & Daly, O.H. (2012) National Survey of Upland Habitats (Phase 2, 2011-2012), Site Report No. 7: Mount Brandon cSAC (000375), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH11_Mount_Brandon_Report_01b_M.pdf
Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013a). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 10: Ox Mountains Bogs

cSAC (002006), Cos. Mayo and Sligo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Ox_Mountains_Bogs_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013b). National Survey of Upland Habitats (Phase 3, 2012-2013), Draft Site Report No. 11: Ben Bulben, Gleniff and Glenade Complex cSAC (000623), Co. Sligo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013c). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 12: Arroo Mountain cSAC (001403), Co. Leitrim. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Arroo_Mountain_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013d). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 13: Cuilcagh – Anierin Uplands cSAC (000584), Cos. Cavan and Leitrim. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Cuilcagh_Anierin_Uplands_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013e). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 14: Slieve League cSAC (000189), Co. Donegal. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Slieve_League_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014a). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 15: Slieve Mish Mountains cSAC (002185), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH13_Slieve_Mish_Mountains_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014b). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 16: Caha Mountains cSAC (000093), Cos. Cork and Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH13_Caha_Mountains_01b_M.pdf

Roche, J.R., Perrin, P.M., Barron, S.J. & Daly, O.H. (2012) National Survey of Upland Habitats (Phase 2, 2011-2012), Site Report No. 9: Galtee Mountains cSAC (000646), Cos. Tipperary and Limerick. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH1

	1_Galtee_Mountains_Report_01b_M.pdf South Clare Habitat Map Cratloe to Parteen. GIS files for this project were made available by Clare County Council and were utilised for the previous reporting period. These data were carried through to inform the current reporting period. Wilmanns, O. & Brun-Hool, J. (1982) Irish mantel and saum vegetation. *Journal of Life Sciences of the Royal Dublin Society* 3: 165-174. Wilson, F. (2009) County Sligo Wetland Survey Phase II County Report. Unpublished report for Sligo County Council.
3.2i Additional information	

4 Range

Range within the biogeographical/marine region concerned

4.1 Surface area	***19,100 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	*stable / increasing / **decreasing** / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
4.10 Favourable reference	***a) 19,200 km²***	

<table>
<tr><td rowspan="4">range</td><td colspan="2">b) Indicate if operators were used (using symbols ≈, >, >>) or</td></tr>
<tr><td colspan="2">c) If favourable reference range is unknown, indicate by using ‘x’</td></tr>
<tr><td colspan="2">d) Indicate method used to set reference value if other than operators

The Favourable reference range has been increased since the last reporting period (NPWS 2013a) to reflect the improved level of knowledge, however there is also evidence of loss of range since the Directive came into force (at least one 10km square).</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td rowspan="7">4.11 Change and reason for change in surface area of range</td><td colspan="2">Is there a change between reporting periods? <u>YES</u>/NO

If yes, provide the nature of that change. More than one option (a to d) can be chosen</td></tr>
<tr><td>a) yes, due to genuine change</td><td><u>YES</u>/NO</td></tr>
<tr><td>b) yes, due to improved knowledge/more accurate data</td><td><u>YES</u>/NO</td></tr>
<tr><td>c) yes, due to the use of different method</td><td>YES/<u>NO</u></td></tr>
<tr><td>d) yes, but there is no information on the nature of change</td><td>YES/<u>NO</u></td></tr>
<tr><td colspan="2">The change is mainly due to (select one of the reasons above):

genuine change / <u>improved knowledge or more accurate data</u> / the use of a different method</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>4.12 Additional information

Optional</td><td colspan="2">Range was calculated using the range tool, based on the current known distribution of the 6430 habitat. A maximum gap distance of two 10km grid cells was used when running the range tool.
Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013a). There were minor recorded losses of area between the previous and current reporting periods resulting in the loss of one 10km square from the range reported in the previous reporting period. The removal of this one 10km square from the current range of 6430 habitat occurred as a result of a loss of 6430 habitat at Curraghnalaght, Co. Cork. The 6430 habitat here had been mapped as part of the Irish Semi-natural Grasslands Survey (ISGS) (O’Neill et al., 2013a) in 2008. By examining aerial photographs of this location post-2012, it was determined that this 6430 habitat was lost due to agricultural improvement of the field it was located within. The short-term trend is decreasing. It should be noted that the NSUH mapped 6430 habitat at two sites within this reporting period but no assessments were made. Short-term trend was assessed over the period 2007-2016, and long-term trend was assessed over the period 1994-2016. Both assessments are assumed to be valid also for the default trends presented.
The number of 10km squares in the range (191) is 28 squares higher than the last monitoring period (NPWS, 2013a). These changes are due to improved knowledge within the current reporting period. The Slieve Mish Mountains SAC (002185) (Perrin et al., 2014a) (four squares), Caha Mountains SAC (000093) (Perrin et al., 2014b) (five squares), Galway City Transport Project (Galway County Council, 2017) (one square), Kerry Wetland Survey (Crushell et al., 2015) (one</td></tr>
</table>

	square), Waterford Wetland Survey (Foss *et al.*, 2015a, 2015b) (three squares), Grassland Monitoring Survey (GMS) (Martin *et al.*, 2018) and Old Roosky Canal survey (Brophy & D'Arcy, 2016) (five squares), Lough Allen Blueway survey (Brophy & Martin, 2015) (four squares) and Survey of Potential Turloughs (O'Neill & Martin, 2015) (six squares), all from surveys with data utilised in this reporting period, added to the range. In addition to these 29 x 10km squares, there was also the aforementioned loss of one 10km square in Co. Cork due to agricultural improvement. Favourable Reference Range (FRR) has been increased since the last reporting period (NPWS, 2013a) to reflect the improved level of knowledge. It also includes the 10km square which was lost due to agricultural improvement since the previous reporting period. FRR is therefore 19,200 km^2.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***1995-2016***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***1.004 km^2***
5.3 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007-2018***	
5.6 Short-term trend Direction	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	*stable / increasing / **decreasing** / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	***b) Operator > (more than)** or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods? **YES**/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	***YES**/NO*
	b) yes, due to improved knowledge/more accurate data	***YES**/NO*
	c) yes, due to the use of different method	*YES/**NO***
	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 1995 when original survey work for the CPU Habitats commenced and incorporates updates made by surveys between 2000 and 2016 that are listed in Section 3.2. Area was calculated from the polygon shapefile, polyline shapefile and point shapefile used for distribution. For each point record not intersecting within a polygon that was yielding an area, 400 m^2 of habitat was estimated (37 points). This was based on expert opinion applied in the previous reporting period and carried over to this reporting period in order to maintain consistency. For the polyline shapefile the total length of 6430 habitat was calculated and multiplied by a width of 1 m to provide an area.	

	During the current reporting period, 16 datasets with 6430 habitat recorded within them were utilised; Area was only fully assessed by Martin *et al*. (2018). This one GMS site represents 0.4% of the total area of 6430 habitat recorded in Ireland, limiting the conclusions that can be made. It had no recorded loss since the previous reporting period. Due to a paucity of data for Area assessment from this reporting period, all 6430 habitat polygons recorded in the previous reporting period from the ISGS (O'Neill *et al.*, 2013a) were therefore examined for losses in area using aerial photography for the purposes of informing the current reporting period. One area (220.3 m^2) of the 6430 lowland riparian community, mapped during the ISGS, was determined to be lost post-2012 due to agricultural improvement. This loss was based on aerial photograph interpretation (API) carried out for the purposes of informing this reporting period. Two other areas of 6430 mapped during the ISGS were also determined to be lost, one entirely and one partially, due to agricultural improvement. One area (459.7 m^2) was revisited as part of the Waterford Habitat Corridor Map Project in 2013 and was remapped as improved grassland (O'Neill *et al*., 2013b). The other area was revisited in 2014 as part of the Kildare Wetland Survey, with part of the 6430 habitat (438.9 m^2) remapped as wet grassland (Foss & Crushell, 2014), which in turn was further determined to be improved grassland by 2016 by API for the purposes of informing this reporting period. The total known area of 6430 habitat lost due to agricultural improvement since the previous reporting period is therefore 0.001 km^2. A final area of 6430 habitat (0.001 km^2), mapped during the Louth Wetland Survey (Foss *et al.*, 2012) and revisited as part of the Marsh Fritillary Survey (Daly & Barron, 2014), was lost due to scrub and woodland encroachment (most likely due to drainage of surrounding fields) since the previous reporting period. The magnitude of the known loss is approximately -0.02% per annum, measured over a period of 11 years between 2005 and 2016 (based on best available data for this trend period). This magnitude is assumed to be applicable also to the default trend period of 2007-2018. Short-term trend in Area was deemed to be decreasing. Although loss of area per year is very small, it results in a loss of range and therefore cannot be considered negligible. There has not been a comprehensive survey of this habitat in Ireland, and more detailed survey work of the 6430 habitat is needed. It is expected that the area listed in Section 5.2 will be refined as more in-depth mapping of the 6430 habitat is completed. In particular, any area represented within the dataset by only a point needs to be surveyed in more detail. In addition to refining the areas of 6430 habitat currently known, there are probably still areas of unmapped 6430 habitat within the country. The NSUH is currently incomplete and more examples of the upland community are likely to be found. The ISGS (O'Neill *et al*., 2013a) only recorded the lowland riparian community where it occurred within or adjacent to semi-natural grassland. There are likely to be many more examples along lowland rivers that have not been mapped. The area value entered is therefore a minimum. Favourable Reference Area is deemed to be more than the current area, but no more than 10% more, given that anthropogenic losses

	have occurred since the Directive came into force. With a rate of 0.02% loss per annum and assuming that no corresponding increases took place since then, this equates to a loss of 0.48% over 24 years. It is likely that the actual percentage loss is higher due to the proximity of the 6430 lowland riparian community to lowland farmland, thereby being impacted by agricultural improvement and changes in drainage management along watercourses; however data are not available to confirm or calculate the actual loss in area since the Directive came into force. The very small patch size and fragmented nature of the lowland community suggest that an enlarged area is necessary for either typical species to reach favourable conservation status or for the necessary structure and functions to exist. The difference in habitat extent between this reporting period and the last is mainly due to the availability of more accurate knowledge of the area of the 6430 habitat resulting in the addition of 0.2 km^2 which was previously unmapped. This along with the documented loss in area of 0.002 km^2 resulted in an area of 1.004 km^2 6430 habitat ((0.8027 + 0.2037) – 0.002 = 1.004 km^2).

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***0.50 km²***
		Maximum	***0.84 km²***
	b) Area in not-good condition	**Minimum**	***0.16 km²***
		Maximum	***0.50 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*		

6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***
6.7 Typical species Method used *Optional*	The lists of typical species for the lowland and upland communities of 6430 are the same as the last reporting period (NPWS 2013a). Typical species were assessed as an assemblage at the monitoring stop level within sites surveyed by Galway County Council (2017) and Martin *et al.* (2018) for the 6430 lowland riparian community. Whilst the 6430 upland community was mapped and relevés from it were recorded by the NSUH during the current reporting period, the habitat was not assessed. Assessments were therefore made retrospectively using the available relevé data. As the NSUH was a baseline survey, trends for the assemblage and for individual species were not assessed. There were no available data for assessment of the 6430 woodland fringe or 'saum' communities in Ireland during the previous and current reporting periods; indeed no assessment criteria are currently available for this version of the habitat in Ireland.
6.8 Additional information *Optional*	Criteria for the lowland riparian community of 6430 were adapted from the UK's Common Standards Monitoring (JNCC 2004) and Dwyer *et al.* (2007) using expert judgement by the ISGS (O'Neill *et al.* 2013a). Galway County Council (2017) and Martin *et al.* (2018) assessed Structure and functions at a monitoring stop level, using criteria to assess vegetation composition (including typical species), vegetation structure and physical structure. A total of 16 monitoring stops were recorded across both Galway County Council (2017) and Martin *et al.* (2018) within this reporting period. Two of the 16 stops failed the criteria that assessed the cover of negative indicator species and cover of scrub/bracken/trees. Criteria for the upland community of 6430 were presented in NPWS (2013a). These were adapted from the UK's Common Standards Monitoring (JNCC 2009) using expert judgement. Three relevés within the 6430 upland community were recorded from across the two NSUH sites surveyed within this reporting period. These relevés were retrospectively assessed for Structure and functions using the criteria presented in NPWS (2013a). Structure and functions were assessed at a monitoring stop level, again using criteria to assess vegetation composition (including typical species), vegetation structure and physical structure. As this was a retrospective assessment of the NSUH data only certain criteria could be applied and therefore represent a "best case" situation for Structure and functions of 6430 upland communities. One of the three relevés failed the criterion assessing the cover of positive indicator species. Of the sites assessed (approximately 0.07 km^2) for Structure and functions in this reporting period, 84.2% of the area was assessed as being in good condition (Favourable). Equal weighting was given to each of the stops as each one assesses a comparable area of habitat. The proportion in good (84.2%) and not-good condition (15.8%) was scaled up to the national estimate (0.84 km^2 in good condition and 0.16 km^2 in not-good condition); however as the area assessed for Structure and functions in this reporting period only represents 6.9% of the national area of habitat 6430, data from the last reporting

	period were also utilised. During the last reporting period 50% of the 6430 habitat was assessed as Favourable (NPWS 2013a). This equates to 0.50 km^2 of the current area of 6430 habitat and this figure is used as the minimum area in good condition. 50% of the 6430 habitat was assessed as Unfavourable (NPWS 2013a). This equates to 0.50 km^2 of the current area of 6430 habitat and this figure is used as the maximum area that is in not-good condition. The most frequent criteria to fail the Structure and functions assessment in the last reporting period for the 6430 lowland riparian communities were 'mode herb height', 'cover of positive indicator species' and 'number of positive indicator species'. The 'proportion of vegetation composed of positive indicator species' and 'proportion of vegetation composed of non-native species' were the most frequent criteria to fail for the 6430 upland communities (NPWS 2013a). The short-term trend of habitat area in good condition was taken to be stable as, based on the data recorded during this reporting period, there is no evidence that status has declined since the last reporting period. In fact, based on limited data, conclusions could be made that the status has improved; however, as this is based on data with a poor national sample size and distribution, the trend was taken as stable based on expert opinion. Typical indicator species for the lowland 6430 habitat are: *Alisma lanceolata, Alisma plantago-aquatica, Angelica sylvestris, Calystegia sepium, Cicuta virosa, Crepis paludosa, Epilobium hirsutum, Epilobium parviflorum, Equisetum fluviatile, Equisetum palustre, Eupatorium cannabinum, Filipendula ulmaria, Galium palustre, Hypericum tetrapterum, Iris pseudacorus, Lysimachia vulgaris, Lythrum salicaria, Mentha aquatica, Myosotis scorpioides, Persicaria amphibia, Rumex hydrolapathum, Sium latifolium, Solanum dulcamara, Stachys palustris, Symphytum officinale, Trollius europaeus* and *Valeriana officinalis*. Typical indicator species for the upland 6430 habitat are: *Alchemilla* spp., *Angelica sylvestris, Cochlearia officinalis* agg., *Crepis paludosa, Filipendula ulmaria, Geum rivale, Heracleum sphondylium, Hieracium* spp., *Hypericum* spp., *Oxyria digyna, Primula vulgaris, Ranunculus acris, Rumex acetosa, Sedum rosea, Solidago virgaurea, Succisa pratensis, Thalictrum minus, Valeriana officinalis* and *Viola riviniana.*

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**

List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A09** (Intensive grazing or overgrazing by livestock) (M) **A31** (Drainage for use as agricultural land) (M) **I01** (Invasive alien species of Union concern) (M) **I02** (Other invasive alien species (other than species of Union concern)) (M)	**A09** (Intensive grazing or overgrazing by livestock) (M) **A31** (Drainage for use as agricultural land) (M) **I01** (Invasive alien species of Union concern) (M) **I02** (Other invasive alien species (other than species of Union concern)) (M)
7.2 Sources of information *Optional*	Pressures were sourced from the following reports and accompanying data: Galway County Council (2017) Unpublished data collected for the Galway City Transport Project. Martin, J.R., O'Neill, F.H. & Daly, O.H. (2018) The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats. *Irish Wildlife Manuals*, No. 102. NPWS, Department of Culture, Heritage and the Gaeltacht, Dublin. NPWS (2013a) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin. NPWS_Approx_Wildfire_Locations_Polygon_2017.shp	
7.3 Additional information *Optional*	Pressures and threats presented in 7.1 were selected and ranked based on intensity (high, medium, low), frequency of occurrence, and area of impact where data were available. Data gathered from the sources listed in Section 7.2 are summarised in the backing document '1601_NSUH17_IMPACTS'. For the current reporting period, data on pressures were available from two sources – Galway County Council (2017) and Martin *et al.* (2018). Habitat 6430 was recorded at the two NSUH sites, Slieve Mish Mountains SAC (002185) and Caha Mountains SAC (000093) (Perrin *et al.* 2014a, 2014b), however they were not assessed and therefore no impacts were recorded. Data from a shapefile on locations of wildfires, which was provided by NPWS, were also utilised, with relevant data for 6430 habitat located at Kilgarrylander within the Slieve Mish Mountains. As the data from the current reporting period only represent a small proportion of the data collected to inform NPWS (2013a), the pressures and threats information presented in NPWS (2013a) were called upon to inform the current reporting period. All pressures presented in NPWS (2013a) were considered for the current reporting period. For one of these there was additional evidence for its importance provided by the data collected during the current reporting period. Using the crosswalk referenced in the backing document '1601_NSUH17_IMPACTS' to convert old impact codes to the new impact recording scheme, this pressure crosswalked to A09 (Intensive grazing or overgrazing by livestock) (recorded once but no effect was given). Based on evidence collected over the last two reporting periods and expert opinion, A09 was retained as a medium-importance pressure. There were not enough new data collected in the current reporting period to downgrade the pressure A09, mainly caused by cattle in the lowland riparian	

	community and by sheep in the upland community. A31 (Drainage for use as agricultural land) was recorded as a low-importance pressure in the previous reporting period. In the current reporting period there have been three documented losses of area (two full and one partial) due to agricultural improvements caused by drainage. Based on evidence from the current reporting period and expert opinion, A31 was upgraded to a medium-importance pressure. Both I01 (Invasive alien species of Union concern) in the form of *Impatiens glandulifera* and I02 (Other invasive alien species (other than species of Union concern) in the form of *Epilobium brunnescens* were recorded in the previous reporting period under the old code I01 as a medium-importance pressure. There were not enough new data collected in the current reporting period to amend these pressures and they were therefore retained as medium-importance pressures. The low-importance impacts A02 (Conversion from one type of agricultural land use to another (excluding drainage and burning)), A26 (Agricultural activities generating diffuse pollution to surface or ground waters) and J03 (Mixed source air pollution, air-borne pollutants), recorded in NPWS (2013a) but not in this reporting period, were retained as low-importance pressures for the current reporting period. A11 (Burning for agriculture) and L02 (Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices)), recorded within the current reporting period only, were also assessed as low importance for 6430 habitat due to low frequency and area impacted upon. It should be noted however that the medium-importance pressure A31 (Drainage for use as agricultural land) is likely to cause an increased frequency in the pressure L02 so this may be ranked as a higher importance pressure in future reporting periods. The four medium-importance pressures reported in Section 7.1 are also considered to be the main threats to the 6430 habitat in the future.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type** or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area*

	covered by habitat') or *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000*** *or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* ***a) Short-term results (within the current reporting period, 2013-2018)*** *or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	**CA03** Maintain existing extensive agricultural practices and agricultural landscape features
8.6 Additional information *Optional*	There were no active conservation measures recorded during the previous or current reporting periods for the 6430 habitat. In some cases the maintenance of extensive grazing is undertaken through the Department of Agriculture's Green, Low Carbon, Agri-Environment Scheme (GLAS). This, however, is likely to be incidental for the 6430 habitat, based on it being present within an area managed under GLAS, rather than it being an actual targeted measure for this habitat. Details of participation in the GLAS scheme and of the uptake across various measures are not currently available. It is therefore not possible to precisely assess the effects of implementation of these measures. It should be recognised that the management regimes of most areas of 6430 habitat are driven by the landowner rather than by any formal management plan or policy; therefore the continued operation of the management regimes currently in place is not guaranteed across the entire habitat. Conservation measures that are not currently being widely implemented, but whose implementation would improve the Structure and functions of the habitat, are the control or removal of non-native species (CI03), particularly *Impatiens glandulifera* and *Epilobium brunnescens*, to adapt grazing activities (CA05) to try to alleviate overgrazing, and to manage drainage and irrigation operations and infrastructures in agriculture (CA15).

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	*Good / **Poor** / Bad / Unknown*
	b) Area	*Good / **Poor** / Bad / Unknown*
	c) Structure and functions	*Good / Poor / **Bad** / Unknown*

9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as Decreasing. Current range is less than the Favourable Reference Range (<10% below FRR). Conservation status of Range is therefore Unfavourable-Inadequate. Future trend of Range is assessed as Negative, as the threat of A31 is expected to have a negative influence on Range, particularly as there is no corresponding conservation measure in place to balance this threat. Future prospects of Range are therefore Poor. Short-term trend direction of Area is assessed as Decreasing. Current area is less than the Favourable Reference Area (<10% below FRA). Conservation status of Area is therefore Unfavourable-Inadequate. Future trend of Area is assessed as Negative, as the threat of A31 is expected to have a negative influence on Area, particularly as there is no corresponding conservation measure in place to balance this threat. Future prospects of Area are therefore Poor. Short-term trend direction is Stable for habitat that is in Good condition. Current Structure and functions are assessed as Unfavourable as <90% of habitat is in "Good" condition. A maximum estimate of 50% of 6430 habitat is in poor condition which equates to Unfavourable-Bad Structure and functions. Conservation status of Structure and functions is therefore Unfavourable-Bad. Future trend of Structure and functions is assessed as Negative, as the threats of A09, A31, I01 and I02 are expected to have a negative influence on Structure and functions, irrespective of the conservation measure CA03 as this is not a targeted measure for the 6430 habitat, nor is it implemented across the national distribution of the habitat. Future prospects of Structure and functions are therefore Bad.

10 Conclusions

Assessment of conservation status at end of reporting period	
10.1 Range	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*
10.2 Area	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*
10.4 Future prospects	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*
10.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / **deteriorating** / stable / unknown*

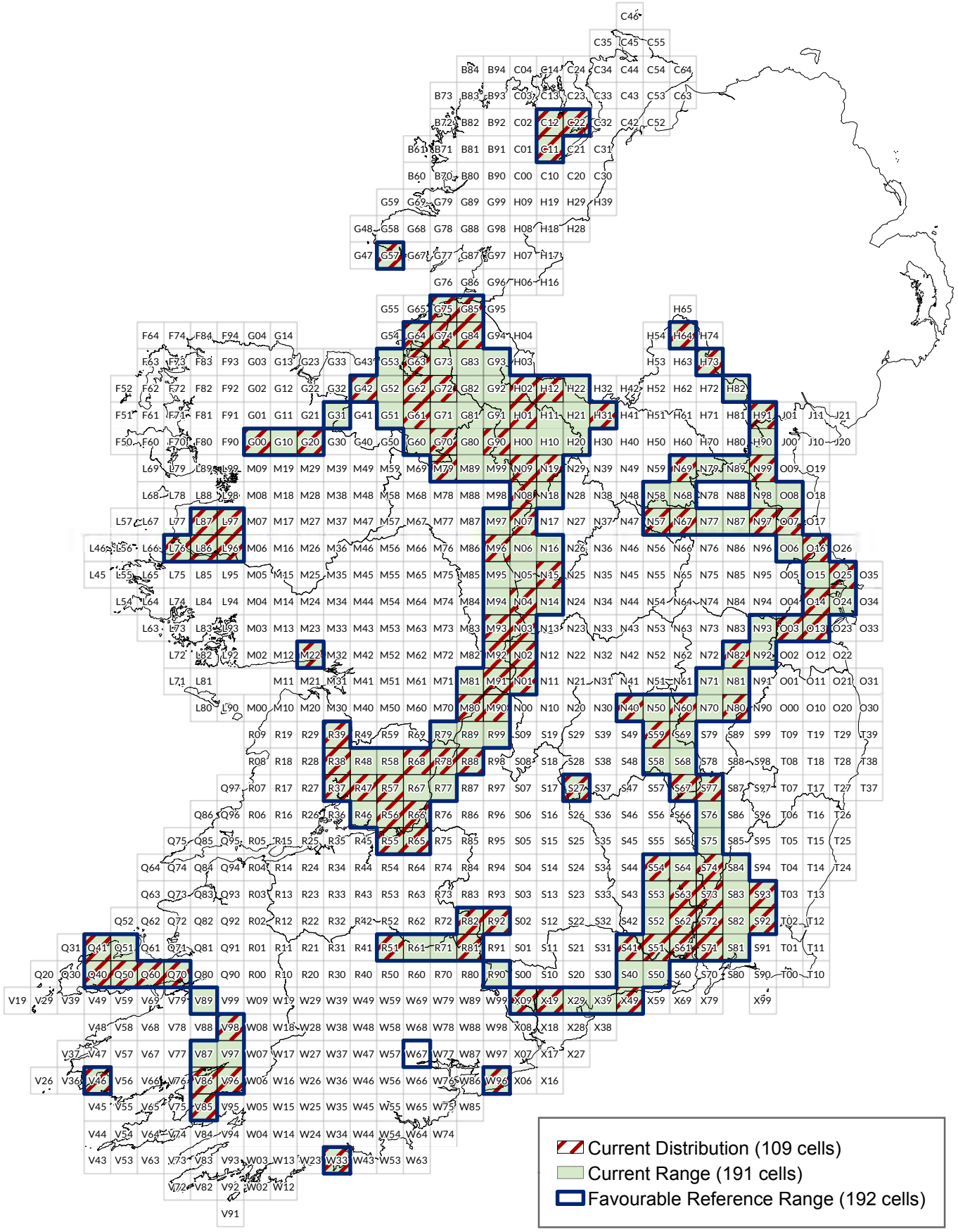
<table>
<tr><td rowspan="8">10.7 Change and reasons for change in conservation status and conservation status trend</td><td colspan="3">Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.</td></tr>
<tr><td></td><td>Overall assessment of conservation status (10.5)</td><td>Overall trend in conservation status (10.6)</td></tr>
<tr><td>a) no, there is no difference</td><td>YES/<u>NO</u></td><td><u>YES</u>/NO</td></tr>
<tr><td>b) yes, due to genuine change</td><td>YES/NO</td><td><u>YES</u>/NO</td></tr>
<tr><td>c) yes, due to improved knowledge/more accurate</td><td>YES/NO</td><td>YES/<u>NO</u></td></tr>
<tr><td>d) yes, due to the use of different methods (including use of different thresholds)</td><td>YES/NO</td><td>YES/<u>NO</u></td></tr>
<tr><td>e) yes, but there is no information on nature of change</td><td>YES/NO</td><td>YES/<u>NO</u></td></tr>
<tr><td>The change is mainly due to (select one of the reasons above):</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td><td><u>genuine change</u> / improved knowledge or more accurate data / the use of a different method</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td>10.8 Additional information

Optional</td><td colspan="2">The Conservation Status of Range is Unfavourable-Inadequate in this reporting period, but was Favourable in the previous reporting period.
The Conservation Status of Area is Unfavourable-Inadequate in this reporting period, as it was in the previous reporting period.
The Conservation Status of the Structure and functions and Future prospects are Unfavourable-Bad in this reporting period, as they were in the previous reporting period.
The Overall Conservation Status was assessed as Unfavourable-Bad, as it was during the previous reporting period. The status of Unfavourable-Bad during the current reporting period was due to <75% of the area of 6430 habitat being assessed as having Favourable Structure and functions.
Overall Trend in Conservation Status was assessed as deteriorating in this reporting period, but as stable in the last reporting period. There is evidence that both Range and Area are declining since the previous reporting period, largely due to agricultural improvement through drainage. The change of trend for Range and Area between reporting periods resulted in the change of trend in Overall Conservation Status.</td></tr>
</table>

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***0.58 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable** / increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing a union between the distribution polygon shapefile and the SAC shapefile, and an intersect between the distribution point shapefile and SAC shapefile. The polyline shapefile did not intersect with the SAC shapefile. The area given in section 11.1 is the total area of 6430 habitat in SACs in the country, including some SACs where 6430 is not listed as a qualifying interest (QI). The area of 6430 within the Natura 2000 network where it is listed as a QI is 0.10 km^2. Anthropogenic losses of 6430 habitat (0.002 km^2) were reported in the current reporting period. These losses occurred outside of the Natura 2000 network. There was one inconsistency between the distribution of the habitat and the SACs in which it is listed as a QI: 6430 is listed as a QI in Lower River Suir SAC (002137) but there is no record of 6430 from this SAC. The short-term trend of the 6430 habitat in good condition within the SAC network is taken to be stable, with the same trend as the 6430 habitat nationally (Section 6.4). The surface area of 6430 habitat within the Natura 2000 network has increased since last reporting period; this is due to improved knowledge lending itself to a refinement of area totals (see Section 5.15 for details).	

12 Complementary information

Hydrophilous tall herb (6430)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Mapáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**6510 Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*)**
1.2i Habitat short name	**Lowland hay meadows**
1.3i Habitat description	The Annex I habitat 6510 Lowland hay meadows is represented in Ireland by mesotrophic semi-natural grasslands that are almost always managed as traditional hay meadows (cut only once a year in late summer or autumn with the hay crop removed). These meadows are synonymous with the fertile plains of the larger river systems such as the Shannon and Moy. However, they have been found on flatter ground amongst low hills, drumlins, and there are also some sites on the coast. The habitat is only rarely found in sub-montane (200-400 m) areas. Overall the Shannon Callows account for 27% of the area of 6510 within the State. The 6510 habitat is comprised of a few distinct meadow communities belonging to the Arrhenatherion. These communities can be classified within the GL3E *Festuca rubra-Rhinanthus minor* grassland (Perrin, 2018), *Lathyrus pratensis* community (Heery, 1991) and MG4/MG5 (Rodwell, 1992).

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***1999-2017***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was compiled from 6510 polygons digitised for the 2015-17 Grassland Monitoring Survey (GMS; Martin *et al.,* 2018) and from the 2007-12 Irish Semi-natural Grasslands Survey (ISGS; O'Neill *et al*., 2013). Heery and Keane (1999), Kearney (2011), NPWS (2013a), Martin and Brophy (2017), O'Neill and Martin (2015), and Galway County Council (2017) provided polygons for the distribution map. Data sources listed in Section 3.2 that are known to represent the 6510 habitat were assigned a high certainty=3, utilising the range of 1 to 3 for low to high certainty. Those data sources that probably

	include the 6510 habitat were assigned a certainty=2, while those sources that possibly include the 6510 habitat were assigned a low certainty=1. No dataset that is over 10 years old was assigned a certainty=3 due to the uncertainty that the grassland habitat recorded over 10 years ago is still present. All data sources with certainty 1 to 3 were used to map the distribution of the 6510 habitat. As detailed in NPWS (2013) grassland relevés collected by Austin O'Sullivan between 1962 and 1972 were also analysed against the 6510 Structure and functions criteria utilised by O'Neill *et al.* (2013) and 66 of the relevés were mapped to represent the 6510 habitat. As the O'Sullivan data are over 40 years old they were not utilised in calculating the current area or current range of the Annex I habitat, but they were utilised when calculating the FRR.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Bourke, D., Hochstrasser, T., Nolan, S., Schulte, R. (2007) Historical Grassland Turboveg Database Project: 2067 Relevés recorded by Austin O'Sullivan 1962-1982. Database reference nos: 25604-28543. Unpublished report for the National Parks and Wildlife Service, Dublin. EPA (2017) A Summary of the State of Knowledge on Climate Change Impacts for Ireland: Report 11 (2010-2016). Prepared for the Environmental Protection Agency by MaREI Centre, Environmental Research Institute, University College Cork. M. Desmond, P. O'Brien and F. McGovern. EPA, Wexford. Galway County Council (2017) Unpublished data collected for the Galway City Transport Project. Heery, S. (1991) The plant communities of the grazed and mown grasslands of River Shannon Callows. *Proceedings of the Royal Irish Academy* 91B (1): 1-19. Dublin. Heery, S. and Keane, S. (1999). Shannon Callows Management Plan. MPSU. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Kearney, P. (2011) Habitat mapping of habitats in County Roscommon. Unpublished report by RPS Group for Roscommon County Council. Roscommon. Martin, J.R, and Brophy, J.T. (2017) An ecological report on the habitats, mammals, and birds of Maddens Island, River Shannon, Co. Offaly. Unpublished report by BEC Consultants Ltd. Martin, J.R., O'Neill, F.H. and Daly, O.H. (2018) The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats. *Irish Wildlife Manuals*, No. 102. National Parks and

	Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin. NPWS (2013a) Inishbofin and Inishshark SAC (000278) Site Synopsis. National Parks and Wildlife Service, Dublin. NPWS (2013b) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin. O'Neill, F.H. and Martin, J.R. (2015) Summary of findings from the Survey of Potential Turloughs 2015. Volume I: Main Report. Unpublished report for National Parks and Wildlife Service, Dublin. O'Neill, F.H., Martin, J.R., Devaney, F.M. and Perrin, P.M. (2013) The Irish Semi-natural Grasslands Survey 2007-2012. *Irish Wildlife Manuals*, No. 78. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. Perrin (2018) Irish Vegetation Classification: Community synopsis *Festuca rubra – Rhinanthus minor* grassland. http://www.biodiversityireland.ie /wordpress/wp-content/uploads/GL3E.pdf. Accessed January 15th 2018. Rodwell, J.S. (ed.) (1992). British plant communities Volume 3: Grasslands and montane communities. Cambridge Community Press, Cambridge.
3.2i Additional information	

4 Range

Range within the biogeographical/marine region concerned

4.1 Surface area	***8,100 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	

4.7 Long-term trend Direction *Optional*	*stable / increasing / **decreasing** / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 19,200 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable reference range has been increased since the last reporting period (NPWS, 2013) due to improved knowledge. There is evidence for loss of range since the Directive came into force, and the current geographic spread is considered insufficient for the long term survival of the habitat.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods? **YES**/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	***YES**/NO*
	b) yes, due to improved knowledge/more accurate data	***YES**/NO*
	c) yes, due to the use of different method	*YES/**NO***
	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 6510 habitat. A maximum gap distance of two 10km grid cells was used when running the range tool. Range is fourteen 10km squares larger than the 67 x 10km grid squares reported in NPWS (2013), with 12 squares lost since the previous reporting period from the north, east and south of the range, and 26 squares gained, mostly from the centre and west of the range. The increase in the range was almost all due to improved knowledge except for one 10km square in Kilkenny where there was a genuine change due to the management of the site changing. Any reductions in the range were mostly due to genuine change, with	

	areas of 6510 habitat lost from Sligo, Cavan and Offaly due to anthropogenic impacts. Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013). In Sligo, Cavan and Offaly the area losses recorded during the current reporting period led to a contraction in the range by eleven 10km squares. These losses were due to agricultural intensification. The loss of one 10km square in Dublin was due to improved knowledge with the area of grassland misidentified as 6510 during the previous round of reporting. Although there was one additional 10km square recorded during the current reporting period due to genuine change, the short-term overall trend direction in Range is decreasing. The number of 10km grid squares in the range (81) is 14 squares higher than the last monitoring period. This increase is mostly due to improved knowledge and more accurate mapping of the habitat since the previous reporting period, particularly in the west of the range in Co. Galway (Galway County Council, 2017). As stated above there was one 10km square in Kilkenny where there was a genuine increase in the range due to the management changing to annual mowing. The Favourable Reference Range (FRR) has been increased since the last reporting period (NPWS, 2013) mostly due to improved knowledge.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***1999-2017***	
5.2 Surface area *(in km²)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***1.60 km²***
5.3 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.7 Short-term trend Magnitude	**a) Minimum**	
	b) Maximum	

Optional	**c) Confidence interval**	
5.8 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator >> (much greater than)	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	***YES****/NO*
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 1999 and incorporates updates made during the last reporting period (NPWS, 2013) and surveys that have taken	

	place during the current reporting period: 2015-17 GMS, Martin and Brophy (2015), O'Neill and Martin (2015), and Galway County Council (2017). There are probably still areas of unmapped 6510 habitat within the country, hence the area value entered is a minimum. Favourable Reference Area was not determined exactly. However, it is deemed to be >10% greater than the current area, given that anthropogenic losses have occurred since the Directive came into force (assuming that no corresponding increases took place since then). The 2015-17 GMS (Martin *et al.*, 2018) visited 24 of the 36 sites with 6510 that had been previously surveyed by the 2007-12 ISGS (O'Neill *et al.,* 2013). At three of the sites permission was not granted by the landowner to undertake a survey, at two of the sites the habitat had been previously misclassified as the 6510 habitat, and one site had been agriculturally improved. The remaining 18 sites were surveyed to determine the extant area of 6510 and to monitor the Structure and functions. At 10 of the 18 surveyed sites, areas of 6510 had been lost due to impacts such as agricultural intensification. The total recorded area of 6510 lost to impacts such as agricultural improvement was 0.23 km^2, which represents 28% of the surveyed area. Short-term trend in Area was deemed to be "decreasing" because the area of 6510 had been reduced at 10 of the 18 surveyed sites due to anthropogenic factors, such as agricultural intensification. The magnitude of the known loss is approximately -4.1% per annum, measured over a period of 7 years between this monitoring period and the previous, calculated by estimating the area lost and expressing this as a per-annum percentage of the original area. The area of 6510 genuinely increased within Cullahill Mountain SAC (site code 000831) in Kilkenny due to a change in management at the site, but this increase in area was small when compared to the overall loss. The total 6510 area lost is taken to be the minimum, with other undocumented losses having taken place in sites not surveyed since the previous monitoring period. If the 28% loss in area is applied to the 6510 area of 1.45 km^2 reported in NPWS (2013) the total reported loss in area nationally during the current reporting period would be 0.41 km^2. The difference in habitat extent between this reporting period and the last is primarily due to improved knowledge with approximately 0.35 km^2 of newly documented 6510 habitat reported, 0.31 km^2 of which was located within the vicinity of Lough Corrib SAC (site code 000297) by Galway County Council (2017). The improved data collected during the current round of reporting has resulted in a net increase in the area of 6510 from 1.45 km^2 reported in NPWS (2013) to 1.60 km^2 reported in Section 5.2, despite the documented loss of 0.23 km^2 due to human impacts during the current reporting period.

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good**	**Minimum**	***0.85 km²***

	condition	**Maximum**	***0.85 km²***
	b) Area in not-good condition	**Minimum**	***0.75 km²***
		Maximum	***0.75 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	*stable / increasing /* ***decreasing*** */ uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***		
6.7 Typical species Method used *Optional*	The typical species from NPWS (2013) were used and are listed in Section 6.8 below.		
6.8 Additional information *Optional*	Changes between the percentage of the habitat in good condition reported by NPWS (2013) and the current reporting period are due to the use of different methods, with modified assessment criteria used in this reporting period (see Martin *et al.,* 2018). The area of 6510 habitat in good condition was estimated for each of the 18 surveyed sites based on the percentage of monitoring stops at each site that were assessed to have Favourable Structure and functions. As the sample of 18 GMS sites is considered representative of the national resource the proportion in good and not-good condition was scaled up to estimate the national area. The percentage of the 6510 habitat with Favourable Structure and functions has increased slightly from 50% in the last reporting period (NPWS, 2013) to 53% in the current reporting period. However, trend is reported as decreasing as the assessment criteria have been modified (e.g. high quality indicator species within a 20 m vicinity of the stop were taken into consideration during the current reporting period) and the nature of the assessed areas have changed (e.g. most areas that were surveyed during the current reporting period		

	were >1 ha). Also the methodology for calculating the percentage of the habitat nationally that is in good condition was changed. In the previous reporting period (NPWS, 2013) only sites where the total area of 6510 was assessed to have Favourable Structure and functions were included within the percentage in good condition. In this reporting period the approximate area of each site with Favourable Structure and functions was calculated based on the percentage of monitoring stops that were assessed to have Favourable Structure and functions. It is also important to note that during the current reporting period only three of the eighteen 6510 sites surveyed had Favourable Structure and functions, whereas eight of these eighteen sites were reported to have Favourable Structure and functions during the last reporting period. The pressures associated with agricultural intensification are the main reason for this decreasing trend. All taxa included in the current list of typical species are as follows: *Alopecurus pratensis, Bromus racemosus, Centaurea nigra, Crepis capillaris, Daucus carota, Filipendula ulmaria, Heracleum sphondylium, Hordeum secalinum, Hypochaeris radicata, Knautia arvensis, Lathyrus pratensis, Leontodon autumnalis, Leontodon hispidus, Leucanthemum vulgare, Lotus corniculatus, Pimpinella major, Plantago lanceolata, Prunella vulgaris, Ranunculus acris, Rhinanthus minor, Sanguisorba officinalis, Tragopogon pratensis, Trifolium pratense, Trisetum flavescens, Vicia cracca.* Orchid species recorded within the 6510 habitat included the two more common species *Dactylorhiza fuchsii* and *Dactylorhiza maculata* and the less common *Platanthera chlorantha.*

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A02** Conversion from one type of agricultural land use to another (H) **A19** Application of natural fertilisers on agricultural land (H) **A20** Application of synthetic (mineral) fertilisers on agricultural land (M) **A06** Abandonment of grassland management (e.g. cessation of grazing or of mowing) (M) **A14** Livestock farming (without	**A02** Conversion from one type of agricultural land use to another (H) **A19** Application of natural fertilisers on agricultural land (H) **A20** Application of synthetic (mineral) fertilisers on agricultural land (M) **A06** Abandonment of grassland management (e.g. cessation of grazing or of mowing) (M) **A14** Livestock farming (without

	grazing) (M)	grazing) (M)
7.2 Sources of information *Optional*	Pressures were recorded during 2015-2017 field surveys for the GMS (Martin *et al*., 2018).	
7.3 Additional information *Optional*	Pressures and threats were selected and ranked based on intensity (high, medium or low), frequency of occurrence, and area of impact, using the data gathered during the 2015-17 GMS and presented in Martin *et al*. (2018). The two pressures reported in Table 23 of Martin *et al.* (2018) that contributed to the largest areas of 6510 loss, A02 and A19 (A19 is reported in Table 23 as slurry spreading), are listed above in Section 7.1 as the two high-importance pressures. Agricultural intensification (recorded under A02) was also the most frequently recorded impact within extant areas of the habitat (Table 27 in Martin *et al*., 2018). Fertilisation, both mineral and natural (e.g. slurry) was the second most frequently recorded impact reported in Table 27 and due to this, and the small loss in area due to chemical fertilisers reported in Table 23, the pressure A20 'Application of synthetic (mineral) fertilisers on agricultural land' was recorded in Section 7.1 as a medium-importance pressure. 'Abandonment, lack of mowing' (recorded under A06) was the only other impact that was recorded at more than one site and as a high/medium pressure in Table 27, and for this reason it was also included as a medium-importance pressure in Section 7.1 above. Although 'Stock feeding' was only recorded in Table 27 at one site, based on expert opinion the use of ring feeders (recorded under A14) to supplement aftergrazing in 6510 meadows is considered to be a medium-importance pressure on the habitat nationally. Further research on the impacts of climate change on this habitat is required. Impacts may affect the range and species composition of the habitat in the future but it is difficult to determine what level of importance should be assigned at this stage (EPA, 2017). The five high/medium-importance pressures recorded during the 2015-17 field survey are also considered to be the five main threats in the future. The high and medium pressures and threats recorded during 2015-17 broadly match the high and medium pressures and threats recorded during the last reporting period.	

8 Conservation measures

8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*

8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type*** *or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000*** *or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* ***a) Short-term results (within the current reporting period, 2013-2018)*** *or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	**CA03** Maintain existing extensive agricultural practices and agricultural landscape features
8.6 Additional information *Optional*	Conservation measures were selected and ranked based on the frequency of occurrence, using the data gathered during the 2015-2017 GMS (Martin *et al*., 2018). The measure listed mainly takes the form of maintaining the management practices currently in place that benefit the 6510 habitat. The maintenance of non-intensive mowing (included under measure CA03) is the most frequent conservation measure applied to the 6510 habitat (see Table 28 in Martin *et al*., 2018). In some cases the maintenance of non-intensive mowing is undertaken through the Department of Agriculture's Green, Low-Carbon, Agri-Environment Scheme (GLAS). It should be recognised that the management regimes of most 6510 grassland habitats are driven by the landowner rather than by any formal management plan or policy; therefore the continued operation of the management regimes currently in place is not guaranteed. Other conservation measures that are not currently being widely implemented outside the areas of 6510 habitat within the Burren Programme, but whose implementation would improve the Structure and functions of the habitat, include CA04 (Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures) and CA05 (Adapt mowing, grazing and other equivalent agricultural activities). The Burren Programme reported that the conservation value, which is based on plant species diversity, had increased within

	a significant number of the higher quality meadows within the scheme when they were resurveyed in 2017 after conservation measures such as CA04 and CA05 were implemented (Sharon Parr, pers. comm.). The Results-based Agri-environment Pilot Scheme (RBAPS) has also improved the Structure and functions for areas of 6510 habitat through targeted management interventions (Dolores Byrne, pers. comm.), such as conservation measures CA04 and CA05.

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	*Good / Poor / **Bad** / Unknown*
	b) Area	*Good / Poor / **Bad** / Unknown*
	c) Structure and functions	*Good / Poor / **Bad** / Unknown*
9.2 Additional information *Optional*	Section 8.5 lists conservation measures that are currently being implemented. Section 8.6 lists additional conservation measures that are recommended, but which are not currently being implemented. If the recommendations were to be implemented, the future trend of Area could be assessed as stable rather than very negative. However, because it is impossible to be certain that any such recommended measures will in fact be carried out over the next monitoring period, the future trend must be assessed as very negative. Short-term trend direction of Range is assessed as Decreasing. Current range is >10% smaller than the Favourable Reference Range. Conservation status of Range is therefore Unfavourable-Bad. Future trend of Range is assessed as negative, as the range is expected to decrease based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Range are therefore Bad. Short-term trend direction of Area is assessed as Decreasing. Current area is >10% smaller than the Favourable Reference Area. Conservation status of Area is therefore Unfavourable-Bad with the magnitude of the known loss -4.1% per annum. Future trend of Area is assessed as very negative, as Area is expected to decrease based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Area are therefore Bad. Current Structure and functions are assessed as Unfavourable-Bad as >25% of habitat is in “Unfavourable” condition. Short-term trend direction is Decreasing (for habitat that is in Good condition). Conservation status of Structure and functions is therefore Unfavourable-Bad. Future prospects of Structure and functions are therefore Bad.	

10 Conclusions			
Assessment of conservation status at end of reporting period			
10.1 Range	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
10.2 Area	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / **deteriorating** / stable / unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/**NO***	***YES**/NO*
	b) yes, due to genuine change	*YES/NO*	*YES/**NO***
	c) yes, due to improved knowledge/more accurate	*YES/NO*	***YES**/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/**NO***
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/**NO***
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / **improved knowledge or more accurate data** / the use of a different method*
10.8 Additional information *Optional*	The Overall Conservation Status was assessed as Unfavourable-Bad, as it had been during the last reporting period. The status of Unfavourable-Bad during the current reporting period was due to the current range being >10% less than the Favourable Reference Range, as well as a loss in area of -4.1% per annum, and the fact that >25% of the surveyed area had Structure and functions that were		

	unfavourable. Overall trend in Conservation Status was assessed as deteriorating during the current reporting period, as large areas of the habitat had been lost due to impacts such as agricultural intensification. These impacts are expected to continue into the future. During the previous reporting period the overall trend had been assessed as stable, as there had been very little data available for assessing the area of the 6510 habitat that had been lost. Range remains Unfavourable-Bad, as in the previous reporting period.

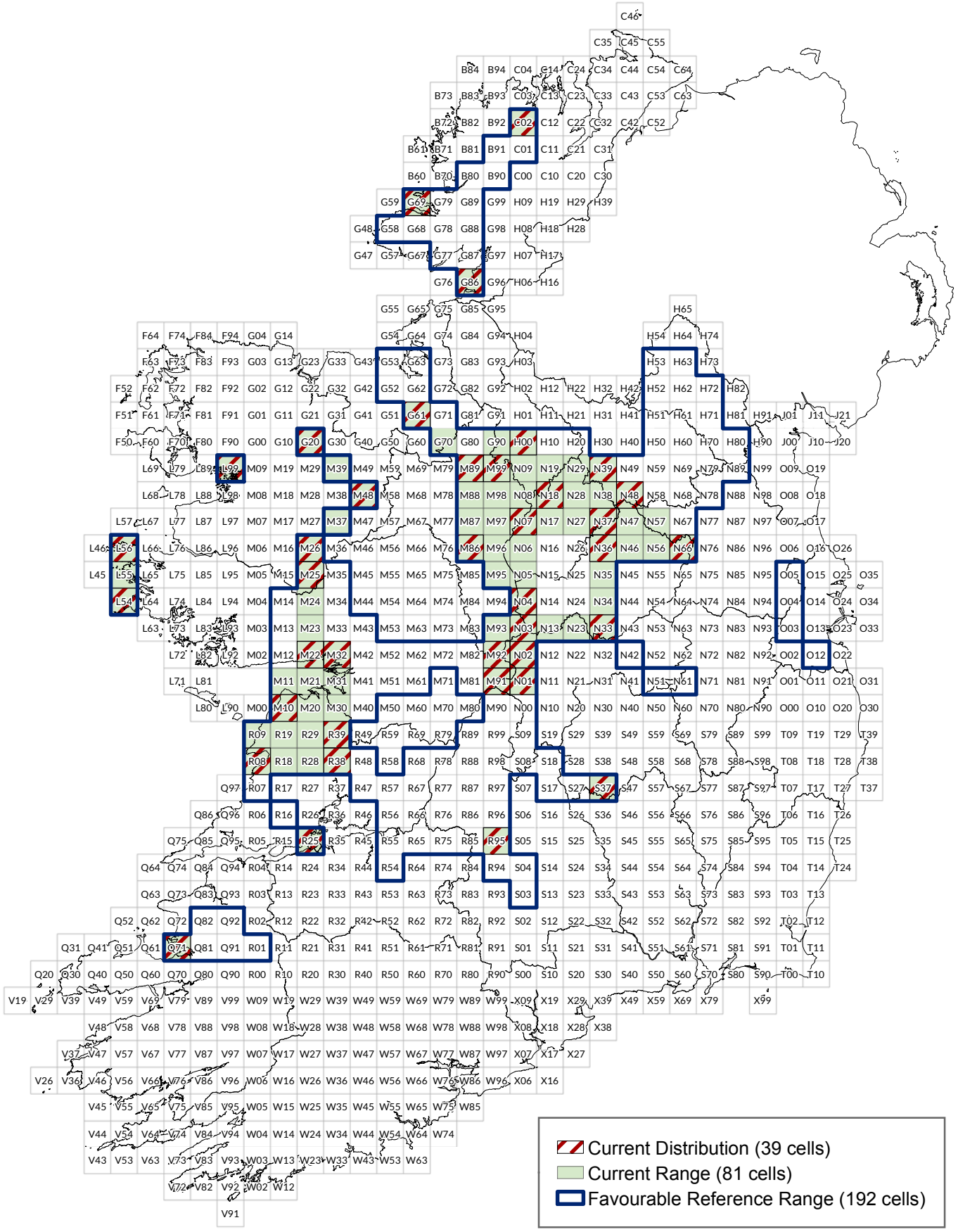
11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***0.64 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval / **minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* *stable / increasing / **decreasing** / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing an intersect between the distribution shapefile and the SAC shapefile. The area given in section 11.1 is the total area of the 6510 habitat in SACs in the country, including some SACs where the habitat is not listed as a qualifying interest (QI). The area of 6510 within the N2000 network where it is listed as a QI is 0.48 km^2. 20% of the 0.23 km^2 of the 6510 habitat lost during the current reporting period was within SACs and there was a loss of 4.57 ha of 6510 habitat from two SACs where the habitat is a QI. The 6510 habitat is listed as a QI, representativity A, at the three Aran Islands SACs: Inishmaan Island (site code 000212), Inishmore	

	Island (site code 000213), and Inisheer Island (site code 001275). Based on the recent AranLIFE survey (Amanda Browne, pers. comm.), however, there is no evidence of 6510 habitat on the Aran Islands and the tradition of cutting for hay has almost ended, with winter fodder provided instead by the standing crop of grass in the winterages or by imported bales of hay. The 6510 habitat is listed as a QI, representativity B, at three SACs – Black Head-Poulsallagh Complex SAC (000020), Kilkieran Bay and Islands (site code 002111) and Bricklieve Mountains and Keishcorran (site code 001656) – although there is no recent evidence for the presence of the 6510 habitat within any of these sites. The short-term trend of the habitat area in good condition within the SAC network is taken to be decreasing, with the same trend as the 6510 habitat nationally. As stated in Section 6.8, the percentage of the 6510 habitat with Favourable Structure and functions has increased slightly, however trend is reported as decreasing, based on expert judgement, as the assessment criteria have been significantly modified since the last reporting period. During the current reporting period, two of the eight 6510 sites within SACs had Favourable Structure and functions, whereas three of these sites were reported to have Favourable Structure and functions during the last reporting period. The pressures associated with agricultural intensification are the main reason for this decreasing trend.

12 Complementary information

Lowland hay meadows (6510)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**7110 Active raised bogs***
1.2i Habitat short name	**Active raised bog**
1.3i Habitat description	Raised bogs are accumulations of deep acid peat (3-12m) that originated in shallow lake basins or topographic depressions. They have a typical elevated surface or dome, which develops as raised bogs grow upwards from the surface (Fossitt, 2000). The bog dome is primarily rainwater fed (ombrotrophic) and isolated from the local groundwater table. This gives rise to acid conditions deficient in plant nutrients, which in turn support a distinctive suite of vegetation types. Although low in overall diversity, raised bogs support specialised plant assemblages dominated by a range of mosses of the genus *Sphagnum*. The bog surface may support a patterned micro-topography of pools, hummocks and lawns that provide a range of water regimes supporting different species assemblages. Intact raised bogs are characterised by the presence of ericoid and Cyperaceae species and an abundance of *Sphagnum* species. Irish raised bogs are classified as Oceanic raised bog mire (Moore & Bellamy, 1974). This mire type has a very restricted distribution on the Atlantic fringe of the north-west of Europe. The vegetation of a typical, intact raised bog is assigned to the *Oxycocco-Sphagnetea* and to the *Erico-Sphagnetum magellanici* phytosociological association (White & Doyle, 1982). Recently, the Irish Vegetation Classification (Perrin, 2018) assigned Active Raised Bog (ARB) to vegetation communities within two main bog vegetation groups: *Rhynchospora alba-Sphagnum cuspidatum* (BG1) and *Erica tetralix-Sphagnum capillifolium* (BG2). Raised bogs are more abundant in the lowlands of central and mid-west Ireland. In Ireland raised bogs are confined to areas with an annual rainfall below 1,250 mm (Hammond, 1984). They occur principally on land below 130m and are classified into two sub-types: Western raised bogs (or Intermediate) and True Midland raised bogs (Schouten, 1984), with the boundary between the two being taken as the 1,000mm isohyet. ARB is characterised by the presence of an acrotelm, which is defined as the living, actively growing upper layer of a raised bog, the surface of which is composed mainly of living bog mosses (*Sphagnum* spp.). The presence of the acrotelm is vital to a raised bog as this is the peat-forming layer and it strongly influences the rate of water runoff. In an Irish context, ARB (which is currently defined as occurring only on the high bog) encompasses active peat-forming ecotopes (central and sub-central) as defined by Kelly (1993) and Kelly & Schouten (2002), and actively peat-forming flushes. Bog Woodland habitat (91D0) is also peat forming and, when found on the high bog is also classed as ARB habitat (7110). Depressions on peat substrates of the *Rhynchosporion* (7150) are also frequently found within ARB habitat (7110). Although ARB is currently described as confined to the high bog, surveys in recent years have indicated the occurrence of peat-

	forming vegetation on cutover areas at some sites. These areas occasionally correspond to regenerating ombrotrophic vegetation characterised by *Sphagnum* cover greater than 40-50%, but they generally lack the diversity and abundance of *Sphagnum* species, micro-topographical features and good quality indicators associated with ARB. These cutover areas have the capacity to develop into embryonic ARB but longer time periods (50-100 years) are likely to be required for high quality ARB to develop.

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***1994-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The new habitat distribution map is a reviewed version of the 2013 map and is based on a combination of: a) 1994-2018 records from detailed habitat surveys (to ecotope level (1,490 ha or 89.81% of national resource); b) 2013-18 records from site visits for which detailed ecotope data are not available and c) additional records based on a comprehensive desktop visual assessment of aerial images for the 2013-16 period (169 ha or 10.19% of national resource). The new distribution map differs from the one reported in 2013 (where a total of 78x10 km grid cells were considered to intersect areas containing ARB). New data gathered in the current reporting period show that a total of 113 cells intersect habitat records. This significant increase (35 cells) is the result of better knowledge of the habitat's distribution, rather than an actual increase in habitat extent. Most of these new records are located along the west, north-western and northern part of the distribution map (e.g. Counties Mayo, Sligo and Cavan). A few new habitat records are also located within the most central part of the habitat's distribution.

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned	
3 Biogeographical and marine regions	
3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
3.2 Sources of information	Fernandez, F., Fanning, M., McCorry, M. & Crowley, W. (2005) Raised Bog Monitoring Project 2004-5. Unpublished report, National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Fernandez, F., MacGowan, F., Crowley, W., Farrell, M., Croal, Y., Fanning, M. & McKee, M. (2006) Assessment of the Impacts of turf cutting on designated Raised Bogs 2003-06. Unpublished report, National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Fernandez, F., Crowley, W. & Wilson, S. (2012) *Raised Bog Monitoring Survey*. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Fernandez, F., Connolly, K., Crowley, W., Denyer, J., Duff, K. & Smith, G. (2014) Raised Bog Monitoring and Assessment Survey 2013. *Irish Wildlife Manuals*, No. 81. National Parks and Wildlife Service, Department of Arts, Heritage and Gaeltacht, Dublin. Fernandez, F. (in prep.) Conservation status assessment of Active raised bog, Degraded raised bog and Depressions on peat substrates of the Rhynchosporion. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and Gaeltacht, Dublin. Fossitt, J.A. (2000) *A guide to habitats in Ireland*. The Heritage Council, Kilkenny. Hammond, R.F. (1979) *The Peatlands of Ireland*. An Foras Talúntais, Dublin. Kelly, L. (1993) Hydrology, Hydrochemistry and Vegetation of Two Raised Bogs in Co. Offaly, Ph.D. Thesis, University of Dublin, Trinity College, Dublin. Kelly, L. & Schouten, M.G.C. (2002) Vegetation. In: M. G. C. Schouten (Ed.), *Conservation and Restoration of Raised Bogs: Geological, Hydrological and Ecological Studies*. pp.110-169, Department of Environment and Local Government, Dublin, Ireland/Staatabosbeheer, The Netherlands. Mackin, F., Barr, A., Rath, P., Eakin, M., Ryan, J., Jeffrey, R. & Fernandez Valverde, F. (2017) Best practice in raised bog restoration in Ireland. *Irish Wildlife Manuals*, No. 99. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland. Moore, P.D. & Bellamy, D.J. (1974) *Peatlands.* Elek Science, London. 221pp. NPWS (2007) The status of EU protected habitats and species in Ireland. Volume (3). Unpublished report, National Parks and Wildlife Service, Department of Environment, Heritage and Local

	Government, Dublin. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin. NPWS (2014) *Review of Raised Bog Natural Heritage Area Network*. National Parks and Wildlife Services, Department of Arts, Heritage and the Gaeltacht. Dublin. NPWS (2015) *National Peatlands Strategy 2015*. National Parks and Wildlife Services, Department of Arts, Heritage and the Gaeltacht. Dublin. NPWS (2017) *National Raised Bog Special Areas of Conservation Management Plan 2017-2022*. National Parks and Wildlife Services, Department of Culture, Heritage and the Gaeltacht. Dublin. Perrin, P. (2018) Irish Vegetation Classification: Technical Progress Report No. 3. Report submitted to National Biodiversity Data Centre. http://www.biodiversityireland.ie/projects/national-vegetation-database/irish-vegetation-classification/explore/ Schouten, M.G.C. (1984) Some Aspects of the Geographical Gradient in Irish Ombrotrophic Bogs. *Proceedings of the Seventh International Peat Congress, Dublin* 1: 414-432. White, J. & Doyle, G. (1982) The vegetation of Ireland: a catalogue raisonné. *J. Life Sci.* 3: 289-368.
3.2i Additional information	

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***17,300 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	

4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 21,700 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators ARB Favourable Reference Range (FRR) is deemed to correspond with the current Degraded Raised Bog (DRB) (7120) Range, based on the definition of the latter which states that it is still capable of regeneration within a 30-year period if appropriate measures are put in place (i.e. no major impacting activities are present and any necessary restoration works are implemented). The interpretation of DRB has been revised in the new reporting period (NPWS, 2017). According to the new interpretation, the habitat definition is based on an eco-hydrological model. This new definition has required a review of DRB's distribution and range. The new DRB current range and, as a result ARB FRR, is 217 x 10 km cells (21,700 km^2) which is smaller than the 26,100 km^2 reported in 2013. This reduction is deemed to be the result of better knowledge of the habitat (i.e. new definition) rather than an actual change.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	

4.12 Additional information *Optional*	Range was calculated using the range tool IT Tool version 3/06/2013 generated by European Topic Centre on Biological Diversity and is based on the current known distribution of 7110. The range is separated into two major units: a larger one throughout the midlands and the smaller elongated configuration within counties Clare and Kerry. The range map also illustrates a gap between these two main areas, which corresponds to areas not suitable for the development of raised bogs (Hammond, 1979). Isolated records of DRB are present in counties Carlow, Cork, Louth and Wicklow. These are remnants of a previous more extensive habitat distribution along the southern and eastern margins of the country where raised bog development was confined to relatively small basins. These smaller raised bogs were drained and cutaway in the past as described by NPWS (2007). The current range value (173 x 10 km cells or 17,300 km^2) differs from the one reported in 2013, which was 13,700 km^2. This increase is the result of better knowledge of the habitat's distribution within the current reporting period. FRR which corresponds to the range of DRB has decreased since the last reporting period (NPWS, 2013a) to reflect the improved level of knowledge. The current habitat range is 20.28% below the FRR. There have been no recorded habitat losses resulting in a loss of range within the current reporting period (2013-18). Range was deemed to have remained stable in the last two reporting periods (Fernandez *et al*., 2005, 2014). As a result, Range of 7110 is also given a stable trend in the long (1994-2018) and short (2007-2018) terms.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***1994-2018***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***16.59 km^2***
5.3 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	

5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	***a) 41.59 km²***	
	b) Indicate if operators were used (≈, >, >>, <) or	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The new ARB Favourable Reference Area is derived by summing the areas of Active Raised Bog (16.59 km^2) and Degraded Raised Bog (25 km^2) in the country.	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	***YES****/NO*
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***

	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*
5.15 Additional information *Optional*	ARB area has been calculated based on a combination of: a) detailed habitat survey records to ecotope level (1994-2018), which account for 89.81% of the national resource; b) 2013-18 records from site visits for which detailed ecotope data are not available; and c) additional records based on desktop visual assessment of aerial images for the 2013-16 period (10.19% of national resource). The previous area value (19.55 km^2) reported in 2013 did not consider habitat losses for those sites surveyed prior to 2011. A subsequent critical assessment in 2014 determined that such losses should be attributed to pre-existing and ongoing negatively impacting activities, especially turf-cutting. Based on this consideration, NPWS (2017) reviewed the 2013 area figure and concluded that the ARB national resource in 2013 should be decreased to 16.39 km^2. Several habitat surveys have been undertaken since this 2014 review (e.g. NPWS, Bord na Móna (BnM)), and a visual assessment of the potential occurrence of ARB within non-designated sites was carried out by Fernandez (in prep.). This information provided an update of the extent of the habitat within some sites and additional new habitat records. As a result, current ARB area has been adjusted to 16.59 km^2. The new ARB Favourable Reference Area (FRA) (41.59 km^2) is derived by summing the areas of ARB (16.59 km^2) and DRB (25 km^2) in the country. Current area value (16.59 km^2) is 60.11% below FRA. The previous Article 17 ARB conservation assessment established an FRA of 216.8 km^2 (Fernandez *et al*., 2014) which corresponded with the area of both ARB and DRB within designated sites. The new figure (41.59 km^2) differs from the 2013 figure (216.8 km^2) for three main reasons: a) new interpretation of DRB; b) the new FRR target considers that all DRB in the country should be restored to ARB, based on its definition, rather than only the DRB within the network of designated sites; and c) some actual DRB losses in the reporting period. NPWS (2017) assessed the ARB FRA within the network of designated sites. The value is 36 km^2 and corresponds with the extent of ARB and DRB within the current SAC (53) and Natural Heritage Areas (NHA) (75) network when the Habitats Directive came into force in 1994. The achievement of this target is considered necessary to restore the favourable conservation status of ARB within the network of designated sites and, as a result, help achieve the FRA of 41.59 km^2. According to NPWS (2017), 3,747 ha of ARB can be achieved within the proposed new network of designated raised bogs (55 SACs and 61 NHAs) in the long term, with restoration measures implemented in the short to medium term. This target corresponded with the following area figures within the designated raised bog network: 1,534 ha of ARB; 1,765 ha of DRB; and 448 ha of peat-forming habitats on cutover areas. Nine new SACs, all included within current NHAs, were designated in late 2016 after the publication of NPWS (2017). This brings the number of current SACs to 62. The new

	proposed network would therefore include 64 SACs. The previous two ARB conservation status assessments (Fernandez *et al*., 2005, 2014) undertook condition assessments for a relatively large number of raised bogs (48 bogs (2005) and 44 bogs (2014)) which represented a wide range of scenarios (geographical variation and included both positive and negatively impacting activities affecting the sites). Fewer assessments have been carried out within the current reporting period. A large proportion of these were based on the assessment of habitat Area and Structure and functions changes over a longer period of time (early 2000s to 2018) than the actual current reporting period (2013-2018). As a result it is not possible to accurately ascertain area changes in the current reporting period within these particular sites. Nevertheless, an overall Unfavourable-Bad (decreasing) condition assessment was reported. Unlike the two previous assessments (Fernandez *et al*., 2005, 2014) where an accurate estimate of overall changes in habitat area were provided (c.35% and 1.5% decrease, respectively), there is not enough information within a sufficiently broad spectrum of sites to generate such a statistic in the current reporting period. A review of major impacting activities affecting designated raised bogs for this reporting period (Fernandez., in prep.) has indicated ongoing negatively impacting activities outweighing positive measures in the reporting period: Turf-cutting: slight decreasing trend within the current network of SACs (62) and retained NHAs (36), but still active at many sites: 22 SACs and 6 NHAs. Turf-cutting taking place at many of the proposed new SACs and NHAs. Drainage: slight decreasing trend within the high bog but an increasing trend for drainage adjacent to the high bog both within and close to designated sites. Forestry on the high bog and cutover: decreasing trend. Limited restoration works were undertaken within designated sites within the reporting period. A slightly more positive trend has been noted within non-designated sites, mostly corresponding with works undertaken by BnM. An overall decreasing trend has been given in the current reporting period. Similar decreasing trends are given for the long (1994-2018) and short (2007-2018) terms, taking into account the previous assessment trends (Fernandez *et al*., 2005, 2014).

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***1.47 km²***
		Maximum	***1.47 km²***
	b) Area in not-good condition	**Minimum**	***15.12 km²***
		Maximum	***15.12 km²***
	c) Area where	**Minimum**	***0.00 km²***

	condition is not known	**Maximum**	***0.00 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	*stable / increasing / **decreasing** / uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? **YES**/NO*		
6.7 Typical species Method used *Optional*	No specific typical species conservation status assessments have been undertaken either at site or national level. As a result changes in the habitat quality (Structure and functions) were used to assess changes in the occurrence of typical species and therefore their conservation status. Both habitat quality and typical species condition are deemed to be interdependent. As a result, a similar assessment to the Structure and functions has been given to the habitat's typical species, as described by Fernandez (in prep.).		
6.8 Additional information *Optional*	The list of typical species has changed since the last report (NPWS, 2013). The only change has been that *Sphagnum fuscum* is now deemed to correspond with two separate species in Ireland: *S. fuscum* and *S. beothuk.* Typical species: Vascular plants: *Andromeda polifolia, Drosera anglica, D. intermedia, D. rotundifolia, Eriophorum angustifolium, E. vaginatum, Menyanthes trifoliata, Narthecium ossifragum, Rhynchospora alba, Utricularia minor* and *Vaccinium oxycoccos.* Mosses, liverworts and lichens: *Aulacomnium palustre, Campylopus atrovirens*, *Cladonia* spp. (*C. ciliata* and *C. portentosa*), *Leucobryum glaucum, Pleurozia purpurea, Racomitrium lanuginosum, Sphagnum denticulatum, S. capillifolium, S. cuspidatum, S. fuscum, S. beothuk, S. austinii, S. magellanicum, S. papillosum, S. pulchrum* and *S. subnitens.* Site-specific conservation objectives (SSCOs) have been developed by NPWS for all original 53 SACs (https://www.npws.ie/protected-sites). In addition, SSCOs are currently being developed for the 9 new SACs,		

	as part of the objectives being prepared for designated NHAs which encompass the smaller SAC sites. The target for the attribute vegetation quality (which relates directly to the Structure and functions) has been set as: "to maintain/restore sufficient high quality bog vegetation (i.e. central ecotope and/or flushes/soaks). At least 50% of ARB habitat should be central ecotope and/or flush/soaks." Bog woodland is also regarded as a desirable variant of ARB as it adds species and structural diversity to the habitat and therefore, where relevant, also contributes to the 50% target at site level. On the basis of this 50% threshold ARB is considered to be in good condition at only three SACs. The overall ARB extent within these three SACs is 1.47 km^2 and this represents 8.86% of the national extent (16.59 km^2). Thus, the extent of ARB in good condition is 1.47 km^2 and the extent of ARB not in good condition is 15.12 km^2 (based on site level conditions). ARB Structure and functions conservation status and condition assessments are based on the variation on the extent of the best quality vegetation types within the reporting period as described by NPWS (2013). At national level the ARB Structure and functions target is for 50% (20.79 km^2) of the national area target (41.59 km^2) to correspond with the best quality vegetation. The current extent of this vegetation type is 4.179 km^2 and thus it is 79.98% below the target. As this figure is more than 25% below the national target, ARB Structure and functions are given an Unfavourable-Bad assessment. The same assessment was given in 2013 (NPWS, 2013). A limited number of site-specific condition assessments have been undertaken within the current reporting period. In addition, most of the individual site assessments covered a longer reporting period (2000s-2018) than the current reporting period (2013-18). As a result, there is insufficient information to provide an accurate estimate of the actual changes in the extent of the best quality habitat types within the reporting period at national level. However, the individual site assessments undertaken have indicated an overall declining trend in habitat quality (i.e. Structure and functions). A stable trend assessment was given in 2014 by Fernandez *et al.* This was based on the very small percentage of losses (0.23%) within central and active flush/soak in the 2004/05-2011/13 period at the 44 bogs assessed. A different set of designated sites were assessed in 2013-18 and higher losses in the best quality vegetation type have been reported. In addition, negatively impacting activities continue to outweigh the positive influence of restoration works on the habitat. Thus, a declining assessment to the habitat's Structure and functions has been given to the current reporting period. Similar declining trends are given for the long term (1994-2018) and short term (2007-2018).

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**C05** Peat extraction (H) **K02** Drainage (H) **B01** Conversion to forest from other land uses, or afforestation (excluding drainage) (M) **A11** Burning for agriculture (M)	**C05** Peat extraction (H) **K02** Drainage (H) **B01** Conversion to forest from other land uses, or afforestation (excluding drainage) (M) **A11** Burning for agriculture (M) **N01** Temperature changes (e.g. rise of temperature & extremes) due to climate change (M)

7.2 Sources of information *Optional*

Desmond, M., O'Brien, P. & McGovern, F. (2017) A Summary of the State of Knowledge of Climate Change Impacts for Ireland. CCRP Report No. 223.Environmental Protection Agency, Johnstown Castle, Ireland.

Fernandez, F. (in prep.) Active raised bog, Degraded raised bog and Depressions on peat substrates of the Rhynchosporion conservation status assessment. *Irish Wildlife Manuals,* No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin.

Jones, M.B., Donnelly, A. & Albanito, F. (2006) Responses of Irish vegetation to future climate change. *Biology and Environment: Proceedings of the Royal Irish Academy* 106B(3): 323–334.

NPWS (2014) *Review of Raised Bog Natural Heritage Area Network*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Dublin.

7.3 Additional information *Optional*

Peat extraction (C05): a slight decrease in turf-cutting within the current 62 SACs and 36 retained NHAs has been reported. However, activity continued at 22 SACs and 6 NHAs in 2018. The NHA Review (NPWS, 2014) reported 518 plots actively cut within the proposed new 25 NHAs before 2014. An internal assessment by NPWS in 2018 estimated 83 plots were actively cut within the proposed new 2 SACs in the 2014-2016 period. Turf cutting activity within NHA sites proposed for de-designation is likely to increase in the future. The condition assessments undertaken in the reporting period has indicated that turf cutting continues to threaten the Future prospects for ARB at 9 of the 28 sites assessed. The Department of Culture, Heritage and the Gaeltacht (DCHG) has committed significant resources to eliminating the impacts from turf cutting activity within the designated sites. This includes the application of the Cessation of Turf Cutting Compensation Scheme (CTCCS) to the retained NHAs, implementation of a turf cutting relocation programme and Article 6(3) investigations to establish if turf cutting

	is feasible within circumscribed parts of a limited number of SACs without impacting on the integrity of the site. These measures will reduce turf-cutting trends within the proposed network of designated sites in the next two reporting periods. Drainage (K02): condition assessments undertaken in the reporting period have indicated that drainage continues to threaten the Future prospects for ARB at all 28 sites assessed. In addition, using recent aerial photography a visual assessment of drainage activity at the cutover within current SACs and retained NHAs has confirmed the increasing negative pressure from this activity, as previously reported in 2014 by Fernandez *et al*. Both the implementation of Drainage Management Plans for designated sites and site-specific restoration plans are expected to decrease this activity's negative trend in the next two reporting periods. The implementation of some of these restoration plans has been already initiated. Burning (A11): condition assessments undertaken in the reporting period and anecdotal accounts have indicated that burning continues to threaten the Future prospect for ARB at 6 of the 28 sites assessed. Although no information on activity trends are available in the current period, an ongoing decreasing trend, as already reported by Fernandez *et al*. (2014), is expected. Furthermore, burning is largely associated with turf cutting activity and an overall decreasing trend, particularly within the network of designated sites, is expected in the next two reporting years. A similar trend is therefore given to burning. Forestry (B01): condition assessments undertaken in the reporting period have indicated that forestry continues to threaten the Future prospects for ARB at 4 of the 28 sites assessed. Removal of conifer plantations was undertaken by Coillte within the reporting period as part of their second raised bog LIFE restoration project. Conifer plantations have been recorded at 28 of the designated sites (62 current SACs and 36 retained NHAs) during this assessment. The removal of conifer plantations is proposed as part of the site-specific restoration plans. Thus, the implementation of the plans is expected to reduce the pressure from this activity on raised bog habitats within the network of designated sites in the next two reporting periods. The role of Coillte (the State forestry company) will be essential in the process. Invasive (I02) and problematic native species (I04): condition assessments undertaken in the reporting period have indicated that invasive species continue to threaten the Future prospects for ARB at 6 of the 28 sites assessed. There is no evidence of an increasing trend in invasive or problematic native species in the current period. Although invasive species are deemed to cause negative impacts in a limited number of sites, they are not in general considered a major threat to raised bog habitats. In addition, the implementation of site-specific restoration plans is likely to reduce the pressure from problematic native species. An overall decreasing trend within the proposed network of designated sites is expected within the next two reporting periods. There are increasing concerns about the potential negative impacts on raised bog habitats from climate change and at a more localised level from air pollution (nitrogen deposition) in recent years. Further

	investigations and monitoring to understand the potential impacts on raised bogs habitat from air pollution is needed. Although there is a certain level of uncertainty on how climate change will affect raised bogs (Desmond *et al*., 2017), other studies (e.g. Jones *et al*., 2006) have predicted significant habitat losses as a consequence of climate change. The implementation of restoration works, mostly planned within the proposed network of designated sites, will increase their resilience and thus capacity to cope with drier periods of time.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* ***c) Increase the surface area of the habitat type (related to 'Area covered by habitat')** or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* ***c) Long-term results (after 2030)***
8.5 List of main conservation measures	**CC02** Adapt/manage exploitation of energy resources **CI03** Management, control or eradication of other invasive alien species **CI05** Management of problematic native species **CJ03** Restore habitats impacted by multi-purpose hydrological changes
8.6 Additional information	A substantial body of work as regards management and conservation

Optional	of peatlands has been undertaken since the 2013 assessment (NPWS, 2013). This includes the publishing of the following documents and the implementation of some of the actions proposed within them: National Peatlands Strategy (NPWS, 2015); NHA Review (NPWS, 2014); National Raised Bog SAC Management Plan (NPWS, 2017); Best Practise Restoration Guidelines (Mackin *et al*., 2017). The National Peatlands Strategy (2015-2025) aims to provide a long-term framework for the management of Irish peatlands by setting out clear Values, Principles, Policies and Actions to be incorporated into the sectoral plans and policies of all Public Authorities and Semi-State bodies. The NHA Review (2014) proposed a reconfigured NHA network of 61 sites. The Review recommended the de-designation of 46 of the existing NHA sites (seven to be partially de-designated) and the designation of 25 new sites as well as the overall cessation of turf cutting activity within the retained sites. The National Raised Bog SAC Management Plan sets national conservation objectives and restoration targets for raised bog habitats (e.g. national target within the network of designated sites of 36 km^2 for ARB) (CC02, CI03, CI05 and CJ03). SSCOs and restoration plans have been developed for all SACs and are currently being developed for the remaining NHAs. In addition, Drainage management plans, which will provide guidelines for the management of periphery drainage, are currently being developed for all SACs and will be developed for NHAs. In addition, the Peatlands Community Engagement Scheme was established in 2017 by the DCHG. The scheme seeks to encourage local communities, groups, schools and individuals to engage with the Department in relation to the conservation of raised bog SACs, NHAs and other raised bog areas (CI03, CI05 and CJ03). Furthermore, the Irish Community Wetlands Forum (http://www.communitywetlandsforum.ie/) with many members and groups working on the conservation of raised bogs has recently been established. Restoration works: overall a limited number of restoration works have been undertaken in the reporting period. BnM undertook the largest raised bog restoration project in this period and restoration works (CI03, CI05 and CJ03) have been initiated and are ongoing at many other sites. The SAC Management Plan commits to implementing restoration works within the network (55 SACs and 61 NHAs) in less than 20 years (2017-2036). The Raised Bog LIFE project (2016-2020) is aiming to implement all restoration works needed at 12 SACs. DCHG also initiated a programme of restoration works within State-owned land within SACs and NHAs and also commenced further restoration works within three other sites in partnership with Coillte. The CTCCS (CC02), established in April 2011 to compensate land owners and turbary-right holders affected by the restrictions on turf cutting continues for SACs and was extended to NHAs in 2014. Over 3,300 applications within SACs and 640 within NHAs have been received by the DCHG to date, indicating both the significant amount of resources allocated to it and the high level of success.

	Turf cutting relocation programme (CC02): This is as an alternative to financial compensation under the CTCCS where turf-cutters could move from their plot within a designated site to a nearby non-designated bog where they could continue to source turf for their domestic use. According to the DCHG approximately 12% (or 500 CTCCS applicants) had expressed an interest in relocation. To date arrangements have been made for the relocation of 67 turf-cutters to non-designated bog. In addition, relocation sites are in the advance stages of the process to relocate another approximately 94 turf-cutters.

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	*Good / **Poor** / Bad / Unknown*
	b) Area	*Good / Poor / **Bad** / Unknown*
	c) Structure and functions	*Good / Poor / **Bad** / Unknown*
9.2 Additional information *Optional*	Future prospects have been assessed at 28 raised bogs in the reporting period, and a total of 20 sites have been given an Unfavourable-Bad/declining assessment, 2 sites were assessed as Unfavourable-Bad/stable and 6 sites as Unfavourable-Bad/ improving. Due to the relatively limited number of sites assessed in this reporting period, the ARB Future prospects national assessment is based not only on the reported influence on the habitat of both negative (e.g. turf cutting, drainage maintenance) and positive activities (e.g. restoration plans and drainage management plans) within the reporting period, but also on their reported trends (section 7.3) and how these are likely to vary at national level in the following two reporting periods. The assessment also takes into consideration the level of implementation of conservation measures in the current reporting period and how these are likely to positively affect the habitat in the next 12 years. Significant resources have been committed by the DCHG to reduce the negative impacts of the main impacting activities (i.e. Peat extraction (C05), Drainage (K02), Forestry (B01) and Burning (A11)). These include CTCCS, turf cutting relocation programme, Article 6(3) investigations, development of site-specific restoration plans and the implementation of restoration works. More recently, there has been the development of Drainage Management Plans (see section 8.6 for further detail). In addition, further restoration actions have been undertaken by BnM and Coillte. BnM have significantly increased restoration efforts since 2013. As a result, decreasing trends in negative activities and increasing trends in conservation actions are expected within the network of designated sites in the next two reporting periods (see section 7.3). On the other hand, there are increasing concerns about the potential negative impacts on raised bog habitats from air pollution (nitrogen deposition) and climate change. Climate change is a potential major threat to the survival of remaining ARB sites currently in poor condition since they lack	

	ecosystem resilience. The full implementation of the measures outlined in the National Raised Bog SAC Management Plan will significantly improve the FPs of Active Raised Bog. However, based on the level of implementation of management actions within the reporting period and the persistence of negatively impacting activities, each of the main attributes have been assessed as follows: Range: an Unfavourable-Bad assessment has been given in each reporting period since 1994 and short- and long-term trends have been assessed as stable. The proposed reconfiguration of the network of designated sites (55 SACs – includes 2 new SACs; 61 NHAs – includes 25 new NHAs; see NPWS, 2014, 2017) is deemed to better protect the habitat's geographical range. To date, designation of the proposed new SACs and NHAs has not taken place. Therefore, presently, the proposed new sites have no statutory protection to halt negatively impacting activities. As a result, taking into account the balance between negative and positive actions described above, the Future prospects of Range are assessed as poor. Area and Structure and functions: both have been given an Unfavourable-Bad assessment and decreasing and declining trends in the short and long term. The Future prospects of both are assessed as bad, taking into consideration the balance between negative and positive actions within the reported period and level of uncertainty as regards threatening activities future trends. Overall Future prospects of ARB are assessed as Unfavourable-Bad. This is likely to significantly change in the next conservation status assessment report provided the actions proposed in the SAC Management Plan are implemented in the next reporting period.

10 Conclusions	
Assessment of conservation status at end of reporting period	
10.1 Range	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*
10.2 Area	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*
10.4 Future prospects	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*
10.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / **deteriorating** / stable / unknown*
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*

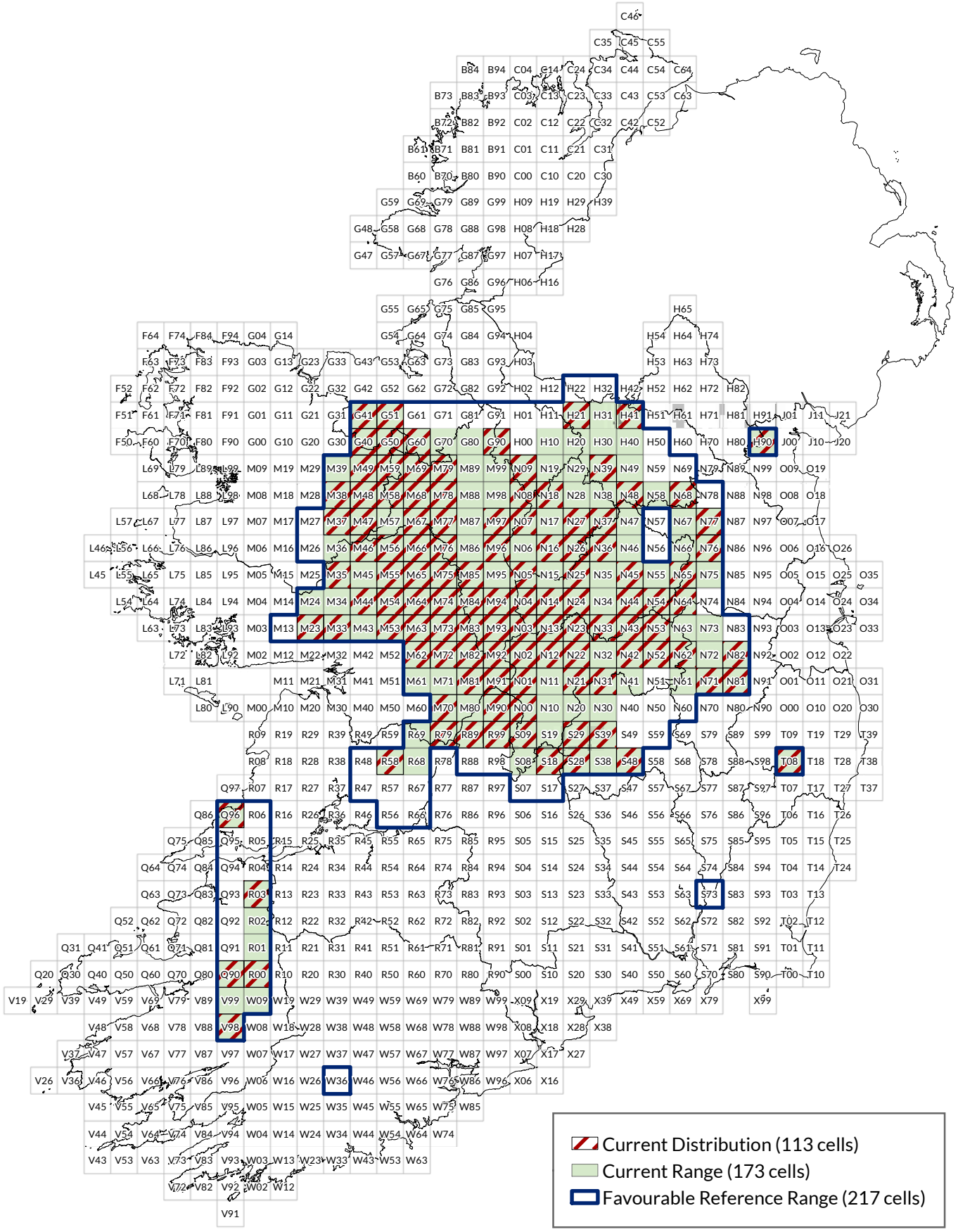
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/**NO***	*YES/**NO***
	b) yes, due to genuine change	*YES/NO*	*YES/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	*YES/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	All attributes except Structure and functions have been given similar assessments in this reporting period as they were in the previous period. Site condition assessments undertaken in the reporting period have indicated a declining trend in the habitat's quality (Structure and functions) (see section 6.8). Overall, although it can be expected that there will be a decrease in negatively and an increase in positively impacting activities, this will mostly depend on the implementation of the National Raised Bog SAC Management Plan.		

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***11.95 km²***
11.2 Type of estimate	***Best estimate** / 95% confidence interval / minimum*	

11.3 Surface area of the habitat type inside the network **Method used**	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
11.4 Short-term trend of habitat area in good condition within the network **Direction**	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* *stable / increasing /* ***decreasing*** */ uncertain/ unknown*
11.5 Short-term trend of habitat area in good condition within network **Method used**	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
11.6 Additional information *Optional*	The figure provided above, which represents 72.04% of the entire national extent (16.59 km^2), corresponds with the extent of the habitat within the 54 SACs for which the habitat is Qualifying Interest (QI) (11.88 km^2) and an additional 0.07 km^2 of ARB within four bogs in SACs for which the habitat is not a QI. This figure is mostly derived from accurate habitat surveys (at ecotope level). This figure is smaller than the 14 km^2 reported in 2013 (NPWS). The main reason for this discrepancy is the availability of more recent habitat information. Some of the data reported in 2013 corresponded with early 2000s habitat data. Nevertheless, a decreasing trend has been reported within the very few SAC raised bogs assessed within the current reporting period (2013-18). SSCOs have been developed by NPWS for 53 SACs (https://www.npws.ie/protected-sites). Habitat area is deemed to be below the FRA for all these 53 raised bog SACs and thus the overall habitat condition for each of them is Unfavourable. As a result, none of these 53 SACs can be considered to be in good condition. ARB has been given a decreasing trend in the short term at national level. This is based on site condition assessments undertaken in this period (mostly within SACs; Fernandez *et al*., 2014). As a result, a decreasing trend is also given to ARB within the Natura 2000 network in the 2007-2018 period. The actual extent of this decrease is unknown.

12 Complementary information

Raised bog (Active)* (7110)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Mapáil V 2.0
Dáta
June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**7120 Degraded raised bogs still capable of natural regeneration**
1.2i Habitat short name	**Degraded raised bog**
1.3i Habitat description	Raised bogs are accumulations of deep acid peat (3-12m) that originated in shallow lake basins or topographic depressions. They have a typical elevated surface or dome, which develops as raised bogs grow upwards from the surface (Fossitt, 2000). The bog dome is primarily rainwater fed (ombrotrophic) and isolated from the local groundwater table. This gives rise to acidic conditions deficient in plant nutrients, which in turn supports a distinctive suite of vegetation types. Although low in overall diversity, raised bogs support specialised plant assemblages dominated by a range of mosses of the genus *Sphagnum*. The bog surface may support a patterned micro-topography of pools, hummocks and lawns that provide a range of water regimes supporting different species assemblages. Intact raised bogs are characterised by the presence of ericoid and Cyperaceae species and an abundance of *Sphagnum* species. Irish raised bogs are classified as Oceanic raised bog mire (Moore and Bellamy, 1974). This mire type has a very restricted distribution on the Atlantic fringe of the north-west of Europe. The vegetation of a typical, intact raised bog is assigned to the *Oxycocco-Sphagnetea* and to the *Erico-Sphagnetum magellanici* phytosociological association (White and Doyle, 1982). Recently, the Irish Vegetation Classification assigned Degraded Raised Bog (DRB) to vegetation communities under the two main bog vegetation groups: *Rhynchospora alba-Sphagnum cuspidatum* (BG1) and *Erica tetralix-Sphagnum capillifolium* (BG2) (Perrin, 2018). Raised bogs are more abundant in the lowlands of central and mid-west Ireland. In Ireland raised bogs are confined to areas with an annual rainfall below 1,250 mm (Hammond, 1984). They occur principally on land below 130m and are classified into two sub-types: Western raised bogs (or Intermediate) and True Midland raised bogs (Schouten, 1984), with the boundary between the two being taken as the 1,000mm isohyet. DRB is characterised by the complete absence, or at best the presence of only a patchy thin cover, of an 'acrotelm' layer. The acrotelm is the living, actively growing upper layer of a raised bog. The acrotelm is vital to the maintenance and development of an active raised bog as this is the peat-forming layer and its presence strongly influences the rate of water runoff. Previously all the vegetated areas of high bog which were not delineated as Active Raised Bog (ARB) were classified as DRB, on the assumption that most of it could be restored to active peat-forming condition after implementation of comprehensive restoration works. The habitat was therefore considered to encompass sub-marginal, marginal and face bank ecotopes, (Kelly, 1993; Kelly and Schouten, 2002), as well as inactive flushes and dry woodland on the high bog.

	Based on the results of a comprehensive programme of research on Irish bogs by Irish and Dutch scientists in the 1990s, an eco-hydrological model has recently been developed based on LiDAR (Light Detection and Ranging) data. The model predicts where there is potential to restore active conditions on the high bog (NPWS, 2017). As a result, only those areas with the right combination of physical conditions (including surface shape, slope and drainage patterns) ultimately capable of supporting ARB are now considered as DRB. These are the areas of raised bogs whose hydrology has been disturbed so that their surfaces have dried out and suffered some species change or loss. Bog species of drier conditions now dominate, and peat formation has ceased. The water level is generally 10 cm or more below the surface and drops to 30+ cm below during dry summer weather. To qualify as DRB, these areas must still be capable of natural regeneration to active bog within 30 years if their hydrology is repaired (usually after restoration works, particularly blocking of drains). The remainder of the high bog that is neither ARB nor DRB is now referred to as 'Supporting Raised bog habitat'.

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***2012-2016***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range map was submitted. No Favourable Reference Range (FRR) map has been submitted as the FRR is deemed to be 0.0 km^2.
2.5i	The new habitat distribution map is a revised version of the 2013 map and is based on the eco-hydrological model developed as part of the Review of Raised Bog Natural Heritage Area Network (NPWS, 2014) and the National Raised Bog Special Areas of Conservation Management Plan 2017-2022 (NPWS, 2017). NPWS (2014) modelled the distribution of DRB within all known raised bog sites of national conservation value (over 270 sites). However, DRB is deemed to be also present in many other raised bogs corresponding with "intact" high bog, not modelled by NPWS (2014). A national DRB distribution map would have been incomplete without taking into account these additional records. As a result, the national DRB distribution map was reviewed by Fernandez (in prep.). The new map consists of all 10 km grid cells intersecting DRB records as determined by the predictive model (NPWS, 2014), plus any other cell not intersected by the previous dataset that contains at least one bog corresponding with "intact" high bog with the suitable conditions to support the habitat.

	These conditions are as follows: a) sites over 30 ha of high bog with typical bog vegetation which were part of a larger bog and contain drains which could be blocked; and b) smaller sites (< 30 ha) which are part of small basins with drains present which could be blocked. The latter are more frequently found in the north-east of the raised bog distribution (e.g. County Cavan). The occurrence of DRB is ruled out from those sites where the high bog area is below 30 ha, which were once part of much larger sites and are now surrounded by facebanks and without drains to be blocked. The new distribution map differs from the one reported in 2013. A total of 201 x 10 km grid cells (20,100 km^2) intersected areas containing DRB during the previous reporting period. The new map shows that a total of 156 cells now intersect at least one habitat record. This significant decrease (45 cells) is the result of the new interpretation of the habitat and thus overall better knowledge, rather than an actual decrease in habitat extent/distribution. Most of these 45 cells are not deemed to contain raised bogs with the appropriate conditions to restore ARB. Although some remnants of raised bog remain within them, they are generally much degraded, the remaining high bog is too small to support DRB (<30 ha) and the absence of high bog drains to be blocked imply the lack of potential to restore ARB. In addition, recent data gathered by NPWS (2014, 2017) has indicated that bogs deemed in 2013 to correspond with the only raised bog record (and therefore DRB) within six of the 10 km grid cells, in fact, correspond with other habitat types (e.g. blanket bogs, fens). The new map also contains two new cells containing DRB previously unknown to support the habitat. The new map covers the 2012 to 2016 period as NPWS (2014) used 2012 LiDAR data to generate the DRB model and aerial images spanning the period 2013-2016 were used to identify additional DRB records. As previously reported (NPWS, 2013), the DRB distribution map does not include areas of “secondary degraded raised bog” such as highly drained high bog devoid of vegetation or cutover/cutaway bog. Although such areas do not correspond with the strict definition of DRB within the Habitats Directive Interpretation Manual, the re-establishment of vegetation with peat-forming capability in these areas may be possible. But these are deemed to require significant resources and periods longer than 30 years to develop ARB. Note: “Intact” refers to uncut high bog still supporting typical high bog vegetation. No completely intact raised bog remains in Ireland and all have been damaged to a certain degree by activities such as turf cutting, drainage, burning and afforestation.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
3.2 Sources of information	Fernandez, F., Fanning, M., McCorry, M. and Crowley, W. (2005) Raised Bog Monitoring Project 2004-5. Unpublished report, National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Fernandez, F., MacGowan, F., Crowley, W., Farrell, M., Croal, Y., Fanning, M. and McKee M. (2006) Assessment of the Impacts of turf cutting on designated Raised Bogs 2003-06. Unpublished report, National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Fernandez, F. Crowley, W. and Wilson S. (2012) *Raised Bog Monitoring Survey.* National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Fernandez, F., Connolly, K., Crowley, W., Denyer, J., Duff, K. and Smith, G. (2014) Raised Bog Monitoring and Assessment Survey 2013. *Irish Wildlife Manuals*, No. 81. National Parks and Wildlife Service, Department of Arts, Heritage and Gaeltacht, Dublin. Fernandez F. (in prep.) Conservation status assessment of Active raised bog, Degraded raised bog and Depressions on peat substrates of the Rhynchosporion. *Irish Wildlife Manuals, No. 1XX*. National Parks and Wildlife Service, Department of Culture, Heritage and Gaeltacht, Dublin. Fossitt, J.A. (2000) *A guide to habitats in Ireland*. The Heritage Council, Kilkenny. Hammond, R.F. (1979) *The Peatlands of Ireland*. An Foras Talúntais, Dublin. Kelly, L. (1993) Hydrology, Hydrochemistry and Vegetation of Two Raised Bogs in Co. Offaly, Ph.D. Thesis. Trinity College, Dublin. Kelly, L. and Schouten, M.G.C. (2002) Vegetation. In: M. G. C. Schouten (Ed.), *Conservation and Restoration of Raised Bogs: Geological, Hydrological and Ecological Studies*. pp.110-169, Department of Environment and Local Government, Dublin, Ireland/Staatabosbeheer, The Netherlands. Mackin, F., Barr, A., Rath, P., Eakin, M., Ryan, J., Jeffrey, R. and Fernandez Valverde, F. (2017) Best practice in raised bog restoration in Ireland. *Irish Wildlife Manuals,* No. 99. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland. Moore, P.D. and Bellamy, D.J. (1974) *Peatlands.* Elek Science, London. 221pp. NPWS (2007) The status of EU protected habitats and species in Ireland, Volume 3. Unpublished report, National Parks and Wildlife Service, Department of Environment, Heritage and Local

	Government, Dublin. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments, Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin. NPWS (2014) *Review of Raised Bog Natural Heritage Area Network*. National Parks and Wildlife Services, Department of Arts, Heritage and the Gaeltacht. Dublin. NPWS (2015) *National Peatlands Strategy 2015*. National Parks and Wildlife Services, Department of Arts, Heritage and the Gaeltacht. Dublin. NPWS (2017) *National Raised Bog Special Areas of Conservation Management Plan 2017-2022*. National Parks and Wildlife Services, Department of Culture, Heritage and the Gaeltacht. Dublin. Perrin, P. (2018) Irish Vegetation Classification: Technical Progress Report No. 3. Report submitted to National Biodiversity Data Centre. http://www.biodiversityireland.ie/projects/national-vegetation-database/irish-vegetation-classification/explore/ Schouten, M.G.C. (1984) Some Aspects of the Geographical Gradient in Irish Ombrotrophic Bogs. *Proceedings of the Seventh International Peat Congress, Dublin* 1: 414-432. White, J. and Doyle, G. (1982) The vegetation of Ireland: a catalogue raisonné. *J. Life Sci.* 3: 289-368.
3.2i Additional information	

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***21,700 km²***	
4.2 Short-term trend Period	***2007-2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	

4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 0.0 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators DRB FRR has been reviewed as part of the new assessment. Previously (NPWS, 2013) both current and FRR were considered to have the same value (26,100 km^2). The new FRR is 0x10 km cells (0.0 km^2) as the new ARB Area national target requires all DRB in the country to be restored to ARB in order for the habitat to achieve Favourable Conservation Status.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
4.12 Additional information *Optional*	Range was calculated using the range tool IT Tool version 3/06/2013 generated by European Topic Centre on Biological Diversity and is based on the current known distribution of 7120. The range is separated into two major units: a larger one throughout the midlands and the smaller elongated configuration within counties Clare and Kerry. The range map also illustrates a gap between these two main areas, which corresponds to areas not suitable for the development of raised bogs (Hammond, 1979). Isolated records of DRB are present in counties Carlow, Cork, Louth and Wicklow. These are remnants of a previous more extensive habitat distribution along the southern and eastern margins of the country where raised bog development was confined to relatively	

	small basins. These smaller raised bogs were drained and cutaway in the past as described by NPWS (2007). The current range value (21,700 km^2 (217 x 10 km cells)) differs from the figure of 26,100 km^2 reported in 2013. This decrease is the result of the new interpretation of the habitat in the Irish context. The definition of DRB is now based on an eco-hydrological model (see section 2.5i). This new interpretation of the habitat is considered to more accurately define those high bog areas still capable of regeneration within a 30-year period if appropriate measures are put in place (i.e. no major impacting activities are present and any necessary restoration works are implemented), as defined by the Habitats Directive. Current range does not include areas of "secondary degraded raised bog". It is considered possible that there are areas of DRB within "intact" high bog sites which may have been misclassified as secondary degraded raised bog (see section 2.5i). There have been no recorded habitat losses resulting in a loss of range within the current reporting period (2013-2018). Range was deemed to have remained stable in the last two reporting periods (Fernandez *et al.*, 2005, 2014). As a result, Range is also given a stable trend in the long (1994-2018) and short (2007-2018) terms.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2012-2016***	
5.2 Surface area *(in km^2)*	**a) Minimum**	***25 km^2***
	b) Maximum	
	c) Best single value	
5.3 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	***a) 0.0 km²***	
	b) Indicate if operators were used (≈, >, >>, <) or	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators Fernandez *et al*. (2014) estimated DRB Favourable Reference Area (FRA) based on the principle that all DRB within the network of designated sites could be restored to ARB. Therefore, FRA (283.15 km²) was the difference between the national "intact" high bog resource (*ca*. 500 km²) and the ARB FRA, which corresponded with the extent of ARB+DRB in 2013, as reported by NPWS (2013). The recent reviewed interpretation of DRB habitat has indicated that the extent of DRB within the proposed new network of sites is 17.65 km², which is substantially different from the previous extent. This discrepancy is mainly the result of the new interpretation of the habitat. The new ARB FRA requires all DRB within the country (25 km²) to be restored to ARB, which means that the DRB FRA is 0.0 km². More specifically, NPWS (2017) indicates that all DRB within the proposed new network of designated sites (17.65 km²) has to be converted to ARB in order for both ARB and DRB to achieve Favourable Conservation Status within the network of designated sites.	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	

	a) yes, due to genuine change	***YES**/NO*
	b) yes, due to improved knowledge/more accurate data	***YES**/NO*
	c) yes, due to the use of different method	*YES/**NO***
	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*	
5.15 Additional information *Optional*	NPWS (2013) reported a DRB area of approximately 480 km^2. This corresponded with the difference between "intact" high bog (*ca*. 500 km^2) and the extent of ARB (19.55 km^2). Subsequently, NPWS (2017) estimated that the 2013 extent of DRB within the current SAC/ Natural Heritage Areas (NHA) network and those non-designated sites deemed of potential national conservation value was, in fact, only 21.24 km^2 based on the new interpretation of DRB. A recent assessment of high-resolution aerial photographs by Fernandez (in prep.) identified the presence of ARB within an additional 72 bogs. In Ireland since DRB is present in all sites supporting ARB (NPWS, 2017) it is assumed to be found within these additional sites also but it was not possible to assess the extent of this DRB. In addition, DRB is also considered to be present within other non-designated bogs (see section 2.5i). This indicates that the extent of DRB calculated by NPWS (2017) should be taken as a minimum. Further investigations are needed to accurately calculate the extent of DRB within these additional sites. In the meantime, based on this more recent data, it seems reasonable to estimate that the current DRB national area value is approximately 25 km^2. The current habitat area (25 km^2) is significantly above the FRA (0.0 km^2). For DRB a habitat area that is more than 15% above the FRA is considered to be Unfavourable-Bad. According to NPWS (2017) 3,747 ha of ARB can be achieved within the new proposed network of designated raised bogs (55 SACs and 61 NHAs) in the long term, with restoration measures implemented in the short to medium term. This figure corresponds with: 1,534 ha of ARB; 1,765 ha of DRB and 448 ha peat-forming habitats on cutover areas. Nine new SACs, all included within current NHAs, were designated in late 2016 after the publication of NPWS (2017). This brings the number of current SACs to 62. The proposed new network would therefore include 64 SACs. The previous two assessments (Fernandez *et al*., 2005, 2014) provided an accurate assessment of overall changes in habitat extent, (defined as those areas with non-active ecotope types) within the respective reporting periods. Due to the new definition an accurate assessment of changes in habitat extent within the current reporting period would have required a comparison of modelled data from two discrete dates within the reporting period for a representative selection of sites but such a figure cannot be provided due to the absence of comparative data. Nonetheless, the condition assessments undertaken in the current reporting period indicate an overall decreasing trend at 22 of the 28 sites assessed. This trend is	

	associated with negatively impacting activities that result in irreversible losses in habitat extent or losses in ARB which increases the extent of DRB which represents a negative trend. A review of major impacting activities affecting designated raised bogs (Fernandez., in prep.) has indicated ongoing negatively impacting activities outweighing positive measures in the reporting period: turf cutting: slight decreasing trend within the current network of SACs (62) and retained NHAs (36), but still active at many sites: 22 SAC and 6 NHAs. Turf cutting taking place at many of the proposed new SACs and NHAs; drainage: slight decreasing trend within the high bog but an increasing trend for drainage adjacent to the high bog both within and close to designated sites; forestry on the high bog and cutover: decreasing trend; restoration works undertaken within a limited number of designated sites. A slightly more positive trend has been noted within non-designated sites, mostly corresponding with works undertaken by Bord na Móna (BnM). An overall decreasing trend has been given in the current reporting period. Similar decreasing trends are given for the long term (1994-2018) and short term (2007-2018), based on the previous assessment trends (Fernandez *et al*., 2005, 2014).

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***0 km²***
		Maximum	***0 km²***
	b) Area in not-good condition	**Minimum**	***25 km²***
		Maximum	***25 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	*stable / increasing / **decreasing** / uncertain/ unknown*		

6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? **YES**/NO*
6.7 Typical species Method used *Optional*	No specific typical species conservation status assessments have been undertaken either at site or national level. As a result changes in the habitat quality (Structure and functions) were used to assess changes in the occurrence of typical species and therefore their conservation status. Both habitat quality and typical species condition are deemed to be interdependent. As a result, a similar assessment to the Structure and functions assessment has been given to the habitat's typical species, as described by Fernandez (in prep.).
6.8 Additional information *Optional*	The list of typical species has changed since the last report (NPWS, 2013). The only change has been that *Sphagnum fuscum* is now deemed to correspond with two separate species in Ireland: *S. fuscum* and *S. beothuk.* **Typical species: Vascular plants***: Andromeda polifolia, Drosera anglica, D. intermedia, D. rotundifolia, Eriophorum angustifolium, E. vaginatum, Menyanthes trifoliata, Narthecium ossifragum, Rhynchospora alba, Utricularia minor* and *Vaccinium oxycoccos.* Mosses, liverworts and lichens: *Aulacomnium palustre, Campylopus atrovirens*, *Racomitrium lanuginosum, Cladonia* spp. (*C. ciliata and C. portentosa*), *Leucobryum glaucum, Pleurozia purpurea, Sphagnum denticulatum, S. capillifolium, S. cuspidatum, S. fuscum, S. beothuk, S. austinii, S. magellanicum, S. papillosum, S. pulchrum* and *S. subnitens.* The habitat's conservation condition assessments (site level) undertaken within the current reporting period have been based directly on the results of ARB assessment. This is due to the absence of topographical data (LiDAR), and thus modelled output, within two discrete dates in the reporting period as well as more specific data (e.g. relevés), which did not enable accurate assessments of DRB Area / Structure and functions changes. The condition of DRB is very often related to the condition of ARB. Site-specific conservation objectives (SSCOs) developed by NPWS for all original raised bog SACs (https://www.npws.ie/protected-sites) recognise this interdependency between the three main raised bog habitats (7110, 7120 and 7150): "Based on the close ecological relationship between these three habitat types, it is not necessary to set conservation objectives for all three habitats individually. It is considered that, should favourable conservation condition for ARB be achieved, then favourable conservation condition for the other two habitats will also be achieved" (NPWS, 2017). In addition, SSCOs are currently being developed for the 9 new SACs, as part of the objectives being prepared for designated NHAs which encompass the smaller SAC sites. Based on the above and due to the absence of modelled DRB

	figures within two separate dates in the reporting period, the DRB Structure and functions conservation condition assessment has been based on the results of ARB Structure and functions condition assessments per site, despite the recognition that this method does not cover all scenarios. The individual site assessments undertaken have indicated an overall Unfavourable-Bad assessment for the habitat's quality (i.e. Structure and functions). The previous two conservation status assessments (Fernandez *et al*., 2005, 2014) based this condition assessment on the overall results of individual site assessments. The assessments took into account changes in the extent of marginal and face bank as well as high bog losses in the reporting period. The new interpretation of the habitat based on the eco-hydrological model has shown that there is no consistent, direct relationship between non-active ecotopes and the areas identified as DRB by the model (that is, marginal or sub-marginal ecotope areas may or may not correspond with DRB). Nevertheless, an increase or decrease in marginal ecotope within the modelled area would indicate a decline or an improvement in habitat quality (Structure and functions), respectively, in the reporting period. Further refinement of monitoring methodologies is required. As a result, the national extent of DRB in good condition is unknown. However, based on the actual definition of the habitat (i.e. capable of being restored to ARB), it is assumed that DRB Structure and functions are not in good condition at any of the sites, as the main objective is to restore the habitat to ARB. Therefore, all 25 km² of estimated DRB Area are deemed to be in not-good condition. An overall Unfavourable-Inadequate/declining assessment was given in 2014 by Fernandez *et al*. (2014). The current reporting period has shown slightly more negative results within the sites assessed. In addition, negatively impacting activities continue to outweigh the positive influence of restoration works on the habitat. Thus, it seems reasonable to provide a declining trend assessment for the habitat's Structure and functions in the current reporting period. Similar declining trends are given for the long term (1994-2018) and short term (2007-2018).

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**

List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**C05** Peat extraction (H) **K02** Drainage (H) **B01** Conversion to forest from other land uses, or afforestation (excluding drainage) (M) **A11** Burning for agriculture (M)	**C05** Peat extraction (H) **K02** Drainage (H) **B01** Conversion to forest from other land uses, or afforestation (excluding drainage) (M) **A11** Burning for agriculture (M) **N01** Temperature changes (e.g. rise of temperature & extremes) due to climate change (M)
7.2 Sources of information *Optional*	Desmond, M., O'Brien, P. and McGovern, F. (2017) A Summary of the State of Knowledge of Climate Change Impacts for Ireland. CCRP Report No. 223. Environmental Protection Agency, Johnstown Castle, Ireland. Fernandez F. (in prep.) Active raised bog, Degraded raised bog and Depressions on peat substrates of the Rhynchosporion conservation status assessment. *Irish Wildlife Manuals,* No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin. Jones, M.B., Donnelly, A. and Albanito, F. (2006) Responses of Irish vegetation to future climate change. *Biology and Environment: Proceedings of the Royal Irish Academy* 106B(3): 323–334. NPWS (2014) *Review of Raised Bog Natural Heritage Area Network*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.	
7.3 Additional information *Optional*	Peat extraction (C05): a slight decrease in turf-cutting within the current 62 SACs and 36 retained NHAs has been reported. However, activity continued at 22 SACs and 6 NHAs in 2018. The NHA Review (NPWS, 2014) reported 518 plots actively cut within the proposed new 25 NHAs before 2014. An internal assessment by NPWS in 2018 estimated 83 plots were actively cut within the proposed new 2 SACs in the 2014-2016 period. Turf cutting activity within NHA sites proposed for de-designation is likely to increase in the future. The condition assessments undertaken in the reporting period has indicated that turf cutting continues to threaten the Future prospects for DRB at 9 of the 28 sites assessed. The Department of Culture, Heritage and the Gaeltacht (DCHG) has committed significant resources to eliminating the impacts from turf cutting activity within the designated sites. This includes the application of the Cessation of Turf Cutting Compensation Scheme (CTCCS) to the retained NHAs, implementation of a turf cutting relocation programme and Article 6(3) investigations to establish if turf cutting is feasible within circumscribed parts of a limited number of SACs without impacting on the integrity of the site. These measures will reduce turf cutting trends within the proposed network of designated sites in the next two reporting periods. Drainage (K02): the condition assessments undertaken in the reporting period have indicated that drainage continues to threaten the Future prospects for DRB at all 28 sites assessed. In addition, using recent aerial photography a visual assessment of drainage activity at the cutover within current SACs and retained NHAs has confirmed the increasing negative pressure from this activity, as	

	previously reported in 2014 by Fernandez *et al*. Both the implementation of Drainage Management Plans for designated sites, and site-specific restoration plans are expected to decrease this activity's negative trend in the next two reporting periods. The implementation of some of these restoration plans has been already initiated. Burning (A11): condition assessments undertaken in the reporting period and anecdotal accounts have indicated that burning continues to threaten the Future prospects for ARB at 6 of the 28 sites assessed. Although no information on activity trends is available in the current period, an ongoing decreasing trend, as already reported by Fernandez *et al*. (2014), is expected. Furthermore, burning is largely associated with turf cutting activity and an overall decreasing trend, particularly within the network of designated sites, is expected in the next two reporting years. A similar trend is therefore given to burning. Forestry (B01): condition assessments undertaken in the reporting period have indicated that forestry continues to threaten the Future prospects for DRB at 4 of the 28 sites assessed. Removal of conifer plantations was undertaken by Coillte within the reporting period as part of their second raised bog LIFE restoration project. Conifer plantations have been recorded at 28 designated sites (62 current SACs and 36 retained NHAs) during this assessment. The removal of conifer plantations is proposed as part of the site-specific restoration plans. Thus, the implementation of the plans is expected to reduce the pressure from this activity on raised bog habitats within the network of designated sites in the next two reporting periods. The role of Coillte (the State forestry company) will be essential in the process. Invasive (I02) and problematic native species (I04): condition assessments undertaken in the reporting period have indicated that invasive species continue to threaten the Future prospects for DRB at 6 of the 28 sites assessed. There is no evidence of an increasing trend in invasive or problematic native species in the current period. Although invasive species are deemed to cause negative impacts in a limited number of sites, they are not in general considered a major threat to raised bog habitats. In addition, the implementation of site-specific restoration plans is likely to reduce the pressure from problematic native species. An overall decreasing trend within the proposed network of designated sites is expected within the next two reporting periods. There are increasing concerns about the potential negative impacts on raised bog habitats from climate change and at a more localised level from air pollution (nitrogen deposition) in recent years. Further investigations and monitoring to understand the potential impacts on raised bogs habitat from air pollution is needed. Although there is a certain level of uncertainty on how climate change will affect raised bogs (Desmond *et al*., 2017), other studies (e.g. Jones *et al*., 2006) have predicted significant habitat losses as a consequence of climate change. The implementation of restoration works, mostly planned within the proposed network of designated sites, will increase their resilience and thus capacity to cope with drier periods of time.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* ***d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')***
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* ***c) Long-term results (after 2030)***
8.5 List of main conservation measures	**CC02** Adapt/manage exploitation of energy resources **CI03** Management, control or eradication of other invasive alien species **CI05** Management of problematic native species **CJ03** Restore habitats impacted by multi-purpose hydrological changes
8.6 Additional information *Optional*	A substantial body of work as regards management and conservation of peatlands has been undertaken since the 2013 assessment (NPWS, 2013). This includes the publishing of the following documents and the implementation of some of the actions proposed within them: The National Peatlands Strategy (NPWS, 2015); NHA Review (NPWS, 2014); The National Raised Bog SAC Management Plan (NPWS, 2017); Best Practise Restoration Guidelines (Mackin *et al.*, 2017). The National Peatlands Strategy (2015-2025 period) aims to provide a long-term framework for the management of Irish peatlands by setting out clear Values, Principles, Policies and Actions to be incorporated into the sectoral plans and policies of all Public

	Authorities and Semi-State bodies. The NHA Review (2014) proposed a reconfigured NHA network of 61 sites. It recommended the de-designation of 46 of the existing NHA sites (seven to be partially de-designated) and the designation of 25 new sites as well as the overall cessation of turf-cutting activity within the retained sites. The National Raised Bog SAC Management Plan sets national conservation objectives and restoration targets for raised bog habitats that require full restoration works within the national network of raised bog SACs and NHAs (CC02, CI03, CI05, CJ03). SSCOs and restoration plans have been developed for all SACs and are currently being developed for the remaining NHAs. In addition, Drainage Management Plans, which will provide guidelines for the management of peripheral drainage, are currently being developed for all SACs. In addition, the Peatlands Community Engagement Scheme was established in 2017 by the DCHG. The scheme seeks to encourage local communities, groups, schools and individuals to engage with the Department in relation to the conservation and management of raised bog SACs, NHAs and other raised bog areas (CI03, CI05, CJ03). Furthermore, the Irish Community Wetlands Forum (http://www.communitywetlandsforum.ie/) with many members and groups already working on the conservation of raised bogs has recently been established. Restoration works: overall a limited number of restoration works have been undertaken in the reporting period. BnM undertook the largest raised bog restoration effort during this period and restoration works (CI03, CI05, CJ03) have been initiated and are ongoing at many other sites. The SAC Management Plan commits to implementing restoration works within the network (64 SACs and 61 NHAs) in less than 20 years (2017-2036). The Raised Bog LIFE project (2016-2020) is aiming to implement all restoration works needed at 12 SACs (with good progress to date). DCHG initiated a programme of restoration works within State-owned land within SACs and NHAs and also commenced further restoration works within three other sites in partnership with Coillte. The CTCCS (CC02), established in April 2011 to compensate land owners and turbary right holders affected by the restrictions on turf cutting, continues to operate for SACs and was extended to NHAs in 2014. Over 3,300 applications within SACs and 640 within NHAs have been received by the DCHG to date, indicating both the significant amount of resources allocated to it and the high level of success. Turf cutting relocation programme (CC02): This is as an alternative to financial compensation under the CTCCS where turf-cutters could move from their plot within a designated site to a nearby non-designated bog where they could continue to source turf for their domestic use. According to the DCHG, approximately 12% (or 500 CTCCS applicants) had expressed an interest in relocation. To date arrangements have been made for the relocation of 67 turf-cutters to non-designated bog. In addition, relocation sites are in the advance stages of the process to relocate another approximately 94 turf-cutters.

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	*Good / **Poor** / Bad / Unknown*
	b) Area	*Good / Poor / **Bad** / Unknown*
	c) Structure and functions	*Good / Poor / **Bad** / Unknown*
9.2 Additional information *Optional*	Future prospects have been assessed at 28 raised bogs in the reporting period. A total of 20 sites have been given an Unfavourable-Bad/declining assessment, two sites Unfavourable-Bad/stable and six sites Unfavourable-Bad/improving. Due to the relatively limited number of sites assessed in this reporting period, the DRB Future prospects national assessment is based not only on the reported influence on the habitat of both negative (e.g. turf cutting, drainage maintenance) and positive activities (e.g. restoration plans and drainage management plans) but also on their reported trends (section 7.3) and how these are likely to vary at national level in the following two reporting periods. The assessment also takes into consideration the level of implementation of conservation measures in the current reporting period and how these are likely to positively affect the habitat in the next twelve years. Significant resources have been committed by the DCHG to reduce the negative impacts of the main impacting activities (Peat extraction (C05), Drainage (K02), Forestry (B01) and Burning (A11)). Measures include the CTCCS, the turf cutting relocation programme, Article 6(3) investigations, the development of site-specific restoration plans and the implementation of restoration works. More recently, there has been the development of Drainage Management Plans (see section 8.6 for further detail). In addition, further restoration actions have been undertaken by BnM and Coillte. BnM have significantly increased restoration efforts since 2013. As a result, appreciable decreasing trends in negative activities and increasing trends in conservation actions are expected within the network of designated sites in the next two reporting periods (see section 7.3). Increasing concerns about the potential negative impacts on raised bog habitats from air pollution (nitrogen deposition) and climate change are yet to be fully quantified. Climate change is a potential major threat to the survival of remaining DRB sites currently in poor condition since their degraded status means they inherently lack ecosystem resilience. The full implementation of the measures outlined in the National Raised Bog SAC Management Plan will significantly improve the Future prospects of DRB. However, based on the balance between implementation of management actions within the reporting period and the persistence of negatively impacting activities, each of the main attributes have been assessed as follows: Range: The proposed reconfiguration of the network of designated sites (62 SACs – includes 2 new SACs; and 61 NHAs – includes 25 new NHAs; NPWS (2014, 2017)) is deemed to better protect the habitat's geographical Range. The designation of the proposed 2 new SACs and 25 new NHAs has not progressed and thus these sites are not	

	afforded statutory protection, and so there is an absence of measures being implemented to halt negative impacts. In summary, taking into account the balance between negative and positive actions described above, Range is given Poor Future prospects. NPWS (2013) already gave a Favourable/decreasing Future prospects to DRB Range. Area and Structure and functions: both have been given an Unfavourable-Bad assessment and decreasing and declining trends in the short and long Term. Both are given Bad Future prospects, taking into consideration the balance between negative and positive actions within the reported period and level of uncertainty as regards threatening activities' future trends. Future prospects: Overall DRB is given Bad Future prospects. This is likely to significantly change in the next conservation status assessment report provided the actions proposed in the SAC Management Plan are implemented in the next reporting period.

10 Conclusions

Assessment of conservation status at end of reporting period

10.1 Range	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
10.2 Area	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / **deteriorating** / stable / unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/**NO***	*YES/**NO***
	b) yes, due to genuine change	*YES/NO*	*YES/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	*YES/NO*

	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	The new Range assessment (Unfavourable-Bad) differs from the previous assessment (Favourable). The new range is based on the new area national target, which is based on converting all DRB in the country to ARB; as a result the FRR target is 0.0 km^2, which implies an Unfavourable-Bad Range assessment. Structure and functions have also been given a different assessment in this reporting period than the previous reporting period. Site condition assessments undertaken in the reporting period have indicated an Unfavourable-Bad/declining trend in the habitat's quality (Structure and functions) versus an Unfavourable-Inadequate/declining assessment given in 2013 (NPWS, 2013) (see section 6.8). Overall, although it can be expected that there will be a decrease in negatively and an increase in positively impacting activities, this will mostly depend on the implementation of the National Raised Bog SAC Management Plan.		

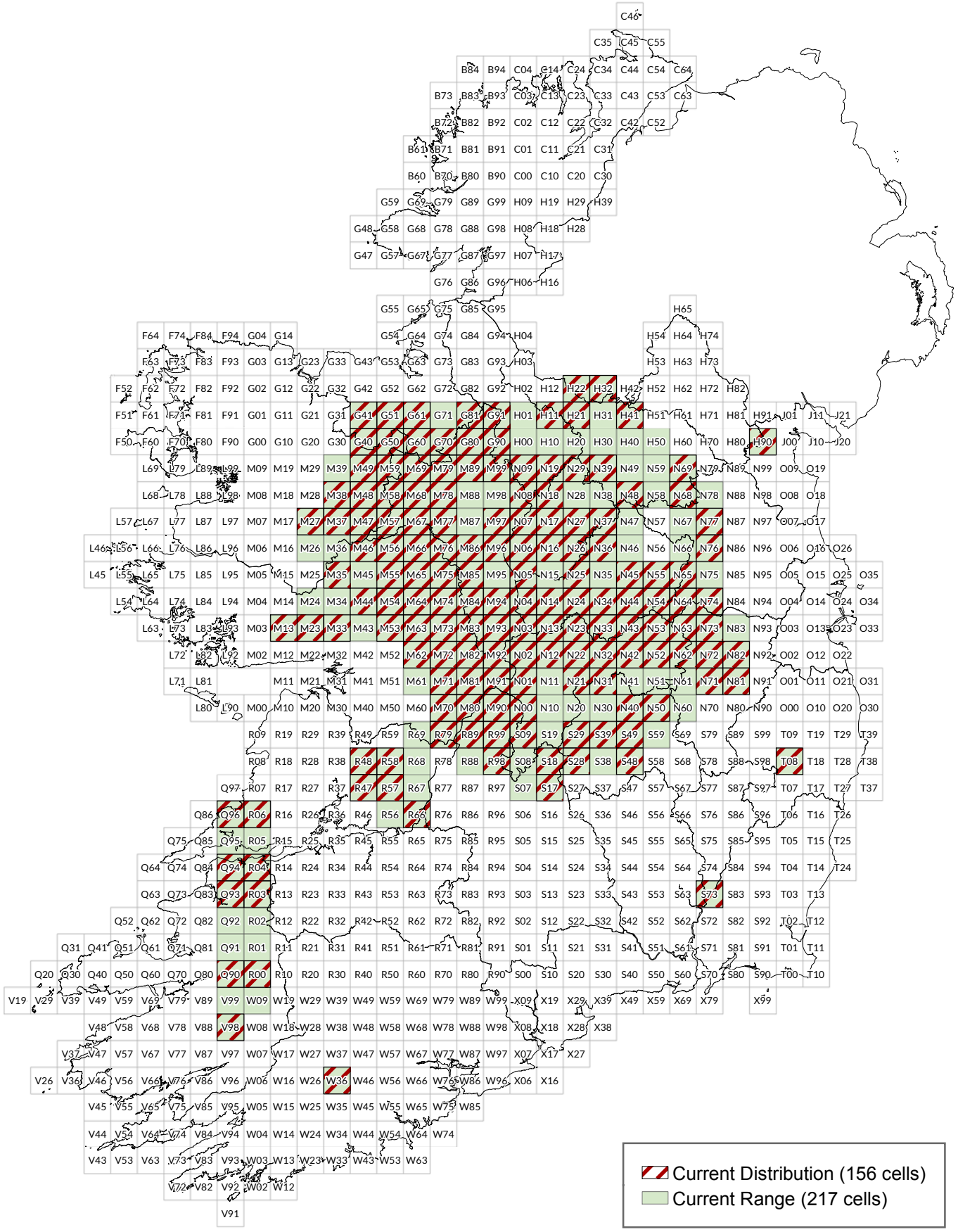
11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km^2 in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***12.18 km^2***
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

11.4 Short-term trend of habitat area in good condition within the network **Direction**	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* *stable / increasing / **decreasing** / uncertain/ unknown*
11.5 Short-term trend of habitat area in good condition within network **Method used**	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
11.6 Additional information *Optional*	The figure provided above (12.18 km^2), which represents 48.72% of the entire national extent (25 km^2), corresponds with the extent of the habitat within the 62 SACs for which the habitat is a Qualifying Interest (QI) (11.73 km^2) and an additional 0.45km^2 within SACs for which DRB is not QI. These recent figures are derived from eco-hydrological modelling and it is substantially smaller than the figure of 10,368 ha reported in 2013 (NPWS, 2014). The reason for this difference is mostly due to the new interpretation of the habitat based on the eco-hydrological model and thus the figure does not correspond with such a large reduction in the habitat's extent. Nevertheless, a decreasing trend has been reported within the few SAC raised bogs assessed within the current reporting period (2013-2018). ARB habitat area is deemed to be below FRA for all 62 raised bog SACs and so the overall habitat condition for each of them is Unfavourable. Based on the close ecological relationship between ARB and DRB it is considered that, should Favourable conservation condition for ARB be achieved on a site, then, as a consequence, Favourable conservation condition for DRB would also be achieved. As a result, DRB is not considered to be in good condition in any of the 62 raised bog SACs. DRB has been given a decreasing trend in the short term at national level. This is based on site condition assessments undertaken in this period. These assessments were mostly done within SACs. As a result, a decreasing trend is also given to DRB within the Natura 2000 network in the 2007-2018 period. The actual extent of this decrease is unknown. DRB has been given a decreasing trend in the short term at national level. This is based on site condition assessments undertaken in this period. These assessments were mostly done within SACs. As a result, a decreasing trend is also given to DRB within the Natura 2000 network in the 2007-2018 period. The actual extent of this decrease is unknown.

12 Complementary information

Degraded raised bogs (7120)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Mapáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**7130 Blanket bogs (* if active bog)**
1.2i Habitat short name	**Blanket bog (*active)**
1.3i Habitat description	Development of blanket bog is largely controlled by climatic factors i.e. cool summers, high rainfall (> 1,250 mm) with more than 225 rain days per annum and very high atmospheric humidity (Hammond, 1981). The habitat may be broadly divided into upland and lowland types, though Schouten (1984) also distinguishes an intermediate or highland (altitude >150 and <300m) type. Blanket bog occurs on minimum peat thicknesses of typically 0.50 m whereas shallower peats support heath habitats. Peat thicknesses are generally c. 1 to 2 m in uplands but can be up to 8 m in lowlands. Blanket bog generally occurs on flat or gently sloping terrain but can occur on steeper ground (up to 40°) in the wettest districts. It often occurs in a complex mosaic with heath, transition mire, fen and freshwater habitats. The phytosociological vegetation communities of lowland Atlantic blanket bog in Ireland have been described by Braun-Blanquet & Tüxen (1952), Moore (1968), Dierssen (1982) and Doyle (1982). The ombrogenous expanses of these bogs are mostly within the Oxycocco-Sphagnetea vegetation class, while the vegetation of flushes and runnels are generally within the Scheuchzerio-Caricetea nigrae class. The association Pleurozio purpureae-Ericetum tetralicis is most typically associated with ombrotrophic areas of this bog type. The character species for this association as defined by Doyle and Moore (1980) are the liverwort *Pleurozia purpurea*, the moss *Campylopus atrovirens* and Black Bog-rush (*Schoenus nigricans*). White-beaked Sedge (*Rhynchospora alba*) is also an important species in the deeper areas of lowland Atlantic blanket bog. The absence of the Oxycocco-Sphagnetea class character species Bog Rosemary (*Andromeda polifolia*) and Cranberry (*Vaccinium oxycoccos*) from Atlantic Blanket Bog vegetation further distinguishes this bog type from raised bog vegetation in Ireland. Species preferential to lowland Atlantic blanket bog include the Lusitanian Butterwort (*Pinguicula lusitanica*), Bog Lousewort (*Pedicularis sylvatica*) and Milkwort (*Polygala serpyllifolia*), and in bog pools Pipewort (*Eriocaulon aquaticum*) and Water Lobelia (*Lobelia dortmanna*) (Schouten, 1984). The vegetation communities of mountain blanket bog may be classified within the ombrotrophic bog class Oxycocco-Sphagnetea and are dominated by the associations Trichcophoreto-Eriophororetum vaginatum and Vaccinio-Ericetum tetralicis. Typical species composition of mountain blanket bogs includes a dominance of Ling Heather (*Calluna vulgaris*), Bog Cottons (*Eriophorum vaginatum,* and some *Eriophorum angustifolium*) and Deer Grass (*Trichophorum germanicum*) together with the more typical montane species Crowberry (*Empetrum nigrum*) and Bilberry (*Vaccinium myrtillus)*, and the liverwort *Diplophyllum albicans* (Moore, 1962). Species of lowland and highland blanket bogs such as

	Purple Moor-grass (*Molinia caerulea*) and Cross-leaved Heath (*Erica tetralix*) are, in general, very scarce. *Racomitrium lanuginosum* is often a very widespread moss in mountain blanket bogs and is an important component species of most Irish mountain blanket bogs. Schouten (1984) commented on floristic differences between western and eastern mountain blanket bogs, with the former found to have *Molinia caerulea, Pedicularis sylvatica, Polygala serpyllifolia,* Tormentil (*Potentilla erecta*), the liverwort *Pleurozia purpurea,* the moss *Campylopus atrovirens* and a lesser contribution from sphagna than the eastern mountain bogs, which have a higher *Sphagnum* content and often contain species characteristic of true midland raised bogs (Hammond, 1981), *Andromeda polifolia* and *Vaccinium oxycoccos.* Lichens of the *Cladonia* genus are a characteristic feature of both upland and lowland blanket bog. According to the Irish Vegetation Classification (Perrin, 2017), all communities of the *Rhynchospora alba-Sphagnum cuspidatum* (BG1) and *Erica tetralix-Sphagnum capillifolium* (BG2) bog groups can occur in habitat 7130. Areas of 'active' and 'inactive' blanket bog habitat qualify as the Annex I 7130 habitat. The former is defined as supporting significant areas of vegetation that are normally peat-forming (e.g. *Schoenus nigricans, Molinia caerulea, Eriophorum* spp. and *Sphagnum* spp.) and accorded priority status under the Habitats Directive. Plant communities and micro-topography of 'active', or peat-forming, blanket bog can be very variable. 'Inactive' blanket bog is a poorly-defined term as yet and its precise definition will depend on rates of recovery of blanket bog vegetation, ecohydrology and peat-forming function. Regarding what qualifies as the priority Annex I habitat 'active' blanket bog, the current approach of the NPWS National Survey of Upland Habitats (NSUH) is to discount: afforested areas; unvegetated areas of milled or cutover blanket bog; and areas of bare peat that are eroding. Areas of eroded bog that have recolonised with swards of *Eriophorum angustifolium* are classed as 'inactive' bog as they have few peat-forming species. The NSUH classified habitats according to their current vegetation, which means that where heath species have replaced bog species on desiccated blanket bog these areas may be classified as either 4010 Wet heath or 4030 Dry heath. The conservation assessment presented here is for the combined classes, 'active' and 'inactive', as historically these have not been clearly differentiated in habitat mapping. Recent research and conservation projects (e.g. INTERREG CABB and EPA QUBBES) and surveys (e.g. NSUH and other NPWS blanket bog surveys; Galway County Council, 2017; Tubridy *et al.*, 2015) are attempting to record appropriate data to better define these classes.

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***1949-2017***
2.2 Distribution map	Submitted

2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was derived from a polygon shapefile and a point shapefile. These shapefiles were created by compiling relevant data which referred to habitat 7130 or Fossitt code PB2 or PB3 (Fossitt 2000) in their attributes. Sources include Barron (2017), Barron & Daly (2015), Coillte Biodiversity Dataset (various dates), Crushell *et al.* (2015), Douglas *et al.* (1990), Foss *et al.* (2014, 2015), Galway County Council (2017), Hodd (2016), Hodd & Barron (2015), Madden & Conaghan (2001), Martin (2016), Moran & Wilson-Parr (2015), O'Neill & Martin (2018), Perrin (2017) which comprises data ranging from 1949 to 2014, Perrin *et al.* (2014a, 2014b), and Tubridy *et al.* (2015). In addition to these, sources utilised for the distribution map from the last reporting period (NPWS 2013a) were also included: 13 National Survey of Upland Habitats (NSUH) sites (Perrin *et al.*, 2011, 2012, 2013a-e; Roche *et al.*, 2009, 2010a,b, 2011a,b, 2012a), Anon. (1998, 2005), Barron & Perrin (2010, 2011), Ballycroy, Connemara and Glenveagh National Park Habitat Maps, Crushell & Foss (2008), Crushell & O'Callaghan (2008), Hickey & Tubridy (2009), Murphy & Fernandez (2009), NPWS (2013b), NPWS Habitat Assignment Project, Wilson (2009), and Wilson & Foss (2011). GIS files from the Carlow Pilot Habitat Mapping Project (Carlow County Council), the Cavan Wetland Survey (Cavan County Council), Dún Laoghaire-Rathdown habitat survey (Dún Laoghaire-Rathdown County Council), the Mayo Local Area Surveys (Mayo County Council) and the Uplands and Peatlands Grazing Survey (NPWS) were also utilised for the distribution map from the last reporting period (NPWS 2013a). All references are detailed below in Section 3.2. A certainty rating system was applied to all data that informed the distribution map. This system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1 the lowest. Of the new data sources added since the last round of reporting (NPWS, 2013a), the following were all judged to be a high certainty of 3: Barron & Daly (2015), Crushell *et al.* (2015), Foss *et al*. (2014, 2015), Galway County Council (2017), Hodd (2016), Hodd & Barron (2015), Martin (2016), O'Neill & Martin (2018), and Perrin *et al*. (2014a, 2014b). For Tubridy *et al.* (2015) some 7130 polygons contain the vegetation community "TcEangBGca" which was listed as "*Trichophorum – Eriophorum angustifolium* Blanket bog/Wet heath" in Appendix 3. "TcEangBGca" has been taken to be a transitional community between wet heath and blanket bog for the purposes of this assessment. Polygons containing this community were assigned a certainty of 2 if no other 7130 vegetation community was recorded, and a certainty of 3 if another 7130 vegetation community was present. Polygons surveyed

	by aerial photograph interpretation (API) only were also assigned a certainty of 2. Polygons from Moran & Wilson-Parr (2015) which were ground-truthed were given a certainty of 3, while those carried out by API only were assigned a certainty of 2. Data from Douglas *et al.* (1990) and Madden & Conaghan (2001) were assigned a certainty of 2. Douglas *et al.* (1990) was assigned a certainty of 2 due to the age of the survey, while Madden & Conaghan (2001) was assigned a certainty of 2 as the location is based on a sketch drawn on a six-inch map within the report. The Coillte Biodiversity Dataset polygons were assigned a certainty of 1 for those which were not ground-truthed, and a certainty of 2 for those which were. Certainty 3s were not assigned to the Coillte Biodiversity Dataset due to the age of the data (surveyed in early 2000s). Data from Perrin (2017) have no habitat data included, only affinities to Annex I habitats. Those with a higher affinity to habitat 7130 over other Annex I habitats were assigned a certainty of 2. Those with a higher affinity to another Annex I habitat over habitat 7130 were assigned a certainty of 1. Certainty values from the datasets utilised during the last reporting period were not reassigned for the purposes of the distribution map as the classes within the certainty rating system are fairly broad. All polygons and points with certainty 1 to 3 were used to map the distribution for the 7130 habitat.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Anon. (1998) Manual for the preparation of Commonage Framework Plans. National Parks and Wildlife Service and Department of Forestry and Food. Ireland. Anon. (2005) Galway City Habitat Inventory. Unpublished report by Natura Environmental Consultants for Galway City Council. Barron S.J. (2017) Phase 1 of the scientific work to inform a system for the management of turf-cutting in designated blanket bog SACs and NHAs: Turf-cutting GIS Review Volumes 1 and 2 DRAFT. Unpublished draft report to National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. Barron S.J. & Daly O.H. (2015) Phase 1 of the scientific work to inform a system for the management of turf-cutting in designated blanket bog SACs and NHAs: Phase 1 Over-arching report – DRAFT. Unpublished draft report to National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin Barron, S. & Perrin, P. (2010) Review and amendment of GIS mapping for blanket bog NHAs. Unpublished report to National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin.

	Barron, S. & Perrin, P. (2011) Production of a habitat map for Killarney National Park, Co. Kerry. Unpublished report to National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Ballycroy National Park Habitat Map is an NPWS project which compiled habitat data from available information. Datasets used were from 1991-2009. Carlow Pilot Habitat Mapping Project. GIS files for this Carlow County Council habitat survey were available. Cavan Wetland Survey. GIS files for this Cavan County Council habitat survey were available. COFORD (2016) Land Availability for Afforestation – Exploring opportunities for expanding Ireland's forest resource. COFORD, Dublin. http://www.coford.ie/media/coford/content/publications/coforarticles/LandAvailabAfforestation130116.pdf Coillte Biodiversity Dataset. GIS files and individual site management plans were made available by Coillte. Datasets used were from 2000 to 2005. Coll, J., Bourke, D., Gormally, M., Sheehy Skeffington, M. and Sweeney, J. (2012) Winners and Losers: Climate change impacts on biodiversity in Ireland. Report Series No. 19. Environmental Protection Agency, Johnstown Castle, Ireland. https://www.epa.ie/pubs/reports/research/climate/CCRP_19.pdf Coll, J., Bourke, D., Sheehy Skeffington, M., Gormally, M. and Sweeney, J. (2014) Projected loss of active blanket bogs in Ireland. Climate Research, 59, 103-115. https://www.researchgate.net/publication/257991879_Projected_loss_of_active_blanket_bogs_in_Ireland Crushell, P. & Foss, P.J. (2008) The County Clare Wetlands Survey Desk Survey & GIS Preparation. Report prepared for Clare County Council, Ireland. Crushell, P. & O'Callaghan, R.J. (2008) A survey of Red Grouse (*Lagopus lagopus*) habitat in Ireland 2007-2008: an assessment of habitat condition and land-use impacts. Unpublished report to Birdwatch Ireland & the National Parks and Wildlife Service. Crushell, P., Foss, P.J. & Kirwan, B. (2015) Kerry Wetland Survey II. Report prepared for Kerry County Council.Connemara National Park Habitat Map is an NPWS map based on aerial photographic interpretation and field visits conducted by G. Kaule from the University of Stuttgart in 2008. Douglas, C., Dunnells, D., Scally, L. & Wyse Jackson, M. (1990) A survey to locate lowland blanket bogs of scientific interest in county Donegal and upland blanket bogs in counties Cavan, Leitrim and Roscommon. NPWS, Dublin, Ireland. Dún Laoghaire Rathdown habitat survey 2011. GIS files for this Dún Laoghaire Rathdown County Council habitat survey were made available. European Commission (eip-agri): 'A sustainable agricultural plan for the MacGillycuddy Reeks – Conservation and restoration of upland habitat in the MacGillycuddy Reeks'. https://ec.europa.eu/eip/agriculture/en/find-connect/projects/sustainable-agricultural-plan-macgillycuddy-

reeks
European Commission (eip-agri): 'Blackstairs farming futures (BFF) Sustainable farming project in the Blackstairs Mountains'. https://ec.europa.eu/eip/agriculture/en/find-connect/projects/blackstairs-farming-futures-bff-sustainable
European Commission (eip-agri): 'Sustainable Uplands Agri-environment Scheme (SUAS)'. https://ec.europa.eu/eip/agriculture/en/find-connect/projects/sustainable-uplands-agri-environment-scheme-suas
Forest Service, Department of Agriculture, Food and the Marine (2015) Forestry Programme 2014-2020: IRELAND. Submitted in accordance with European Union Guidelines on State aid for agriculture and forestry and in rural areas 2014 to 2020. https://www.agriculture.gov.ie/media/migration/forestry/forestryprogramme2014-2020/IRELANDForestryProgramme20142020230215.pdf
Foss, P.J., Crushell, P., Kirwan, B., O'Loughlin, B. & Wilson, F. (2014) Louth Wetland Survey III. Part 1: Main Report. Report prepared for Louth County Council and The Heritage Council.
Foss, P.J., Crushell, P. & Kirwan, B. (2015) County Waterford Wetland Survey. Part 1: Main Report. Report prepared for Waterford City & County Council.
Fossitt, J.A. (2000) *A guide to habitats in Ireland*. The Heritage Council, Kilkenny. https://www.npws.ie/sites/default/files/publications/pdf/A%20Guide%20to%20Habitats%20in%20Ireland%20-%20Fossitt.pdf
Galway County Council (2017) Unpublished data collected for the Galway City Transport Project.
Glenveagh National Park Habitat Map is an NPWS map produced in 2010 based on the NHA survey data collected between 1991 and 1994 and on work completed by Linda Weekes. The map is derived from the best information available at the time, site visits and aerial photograph interpretation.
GSI: https://www.gsi.ie/documents/GSI_Newsletter_No09.pdf (page 8).
Habitat Assignment Project. An NPWS spreadsheet noting the qualifying interest of SACs and other habitats which occur in SACs, NHAs and pNHAs. This table was used as a reference for incorporating polygon data for SACs, NHAs and pNHAs.
Hammond, R.F. (1981) The Peatlands of Ireland. Soil Survey Bulletin No. 35, 2nd edition. An Foras Talúntais, 19 Sandymount Avenue, Dublin 4.
Hickey, B. & Tubridy, M. (2009) Habitats Survey (Phase V) County Laois. Unpublished report by Mary Tubridy and Associates for Laois Heritage Forum.
Hodd, R.L. (2016) Survey of Flora Protection Order Bryophytes 2016. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.
Hodd, R. & Barron, S. (2015) An assessment of damaged habitat on Sliabh Beagh, Cos Monaghan, Tyrone and Fermanagh, using aerial imagery. Unpublished report for Blackwater Regional Partnership.

IUCN UK Peatland Programme (2014) IUCN UK Committee Peatland Programme Position Statement: Burning and Peatlands. http://www.iucn-uk-peatlandprogramme.org/sites/www.iucn-uk-peatlandprogramme.org/files/170518%20Peatlands%20and%20Burning%20position%20statement_amended.pdf

JNCC (2009) Common Standards Monitoring Guidance for Upland Habitats. Joint Nature Conservation Committee, Peterborough.

Joint Research Centre (2014) Forest Fires in Europe, Middle East and North Africa 2013. Joint report of JRC and Directorate-General Environment. http://effis.jrc.ec.europa.eu/media/cms_page_media/40/FireReport2013_final2pdf_2.pdf

Joint Research Centre (2015) Forest Fires in Europe, Middle East and North Africa 2014. Joint report of JRC and Directorate-General Environment. http://effis.jrc.ec.europa.eu/media/cms_page_media/40/Forest_fires_in_Europe_Middle_east_and_North_Africa_2014_final_pdf_YNHDYbP.pdf

Joint Research Centre (2016) Forest Fires in Europe, Middle East and North Africa 2015. Joint report of JRC and Directorate-General Environment. http://effis.jrc.ec.europa.eu/media/cms_page_media/40/Forest_fires_in_Europe_Middle_east_and_North_Africa_2015_final_pdf_JkX4Yl3.pdf

Joint Research Centre (2017) Forest Fires in Europe, Middle East and North Africa 2016. Joint report of JRC and Directorate-General Environment. http://effis.jrc.ec.europa.eu/media/cms_page_media/40/Forest_fires_in_Europe_Middle_east_and_North_Africa_2016_final_pdf_JZU7HeL.pdf

Kelly, K., Twamley-Stein, G.T. & Higgins, G.T. (n.d.) Preliminary Report on the Mount Brandon Nature Reserve Grazing Project. Unpublished report submitted to NPWS.

Lindsay, R., Birnie, R. & Clough, J. (2014a) IUCN UK Committee Peatland Programme Briefing Note No. 4 Ecological Impacts of Forestry on Peatlands. http://www.iucn-uk-peatlandprogramme.org/sites/www.iucn-uk-peatlandprogramme.org/files/4%20Forestry%20final%20-%205th%20November%202014.pdf

Lindsay, R., Birnie, R. & Clough, J. (2014b) IUCN UK Committee Peatland Programme Briefing Note No. 3 Impacts of Artificial Drainage on Peatlands. http://www.iucn-uk-peatlandprogramme.org/sites/www.iucn-uk-peatlandprogramme.org/files/3%20Drainage%20final%20-%205th%20November%202014.pdf

Madden, B and Conaghan, J. (2001) Baseline Survey of Blanket Bog Site at Slieve Bearnagh, Co. Clare. Report prepared by Biosphere Environmental Services.

Martin, J.R. (2016) Appropriate Assessment Screening Report for a proposed upgrade of Crolly Water Treatment Plant, Co. Donegal. Unpublished Report by BEC Consultants Ltd.

Mayo Local Area Surveys. GIS files for this Mayo County Council habitat survey of nine towns in Co. Mayo completed by Atkins

Ireland were made available.
Moran, P. & Wilson-Parr, R. (2015) Hen Harrier Special Protection Area (SPA) Habitat Mapping Project 2014. Irish Wildlife Manuals, No. 83. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/IWM83.pdf
Murphy, S. & Fernandez, F. (2009) The development of methodologies to assess the conservation status of limestone pavement and associated habitats in Ireland. Irish Wildlife Manuals, No. 43. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/IWM43.pdf
NPWS (2007) The status of EU protected species and habitats in Ireland, Volume 3. National Parks and Wildlife Service. Department of Environment, Heritage and Local Government, Dublin, Ireland.
NPWS (2013a) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin. https://www.npws.ie/sites/default/files/publications/pdf/Article_17_Print_Vol_2_report_habitats_v1_1_0.pdf
NPWS (2013b) Management Planning Support Unit Maps 2405_imap95 (CPU_Habitats_March_2012.shp).
O'Neill, F.H. & Martin, J.R. (2018) The Irish Juniper Monitoring Survey 2017. Irish Wildlife Manuals, No. 101. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.
Perrin, P. (2017) Irish Vegetation Classification: Technical Progress Report No. 3. Report submitted to National Biodiversity Data Centre. http://www.biodiversityireland.ie/projects/national-vegetation-database/irish-vegetation-classification/explore/
Perrin, P.M., Roche, J.R. & Barron, S.J. (2011) National Survey of Upland Habitats (Phase 1, 2010 - 2012) Site Report No 1: Mweelrea, Sheeffry, Erriff Complex SAC (001932), Co. Mayo. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH10_Mweelrea_Sheeffry_Erriff_Report_01c_M.pdf
Perrin, P.M., Roche, J.R., Barron, S.J. & Daly, O.H. (2012) National Survey of Upland Habitats (Phase 2, 2011-2012), Site Report No. 7: Mount Brandon SAC (000375), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH11_Mount_Brandon_Report_01b_M.pdf
Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013a). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 10: Ox Mountains Bogs SAC (002006), Cos. Mayo and Sligo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht,

	Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Ox_Mountains_Bogs_Report_01b_M.pdf Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013b). National Survey of Upland Habitats (Phase 3, 2012-2013), Draft Site Report No. 11: Ben Bulben, Gleniff and Glenade Complex SAC (000623), Co. Sligo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013c). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 12: Arroo Mountain SAC (001403), Co. Leitrim. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Arroo_Mountain_Report_01b_M.pdf Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013d). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 13: Cuilcagh – Anierin Uplands SAC (000584), Cos. Cavan and Leitrim. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Cuilcagh_Anierin_Uplands_Report_01b_M.pdf Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013e). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 14: Slieve League SAC (000189), Co. Donegal. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Slieve_League_Report_01b_M.pdf Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014a). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 15: Slieve Mish Mountains SAC (002185), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH13_Slieve_Mish_Mountains_01b_M.pdf Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014b). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 16: Caha Mountains SAC (000093), Cos. Cork and Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH13_Caha_Mountains_01b_M.pdf Perrin, P.M., Barron, S.J., Roche, J.R. & O'Hanrahan, B. (2014c) Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland. Version 2.0. *Irish Wildlife Manuals*, No. 79. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/IWM79.pdf

	Renou-Wilson, F., Bolger, T., Bullock, C., Convery, F., Curry, J., Ward, S., Wilson, D. & Müller, C. (2011) BOGLAND: Sustainable Management of Peatland in Ireland. Protocol Document. STRIVE Report Series No. 76. EPA Strive Programme 2007-2013. file:///C:/Users/sbarron/Downloads/STRIVE_76_Renouwilson_bogland_prn.pdf Renou-Wilson, F. & Wilson, D. (2018) Vulnerability assessment of peatlands: exploration of impacts and adaptation options in relation to climate change and extreme events (VAPOR). EPA Research Report No. 250. Environmental Protection Agency, Johnstown Castle, Ireland. http://www.epa.ie/researchandeducation/research/researchpublications/researchreports/Research_Report_250.pdf Roche, J.R., Perrin, P.M. & Barron, S.J. (2009) National Survey of Upland Habitats (Pilot Survey Phase, 2009-2010), Site Report No. 2: Corraun Plateau SAC (000485), Co. Mayo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/SPEU09_Corraun_Plateau_Report_01b_M.pdf Roche, J.R., Perrin, P.M. & Barron, S.J. (2010a) National Survey of Upland Habitats (Pilot Survey Phase, 2009-2010), Site Report No. 3: Comeragh Mountains SAC (001952), Co. Waterford. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/SPEU09_Comeragh_Mountains_Report_01b_M.pdf Roche, J.R., Perrin, P.M. & Barron, S.J. (2010b) National Survey of Upland Habitats (Pilot Survey Phase, 2009-2010), Site Report No. 4: Carlingford Mountain SAC (000453), Co. Louth. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/SPEU09_Carlingford_Mountain_Report_01b_M.pdf Roche, J.R., Perrin, P.M. & Barron, S.J. (2011a) National Survey of Upland Habitats (Phase 1, 2010 - 2012), Site Report No. 6: Croaghaun / Slievemore SAC (001955), Co. Mayo. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH10_Croaghaun_Slievemore_Report_01b_M.pdf Roche, J.R., Perrin, P.M. & Barron, S.J. (2011b) National Survey of Upland Habitats (Phase 1, 2010 - 2012), Draft Site Report No. 5: Nephin Mountain, Co. Mayo. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland. Roche, J.R., Perrin, P.M., Barron, S.J. & Daly, O.H. (2012a) National Survey of Upland Habitats (Phase 2, 2011-2012), Site Report No. 9: Galtee Mountains SAC (000646), Cos. Tipperary and Limerick. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH11_Galtee_Mountains_Report_01b_M.pdf

	Roche, J.R., Perrin, P.M., Barron, S.J. & Daly, O.H. (2012b) National Survey of Upland Habitats (Phase 2, 2011-2012), Draft Site Report No. 8: Killarney National Park, Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Tubridy, M., Iremonger, S., Hickey, B. and O'Hanrahan, B. (2015) Blackstairs Habitat Mapping and Biodiversity Audit 2015. Report for the Blackstairs Farming Group. Uplands and Peatlands Grazing Survey. GIS files for this NPWS project, completed in 2011, were available.Wilson, F. (2009) County Sligo Wetland Survey Phase II County Report. Unpublished report for Sligo County Council. Wilson, F. & Foss, P. (2011) The County Wicklow Wetland Survey. Report for Wicklow County Council and The Heritage Council. Zwart, K. (1994) A study of peatland erosion and its effects on aquatic ecosystems in Lough Feagh (Burrishoole) catchment. Van Hall Institute, Groningen/The Salmon Research Agency of Ireland Inc. Furnace.
3.2i Additional information	

4 Range

Range within the biogeographical/marine region concerned

4.1 Surface area	***47,100 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	

4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 47,100 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable reference range has been increased since the last reporting period (NPWS, 2013a) to reflect the improved level of knowledge. There is no evidence of loss of range since the Directive came into force and no enlargement of range is deemed necessary to ensure the long-term survival of the habitat.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods? **YES**/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/**NO***
	b) yes, due to improved knowledge/more accurate data	***YES**/NO*
	c) yes, due to the use of different method	*YES/**NO***
	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 7130 habitat. A maximum gap distance of two 10km grid cells was used when running the range tool. Short-term trend in Range was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013a). Data used for the short-term trend dated from 2007 to 2017, while those used for the long-term trend dated from 1994 to 2017. There were no recorded losses of area resulting in a loss of range at the sample sites covered by the NSUH during these two reporting periods. The short-term trend is stable. It should be noted that the NSUH surveyed two 7130 habitat sites within this reporting period compared with 13 sites in the last reporting period, therefore limiting the conclusions that can be made. The number of 10km squares in the range (471) is 12 squares higher than the last monitoring period (NPWS, 2013a). These changes are due to improved knowledge from surveys with data utilised in this reporting period: six squares from the Coillte Biodiversity Dataset, two from Perrin (2017) (Lackareagh, Clare and west of Lough Anaserd, Galway) and four squares from Tubridy *et al*. (2015) (the	

	Blackstairs Mountains) added to the range. Favourable Reference Range has been increased since the last reporting period (NPWS, 2013a) to reflect the improved level of knowledge. The Favourable Reference Range is the current range, reported in section 4.1.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***1949-2017***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***2,574.51 km^2***
5.3 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	stable */ increasing /* ***decreasing*** */ uncertain / unknown*	
5.11 Long-term trend Magnitude	**a) Minimum**	
	b) Maximum	

Optional	**c) Confidence interval**	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator > (more than) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	***YES****/NO*
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 1949 when bog and heath relevés were recorded by Braun-Blanquet and Tüxen (data utilised in Perrin, 2017) and incorporates updates made by surveys between 1959 and 2017 that are listed in section 3.2. Area was calculated from the polygon shapefile and point shapefile used for distribution. For each point record not intersecting with a polygon that was yielding an area, 1 km^2 of habitat was estimated. This is a conservative expert opinion based on the logic that the 7130 habitat can cover substantial areas. Points intersecting site boundaries of surveys carried out within the current reporting period, but not with 7130 habitat polygons, and points within 50 m of a 7130 polygon were examined individually, with 65 excluded for area due to their proximity to 7130 polygons. The default trend periods are presented above and are used to calculate the magnitude of annual loss; however the data used for the short-term trend dated from 2005 to 2011, while those used for the long-term trend dated from 1995 to 2011. During the current reporting period 17 datasets with 7130 habitat recorded within them were utilised; Area was only fully assessed by the NSUH datasets (Perrin *et al.*, 2014a, 2014b). The two NSUH sites (Caha Mountains SAC (000093) and Slieve Mish Mountains SAC (002185)) represent	

	1.2% of the total area of 7130 habitat recorded in Ireland, limiting the conclusions that can be made. Approximately 1.76 ha of 7130 habitat, within the two NSUH sites (Caha Mountains SAC (000093) and Slieve Mish Mountains SAC (002185)), were determined to be lost since 2005, mainly due to peat extraction, paths and tracks, and landslides (Perrin *et al.*, 2014a, 2014b). The total known area of 7130 habitat lost since 2005 is approximately 4.96 ha (1.76 ha from Perrin *et al.* (2014a, 2014b) and an additional 3.2 ha as reported by previous NSUH surveys). The magnitude of the known loss is therefore approximately -0.0002% per annum, measured over a period of 12 years, but actual losses are likely to be higher. Although the magnitude of known loss is <1% per annum, losses in 7130 habitat were recorded at twelve of the sixteen NSUH sites. This indicates that losses in area are likely to be occurring across the geographic spread of 7130 habitat in Ireland. There was a small reported gain in area (0.36 ha) since 2005 in the Slieve Mish Mountains SAC (002185) (Perrin *et al*., 2014a) due to revegetated bare ground and cutover peat, however this gain was not enough to counteract losses at either a site level or national level. Short-term trend in Area was deemed to be decreasing. There has not been a comprehensive mapping survey of this habitat in Ireland, with more detailed survey work of the 7130 habitat needed. It is expected that the area listed in section 5.2 will be refined as more in-depth mapping of the 7130 habitat is completed. In particular, any area represented within the dataset by only a point needs to be surveyed in more detail. In addition to refining the areas of 7130 habitat currently known, there are probably still areas of unmapped 7130 habitat within the country, particularly outside designated areas. The NSUH is currently incomplete and more examples of the 7130 habitat are likely to be found. The area value entered is therefore a minimum. Given that anthropogenic losses have occurred since the Directive came into force, Favourable Reference Area (FRA) is deemed to be greater, but by less than 10%, than the current area. FRA was reported as much greater (i.e. by more than 10%) than current area in the previous reporting period. The adjustment in the area figure is due to improved knowledge, with particular reference to the SABB project (Barron, 2017). Based on the data from all NSUH sites surveyed to date (15 SACs and 1 non-SAC), a total area loss since 1995 of 7.4 ha of 7130 habitat has been recorded, excluding losses from any form of peat cutting. Regarding the latter, the NPWS SABB project (Barron, 2017) calculated that, due to turf-cutting, a total of approximately 375.62 ha of 7130 habitat has been lost from the NSUH sites since 1995, with a further 1,315.88 ha of 7130 habitat lost from the rest of the SACs where 7130 is a Qualifying Interest (QI). Based on this suite of sites this amounts to a total magnitude of loss of -0.03% per annum measured over a period of 24 years. However, losses of Annex I blanket bog habitat outside the boundaries of protected sites (due to impacts such as afforestation, commercial and domestic peat cutting, windfarms, other infrastructure, drainage for agriculture and landslides) are largely unquantified and likely to be significantly greater.

	There were small reported gains in area (6.2 ha) since 1995, however these gains were not of sufficient magnitude to counteract losses at either the site where they occurred (Slieve Mish Mountains SAC (002185); Perrin *et al*., 2014a), or at a national level. Long-term trend in Area was deemed to be decreasing. The difference in habitat extent between this reporting period and the last is largely due to the availability of more accurate data of the area of habitat 7130, resulting in the refinement of some area estimates of the last reporting period. The majority of this refinement is within the Caha Mountains SAC (000093), Slieve Mish Mountains SAC (002185), Blackstairs Mountains and Slieve Bloom Mountains; however there are also refinements to area data from other parts of the country. Collectively 95.67 km^2 of 7130 habitat mapped in the last reporting period is replaced by 101.43 km^2 of 7130 habitat in this reporting period, resulting in a net gain of 5.76 km^2. In addition to this, the area value reported in the previous reporting period is further refined to account for areas of 7130 habitat (30.65 km^2 calculated from Barron, 2017) that had been included but which were, at the time of reporting, gone due to turf cutting before (SABB category 1 – seriously impacted (i.e. gone) by 1995) and also after (SABB categories 3 and 6 – seriously impacted by 2012) the Habitats Directive came into force. Other surveys in the current reporting period have resulted in the addition of 312.62 km^2 of 7130 habitat which had not previously been mapped. This refinement results in an area of 2,574.51 km^2 of 7130 habitat (((2,286.78 + 5.76) – 30.65) + 312.62 = 2,574.51 km^2).

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***1,340.89 km²***
		Maximum	***1,443.74 km²***
	b) Area in not-good condition	**Minimum**	***1,130.77 km²***
		Maximum	***1,233.62 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	*stable / increasing /* ***decreasing*** */ uncertain/ unknown*		

6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***
6.7 Typical species Method used *Optional*	The list of typical species is the same as the last reporting period (NPWS 2013a). Typical species were assessed as an assemblage at the monitoring stop level within sites surveyed by the NSUH, Galway County Council (2017) and Tubridy *et al.* (2015). At each monitoring stop the presence of a minimum of seven positive indicator species was required to pass the target for this criterion (a minimum of five was used in Tubridy *et al.* (2015)). Trends for species assemblages and for individual species were not assessed as the NSUH was a baseline survey.
6.8 Additional information *Optional*	The NSUH (Perrin *et al.*, 2014c) assessed Structure and functions at a monitoring stop level, using criteria to assess vegetation composition (including typical species), vegetation structure and physical structure; all criteria need to pass for a stop to pass. Criteria were adapted from the UK's Common Standards Monitoring (JNCC, 2009) using expert judgement. The NSUH primarily assesses SACs and is currently incomplete. Where NSUH sites include commonage land, comparisons were made between NSUH and commonage station data with respect to a few shared parameters (area of bare peat, cover and height of *Calluna vulgaris*, and sward height). A total of 29 monitoring stops were recorded across both NSUH sites surveyed within this reporting period. Eleven of the 29 stops (37.9% of stops) failed one or more of the criteria assessing the vegetation composition, vegetation structure and physical structure of 7130, with the following assessment criteria having the highest failure rates: 'no signs of burning into moss/lichen layer or exposure of bare peat due to burning' (17.2%); 'no signs of burning in sensitive areas' (17.2%); 'areas showing signs of drainage' (10.3%); and 'cover of erosion gullies and eroded areas within the greater bog mosaic' (10.3%). For full details see the NSUH site reports (Perrin *et al.*, 2014a, 2014b). Four of the six stops (66.7%) recorded in 7130 habitat in Galway County Council (2017) failed the Structure and functions assessment. The criteria used were the same as the NSUH criteria (Perrin *et al.*, 2014c). The criterion assessing 'number of positive indicator species present' (33.3%) had the highest failure rate. Several other criteria, including those assessing signs of burning, also failed (one stop out of six). Eight of the 13 stops (61.5%) from Tubridy *et al.* (2015) failed the Structure and functions assessment. Their assessment criteria largely followed the criteria as described in NSUH (Perrin *et al*., 2014c), though some amendments were made. These amendments were required "to ensure that field based studies inform the requirements

	and specifications for an agri-environmental scheme" (Tubridy *et al.*, 2015). A cut-off threshold of ≥5 for 'number of positive indicator species present' (as opposed to ≥7 in the NSUH) was used to account for the eastern location (on a geographical level) of the 7130 habitat in this survey. The criterion of '<66% cover of *Myrica gale* showing signs of browsing' was used in addition to 'cover of palatable dwarf shrubs (*Calluna, Erica cinerea, Vaccinium myrtillus*) collectively showing signs of browsing <33%' (as opposed to 'browsing of ericoids, *Empetrum nigrum* and *Myrica gale* <33%' in the NSUH). 'Cover of each of the following species: *Calluna vulgaris, Eleocharis multicaulis, Eriophorum vaginatum, Molinia caerulea, Schoenus nigricans, Trichophorum germanicum* individually <70% (relevé)' was used as opposed to 'cover of potentially dominant species each <75%' in the NSUH. Additional criteria assessing 'no patches >200m^2 of intensely disturbed bare ground or bare peat with hard rubbery or ashed surface' and '≥80% of monitoring stops have ≥95% continuous vegetation cover' were used, and *Deschampsia flexuosa* was added to the list of negative indicator species. For full details see supporting documentation ('condition assessment of annex habitats in the SAC.xlsx') for Tubridy *et al.* (2015). The criterion assessing the 'cover of bryophyte or lichen species, excluding *Sphagnum fallax'* had the highest failure rate (38.5%), followed by 'number of positive indicator species present' (30.8%), 'no signs of burning into moss/lichen layer or exposure of bare peat due to burning' (30.8%) and 'no signs of burning in sensitive areas' (30.8%). Of the sites fully assessed for Structure and functions (approximately 38.93 km^2) in this reporting period, 52.1% of the area was assessed as being in good condition (Favourable). Equal weighting was given to each of the stops as each one assesses a comparable area of habitat. The proportion in good (52.1%) and not-good condition (47.9%) was scaled up to the national estimate (1,340.89 km^2 in good condition and 1,233.62 km^2 in not-good condition), however as the area assessed for Structure and functions in this reporting period only represents 1.5% of the national area of habitat 7130, data from the last reporting period were also utilised. During the last reporting period 56.1% of the 7130 habitat was assessed as Favourable (NPWS, 2013a). This equates to 1,443.74 km^2 of the current area of 7130 habitat and this figure is used as the maximum area in good condition. 43.9% of the 7130 habitat was assessed as Unfavourable (NPWS, 2013a). This equates to 1,130.77 km^2 of the current area of 7130 habitat and this figure is used as the minimum area that is not in good condition. The most frequent criteria to fail the Structure and Functions assessment in the last reporting period were 'cover of erosion gullies and eroded areas within the greater bog mosaic', 'cover of disturbed bare ground in the local vicinity' and 'no signs of burning in sensitive areas' (NPWS, 2013a). The default short-term trend period is presented above; however the data used for the short-term trend dated from 2007 to 2015. Based on limited data, conclusions could be made that the area in good condition has declined; however, as this is based mainly on data from one part of the country (southwest Ireland: Cork and Kerry) with a poor national sample size, the short-term trend of habitat

	area in good condition was taken to be the same as that reported in the previous reporting period. Short-term trend of Structure and functions in the previous reporting period was assessed as 'declining' due to the assumption that the reduced grazing brought about by the Commonage Framework Plans (CFPs) would be exceeded by the ongoing deleterious effects from peat cutting, erosion, drainage and burning. As with the Area assessment, it should be noted that only one of the 16 sites surveyed through the NSUH is not an SAC. The area of 7130 habitat in good condition outside the SACs is likely to be significantly lower due to the aforementioned impacts above. Typical indicator species from the NSUH for 7130 habitat are: *Andromeda polifolia, Breutelia chrysocoma, Calluna vulgaris, Carex bigelowii, Diplophyllum albicans*, *Drosera* spp. (count separately), *Empetrum nigrum, Erica tetralix, Eriophorum angustifolium, Eriophorum vaginatum, Menyanthes trifoliata, Myrica gale, Narthecium ossifragum*, non-crustose lichens (count separately), *Odontoschisma sphagni, Pedicularis sylvatica, Pinguicula lusitanica, Pleurozia purpurea, Polygala serpyllifolia, Racomitrium lanuginosum, Rhynchospora* spp. (count separately), *Scapania gracilis, Schoenus nigricans, Sphagnum* spp. (count separately, exclude *S. fallax*), *Trichophorum germanicum, Vaccinium myrtillus*.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A09** Intensive grazing or overgrazing by livestock (H) **A11** Burning for agriculture (H) **A27** Agricultural activities generating air pollution (H) **B01** Conversion to forest from other land uses, or afforestation (excluding drainage) (H) **C05** Peat extraction (H) **L01** Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization) (M) **D01** Wind, wave and tidal power, including infrastructure (M) **K02** Drainage (M)	**A09** Intensive grazing or overgrazing by livestock (H) **A11** Burning for agriculture (H) **A27** Agricultural activities generating air pollution (H) **B01** Conversion to forest from other land uses, or afforestation (excluding drainage) (H) **C05** Peat extraction (H) **L01** Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization) (M) **D01** Wind, wave and tidal power, including infrastructure (M) **K02** Drainage (M)

		N01 Temperature changes (e.g. rise of temperature & extremes) due to climate change (M) **N02** Droughts and decreases in precipitation due to climate change (M)
7.2 Sources of information *Optional*	Pressures were sourced from the following reports and accompanying data: Aherne, J., Burton, A., Scott, H., Whitfield, C. & Wolniewicz, M. (2014) Influence of Transboundary Air Pollution on Acid-sensitive Ecosystems. Environmental Protection Agency, Ireland URL: www.epa.ie/pubs/reports/research/air. Barron S.J. (2017) Phase 1 of the scientific work to inform a system for the management of turf-cutting in designated blanket bog SACs and NHAs: Turf-cutting GIS Review Volumes 1 and 2 DRAFT. Unpublished draft report to National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. Baker, M.E. & King, R.S. (2010) A new method for detecting and interpreting biodiversity and ecological community thresholds: Threshold Indicator Taxa ANalysis (TITAN). *Methods in Ecology and Evolution* 1(1): 25–37. Bobbink, R. & Hettelingh, J.P., (eds.) (2011) *Review and revision of empirical critical loads and dose-response relationships*. Coordination Centre for Effects, National Institute for Public Health and the Environment (RIVM). www.rivm.nl/cce. Cathcart, H., Wilkins, K. & Aherne, J. (2018) High spatio-temporal resolution maps of atmospheric dry deposition velocities using the MÉRA dataset. MÉRA Workshop, National Botanic Gardens, Glasnevin May 17, 2018. URL: www.met.ie/science/events/mera-workshop. EPA (2018) Ireland's Transboundary Gas Emissions 1990-2016. URL: www.epa.ie/pubs/reports/air/airemissions. Excel sheet 'Connected22012018.xlsx' provided by Sustainable Energy Authority of Ireland (SEAI) containing the location of connected wind farms as per Eirgrid and ESB Networks. It should be noted that precise accuracy of this coordinate information cannot be assured, that possible stand-alone projects not intended for connection to the Irish electricity grid are not included, and that map locations provided are not necessarily all discrete wind farms (some could be extensions to existing wind farms). FIPS data: PrivateForests2016.shp. Only polygons with a planting year within this reporting period were utilised. Foss, P.J., Crushell, P. & Kirwan, B. (2015) County Waterford Wetland Survey. Part 1: Main Report. Report prepared for Waterford City & County Council. Galway County Council (2017) Unpublished data collected for the Galway City Transport Project. Hodd, R.L. (2016) Survey of Flora Protection Order Bryophytes 2016. Unpublished report to National Parks and Wildlife Service,	

	Dublin, Ireland. Hodd, R. & Barron, S. (2015) An assessment of damaged habitat on Sliabh Beagh, Cos Monaghan, Tyrone and Fermanagh, using aerial imagery. Unpublished report for Blackwater Regional Partnership. NPWS (2013a) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin. NPWS_Approx_Wildfire_Locations_Polygon_2017.shp Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014a). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 15: Slieve Mish Mountains cSAC (002185), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014b). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 16: Caha Mountains cSAC (000093), Cos. Cork and Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Slootweg, J., Posch, M. & Hettelingh, J-P. (2015) Modelling and mapping the impacts of atmospheric deposition of nitrogen and sulphur: CCE Status Report, Coordination Centre for Effects, www.wge-cce.org. Tubridy, M., Iremonger, S., Hickey, B. & O'Hanrahan, B. (2015) Blackstairs Habitat Mapping and Biodiversity Audit 2015. Report for the Blackstairs Farming Group. Wilkins, K., Aherne, J. & Bleasdale, A. (2016) Vegetation community change points suggest that critical loads of nutrient nitrogen may be too high. *Atmospheric Environment* 146: 324-331.
7.3 Additional information *Optional*	Pressures and threats presented in 7.1 were selected and ranked based on intensity (high, medium, low), frequency of occurrence, and area of impact where data were available. Data gathered from the sources listed in section 7.2 are summarised in the backing document 'NSUH17_AR1719_pressures_assessment_01a.xlsx'. For the current reporting period data on pressures were available for two NSUH sites – Slieve Mish Mountains SAC (002185) and Caha Mountains SAC (000093) (Perrin *et al*., 2014a, 2014b). Data from shapefiles on locations of wildfires which occurred in spring 2017 (provided by NPWS), locations of newly planted forestry within this reporting period (FIPS data) and locations of wind farms (provided by SEAI) were also utilised. Additional data from Barron & Daly (2015), Foss *et al.* (2015), Galway County Council (2017), Hodd (2016), Hodd & Barron (2015) and Tubridy *et al.* (2015) were examined, with relevant data extracted and analysed. As the data from the current reporting period only represent a small proportion of the data collected to inform NPWS (2013a), the pressures and threats information presented in NPWS (2013a) were also used to inform the current reporting period. In the previous reporting period, sheep grazing in the uplands, both

	undergrazing and overgrazing, was recorded under 'A04.02.02 non-intensive sheep-grazing'. It was recorded as a high importance pressure and threat for the 7130 habitat (NPWS, 2013a). Using the crosswalk referenced in the backing document 'NSUH17_AR1719_pressures_assessment_01a.xlsx' to convert old impact codes to the new recording codes for this reporting period, A04.02.02 crosswalks to A10 (Extensive grazing or undergrazing by livestock). However there was no evidence from the NSUH sites surveyed in the previous reporting period, or from this reporting period, that A10 was a pressure. A10 is therefore not currently considered a pressure for the 7130 habitat. A09 (Intensive grazing or overgrazing by livestock) can lead to erosion and damage to the vegetation of the 7130 habitat. Perrin *et al.* (2014b) recorded overgrazing under A04.02.02, with 9.1% of 7130 stops at this site failing due to excessive levels of grazing. Hodd (2016) also recorded A09 at one survey site within this reporting period. It was stated in NPWS (2013a) that "Sheep grazing is widespread within the sites surveyed by the NSUH and, where levels of grazing or trampling are high, or where blanket bog has been degraded by higher numbers in the past, is still causing degradation or impeding habitat recovery". Based on evidence collected in the previous and current reporting periods and expert opinion, A09 was retained as a high-importance pressure for this reporting period. All remaining high- and medium-importance pressures presented in NPWS (2013a) were reconsidered for the current reporting period, with all having additional evidence provided for their importance by the data collected during the current reporting period. A11 (Burning for agriculture) was recorded as a high-importance pressure in NPWS (2013a), and was retained as a high-importance pressure for this reporting period. This pressure can lead to widespread loss and degradation of upland habitats (Perrin *et al.*, 2014c). In the IUCN UK Peatland Programme's position statement they state that "burning can degrade bog habitats, leading to reductions or loss of key bog species (plants and animals), reduced structural diversity and increased dominance of non-peat forming vegetation such as heathland species" (IUCN UK PP, 2014). NPWS (2013a) stated that "damage from fire was recorded within this habitat at 50% of the sites surveyed by the NSUH". A11 was recorded within 7130 habitat in the Slieve Mish Mountains SAC (002185) (7.1% of 7130 habitat) (Perrin *et al.*, 2014a), Caha Mountains SAC (000093) (0.1% of 7130 habitat) (Perrin *et al.*, 2014b), as well as within 7130 habitat in the Blackstairs Mountains (Tubridy *et al.*, 2015) and Eshbrack Bog NHA (001603) (Hodd & Barron, 2015). It is estimated that up to 0.7% (18.77 km^2) of the national 7130 habitat area was burnt in the spring of 2017 (using NPWS_Approx_ Wildfire_Locations_Polygon_2017.shp in conjunction with the 7130 distribution polygon shapefile). In addition to this, the Joint Research Centre (JRC) of the European Commission provides information on fires in the pan-European region via the European Forest Fire Information System (EFFIS). Through its series of technical reports, it has been estimated that over 10,000 ha of open land in Ireland have been affected by fire in 2013, less than 5,000 ha of open land in 2014, approximately 10,000 ha of open land in 2015 and

	approximately 5,000 ha of open land in 2016 (JRC, 2014, 2015, 2016, 2017 respectively), with the majority of fires taking place in upland habitats (JRC, 2015), which would include 7130 habitat. JRC (2016) states that "there is a strong correlation between the patterns of these fires and established traditional agricultural burning practice in Irish upland areas". B01 (Conversion to forest from other land uses, or afforestation (excluding drainage)) was recorded as a high-importance pressure in NPWS (2013a), and was retained as a high-importance pressure for this reporting period. The Environmental Impact Assessment (EIA) threshold for forestry is 50 ha or more (S.I. No. 191 of 2017), which means large areas of unenclosed land can be planted without adequate environmental assessment. In addition to this, there has been recent pressure to increase land availability for afforestation on unenclosed land (114 ha of unenclosed land were planted in 2012 and 106 ha in 2013 (COFORD, 2016)) as planting on agricultural land is not happening at the desired rate in order to reach the target of 18% forest cover by mid-century (C. Douglas, NPWS, pers. comm.). Afforestation can result in direct habitat loss, as well as fragmentation of the 7130 habitat. There is an immediate negative effect on 7130 habitat due to ploughing and drainage, and continued disturbance of the water balance due to growing trees (i.e. evapotranspiration and interception of water by tree canopies) (Lindsay *et al.*, 2014a). It is estimated that approximately 0.002% of the known national 7130 habitat area (0.05 km^2) has some evidence of new forestry (i.e. planted within the current reporting period) within it (using PrivateForests2016.shp in conjunction with the 7130 distribution polygon shapefile). C05 (Peat extraction) was recorded as a high-importance pressure in NPWS (2013a), and was retained as a high-importance pressure. It includes both the mechanical removal of peat and hand cutting of peat. C05 was recorded within 7130 habitat in the Slieve Mish Mountains SAC (002185) (4.4% of 7130 habitat) (Perrin *et al.*, 2014a), Caha Mountains SAC (000093) (0.9% of 7130 habitat) (Perrin *et al.*, 2014b), as well as within 7130 habitat in the areas surveyed by Galway County Council (2017) and in Eshbrack Bog NHA (001603) (Hodd & Barron, 2015). Barron (2017) calculated that approximately 6,115.88 ha of 7130 habitat, between 1995 and 2012, has been partially impacted by turf cutting within SACs where 7130 is a QI. The amount outside of SACs is expected to be much higher. NPWS (2013a) state: "Turf cutting by hand has been recorded within the majority of cSACs surveyed by the NSUH and unregulated mechanised turf cutting has been recorded within several cSACs. This is particularly damaging where occurring on deep wet bog and use of chainsaw/sausage machine is considered the most destructive method used as it does not require road access thus can occur on intact, remote areas. Peat cutting activity while locally significant in many cSACs is also much more prevalent outside" [of designated areas]. Erosion, recorded under L01 (Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization)) was recorded as a high-importance pressure in NPWS (2013a). It has been retained as a pressure of medium-high importance but because of guidelines and

	database limitations only five high-importance pressures can be listed. NPWS (2013a) state that "severe peat erosion is frequent within upland blanket bog". L01 was recorded within 7130 habitat in the Slieve Mish Mountains SAC (002185) (0.5% of 7130 habitat) (Perrin *et al.*, 2014a), Caha Mountains SAC (000093) (2.4% of 7130 habitat) (Perrin *et al.*, 2014b) and Blackstairs Mountains (Tubridy *et al.*, 2015). Habitat 7130 is prone to erosion where levels of grazing or trampling by sheep are excessive, or where burning or turf cutting has occurred. Without remedial action areas of bare peat may continue to erode due to climatic conditions regardless of removal or control of the causal factors, and therefore is a standalone pressure. D01 (Wind, wave and tidal power, including infrastructure) was recorded as a medium-importance pressure in NPWS (2013a), and was retained as a medium-importance pressure for this reporting period. Wind farms can result in direct habitat loss and degradation of the 7130 habitat. They are likely to cause significant changes to patterns of surface water flow and may open pathways of water loss in or beneath the peat as a result of turbine access roads and other infrastructure. A number of blanket bog slippages and landslides associated with wind farm construction activity or post-construction have also occurred (NPWS, 2013a). A review of Irish wind farm developments has indicated that 45.4% of wind farms are located within 2 km of 7130 habitat. As wind farm data were, in general, provided as a single point for each wind farm development, the review located wind farms within a 2 km buffer zone around 7130 habitat using the grid references provided by the SEAI (Connected22012018.xlsx) and the 7130 distribution polygon shapefile. Fifteen randomly selected wind farms located in upland areas were mapped in order to get an idea of the footprint of wind farms in upland areas. An average radius of 2 km was calculated based on these mapped areas. K02 (Drainage) was recorded as a medium-importance pressure in NPWS (2013a), and was retained as a medium-importance pressure for this reporting period. Drainage of 7130 habitat is usually the first step carried out when attempting to develop the habitat in some way (e.g. for forestry or agriculture). Lindsay *et al.* (2014b) state that the "main long-term effect of drainage is to re-shape the bog itself, with major implications for water, carbon and biodiversity". K02 was recorded within 7130 habitat in the Caha Mountains SAC (000093) (0.9% of 7130 habitat) (Perrin *et al.*, 2014b), as well as within 7130 habitat in Eshbrack Bog NHA (001603) (Hodd & Barron, 2015) and 7130 areas surveyed by Foss *et al.* (2015). Empirical critical loads of nutrient nitrogen have been recommended for a number of European habitats (Bobbink and Hettelingh, 2011). These recommended ranges were refined and extended using plant species diversity for habitat-specific positive indicators species. The influence of nitrogen deposition on plant species diversity was assessed using Threshold Indicator Taxa Analysis (TITAN; Baker & King, 2010) following Wilkins *et al*. (2016) and the Probability of Plant Species occurrence (PROPS-CLF; Slootweg *et al*., 2015). The spatial distribution of total nitrogen deposition was mapped on a 2.5 km x 2.5 km grid resolution using observations of atmospheric nitrogen during the last decade, a period with limited changes in

	national emissions of nitrogen (EPA, 2018). Total nitrogen deposition included dry ammonia deposition based on network of passive gaseous ammonia samplers and modelled dry deposition velocity (Cathcart *et al*., 2018), and observations of wet deposition for nitrate and ammonium in rainfall (Aherne *et al*., 2014). The observations were mapped using regression kriging which used maps of nitrogen emissions (URL: projects.au.dk/mapeire) and climate (URL: www.met.ie/climate/available-data/mera) as spatial predictors. The proportion of each habitat that exceeded the lower critical load value of the recommended range was calculated. The importance of the impact of Nitrogen Deposition based on this proportion was determined as follows: Low-importance pressure/threat: 5-10%; Medium-importance pressure: 10-25%; High-importance pressure: >25%. Blanket bog was assigned a Critical value of 5; 32% of the habitat area exceeded this value. Therefore the pressure *A27 Agricultural activities generating air pollution* was assigned a High importance as approximately 75 to 80% of total nitrogen deposition can be attributed to agricultural sources nationally. The low-importance pressures A36 (Agriculture activities not referred to above) (i.e. agricultural intensification), J03 (Mixed source air pollution, air-borne pollutants), L06 (Interspecific faunal and floral relations (competition, predation, parasitism, pathogens)) and N (Climate change), recorded in NPWS (2013a) but not in this reporting period, were retained as low-importance pressures for the current reporting period. E01 (Roads, paths railroads and related infrastructure (e.g. bridges, viaducts, tunnels)), F07 (Sports, tourism and leisure activities), I02 (Other invasive alien species (other than species of Union concern)) and M05 (Collapse of terrain, landslide), were recorded in both the previous and current reporting periods. They have also been retained as low-importance pressures. J04 (Mixed source soil pollution and solid waste (excluding discharges)), recorded within the current reporting period only, was also assessed as a low-importance pressure for 7130 habitat, largely due to the small area of impact. The eight high- and medium-importance pressures reported in section 7.1 are also considered to be the main threats to the 7130 habitat in the future. Although climate change (assessed under two codes, N01 Temperature changes due to climate change and N02 Droughts and decreases in precipitation due to climate change) is assessed as a low-importance pressure, it is considered to be a medium-importance threat to 7130. Areas in favourable and unfavourable condition will be impacted by climate-induced disturbances, “including (1) gradual changes (in temperature; in the amount, intensity and seasonal distribution of precipitation) and (2) extreme events (severe drought; increased wildfires; flooding events)” (Renou-Wilson & Wilson, 2018), particularly areas in unfavourable condition as these areas are more susceptible to the impacts of climate change. Blanket bogs in favourable condition are considered better able to buffer the impacts of external perturbations such as small changes in climate but are unlikely to survive as carbon sinks if large changes in precipitation and temperature occur (Renou-Wilson *et al.*, 2011). As a rain-dependent

	habitat 7130 blanket bog requires precipitation of greater than 1250mm/pa on well over 200 days annually, as well as cool temperatures (conditions of low evaporation and transpiration), as peat formation requires waterlogged conditions. These requirements render blanket bogs potentially vulnerable to climate changes through impacts on blanket bog plant and animal species and on other aspects of ecosystem functioning. Climate envelope modelling used to predict climate change-driven shifts in species and habitat distributions predict that under limited dispersal scenarios *7130 habitat will contract in range by 38% (Coll *et al.*, 2012), with projected losses greatest along the western Atlantic seaboard (Coll *et al.*, 2014). Modelling also predicted minor climate space gains for *7130 in the Midlands and north-east, however it was noted that new habitat formation in these areas is not possible (Coll *et al.*, 2014). Areas of degraded blanket bog are already likely to be incurring accelerated erosion due to extreme weather events associated with climate changes. Research in the west of Ireland by Zwart (1994) demonstrated that degraded peat erodes rapidly and reported rates of up to 250 tonnes per km^2 over a 3-month period. Geological Survey of Ireland consider that predicted climate change will result in increased landslide hazard with higher and more intense rainfall in certain parts of western and northwest Ireland (GSI). Other concerns relating to prospective seasonal changes include increases in winter rainfall leading to enhanced erosion. An increased risk of severe fire events is likely in areas where drought periods increase as a result of climate change, and the spread of intense blanket bog fires would also be expected to increase in such conditions. Invasive non-native species may also pose a greater risk to blanket bog if their growth conditions are more favoured by changes in climate. Species such as *Rhododendron ponticum* as well as conifers *Pinus contorta* (Lodgepole pine) and *Picea sitchensis* (Sitka spruce) (the predominant species of plantation forestry) could conceivably increase their spread on blanket bog with temperature rises and/or where more frequent or prolonged drought periods increase habitat desiccation (C. Douglas, NPWS, pers. comm.). Effective restoration of degraded blanket bog areas is required to improve its condition and thereby its resilience to climate change.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type** or* *b) Expand the current range of the habitat type (related to 'Range')*

	or *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000*** *or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* ***a) Short-term results (within the current reporting period, 2013-2018)*** *or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	**CA05** Adapt mowing, grazing and other equivalent agricultural activities **CA06** Stop mowing, grazing and other equivalent agricultural activities **CA15** Manage drainage and irrigation operations and infrastructure in agriculture **CB01** Prevent conversion of (semi-) natural habitats into forests and of (semi-)natural forests into intensive forest plantation **CC02** Adapt/manage exploitation of energy resources **CF03** Reduce impact of outdoor sports, leisure and recreational activities **CI03** Management, control or eradication of other invasive alien species **CI05** Management of problematic native species **CH03** Reduce impact of other specific human measures
8.6 Additional information *Optional*	Conservation measures were selected using data gathered from information provided by NPWS (pers. comm.), European Commission (eip-agri agriculture and innovation) and Forest Service (2015). Data from the NSUH, recorded in the previous reporting period, were also utilised where appropriate. In some cases the management of grazers in upland habitats is undertaken through the Department of Agriculture's Green, Low Carbon, Agri-Environment Scheme (GLAS), both in regard to Commonage Management Plans and private Natura Management Plans. Details of participation in the GLAS scheme and of the uptake across various measures are not currently available. It is therefore not possible to precisely assess the effects of implementation of these measures. The main purpose of these sustainable management plans, in regard to upland habitats, is to restore the condition of both commonage and private Natura lands by protecting against both undergrazing

	and overgrazing (A. Bleasdale, NPWS, pers. comm.). As 7130 does not require grazing the management of overgrazing will be relevant to this habitat (CA05/CA06). It should be recognised that not all shareholders within the commonages or people who hold private Natura lands have joined up to the aforementioned management plans. Apart from certain agricultural measures applying to commonage lands the management regimes of most areas of 7130 habitat are driven by the landowner rather than by any formal management plan or policy; therefore the continued operation of the management regimes currently in place is not guaranteed across the entire habitat. Within Ireland's National Parks (NPs), Connemara NP is undertaking Rhododendron control (CI03), maintenance of tracks and trails to prevent damage to sensitive habitats (CF03) and control of trespassing stock (CA05). Killarney NP is also carrying out the aforementioned conservation measures in addition to deer management (CI03 – Sika deer; CI05 – Red deer) (C. Douglas, NPWS, pers. comm.). CA05 (adapt mowing, grazing and other equivalent agricultural activities), CI03 (management, control or eradication of other invasive alien species) and CI05 (management of problematic native species) were recorded as positive impacts at one NSUH site during the previous reporting period. These were in relation to the reduction of sheep numbers trespassing within Killarney NP from adjoining areas through the erection of fences, and the culling of both Sika and Red deer (Roche *et al.*, 2012b). Glenveagh NP carries out Rhododendron control (CI03), maintenance of tracks and trails (CF03) and control of deer numbers (CI05 – Red deer) (D. Duggan, NPWS, pers. comm.). Wicklow Mountains NP also maintain tracks and trails (CF03), control trespass of stock (CA05) and deer numbers (CI03 – Sika deer and occasional Fallow deer, and CI05 – Red deer). In addition to these conservation measures, they enforce the Ministerial Direction 2010 on the use of All Terrain and Off-Road Vehicles where possible (CF03) and work towards a reduction in small-scale illegal dumping through the PURE project (CH03), which is an environmental project established to combat illegal dumping in the Wicklow/Dublin uplands (http://www.pureproject.ie/). Finally, Wicklow Mountains NP also control fires where possible (CA05) and have worked closely with local farmers and Teagasc through the Wicklow Uplands Council, with the result of a reduction in farmer-lit fires (E. Mullen, NPWS, pers. comm.). Two Forest Service Circulars (10/2010 and 18/2011) advise against afforestation from large areas of upland sites containing sensitive habitats (CB01), while the Forestry Service (2015) state: "The inappropriate afforestation of sensitive habitats such as peat lands and wetlands will be avoided, as well as the negative effects on areas of ecological value including areas under high natural value farming". As discussed in section 7.3 however, there is no requirement to carry out EIAs on areas below 50 ha, thus relatively large areas can be afforested without adequate environmental assessment. Also, although there has been a documented move of afforestation from peatland and upland areas to wet mineral soils and lower elevations (20% of area planted in 2000 to 4% in 2011) (Forestry Service, 2015), there is now pressure to increase land availability for afforestation

	on unenclosed land, with 114 ha of unenclosed land afforested in 2012 and 106 ha in 2013 (COFORD, 2016). While unenclosed land is not synonymous with 7130 habitat it is assumed these lands include some areas of this habitat. DAFM Forest Service has been involved in the development of Wildfire Interagency Groups and local-level partnerships in fire-prone counties in order to permit better targeted fire prevention and enforcement (CA05). A number of demonstration prescribed burns were carried out in 2016, one of which was carried out under the supervision of the KerryLIFE Project, while Teagasc arranged a mechanised vegetation management demonstration to demonstrate alternative methods of vegetation management (EFFIS, 2017) (CA05). The EU KerryLIFE Project commenced in 2014 with the aim of improving selected populations of Freshwater Pearl Mussel towards favourable conservation condition through sustainable management of c. 2500 ha of farmed lands (CA05 and CA06). The proposed sensitive grazing regime is expected to improve cover and height of heathers, while encouraging areas of bare or eroding peat to re-vegetate. If successful, it is likely to have most benefit for the peatland habitats within the catchment area, including 7130 habitat (C. Douglas, NPWS, pers. comm.). Response to measures will not be available until the next reporting period. An EPA-funded study "Quantification of Blanket Bog Ecosystem Services to water" (QUBBES) seeks to quantify the economic benefit of ecosystem services provided by relatively intact blanket bogs. Research is currently underway at three sites, two of which are located in the Republic of Ireland (Cuilcagh-Anierin Uplands SAC (000584) and Ox Mountains SAC (002006)). The results of this research are likely to inform better management of 7130 habitats for their ecosystem services including biodiversity, drinking water provision and regulation of surface water run-off (C. Douglas, NPWS, pers. comm.) (CA05 and/or possibly CB06 (stop forest management and exploitation practices)). Two projects supported by the European Union's INTERREG VA Programme commenced in 2017. Collaborative Action for the Natura Network (CANN) is a five-year multi-partnership conservation project that will produce Conservation Action Plans for a range of SACs, across Northern Ireland, the Border Region of Ireland and Western Scotland, and accumulatively account for over 25,000 ha of land. Direct conservation actions will be carried out on 3,650 ha of these SACs including blanket bog habitat, all with an aim to progress the habitats and species at these sites towards favourable conservation status (http://www.newrymournedown.org/the-cann-project/) The second conservation project supported by the INTERREG VA Programme is Co-operation across Borders for Biodiversity (CABB). This is a €4.9m five-year partnership project led by RSPB NI and also involves RSPB Scotland, Birdwatch Ireland, Butterfly Conservation, Moors for the Future, and Northern Ireland Water. One of the aims of this project is to work in partnership with farmers, landowners, statutory agencies and other key organisations to improve the condition of 2,228 ha of threatened habitats (blanket bog, wet grasslands and machair) across several SACs and SPAs in Ireland,

	Northern Ireland and western Scotland. (https://www.rspb.org.uk/our-work/conservation/projects/co-operation-across-borders-for-biodiversity-cabb/). Conservation measures for blanket bog within these projects include drain blocking (CA15), fencing (CA05), adoption of appropriate grazing levels (CA05) and the writing of conservation action plans. Due to the infancy of these projects, responses to measures will not be available until the next reporting period. A total of eight European Innovation Partnership (EIP) projects with peatland focus or actions have been selected and offered financial support through the EIP-Agri budget administered by the Department of Agriculture, Food & the Marine. The total budget for these projects (albeit not entirely dedicated towards peatland actions alone) is in excess of €40 million. Three projects have already been initiated, with ecologically sustainable grazing in upland habitats a cross-cutting deliverable (CA03 and CA05). The response to measures will not be apparent until the next reporting period due to the infancy of these projects. The EIP project 'Blackstairs Farming Futures (BFF) Sustainable farming project in the Blackstairs Mountains' aims to maintain and improve peatland habitats and associated semi-natural habitats within the Blackstairs Mountains (CA03 and CA05), with the EIP project 'Sustainable Uplands Agri-environment Scheme (SUAS)' having a similar objective. The EIP project 'A Sustainable Agricultural Plan for the MacGillycuddy Reeks – Conservation and restoration of Upland Habitat in the MacGillycuddy Reeks' proposes to implement sustainable management of upland peatlands (e.g. wet heath, dry heath and blanket bog) and grasslands. It proposes to clear 85 ha of Rhododendron (CI03) and 85 ha of Bracken (CI05), manage recreational impacts (CF03) and provide and maintain trails to prevent damage to upland habitats such as 7130 habitat (CE01). A PhD study, which commenced in 2011, is investigating 'Conservation Grazing with Native Irish Cattle in High Nature Value (HNV) Environments' (K. Kelly with the Institute of Technology, Tralee). The aim of this research is to 'develop evidence-based management recommendations for the uplands, specifically with regard to the impact of cattle grazing on upland habitats' (Kelly *et al.* n.d.) (CA05). Results of this research are currently being analysed, therefore the response to cattle grazing will not be apparent until the next reporting period. The National Peatland Strategy https://www.npws.ie/peatlands-and-turf-cutting/peatlands-council/national-peatlands-strategy) seeks to reduce the dependency on peat as a source of fuel. The Department of Culture, Heritage and the Gaeltacht have commenced scientific studies towards the management of peat extraction in blanket bog SACs (CC02).

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	*Good /* ***Poor*** */ Bad / Unknown*

	c) Structure and functions	*Good / Poor / **Bad** / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as stable. Current range is equal to Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as stable, as no change in range is expected based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Range are therefore good. Short-term trend direction of Area is assessed as decreasing. Current area is less than the Favourable Reference Area (< 10% below FRA). Conservation status of Area is therefore Unfavourable-Inadequate. Future trend of Area is assessed as negative, as the threats of A09, B01, C05, D01 and L01 in particular are expected to have a negative influence on area, especially for areas of 7130 habitat outside of Natura sites, even with the conservation measures CA05, CB01 and CF03 in place. Future prospects of Area are therefore poor. Short-term trend direction in Structure and functions is decreasing for habitat that is in good condition. Current Structure and functions are assessed as Unfavourable as <90% of habitat is in "Good" condition. A maximum estimate of 47.9% of 7130 habitat is in bad condition which equates to Unfavourable-Bad Structure and functions. Conservation status of Structure and functions is therefore Unfavourable-Bad. Future trend of Structure and functions is assessed as decreasing, as the threats of A09, A11, K02 and L01 are expected to have a negative influence on Structure and functions, even with the conservation measures CA05 and CF03 in place. Future prospects of Structure and functions are therefore bad.	

10 Conclusions

Assessment of conservation status at end of reporting period	
10.1 Range	***Favourable (FV)** / Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.2 Area	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*
10.4 Future prospects	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*
10.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / **deteriorating** / stable / unknown*

<table>
<tr><td rowspan="8">10.7 Change and reasons for change in conservation status and conservation status trend</td><td colspan="3">Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.</td></tr>
<tr><td></td><td>Overall assessment of conservation status (10.5)</td><td>Overall trend in conservation status (10.6)</td></tr>
<tr><td>a) no, there is no difference</td><td>YES/<u>NO</u></td><td>YES/<u>NO</u></td></tr>
<tr><td>b) yes, due to genuine change</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>c) yes, due to improved knowledge/more accurate</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>d) yes, due to the use of different methods (including use of different thresholds)</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>e) yes, but there is no information on nature of change</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>The change is mainly due to (select one of the reasons above):</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td></tr>
<tr><td>10.8 Additional information

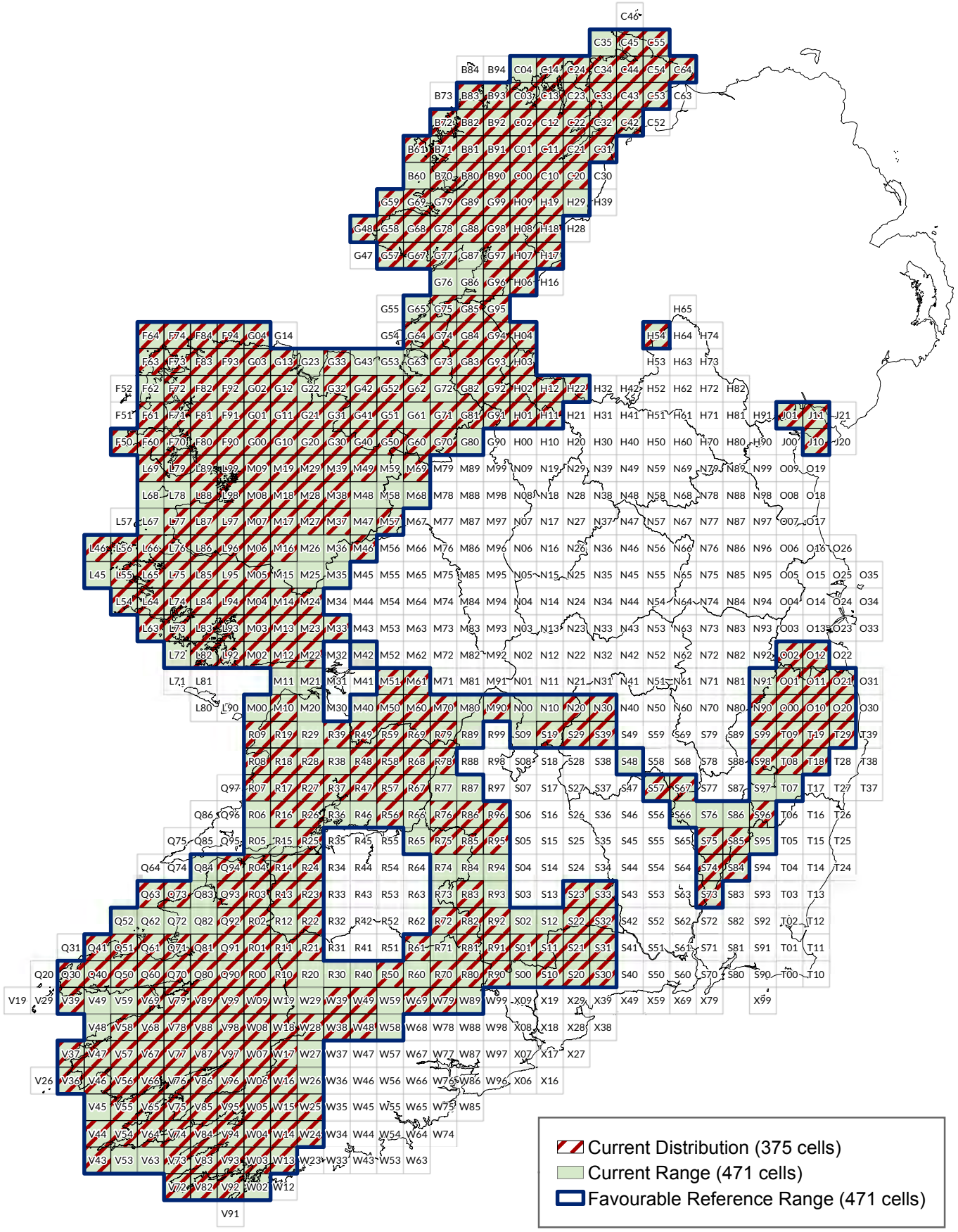
Optional</td><td colspan="2">The Conservation Status of Range is Favourable in this reporting period, as it was in the previous reporting period.
The Conservation Status of Area is Unfavourable-Inadequate in this reporting period, but was Unfavourable-Bad in the previous reporting period. The change in FRA is due to improved knowledge rather than due to genuine change.
The Conservation Status of Structure and functions and Future prospects are Unfavourable-Bad in this reporting period, as they were in the previous reporting period.
The Overall Conservation Status was assessed as Unfavourable-Bad, as it was during the last reporting period. The status of Unfavourable-Bad during the current reporting period was due to <25% of the area of 7130 habitat being assessed as having Favourable Structure and functions.
Trend in Overall Conservation Status was assessed as deteriorating in this reporting period, as it was in the previous reporting period.</td></tr>
</table>

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***1,632.37 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval / **minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* *stable / increasing / **decreasing** / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing a union between the distribution polygon shapefile and the SAC shapefile, and an intersect between the distribution point shapefile and SAC shapefile. The area given in section 11.1 is the total area of 7130 habitat in SACs in the country, including some SACs where 7130 is not listed as a qualifying interest (QI). The area of 7130 within the Natura 2000 network where it is listed as a QI is 1,510.34 km². There was no inconsistency between the Natura 2000 sites where the 7130 habitat is listed as a QI and the current distribution for the habitat. The short-term trend of the 7130 habitat in good condition within the SAC network is taken to be decreasing, with the same trend as the 7130 habitat nationally (section 6.4). The reported surface area of 7130 habitat within the Natura 2000 network has increased since the last reporting period; this is due to improved knowledge lending itself to a refinement of area totals (see section 5.15 for details).	

12 Complementary information

Blanket bog (Active)*
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**7140 Transition mires and quaking bogs**
1.2 Habitat short name	**Transition mires**
1.3i Habitat description	Transition mires and quaking bogs are physically unstable peat-forming communities, typically occurring as swards or floating mats over saturated peat or open water. The habitat type encompasses a broad range of plant communities that are characteristic of ombrotrophic to soligenous waters. There is usually an abundant bryophyte layer. Vegetation ranges from extensive floating mats of small to medium sedges with *Sphagnum* on open water, to localised basic flushes over acid peat with base-tolerant *Sphagnum* and brown mosses. Aquatic and semi-aquatic vegetation is frequently present. Whilst some plant communities (e.g. those in infilling dystrophic pools) are typical of acid waters, it is also characteristic to find communities that are intermediate between acid bog/ poor fen and basic rich fen. A fuller account of the vegetation of transition mires is provided in the accompanying backing document (Long *et al.*, 2018), and a preliminary vegetation classification of fens in Ireland has just recently been made available as part of the Irish Vegetation Classification (http://www.biodiversityireland.ie/projects/national-vegetation-database/). Transition mires are generally mineral rich (but not necessarily calcium rich), with oligotrophic to mesotrophic water with slightly basic to moderately acid pH. Transition mires may occupy a physically transitional zone between bog and fen vegetation (such as in the lagg zone of a raised bog), or where groundwater seeps through deep peat (upland soligenous flushes for instance). They can also represent a transitional stage between groundwater fed fen and rainwater fed bog, as peat accumulates and isolates the vegetation from groundwater (for instance in lowland topogenous depressions and open water transitions). Transition mire vegetation may also be found in damaged habitats, such as flooded peat cuttings over calcareous substrate. There are a number of rare and protected species which occur/ are confined to transition mire habitats in Ireland, such as the Annex II species *Hamatocaulis vernicosus* (also listed on the Flora (Protection) Order, FPO) and the FPO species *Hammarbya paludosa* and *Eriophorum gracile.* Transition mire and quaking bogs Annex I habitat is widespread, but localised, in Ireland. It has been recorded most frequently in blanket bog regions in the north and west and limestone regions in the north-west and midlands, and in inter-drumlin hollows and lakes in the border counties. In the Connemara region, transition mires develop in the infilling margins of coastal lakes. Transition mires are probably under-recorded as there is a lack of a national survey and classification.

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***2005-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range map submitted
2.5i	A baseline, national field survey of fen habitats has not been conducted in Ireland to date. The distribution map for 7140 is based on the Article 17 point and polygon master shapefiles from 2013, augmented with polygons, points and other data which has been collected in the interim (coming from a variety of sources – see Long *et al.*, 2018). For 2013, the habitat distribution was based to a large extent on the NPWS Fen Study Database compiled as part of the 'Study of the extent and conservation status of springs, fens and flushes in Ireland' (Foss, 2007b), with additional sites extracted from a variety of relatively recent field and desk-based surveys (Kimberley, 2013). To compile the 2013-2018 map, a thorough review of all of these points and polygons was carried out in the first instance, and decisions on whether to remove any of these features from the 2013-2018 map were made where any new information has since become available that indicated that these features were no longer valid with respect to this Annex habitat, or conversely, where new information allowed us to upgrade the confidence of the fen type present. This dataset was then augmented by a variety of new sources, predominantly habitat surveys which recorded Annex habitats, and others where the species being surveyed are considered to be suitable indicators of this Annex habitat, or the habitats mapped considered to be analogous to Annex fen types. Often multiple sources of information were used to form an opinion on a particular feature. The sources used are listed in section 3.2, and in Long *et al.* (2018). Some data sources were polygons that represented habitat mosaics, including some proportions of 7140. Consistent with the approach used in 2013, the locations of these sites for mapping purposes were represented by centroids.

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned	
3 Biogeographical and marine regions	
3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
3.2 Sources of information	Barron, S.J. and Daly, O.H. (2015) Surveys of possible Marsh Fritillary sites and habitat in Cos. Clare (outside the Burren) and Kerry, Final report. Unpublished Report to National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Barron, S.J., O'Neill, F.H. and Martin, J.R. (2015) N6 Galway City Transport Project – Habitat mapping and assessment of a section of Lough Corrib cSAC and surrounding areas. Unpublished Report by BEC Consultants Ltd. Blockeel, T.L., Bosanquet, S.D.S. Bosanquet, Hill, M.O. and Preston, C.D. (2014a) *Atlas of British and Irish bryophytes. Volume 1.* British Bryological Society (Pisces Publications, Newbury). Blockeel, T.L., Bosanquet, S.D.S. Bosanquet, Hill, M.O. and Preston, C.D. (2014b) *Atlas of British and Irish bryophytes. Volume 2.* British Bryological Society (Pisces Publications, Newbury). Bord na Móna (2017a) Draft Rehabilitation Plan 2017: Blackwater Bog. Bord na Móna (2017b) Draft Rehabilitation Plan 2017: Clongawny Bog. Bord na Móna (2017c) Draft Rehabilitation Plan 2017: Lough Bannow Bog. Brophy, J.T. and Long, M.P. (in prep. a) Monitoring of sites and habitat for three Annex II species of whorl snail (*Vertigo*). Volume 3: *Vertigo geyeri* site reports. *Irish Wildlife Manuals*, No. XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland. Brophy, J.T. and Long, M.P. (in prep. b) Monitoring of sites and habitat for three Annex II species of whorl snail (*Vertigo*). Volume 4: *Vertigo moulinsiana* site reports. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland. Campbell, C., Hodgetts, N. and Lockhart, N. (2015) Monitoring methods for *Hamatocaulis vernicosus* Mitt. Hedenäs (Slender Green feather-moss) in the Republic of Ireland. *Irish Wildlife Manuals*, No. 91. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland. Campbell, C., Hodd, R.L. and O'Neill, F. (in prep.) The monitoring and assessment of *Hamatocaulis vernicosus* (Slender Green feather-moss) in the Republic of Ireland 2015-2017. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland. Crushell, P., Foss, P.J. and Kirwan, B. (2014) County Kerry Wetland

Survey. Report prepared for Kerry County Council.

Crushell, P., Foss, P.J. and Kirwan, B. (2015) Kerry Wetland Survey II. Report prepared for Kerry County Council.

Daly, O.H. (2016) Surveys of possible Marsh Fritillary sites and habitat in the mid-west (Roscommon and Longford), Draft report. Unpublished Report to National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Daly, O.H. and Barron, S. (2014) Surveys of possible Marsh Fritillary sites and habitat in Cos Louth, Meath and Monaghan, Final report. Unpublished Report to National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Daly, O.H. and Barron, S.J. (2015) Surveys of possible Marsh Fritillary sites and habitat in Cos. Galway and Mayo, Final report. Unpublished Report to National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

EC (2007) Interpretation Manual of European Union Habitats. Version EUR27, European Commission, Brussels.

EU Collated typical species. Version 1.0: provides a list of typical species reporting by the Member States as a part of the 2007-2012 Article 17 report.

Fernandez Valverde, F. (2018) Derrylahan & Loughanboy Lough field visit notes. Unpublished notes for National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht.

Foss, P. (2007a) Transition mire (7140) conservation status assessment. Unpublished report to the National Parks and Wildlife Service.

Foss, P. (2007b) Study of the extent and conservation status of springs, fens and flushes in Ireland. Report for the National Parks and Wildlife Service of Ireland.

Foss, P.J. and Crushell, P. (2013) County Kildare Wetland Survey II. Report prepared for Kildare County Council and The Heritage Council.

Foss, P.J. and Crushell, P. (2014) County Kildare Wetland Survey III. Report prepared for Kildare County Council and The Heritage Council.

Foss, P.J., Crushell, P., Kirwan, B., O'Loughlin, B. and Wilson, F. (2014) Louth Wetland Survey III. Report prepared for Louth County Council and The Heritage Council.

Foss, P.J., Crushell, P. and Kirwan, B. (2015) County Waterford Wetland Survey. Report prepared for Waterford City and County Council.

Fossitt, J.A. (2000) *A guide to habitats in Ireland*. Heritage Council, Kilkenny.

Hájek, M., Horsák, M., Hájková, P. and Dítě, D. (2006) Habitat diversity of central European fens in relation to environmental gradients and an effort to standardise fen terminology in ecological studies. *Perspectives in Plant Ecology, Evolution and Systematics* 8: 97–114

Joint Nature Conservation Committee (2004) *Common Standards Monitoring Guidance for Lowland Wetlands Habitats*. Version August 2004. ISSN 1743-8160 (online).

Jones, P.S., Stevens, J., Bosanquet, S.D.S., Turner, A.J., Birch, K.S. and Reed, D.K. (2013) Distribution, extent and status of Annex I wetland habitats in Wales: Supporting material for the 2013 Article 17 assessment. CCW Staff Science Report No 13/7/1.

Joosten, H., Tanneberger, F. and Moen, A. (eds.) (2017) *Mires and peatlands of Europe: Status, distribution and conservation.* Schweizerbart Science Publishers, Stuttgart.

Kimberley, S. (2013) Conservation status assessments of three fen habitat types. Unpublished NPWS report.

Kimberley, S. and Coxon, C. (2013) Environmental supporting conditions for Groundwater-Dependent Terrestrial Ecosystems. A report for the Environmental Protection Agency, Ireland.

Long, M.P. and Brophy, J.T. (in prep.) Monitoring of sites and habitat for three Annex II species of whorl snail (*Vertigo*). Volume 1: Final Report. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of the Culture, Heritage and the Gaeltacht, Ireland.

Long, M.P., Crowe, O., Kimberley, S. and Denyer, J. (2018) Backing document – National Conservation Status Assessments (NCAs) for three fen habitat types: 7140 – Transition mires and quaking bogs, 7210 – Calcareous fens with *Cladium mariscus* and species of Caricion davallianae, 7230 – Alkaline fens. Unpublished report to NPWS.

Northern Ireland Environment Agency (2013) Supporting documentation for the Third Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2007 to December 2012 for Habitat: H7140 - Transition mires and quaking bogs.

Northern Ireland Environment Agency (2015) West Fermanagh Scarplands SAC Conservation Objectives.

Northern Ireland Environment Agency (2017) Garron Plateau SAC Conservation Objectives.

NPWS (2008) The Status of EU Protected Habitats and Species in Ireland. Backing Documents, Article 17 forms, Maps Volumes 1,2 and 3. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.

NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Species Assessments Volume 3. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.

Ó Críodáin, C. and Doyle, G.J. (1994) An overview of Irish small-sedge vegetation: syntaxonomy and a key to communities belonging to the Scheuchzerio-Caricetea nigrae (Nordh. 1936) Tx. 1937. *Biology and Environment: Proceedings of the Royal Irish Academy* 94B (2), 127-144.

O'Neill, F.H., Hodd, R.L and Long, M.P. (2018) Results of a monitoring survey of the Annex II species *Saxifraga hirculus* (Marsh Saxifrage) in Ireland 2015-2018. *Irish Wildlife Manuals*, No. XXX.

National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland

O'Neill, F.H., Martin, J.R., Devaney, F.M. and Perrin, P.M. (2013) The Irish semi-natural grasslands survey 2007-2012. *Irish Wildlife Manuals*, No. 78. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

O'Neill, F.H. and Martin, J.R. (2015). Summary of findings from the Survey of Potential Turloughs 2015. Unpublished Report for National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

O'Neill, F.H. and Martin, J.R. (2018) The Irish Juniper Monitoring Survey 2017. *Irish Wildlife Manuals*, No. 101. National Parks and Wildlife Service, Department of Culture Heritage and the Gaeltacht, Dublin, Ireland.

Perrin, P.M., Barron, S.J., Roche, J.R. and O'Hanrahan, B. (2010) Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland. Version 1.0. *Irish Wildlife Manuals*, No. 48. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Perrin, P.M., Barron, S.J., Roche, J.R. and O'Hanrahan, B. (2014a) Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland. Version 2.0. *Irish Wildlife Manuals*, No. 79. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. and Devaney, F.M. (2014b) National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 15: Slieve Mish Mountains cSAC (002185), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., and Devaney, F.M. (2014c) National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 16: Caha Mountains cSAC (000093), Cos. Cork and Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Regan, S. and Conaghan, J. (2016) Eco-Hydrological Investigation of Tory Hill fen SAC, Co. Limerick. Report prepared for The Office of Public Works.

Regan, S., Gill, L., Conaghan, J., Brew, T. and Gilligan, N. (2016) 05 - Assessing the conservation status of GWDTEs under the Habitats Directive and Water Framework Directive; A case study from Tory Hill Fen SAC. National Hydrology Conference 2016.

Regan, S. and Conaghan, J. (2017) Eco-Hydrological Investigation of Ballymore Fen SAC, Co. Westmeath. Report prepared for The Office of Public Works.

Rodwell, J.S. (ed.) (1991) *British Plant Communities. Volume 2. Mires and heath.* Cambridge University Press.

Rodwell, J.S. (ed.) (1995) *British Plant Communities. Volume 4. Aquatic communities, swamps and tall-herb fens*. Cambridge University Press.

	Wetland Surveys Ireland Ltd. (2017) Tullaher Lough and Bog SAC, County Clare and Ferbane Bog SAC, County Offaly - Use of Unmanned Aerial Vehicle (UAV) Surveys in Mapping Wetland Habitats. Unpublished report to National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht. Wheeler, B.D. and Proctor, M.C.F. (2000) Ecological gradients, subdivisions and terminology of north-west European mires. *Journal of Ecology* 88: 187-203. White, J. and Doyle, G.J. (1982) The vegetation of Ireland. A catalogue raisonné. *Journal of Life Sciences, Royal Dublin Society* 3: 289-368. Woodrow, W. and McNicholas, D. (2014) Surveys of possible Marsh Fritillary sites and habitats in Co Cavan and Co Leitrim – 2013. Report to National Parks and Wildlife Service, Dublin.
3.2i Additional information	BBS (2009) *Checklist of British and Irish bryophytes*. The British Bryological Society, Stafford, U.K. Lockhart, N., Hodgetts, N. and Holyoak, D. (2012) *Ireland Red List No.8: Bryophytes.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Otte, M.L. (ed.) (2003) *Wetlands of Ireland: Distribution, ecology, uses and economic value*. University College Dublin Press, Dublin. Proctor, M. (2013) *Vegetation of Britain and Ireland.* Harper Collins, London. Stace, C.A. (2010) *New Flora of the British Isles*. 3rd edition. Cambridge University Press, Cambridge. Some shapefiles and other data provided did not have associated reports. They include: Blanket bog study habitat maps, shapefiles received from NPWS. British Bryological Society Atlas dataset (2014) Fen habitat polygons for some raised bog sites, shapefiles received from Raised Bog LIFE team. Fen habitat polygons, shapefiles received from Coillte. IPCC list of fen and potential fen sites, received as excel spreadsheet from IPCC. NPWS data collated on wildfires (2017), data received from NPWS. Note also that sources used and listed in Kimberley (2013) were also drawn upon, but are not listed separately in this report.

4 Range

Range within the biogeographical/marine region concerned

4.1 Surface area	***35,100 km²***

4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	1994-2018	
4.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	*a) In km² or*	
	b) Operator ≈ (approximately equal to) *or*	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***

	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of 7140. A maximum gap distance of two 10km grid cells was used when running the range tool. Short-term trend direction was estimated as 'stable' based on expert opinion – while there may have been some losses of both habitat area and habitat quality within the reporting period, these are unlikely to be large, and as this is an uncommon but widespread habitat, the range is unlikely to be affected by such losses/decreases in quality. The number of 10km squares in the range (351) differs from the last monitoring period (236) due to the integration of new information. A suite of new datasets were assessed and integrated as appropriate as part of this work, meaning that our understanding of the range of transition mire habitat in Ireland has been improved. The Favourable Reference Range (FRR) has been set as approximately equal to the current range as it is based on more complete data being available on the distribution of fens across Ireland (though still incomplete) than was available in the last monitoring round. The FRR is considered to encompass all ecological and geographical variation of the habitat and is likely to be sufficiently large to allow the long-term viability of the habitat. Further notes on range (e.g. comparisions with previous assessments) are available in the accompanying backing document (Long *et al.*, 2018).

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2005-2018***	
5.2 Surface area *(in km²)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***77.41 km²***
5.3 Type of estimate	***Best estimate** / 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	

5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	1994-2018	
5.10 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator > (greater than) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***

	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*
5.15 Additional information *Optional*	The areas generated for points and polygons for the 2013 submission were used in the first instance (Kimberley, 2013). Additional data sources listed above were treated as follows: Polygon datasets listed as including this habitat: Area Habitat = Total Polygon Area. Polygons which represented habitat mosaics, and proportions given: Area Habitat = Area Polygon x Proportion 7140 habitat. Points: Area = Median Area, which for 7140 was calculated as the median area across all high-quality habitat polygons (Habitat Confidence A, B1 and B2 as defined by Kimberley, 2013). This median value for 7140 was calculated as 1,234 m^2, and was applied to all new points (since 2013), as well as any points from the 2013 submission where a default median value had been provided. See Long *et al.* (2018) for a fuller discussion on median areas. A thorough assessment of all resulting points and polygons was undertaken to ensure no duplication of areas from points and polygons representing the same habitat location. The total area was then calculated as the sum of the areas. The maximum area was based as the total area across all points and polygons of Habitat Confidence A, B1, B2 and C1. Points and polygons classified as C2 and D were excluded from the area calculations and from the maps, as per Kimberley (2013). Specific data on loss of habitat area are not available. However, when discussing reclamation as a high-level pressure and threat on all three fen habitat types, Kimberley (2013) notes: "Land reclamation for agricultural and forestry purposes has resulted in significant loss of wetland habitat in Ireland." Other pressures are also likely to be causing some habitat loss. Conversely, some small gains in habitat area may be occurring, e.g. at Tullaher Lough (Wetland Surveys Ireland Ltd., 2017), Nahinch Lough (C. Peppiatt, pers. comm.) and Derrylahan and Loughanboy Lough (Fernandez Valverde, 2018). Each of these reports describes 7140 habitat created by historical terrestrialisation of shallow open water. Short-term trend direction was estimated as 'stable'. The trend estimate is largely based on expert interpretation of the data sources available since there are no field-validated baseline data with which to compare the present area. The difference in habitat extent between this reporting period and the last is due to the inclusion of new information relating to sites that were submitted as part of the 2013 report (particularly pertaining to area), together with the integration of new datasets. Further information, including figures and findings from the previous two reporting periods, can be found in Long *et al.* (2018). The FRA is set as greater than the current area. It is unlikely that >10% of the resource has been lost since 1994. An additional 1-10% of the current area is considered adequate to ensure the long-term viability of the habitat.

	Overall, the extent (and condition) of transition mires within most counties remains unmapped and poorly known. A national fen survey could lead to a reduction or increase in the stated area of the habitat.

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***49.5 km²***
		Maximum	***49.5 km²***
	b) Area in not-good condition	**Minimum**	***27.9 km²***
		Maximum	***27.9 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	*stable / increasing / decreasing /* ***uncertain****/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period?* ***YES****/NO*		
6.7 Typical species Method used *Optional*	The updated list of typical species is as follows. Vascular plants: *Agrostis stolonifera, Caltha palustris, Cardamine pratensis, Carex demissa, C. diandra, C. lasiocarpa, C. lepidocarpa, C. limosa, C. nigra, C. pulicaris, C. rostrata, Comarum palustre, Epilobium palustre, Equisetum fluviatile, Eriophorum angustifolium, E. latifolium, Filipendula ulmaria, Galium palustre, Hydrocotyle vulgaris, Lysimachia vulgaris, Lythrum salicaria, Mentha aquatica, Menyanthes trifoliata, Molinia caerulea, Myrica gale, Pedicularis palustris, Phragmites australis, Potamogeton polygonifolius, Ranunculus flammula, Rhynchospora alba, Silene flos-cuculi, Succisa pratensis, Valeriana officinalis* and *Viola palustris.* Bryophytes: *Aneura pinguis, Aulacomnium palustre, Bryum pseudotriquetrum, Calliergon giganteum, Calliergonella cuspidata,*		

	Campylium stellatum, Fissidens adianthoides, Philonotis fontana, Polytrichum commune, Sarmentypnum exannulatum, Scorpidium cossonii, S. revolvens, S. scorpioides, Sphagnum contortum, S. denticulatum, S. fallax, S. fimbriatum, S. palustre, S. squarrosum, S. subnitens and *Straminergon stramineum.* High-quality indicator species: *Cinclidium stygium, Eriophorum gracile, Hamatocaulis vernicosus, Hammarbya paludosa, Pyrola rotundifolia* subsp. *rotundifolia, Saxifraga hirculus, Sphagnum platyphyllum, S. subsecundum, S. teres, S. warnstorfii* and *Tomentypnum nitens.* Typical species were not specifically assessed in this reporting period. In the absence of a national survey and dataset, this revised list of typical species is based on previous Article 17 reporting for this habitat (Kimberley, 2013 and Foss, 2007a, b, and references cited in these accounts), updated using additional references and expert opinion. Full details on the thorough review of typical species can be found in Long *et al.* (2018), particularly Appendix 3. The review of additional references included scientific papers and books on the classification of fen habitats from Ireland, UK and elsewhere in Europe, and data from Irish national habitat and species surveys (e.g. National Survey of Upland Habitats and monitoring manual for *Hamatocaulis vernicosus*) and Article 17 reporting from Northern Ireland, Scotland and Wales. Expert opinion included consultation with NPWS, Northern Ireland Environment Agency, Natural Resources Wales, Scottish Natural Heritage and a range of experienced wetland ecologists within Ireland. The amendments to the list from the previous reporting period include changes such as the removal of *Sphagnum riparium* (not found in Ireland), the addition of a number of bryophytes (which are good indicator species) and addition of species considered to characterise particularly high quality transition mire habitat. Nomenclature was updated where relevant to follow Stace (2010) for vascular plants and the bryophyte nomenclature adopted by Lockhart *et al.* (2012) is used; this is based on the Checklist of British and Irish bryophytes (Hill *et al.*, 2009) with minor modifications to reflect recent taxonomic changes.
6.8 Additional information *Optional*	Due to the lack of a comprehensive, targeted survey of transition mires in Ireland, detailed information on what constitutes 'good' or 'not-good' condition is not available. Lack of data meant that it was not possible to define 'good' and 'not-good' condition during this project. However, during the detailed review of all existing sources of information, some information relating to habitat condition was available. BEC Consultants, as part of the National Survey of Upland Habitats (NSUH), developed criteria for assessing the conservation status of upland examples of transition mires (Perrin *et al.*, 2014a; p. 85). These focus on the presence or absence of positive indicator species for a suite of vegetation types, as well as the presence or absence of certain negative indicators. Vegetation and physical structure is also assessed, with measures such as vegetation height, disturbed ground and drainage included. While these are useful, they were designed

	primarily for upland habitats, and so further survey of lowland transition mires is needed to develop more broadly applicable criteria. Assessments were carried out at three transition mires sites as part of the NSUH during the current reporting period (Perrin *et al*., 2014b, c). All three were reported to be in good condition (though one failed initially, but was later passed based on expert opinion). In the Galway City Transport Project (Barron *et al*., 2015), 11 points from five sites were assessed, and two of these points were considered to be in 'not-good' condition due to lack of positive indicator species and excessive bare ground/disturbance. Both the Louth and the Waterford County Wetland Surveys reported that two out of three transition mire sites were in 'not-good' condition, and listed a number of related pressures and threats (which have been reviewed and factored into section 7 below). These include issues relating to pollution, fertilisation, reclamation, forestry, drainage and grazing. The Kildare County Wetland Survey reported on two out of two transition mire sites which were in 'not-good' condition, and lists issues relating to drainage, pollution and grazing as being the main pressures at these sites. Many of the other data sources reviewed provided information on condition, and issues affecting condition, while not explicitly assessing these. In particular, a four-year study on *Vertigo* snails assessed habitats with respect to suitability for the molluscs, and this information has been informative in terms of fen condition and issues affecting it (Long and Brophy, in prep.). Based on this dataset, some of the main issues influencing fen condition are (in alphabetical order): Climate change – where drainage or hydrological regime are already compromised at a site, the problems are likely to be exacerbated; Drain clearance; Dumping of spoil, garden waste, household and other waste; Eutrophication – from fertiliser application nearby, from excessive access for stock; Forestry – and sometimes from self-seeding of conifers; Grazing issues – sometimes relating to undergrazing, sometimes to overgrazing/trampling; Invasive species, e.g. *Rhododendron ponticum*; Low diversity of vegetation; Problematic native species – e.g. expansion of *Myrica gale*, *Ulex europaeus*, *Pteridium aquilinum*; Succession; Vegetation >50 cm in height; Vegetation dominated by tall sedges or rushes; Water table lower than 5 cm below ground level. On review of all datasets available for the reporting period, with particular reference to those which contained information on habitat condition, it is estimated that 36% of sites/points were deemed to be

	in 'not-good' condition. As the data are both limited and variable, it is difficult to extrapolate this result to the national level. However, it can be stated with moderate confidence that the structure and functions of over one-quarter, and perhaps one-third, of the national resource of transition mires (7140) are impaired. These estimations are used to derive the figures in 6.1.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**B01** Conversion to forest from other land uses, or afforestation (H) **J01** Mixed source pollution to surface and ground waters (H) **K02** Drainage (H) **K04** Modification of hydrological flow (H) **A06** Abandonment of grassland management (M) **A09** Intensive grazing or overgrazing by livestock (M) **C05** Peat extraction (M) **K01** Abstraction from groundwater, surface water or mixed water (M) **L02** Natural succession resulting in species composition change (M)	**B01** Conversion to forest from other land uses, or afforestation (H) **J01** Mixed source pollution to surface and ground waters (H) **K02** Drainage (H) **K04** Modification of hydrological flow (H) **A06** Abandonment of grassland management (M) **A09** Intensive grazing or overgrazing by livestock (M) **K01** Abstraction from groundwater, surface water or mixed water (M) **L02** Natural succession resulting in species composition change (M)

7.2 Sources of information *Optional*	See sections 3.2 and 7.3
7.3 Additional information *Optional*	All available data sources (see section 3.2) from within the monitoring period were inspected for information on pressures and threats. Those containing relevant information were carefully checked, and data were collated primarily from the following sources (for all three fen types): Eco-hydrological Investigation of Tory Hill fen SAC (2016); Galway City Transport Project (2014); Kerry Wetland Surveys (2014 and 2015); Kildare Wetland Surveys (2013 and 2014);

	Louth Wetland Survey (2014); National Survey of Upland Habitats: Caha Mountains SAC (2014); National Survey of Upland Habitats: Slieve Mish Mountains SAC (2014); NPWS data collated on wildfires (2017); *Vertigo* monitoring surveys (2014-2017); Waterford Wetland Survey (2015). Pressures and threats data were available from 20 sites with transition mire. The data are limited and detailed information relates only to a relatively small number of sites. However, they reflect a range of different geographic locations; upland and lowland sites; different site ownership and site management; and therefore give a reasonable overview. Pressures and threats were ranked according to their recorded impact level and number of sites or area impacted. Not all data sources listed impact codes or impact level. In these cases the most appropriate impact code was selected and text in the report consulted to assist in assigning impact level. As the data are limited, expert judgement was also used in the selection and ranking of pressures and threats. Fuller information on pressures and threats, and on the ranking process, is available in the backing document which accompanies this report (Long *et al*., 2018). The main pressures (and also threats) facing transition mires in Ireland, based on the data available, are afforestation, water pollution, drainage and hydrological changes. However, grazing/agricultural management is also prominent as an issue. Climate change has not been added as an impact but it is likely to affect this habitat in Ireland in decades to come (e.g. warmer temperatures and changes to rainfall and flood events may increase drying out and vegetation succession). In 2013, reclamation, mis-directed conservation measures and peat extraction were deemed to be the pressures with the highest impact, and also the biggest threats. The apparent changes since 2013 are most likely due to new information being available, and differences between surveys and between surveyors may also account for some of the apparent differences in categories chosen when assigning pressures and threats. Peat extraction has not been added as a threat due to likelihood that levels of peat extraction will decrease in Ireland in the near future, both due to environmental legislation to protect peatland habitats and to the phasing out of industrial Bord na Móna cutting. The fact that transition mires tend to be very wet means that they were generally shielded from direct cutting effects, and damage, where it occurred, was due to changes (e.g. in hydrology) wrought by nearby peat cutting.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* ***a) Measures identified, but none yet taken** or* *b) Measures identified and taken or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'range') or* *c) Increase the surface area of the habitat type (related to 'area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	None taken
8.6 Additional information *Optional*	Due to the lack of a dedicated fen survey in Ireland, few data exist on conservation measures, and particularly those aimed at conserving or restoring transition mires. However, some data sources which were accessed during this work mention examples of conservation measures, and other examples are known from within the current project team. These are listed below (not limited to transition mires), and form the basis of a list which can be considered for further development into the future. Overall, however, there is a lack of dedicated conservation action being implemented for transition mires in Ireland. Bord na Móna mention allowing areas of bare peat and open water to recolonise naturally as a conservation measure. Both Coillte and Bord na Móna have designated a number of sites within their land holdings as being important for biodiversity, and this includes some areas of fen. Drain blocking and other attempts at restoring favourable hydrological regimes at and near areas of fen is a conservation measure which they have undertaken at some sites,

	though often not directly relating to fen habitat. Some sites have had boardwalks installed to help encourage members of the public to engage with the area (and thus potentially to get involved in its conservation), and also to manage public use of the sites. Signage at sites also has a similar function. Examples (not limited to transition mires) include Pollardstown Fen in Co. Kildare, BirdWatch East Coast Nature Reserve in Co. Wicklow, Abbeyleix Bog in Co. Laois and Fenor Bog in Co. Waterford. In order to better understand fen hydrology, a number of hydrometric studies are currently taking place (e.g. at Tory Hill in Co. Limerick, Scragh Bog in Co. Westmeath and at Pollardstown Fen, Co. Kildare) – again, not limited to transition mires. Water level management takes place at a small number of sites (e.g. BirdWatch East Coast Nature Reserve in Co. Wicklow and Fenor Bog in Co. Waterford), but there are usually a number of conservation and other aims, not just the conservation of Annex I fen habitats, and rigorous scientific assessment of impacts of measures is generally not carried out. The Raised Bog LIFE project which is actively working to restore areas of raised bog, and at whose sites there are examples of Annex I fen habitats, has noted that they are not actively applying conservation measures to areas of fen. Rather, they are aiming to ensure that any measures they might apply to support raised bog functioning do not negatively impact on the adjacent fen. Removal of non-native trees and planting of natives is known to be taking place at one site with conservation as the aim (Fenor Bog, Co. Waterford). Non-intensive grazing by cattle, sheep and horses was mentioned as a management measure at a number of sites. These grazing measures are mainly passive, and involve maintaining the management practices currently in place that benefit the habitat. It should be noted that the management regimes of most fen sites in Ireland are driven by the landowner rather than by any formal management plan or policy; therefore the continued operation of the management regimes currently in place is not guaranteed. Note that there are likely to be other examples of conservation measures being taken for transition mires in Ireland - this list is not conclusive and should be added to in future years. In Ireland, drainage of large sites is controlled by EIA agricultural regulations (S.I. No. 456/2011 – European Communities (Environmental Impact Assessment) (Agriculture) Regulations 2011). Many fen sites are smaller than the threshold value of 15ha but often the wetland systems associated with them are large enough to bring the wetlands as a whole above the threshold. Also worth noting is that under the Planning and Development Regulations (2001-2011) planning permission is required for the drainage or reclamation of wetlands in excess of 0.1ha (or below that if having a significant effect on the environment). It should be noted that these are policy instruments rather than conservation measures, but they should confer a degree of protection to fen sites. Based on the list of threats identified for transition mires in Ireland

	(see section 7.1), below are listed the associated suite of potential conservation measures. Passive measures such as maintaining grazing are not included. There is little information available currently on the extent to which measures such as these are taking place in Ireland, but it is suggested that future fen studies and assessments should aim to systematically review and identify suitable conservation measures. This list should not be taken as exhaustive, but should be considered as part of a thorough and systematic review of suitable measures. CA04 Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures; CA05 Adapt mowing, grazing and other equivalent agricultural activities; CA06 Stop mowing, grazing and other equivalent agricultural activities; CB01 Prevent conversion of (semi-) natural habitats into forests and of (semi-) natural forests into intensive forest plantation; CC01 Adapt/manage extraction of non-energy resources; CC02 Adapt/manage exploitation of energy resources; CC07 Habitat restoration/creation from resources, exploitation areas or areas damaged due to installation of renewable energy infrastructure; CJ01 Reduce impact of mixed source pollution; CJ02 Reduce impact of multi-purpose hydrological changes; CJ03 Restore habitats impacted by multi-purpose hydrological changes; CL01 Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes. Conservation measures are needed for transition mire sites due to the fact that it is estimated that approximately a quarter to a third of sites in Ireland may be in 'not-good' condition. There are a large number of pressures acting on these sites, and a number of threats which are likely to act on the sites in the future (see section 7). To counteract the potential negative effects, conservation measures are needed. Few data are available on conservation measures currently underway, and less still on their effectiveness. Re-wetting and natural recolonisation are measures that are both likely to have been implemented at some Coillte, Bord na Móna and Raised Bog LIFE sites. However these are likely to be small in scale (as they are mostly aimed at bog, not fen), and dedicated surveys are needed to assess their effectiveness at improving the conservation status of transition mires. Hydrological studies like that at Tory Hill will help scientists and decision-makers better understand fen hydrology, but will not in themselves help to improve conservation status. Signage and boardwalks help to involve local communities, and also to protect sites from damage, but again are not measures which usually help to improve the conservation status of transition mires.

	Most areas of transition mire in Ireland are likely to be in private ownership, and due to the nature of the habitat (very wet, often floating vegetation) these areas are generally unmanaged, with the exception perhaps of some occasional minimal management such as light grazing. There is therefore a need for a broad-reaching education programme for landowners and other relevant bodies (NPWS, Teagasc, IFA, Coillte, Bord na Móna, etc.) as to what measures are needed. In summary, an evidence-based programme of conservation measures is urgently needed for transition mires in Ireland, and should follow quickly from a national survey of this habitat type.

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	*Good /* ***Poor*** */ Bad / Unknown*
	c) Structure and functions	*Good / Poor /* ***Bad*** */ Unknown*
9.2 Additional information *Optional*	The Future prospects for the Range of the habitat have been assessed as good. A number of pressures and threats have been identified, and there is a lack of conservation measures in place to counteract these. However, given the wide range for this habitat, based on multiple sites, it is likely to be more than 12 years before these pressures and threats might start taking a toll on the range of the habitat. The Future prospects for Area of the habitat are assessed as poor. This is based on the fact that we assume that losses have occurred since the Directive came into force and there are no measures currently in place to restore these areas. There is no evidence to suggest that there will be further losses in the next 12 years. The future projection of the conservation status of Area remains poor because of its current status. The Future prospects for the Structure and functions of transition mire habitats in Ireland are assessed as bad. This is based on the assessment result in 2013, and the fact that little has happened in the interim in terms of putting in place conservation measures (either broad scale or site-specific) to counteract pressures and threats that have been identified as acting on the habitat. Thus, overall, the Future prospects for transition mire in Ireland have been assessed as Bad given that a significant proportion of the habitat is damaged (deemed to be >25% in a review in 2013, and based on expert judgement and a review of interim studies, deemed still to be >25%), coupled with the fact that there are few to no conservation measures in place.	

10 Conclusions			
Assessment of conservation status at end of reporting period			
10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/****NO***	***YES****/NO*
	b) yes, due to genuine change	*YES/NO*	*YES/****NO***
	c) yes, due to improved knowledge/more accurate	*YES/NO*	*YES/****NO***
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/****NO***
	e) yes, but there is no information on nature of change	*YES/NO*	***YES****/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	Range: While there may have been some losses of both habitat area and habitat quality within the reporting period, these are unlikely to be large, and as this is an uncommon but widespread habitat, the range is unlikely to have been affected by such losses/decreases in quality since the Directive came into force. Thus Range was assessed as Favourable.		

	Area: There are no field-validated data currently available to accurately quantify area or changes in area. Short-term trend was assessed as stable because changes are thought to be mostly related to habitat quality rather than area. However, there have been some losses of habitat area since the Directive came into force, and there is a lack of effective conservation measures; therefore, overall, Area was assessed as Inadequate. Structure and functions: This parameter was assessed as Bad in the 2013 reporting period, and while there is still a lack of concrete data from, for example, a national fen survey, expert knowledge suggests that this is still the case. Information, though variable in nature, was gleaned from surveys carried out within the last reporting period which support this view, and thus this parameter was again assessed as Bad. Future prospects: Based on the Future prospects assessments in section 9 (Range = good; Area = poor; Structure and functions = bad), the overall assessment of Future prospects for transition mire is Bad. Overall: Based on the results above, a combined overall Conservation Status of Bad applies. Overall trend direction: Based on the fact that two of the assessment parameters (Range and Area) have a trend of stable, with one (Structure and functions) uncertain, the overall trend for the habitat is stable. Expert judgement and experience have been used to inform the decisions made on the above at all stages, and available data, while often piecemeal and collected for a variety of purposes (i.e. not with fen conservation assessments as a focus), have been used at every opportunity to inform decision-making.

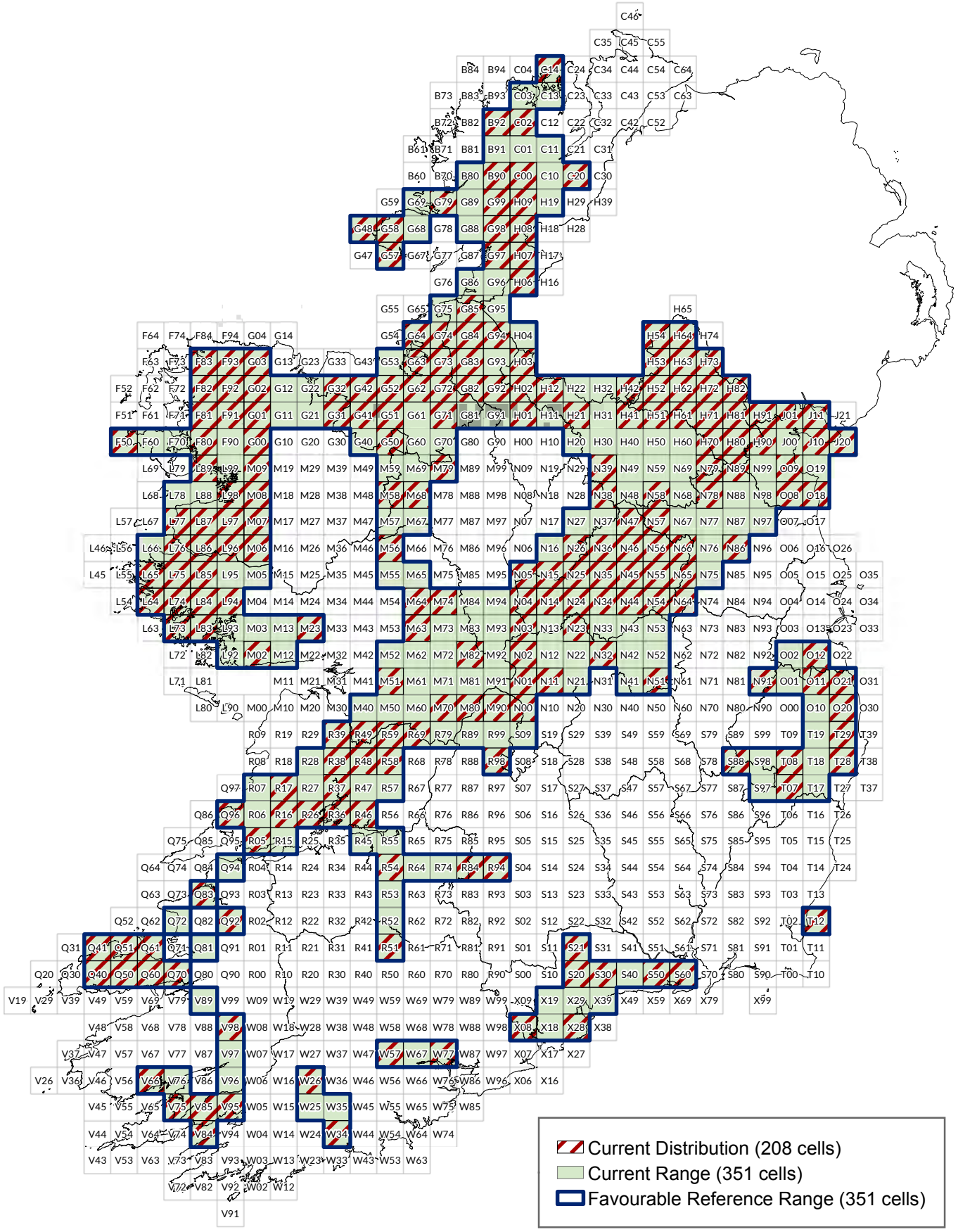
11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***45.25 km²***
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* *stable / increasing / decreasing /* ***uncertain****/ unknown*	

11.5 Short-term trend of habitat area in good condition within network **Method used**	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*
11.6 Additional information *Optional*	Area within the network was estimated by performing a union between the polygon distribution shapefile and the SAC shapefile, and a spatial join between the point distribution shapefile and the SAC shapefile. Any sites represented by points that were found to sit within the boundaries of the SAC were assumed to be wholly located within the SAC and an area was assigned to these points as described in section 5.15. The area given in section 11.1 is the total area of 7140 habitat in SACs in the country, including some SACs where 7140 is not listed as a qualifying interest (QI). The area of 7140 within the Natura 2000 (SAC) network where it is listed as a QI is 17.19 km^2, and this is from across 20 SACs. This compares with 15.5 km^2 in 2013. Better quality and more data are the reasons for the increased figure, rather than an expansion of the habitat or a change in designations. The trend was assessed as 'uncertain' due to lack of detailed data.

12 Complementary information

Transition mires (7140)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**7150 Depressions on peat substrates of the *Rhynchosporion***
1.2i Habitat short name	**Rhynchosporion depressions**
1.3i Habitat description	Depressions on peat substrates of the *Rhynchosporion* (7150), which is characterised by the presence (*inter alia*) of *Rhynchospora alba* and *R. fusca,* is considered to be an integral part, and a micro-habitat, of Active raised bog (7110) and Blanket bog (7130). In raised bogs, *Rhynchospora* vegetation communities are only considered Annex I type (*sensu stricto*) when they occur in their most developed form in the wettest sections of the Active raised bog (7110), which correspond with pools, *Sphagnum* lawns and hollows. 7150 habitat is also deemed to be an integral part of blanket bog ecosystems and can also be found in poor fens or flushes, and transition mires which can occur in close association with blanket bog. Only when the *Rhynchospora* species are associated with plant communities of the most sensitive and less disturbed parts of blanket bog and associated wetland habitats are they considered to correspond with the EU Annex I habitat type. These correspond with small depressions or flushed areas, or as extensive water tracks and interconnecting shallow pool areas around hummocks of *Sphagnum*; along pool margins and on low-level flats or lawns that often form an interface between hummock and bog pool. 7150 is therefore considered to be an integral part of lowland (<150m) and highland (150-300m, *sensu* Schouten (1984)) blanket bog (7130), as well as associated flushes and transition mires (and rarely wet heath) ranging from ombrotrophic to minerotrophic where ground conditions are wet to very wet. The latter habitats conform to: Poor fen and flush (Fossitt PF2); Transition Mire and Quaking Bog (7140); and Wet Heath (4010). *Rhynchosporion* vegetation (7150) does not appear to occur on mountain blanket bog sites above 300m (Schouten, 1984; Conaghan *et al*., 2000). Depressions on peat substrates of the *Rhynchosporion* (7150) is reported as occurring in the fluctuation zone of oligotrophic pools with sandy, slightly peaty substrates (Stallegger, 2008). However, according to the National Survey of Upland Habitats (NSUH) (NPWS, 2013) it had not been recorded in this context in Ireland. Stallegger (*ibid*.) also reported it as occurring on wet heath, but this has been recorded exceedingly rarely during the NSUH (NPWS, 2013). *Rhynchospora* vegetation communities can be found extensively in other more man-modified situations such as degraded raised bog (e.g. tracks and cutover areas) and blanket bogs (e.g. areas impacted by overgrazing and trampling by livestock; peat-cutting; tracks). *R. alba* can colonise rapidly and form pioneer communities, after cutting/drainage/burning, if enough acid peat is left and conditions are wet enough. They are characterised by a depauperate species assemblage and disturbed conditions and lack the other indicative species of 7150 such as abundant *Sphagnum* spp. and *Drosera*

	anglica. This vegetation is therefore not considered to correspond with the EU habitat in the Irish context. Recently, the Irish Vegetation Classification assigned *Rhynchospora* vegetation to vegetation communities under the *Rhynchospora alba-Sphagnum cuspidatum* (BG1) group (Perrin, 2018).

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***1949-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The new habitat distribution map is a reviewed version of the 2013 map (NPWS, 2013). The following are the reasons for an update of the map: a) the new habitat definition no longer considers Degraded raised bog (DRB) (7120) as hosting 7150; and b) the review of the distribution of Active Raised Bog (ARB; 7110) and Blanket bog (7130) undertaken as part of the new Article 17 assessment (2018). The following are the steps followed to generate the new map: a) All those 10km cells identified by NPWS (2013) as containing 7150 based on the presence of 7150 records associated with 7130 or the occurrence of 7130 and *Rhynchospora* spp. (Preston *et al*., 2002) have been retained. The 2013 assessment also took into account 7150 records provided by the Habitat Assignment Project (Fernandez, in prep.) which notes the qualifying interest of SACs and other habitats which occur in SACs and Natural Heritage Areas (NHAs). b) All those 10km cells identified by NPWS (2013) as containing 7150 based exclusively on the presence of 7120 records have been ruled out. c) All those 10km cells identified as containing 7110 by the new Article 17 assessment are deemed to be also part of the current 7150 distribution. d) Additional new 7150 records have been identified based on the following sources: - Blanket Bog dataset: derived from Survey and Evaluation of Blanket Bogs for proposal as Natural Heritage Areas (2003/04) (Derwin, 2004; reviewed by Perrin & Barron, 2010); - Glenveagh National Park dataset: Glenveagh National Park and An Taisce Property Habitat Map (Lynda Weekes, 1990); - UCON and NSUH datasets: derived from National Survey of

	Upland Habitats (Perrin *et al*., 2010, 2011, 2013a-d, 2014a-e, 2017); - Barron S.J (2017): SABB dataset derived from Phase 1 of the scientific work to inform a system for the management of turf-cutting in designated blanket bog SACs and NHAs. e) In addition, some new 10km cells have been selected as a result of the occurrence of 7130 records reported by the 2018 7130 distribution map and *Rhynchospora* spp. records as provided by the National Biodiversity Data Centre. Those 10km cells with 7130 records according to the new Article 17 distribution map but with no records of *Rhynchospora* spp. are not included in the final 7150 habitat distribution map. Although 7150 may be associated with other habitats (such as Poor fen and flush (Fossitt PF2), Transition Mire and Quaking Bog (7140), and Wet Heath (4010)) its status within these additional habitats is not well understood in the Irish context and further investigations are required. As a result, no habitat records exclusively associated with these habitats are available and cannot be considered in the new 7150 distribution map. The new 10km grid distribution map is slightly different from the one reported in 2013. A total of 331 x 10km grid cells (33,100 km^2) are considered to intersect areas containing *Rhynchosporion* depressions, compared to the 346 cells reported in 2013. This is the result of the new interpretation of the habitat as well as more recent habitat and species data. 75 cells previously deemed to support 7150 solely based on the occurrence of DRB and *Rhynchospora* spp. records are not now considered to be part of the habitat distribution. On the other hand, 60 new cells have been added to the map, based on new habitat and species records, as reported by the resources described above.

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned	
3 Biogeographical and marine regions	
3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
3.2 Sources of information	Barron, S.J. (2017) Phase 1 of the scientific work to inform a system for the management of turf-cutting in designated blanket bog SACs and NHAs: Turf-cutting GIS Review Volumes 1 and 2 DRAFT. Unpublished draft report to National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. Conaghan, J. *et al*. (2000) Distribution, Ecology and Conservation of Blanket Bog in Ireland. (A synthesis of the reports of the blanket bog surveys carried out between 1987 and 1991 by the National Parks and Wildlife Service). Unpublished report commissioned by

NPWS, Dúchas, The Heritage Service, Dublin.

Derwin, J. (2004) Survey and Evaluation of Blanket Bogs for proposal as Natural Heritage Areas. Commissioned by National Parks and Wildlife Service, Dept. of Environment, Heritage and Local Government.

Fernandez, F., Fanning, M., McCorry, M. & Crowley, W. (2005) Raised Bog Monitoring Project 2004-5. Unpublished report, National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin.

Fernandez, F., MacGowan, F., Crowley, W., Farrell, M., Croal, Y., Fanning, M. & McKee M. (2006) Assessment of the Impacts of turf cutting on designated Raised Bogs 2003-06. Unpublished report, National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin.

Fernandez, F. Crowley, W. & Wilson S. (2012) *Raised Bog Monitoring Survey*. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin.

Fernandez, F., Connolly K., Crowley W., Denyer J., Duff K. & Smith G. (2014) Raised Bog Monitoring and Assessment Survey 2013. *Irish Wildlife Manuals*, No. 81. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

Fernandez F. (in prep.) Conservation status assessment of Active raised bog, Degraded raised bog and Depressions on peat substrates of the Rhynchosporion. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin.

Fossitt, J.A. (2000) *A guide to habitats in Ireland*. The Heritage Council, Kilkenny.

Hammond, R.F. (1979) *The Peatlands of Ireland*. An Foras Talúntais, Dublin.

Kelly, L. (1993) Hydrology, Hydrochemistry and Vegetation of Two Raised Bogs in Co. Offaly, Ph.D. Thesis. Trinity College, Dublin.

Kelly, L. & Schouten, M.G.C. (2002) Vegetation. In: M. G. C. Schouten (Ed.), *Conservation and Restoration of Raised Bogs: Geological, Hydrological and Ecological Studies*. pp.110-169, Department of Environment and Local Government, Dublin, Ireland/Staatabosbeheer, The Netherlands.

Mackin, F., Barr, A., Rath, P., Eakin, M., Ryan, J., Jeffrey, R. & Fernandez Valverde, F. (2017) Best practice in raised bog restoration in Ireland. *Irish Wildlife Manuals,* No. 99. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

NPWS (2007) The status of EU protected habitats and species in Ireland. Volume (3). Unpublished report, National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin.

NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin.

NPWS (2014) *Review of Raised Bog Natural Heritage Area Network*.

National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Dublin.

NPWS (2015) *National Peatlands Strategy 2015*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Dublin.

NPWS (2017) *National Raised Bog Special Areas of Conservation Management Plan 2017-2022*. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. Dublin.

Perrin, P.M. & Barron, S.J. (2010) Review and amendment of GIS mapping for blanket bog NHAs. Report for National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin.

Perrin, P.M., Roche, J.R. & Barron, S.J. (2011) National Survey of Upland Habitats (Phase 1, 2010 - 2012) Site Report No 1: Mweelrea, Sheeffry, Erriff Complex cSAC (001932), Co. Mayo. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin. https://www.npws.ie/sites/default/files/publications/pdf/NSUH10_Mweelrea_Sheeffry_Erriff_Report_01c_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013a) National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 10: Ox Mountains Bogs cSAC (002006), Cos. Mayo and Sligo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Ox_Mountains_Bogs_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013b) National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 12: Arroo Mountain cSAC (001403), Co. Leitrim. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Arroo_Mountain_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013c) National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 13: Cuilcagh – Anierin Uplands cSAC (000584), Cos. Cavan and Leitrim. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013d) National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 14: Slieve League cSAC (000189), Co. Donegal. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., & Devaney, F.M. (2014a) National Survey of Upland Habitats (Pilot Survey Phase, 2009-2010), Site Report No. 2: Corraun Plateau cSAC (000485), Co. Mayo (Revision). National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014b) National Survey of Upland Habitats (Phase 1, 2010-

	2011), Site Report No. 6: Croaghaun/Slievemore cSAC (001955), Co. Mayo (Revision). National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., & Devaney, F.M. (2014c) National Survey of Upland Habitats (Phase 2, 2011-2012), Site Report No. 7: Mount Brandon cSAC (000375), Co. Kerry (Revision). National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., & Devaney, F.M. (2014d) National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 16: Caha Mountains cSAC (000093), Cos. Cork and Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. https://www.npws.ie/sites/default/files/publications/pdf/NSUH13_Caha_Mountains_01b_M.pdf Perrin, P.M., Barron, S.J., Roche, J.R. & O'Hanrahan, B. (2014e) Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland. Version 2.0. *Irish Wildlife Manuals*, No. 79. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. https://www.npws.ie/sites/default/files/publications/pdf/IWM79.pdf Perrin, P. (2018) Irish Vegetation Classification: Technical Progress Report No. 3. Report submitted to National Biodiversity Data Centre. http://www.biodiversityireland.ie/projects/national-vegetation-database/irish-vegetation-classification/explore/ Schouten, M.G.C. (1984) Some Aspects of the Geographical Gradient in Irish Ombrotrophic Bogs. *Proceedings of the Seventh International Peat Congress, Dublin* 1: 414-432. Stallegger M. (2008) *Management of Natura 2000 habitats. 7150 Depressions on peat substrates of the Rhynchosporion*. European Communities.
3.2i Additional information	

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***46,900 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	

4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 46,900km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The habitat's Favourable Reference Range (FRR) has been reviewed due to the new interpretation of the habitat in the Irish context and new data sources. *Rhynchosporion* depressions (7150) are now deemed to be confined to Active raised bog (7110) and Blanket bog (7120) (see section 2.5i). Both current range and FRR are still considered to have the same value, for the reasons previously described by NPWS (2013). The new range and FRR is 469 x 10 km cells (46,900 km^2), which is smaller than the 47,200 km^2 reported in 2013. This reduction is deemed to be the result of better knowledge of the habitat rather than an actual change.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***

	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*
4.12 Additional information *Optional*	Range was calculated using the range tool IT Tool version 3/06/2013 generated by European Topic Centre on Biological Diversity and is based on the current known distribution of 7150. The new Range map still shows that the habitat is mostly concentrated in the west and the midlands and mostly absent from the east and south-east. The distribution map shows that the number of cells supporting the habitat along the east has been reduced as a result of the review in habitat definition (i.e. 7150 is no longer associated with DRB (7120)). On the other hand, new data has identified some new dispersed records along the most eastern and south-eastern edge of the distribution. The current range value (46,900 km^2, or 469 x 10km cells) differs from the one reported in 2013 (47,200 km^2). This decrease is the result of the new interpretation of the habitat as well as more recent habitat and species data. No changes in range have been reported for any of the two hosting habitats (7110 and 7130) within the current reporting period (2013-2018). Nor have there been any actual recorded losses of 7150 habitat reported that result in a loss of range within the current reporting period (2013-2018). As a result, 7150 is given a stable trend and the Range was deemed to have remained stable in the last two reporting periods (NPWS, 2013). Therefore, the habitat's Range is also given a stable trend in the long (1994-2018) and short (2007-2018) terms.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***1949-2018***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***21.43 km^2***
5.3 Type of estimate	***Best estimate** / 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	

5.6 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	*stable / increasing / **decreasing** / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	***b) Operator >> (much more than)** or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods? **YES**/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	***YES**/NO*
	b) yes, due to improved knowledge/more accurate data	***YES**/NO*
	c) yes, due to the use of different method	***YES**/NO*
	d) yes, but there is no information on the nature of change	*YES/**NO***

	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*
5.15 Additional information *Optional*	The period over which the surface area of 7130 was determined begins in 1949 when bog and heath relevés were recorded by Braun-Blanquet and Tüxen (data utilised in Perrin, 2017) and incorporates updates made by surveys between 1959 and 2017 that are listed in section 3.2. The previous assessment (NPWS, 2013) estimated that the Area extent was 29.84 km^2. The new interpretation of 7150 no longer considers 7120 as hosting habitat for 7150 and, in addition, the review of the habitat's coverage (% value) when associated with 7110 (i.e. reduced from 10% to 5%) required a review of the habitat's extent as described by Fernandez (in prep.). Furthermore, the areas of both 7110 and 7130 habitats have been updated within the new Article 17 report as follows: 7110 (16.59 km^2) and 7130 (2,574.58 km^2). As a result, the new 7150 Area figure is 21.43 km^2 (16.59 x 5% + 2,574.58 x 0.8%). NPWS (2013) considered that the habitat's area when the Habitats Directive came into force (1994) was sufficient to ensure the long-term survival of the habitat. Thus, although the actual figure is unknown, it was deemed to be larger than the current figure. A similar approach is taken in this new assessment. The 2013 (NPWS) assessment considered that the current habitat area was less than 10% below the Favourable Reference Area (FRA) and thus was given an Unfavourable-Inadequate assessment. In this reporting period the 7150 Area assessment has been aligned to the assessments given to both hosting habitats: 7110 and 7130. Both habitats have been given an Unfavourable-Bad assessment in the new reporting period and thus 7150 Area Conservation Status is also deemed to be Unfavourable-Bad. The actual Favourable Reference Area is unknown. In the case of those raised bogs where 7150 is present and for which a habitat condition assessment was undertaken in the reporting period, the habitat Area has been assessed as Unfavourable-Bad/decreasing (Fernandez, in prep.). Only a total of three monitoring stops have been assessed during the NSUH surveys in the new reporting period. All three monitoring stops were recorded at Caha Mountains cSAC (Perrin *et al.*, 2014d). No changes in area of habitat were noted and thus the Area status was assessed as Favourable. These three monitoring stops are not representative of the overall condition of the habitat Area when associated with blanket bogs. As a result, the Area status of 7150, when associated with blanket bogs, is extrapolated from the Area status of blanket bog (7130) as given in the new Article 17 (2018) assessment (Unfavourable-Bad). A review of major impacting activities affecting designated raised bogs for this reporting period (Fernandez, in prep.) has indicated ongoing negatively impacting activities outweighing positive measures in the reporting period: Turf cutting: for Active raised bog (7110) a slight decreasing trend

	has been reported within the current network of SACs (62) and retained NHAs (36), but it is still active at many sites: 22 SAC and 6 NHAs. Turf cutting is reported at many of the proposed new SACs and NHAs. For Blanket bog (7130) the new Article 17 blanket bog conservation status assessment has classified the activity as being a High-importance pressure and threat; Drainage: for Active raised bog (7110) a slight decreasing trend within the high bog but an increasing trend for drainage adjacent to the high bog both within and close to designated sites. For Blanket bog (7130) the new 2018 Article 17 assessment has considered this activity as a Medium-importance pressure and threat. Forestry (on the high bog and cutover): for Active raised bog (7110) a decreasing trend; for Blanket bog (7130) the new Article 17 blanket bog conservation status assessment has classified the activity as being a High-importance pressure and threat. The new Article 17 assessment for blanket bog (7130) has identified intensive grazing and peat erosion as High-importance pressures and threats, and wind farms as posing a Medium-importance pressure and threat. Positive management actions: for Active raised bog (7110) there have been limited amounts of restoration works undertaken within designated sites. A slightly more positive trend has been noted within non-designated sites, mostly corresponding with works undertaken by Bord na Móna. Within Blanket bog (7130) there are several projects aimed at achieving more sustainable farming practices, initiatives aimed at mitigating the impacts from forestry, transport and outdoor/recreational activities as well as some collaborative restoration works projects. Since the Area attribute has been given a decreasing trend for both 7110 and 7130 in the new reporting period, the same trend is accorded to 7150. The decreasing trend was given in 2013 (NPWS) also and is likewise assigned to the long (1994-2018) and short (2007-2018) terms based on the previous assessment trends.

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***10.801 km²***
		Maximum	***11.624 km²***
	b) Area in not-good condition	**Minimum**	***9.802 km²***
		Maximum	***10.625 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***

6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***
6.4 Short-term trend of habitat area in good condition Direction	*stable / increasing /* ***decreasing*** */ uncertain/ unknown*
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period?* ***YES****/NO*
6.7 Typical species Method used *Optional*	No specific typical species conservation status assessments have been undertaken either at site or national level. As a result, changes in the habitat quality (Structure and functions) were used to assess changes in the occurrence of typical species and therefore their conservation status. Both habitat quality and typical species condition are deemed to be interdependent. As a result, a similar assessment to the Structure and functions has been given to the habitat's typical species, as described by Fernandez *et al*. (in prep.).
6.8 Additional information *Optional*	The list of typical species has changed since the last report (NPWS, 2013). This is based on the improved knowledge of the habitat. Typical species on raised bogs: *Eriophorum angustifolium, Drosera anglica, D. intermedia, Menyanthes trifoliata, Narthecium ossifragum, Rhynchospora alba, R. fusca, Sphagnum cuspidatum, S. denticulatum, S. magellanicum, S. papillosum, S. pulchrum* and *Utricularia minor.* Typical species on blanket bogs: *Eleocharis multicaulis, Eriocaulon aquaticum, Eriophorum angustifolium, Campylopus atrovirens, C. brevipilus, Carex limosa, Carex panicea, Drosera anglica, D. intermedia, Juncus bulbosus, Menyanthes trifoliata, Narthecium ossifragum, Potamogeton polygonifolius, Pleurozia purpurea, Rhynchospora alba, R. fusca, Sphagnum denticulatum, S. cuspidatum, S. compactum, S. tenellum, S. magellanicum, S. papillosum*, *S. pulchrum, Utricularia minor, U. intermedia* and *Zygogonium* agg. algae. When found associated with ARB (7110) the Structure and functions assessment for *Rhynchosporion* depressions (7150) is directly correlated with the ARB Structure and functions status and trend assessments. The Structure and functions for ARB are assessed based on the objective that at least half of the extant area of ARB should be made up of central ecotope and active flush/soak (i.e. best quality

	examples of ARB community types). When found associated with Blanket bog (7130), *Rhynchosporion* depressions Structure and functions are assessed based on methodologies developed as part of the National Survey of Upland Habitats (NSUH) (Perrin *et al*., 2014e). 7150 Structure and functions have been assessed at 28 raised bog sites within the current reporting period. The results indicate that 7110 Structure and functions are overall Unfavourable-Bad/declining and so the same assessment for Structure and functions has been accorded to 7150. ARB Structure and functions are in good condition at only 3 bogs: Ballynamona Bog and Corkip Lough SAC (002339); Carrowbehy/Caher Bog SAC (000597); and Mongan Bog SAC (000580). Since the overall extent of ARB within the three bogs is 1.471 km^2, the approximate extent of *Rhynchosporion* depressions is therefore 0.074 km^2 (1.471 x 5%). This means that the remainder of the habitat, 0.756 km^2 (0.8295-0.074 km^2), is not in good condition (based on site-level conditions). When the habitat is found associated with blanket bog (7130), 7150 Structure and functions have been assessed only at 3 locations (monitoring stops) at Caha Mountains SAC in the current reporting period, which is not representative of the overall condition of the 7150 Structure and functions. Therefore, when associated with blanket bogs the Structure and functions is extrapolated from the new Article 17 (2018) 7130 assessment. The recent Article 17 assessment for blanket bog (7130) has generated the following figures for the extent of 7130 in good and bad condition: - Area in good condition: min. 1340.93 km² and max. 1443.78 km². - Area in not-good condition: min. 1130.80 km² and max. 1233.65 km². As a result, and after applying the 0.8% factor (see section 5.15) the extent of 7150, when associated with 7130, is as follows: - Area in good condition: min. 10.727 km² and max. 11.550 km². - Area in not-good condition: min. 9.046 km²and max. 9.869 km². In summary, the Structure and functions for 7150 are given the following values: - Area in good condition: min. 10.801 km² and max. 11.624 km². - Area in not-good condition: min. 9.802 km²and max. 10.625 km². The hosting habitats (7110 and 7130) for Structure and functions have been assessed as follows in the current reporting period: 7110 Unfavourable-Bad/declining and 7130 Unfavourable-Bad/declining. The previous 2013 assessment (NPWS) gave an overall Unfavourable-Inadequate/declining assessment to 7150 Structure and functions. This was based on an Unfavourable-Bad/declining assessment when the habitat was found associated with 7130 based on the monitoring stops assessed as part of the NSUH surveys and an overall Favourable assessment given to the habitat when found associated with raised bogs, as per Fernandez *et al*. (2005). However, subsequently Fernandez *et al*. (2014) gave a more negative assessment to 7150 Structure and functions within the 44 raised

	bogs assessed: Unfavourable-Bad/declining. In addition, negatively impacting activities continue to outweigh the positive influence of restoration works on the habitat on the associated habitats (7110 and 7130). Therefore an Unfavourable-Bad/declining assessment is assigned to the habitat's Structure and functions in the current reporting period. Similar declining trends are given to the long term (1994-2018) and short term (2007-2018).

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A09** Intensive grazing or overgrazing by livestock (H) **A11** Burning for agriculture (H) **C05** Peat extraction (H) **K02** Drainage (H) **B01** Conversion to forest from other land uses, or afforestation (excluding drainage) (H)	**A09** Intensive grazing or overgrazing by livestock (H) **A11** Burning for agriculture (H) **C05** Peat extraction (H) **K02** Drainage (H) **B01** Conversion to forest from other land uses, or afforestation (excluding drainage) (H) **N01** Temperature changes (e.g. rise of temperature & extremes) due to climate change (M)

7.2 Sources of information *Optional*

Desmond, M., O'Brien, P. & McGovern, F. (2017) A Summary of the State of Knowledge of Climate Change Impacts for Ireland. CCRP Report No. 223.Environmental Protection Agency, Johnstown Castle, Ireland.

Fernandez F. (in prep.) Active raised bog, Degraded raised bog and Depressions on peat substrates of the Rhynchosporion conservation status assessment. Unpublished draft report to National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin.

Jones, M.B., Donnelly, A. & Albanito, F. (2006) Responses of Irish vegetation to future climate change. *Biology and Environment: Proceedings of the Royal Irish Academy* 106B(3): 323–334.

NPWS (2014) *Review of Raised Bog Natural Heritage Area Network*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

7.3 Additional information *Optional*

Peat extraction (C05): a slight decrease in turf-cutting within the current 62 SACs and 36 retained NHAs has been reported. However, activity continued at 22 SACs and 6 NHAs in 2018. The NHA Review (NPWS, 2014) reported 518 plots actively cut within the proposed new 25 NHAs before 2014. An internal assessment by NPWS in 2018

	estimated 83 plots were actively cut within the proposed 2 new SACs in the 2014-2016 period. Turf cutting activity within NHA sites proposed for de-designation is likely to increase in the future. The condition assessments undertaken in the reporting period for raised bogs has indicated that turf cutting is a continuing threat to the Future prospects for ARB and *Rhynchosporion* depressions at 9 of the 28 sites assessed. Peat extraction has been classified as a High-importance pressure and threat to blanket bogs by the new Article 17 7130 assessment. The Department of Culture, Heritage and the Gaeltacht (DCHG) has committed significant resources to eliminating the impacts from turf cutting activity within the designated sites. This includes rolling out the Cessation of Turf Cutting Compensation Scheme (CTCCS) to the retained NHAs, implementation of a turf cutting relocation programme and Article 6(3) investigations to establish if turf cutting is feasible within circumscribed parts of a limited number of SACs without impacting on the integrity of the site. According to the new Article 17 7130 assessment, DCHG has also initiated processes to regulate peat extraction within designated blanket bogs. These measures are expected to reduce turf cutting trends within the proposed network of designated sites in the next two reporting periods (particularly within raised bogs). Drainage (K02): for raised bogs the condition assessments undertaken in the reporting period have indicated that drainage continues as a threat to the Future prospects of ARB and *Rhynchosporion* depressions at all 28 sites assessed. In addition, using recent aerial photography a visual assessment of drainage activity at the cutover within current SACs and retained NHAs has confirmed the increasing negative pressure from this activity, as previously reported in 2014 by Fernandez *et al*. Both the implementation of raised bogs Drainage Management Plans for designated sites, and site-specific restoration plans are expected to decrease this activity's negative trend in the next two reporting periods. The implementation of some of these restoration plans has been already initiated. Drainage has been classified as a Medium-importance pressure and threat to blanket bogs by the new Article 17 7130 assessment. Some of the conservation measures already initiated and proposed for blanket bogs (see section 8.6) are likely to reduce the activity's negative effects in the future. Burning (A11): raised bog condition assessments undertaken in the reporting period and anecdotal accounts have indicated that burning continues to threaten the Future prospects for ARB and *Rhynchosporion* depressions at 6 of the 28 sites assessed. Although no information on activity trends are available in the current period, an ongoing decreasing trend, as already reported by Fernandez *et al*. (2014), is expected. Furthermore, burning is largely associated with turf cutting activity and an overall decreasing trend is expected in the next two reporting years, particularly within the network of designated sites. The same trend is therefore given to burning. A rather different scenario has been reported on blanket bogs by the new Article 17 7130 assessment which classified this activity as a High-importance pressure and threat. Forestry (B01): raised bog condition assessments undertaken in the reporting period have indicated that forestry continues to threaten

	the Future prospects for ARB and *Rhynchosporion* depressions at 4 of the 28 sites assessed. Removal of conifer plantations has been undertaken by Coillte within the reporting period as part of their second raised bog LIFE-funded restoration project. Conifer plantations have been recorded at 28 designated sites (62 current SACs and 36 retained NHAs) during this assessment. The removal of conifer plantations is proposed as part of the site-specific restoration plans. Therefore, the implementation of the raised bog restoration plans is expected to reduce the pressure from this activity on raised bog habitats within the network of designated sites in the next two reporting periods. The role of Coillte (the State forestry company) will be essential in this process. Conversion to forestry and afforestation has been classified as a High-importance pressure and threat to blanket bogs by the new Article 17 7130 assessment. Invasive (I02) and problematic native species (I04): raised bog condition assessments undertaken in the reporting period have indicated that invasive species continue to threaten the Future prospects of ARB and *Rhynchosporion* depressions at 6 of the 28 sites assessed. There is no evidence of an increasing trend in invasive or problematic native species in the current period. Although invasive species are deemed to cause negative impacts in a limited number of sites, they are not in general considered a significant threat to raised bog habitats. In addition, the implementation of raised bog site-specific restoration plans is likely to reduce the pressure from problematic native species. An overall decreasing trend within the proposed network of designated sites is expected within the next two reporting periods. The new Article 17 assessment for 7130 has retained invasive species as a Low-importance pressure and threat. Intensive grazing or overgrazing by livestock (A09) and Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization) (L01) have been classified as High-importance threats to 7130 by the new Article 17 assessment. Wind, wave and tidal power, including infrastructure (D01) has been classified as a Medium-importance threat. There are increasing concerns about the potential negative impacts on peatlands from climate change and at a more localised level from air pollution (nitrogen deposition) in recent years. Further investigations and monitoring to understand the potential impacts on peatlands from air pollution is needed. Although there is a certain level of uncertainty on how climate change will affect raised bogs (Desmond *et al*., 2017), other studies (e.g. Jones *et al*., 2006) have predicted significant habitat losses as a consequence of climate change. The implementation of restoration works within both blanket bogs and raised bogs, mostly planned within the proposed network of designated raised bog sites, will increase their resilience and thus capacity to cope with drier periods of time.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* ***d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')***
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* ***b) Medium-term results (within the next two reporting periods, 2019-2030)** or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	**CA03** Maintain existing extensive agricultural practices and agricultural landscape features **CA05** Adapt mowing, grazing and other equivalent agricultural activities **CA06** Stop mowing, grazing and other equivalent agricultural activities **CB01** Prevent conversion of (semi-) natural habitats into forests and of (semi-)natural forests into intensive forest plantation **CC02** Adapt/manage exploitation of energy resources **CE01** Reduce impact of transport operation and infrastructure **CF03** Reduce impact of outdoor sports, leisure and recreational activities **CI03** Management, control or eradication of other invasive alien species **CI05** Management of problematic native species **CJ03** Restore habitats impacted by multi-purpose hydrological changes

8.6 Additional information *Optional*	An additional conservation measure that could not be included in 8.5 (because of the limit on the number of measures that can be listed) is **CH03** Reduce impact of other specific human actions. A substantial body of work on the management and conservation of peatlands has been undertaken since the 2013 assessment (NPWS, 2013). This includes the publishing of the following documents and the implementation of some of the actions proposed within them: National Peatlands Strategy (NPWS, 2015); NHA Review (NPWS, 2014); National Raised Bog SAC Management Plan (NPWS, 2017); Best Practise Restoration Guidelines (Mackin *et al*., 2017). The National Peatlands Strategy (2015-2025) aims to provide a long-term framework for the management of Irish peatlands by setting out clear Values, Principles, Policies and Actions to be incorporated into the sectoral plans and policies of all Public Authorities and Semi-State bodies. The NHA Review (2014) proposed a reconfigured NHA network of 61 sites. This recommended the de-designation of 46 of the existing NHA sites (seven to be partially de-designated) and the designation of 25 new sites as well as the overall cessation of turf-cutting activity within the retained sites. The National Raised Bog SAC Management Plan sets national conservation objectives and restoration targets for raised bog habitats (e.g. national target of 36 km^2 within the network of designated sites for ARB) (CC02, CI03, CI05, CJ03). Site-specific conservation objectives (SSCOs) and restoration plans have been developed for all SACs and are currently being developed for the remaining NHAs. In addition, Drainage management plans, which will provide guidelines for the management of periphery drainage, are currently being developed for all SACs. In addition, the Peatlands Community Engagement Scheme was established in 2017 by DCHG. The scheme seeks to encourage local communities, groups, schools and individuals to engage with the Department in relation to the conservation of raised bog SACs, NHAs and other raised bog areas (CI03, CI05, CJ03). Furthermore, the Irish Community Wetlands Forum (http://www.communitywetlandsforum.ie/) with many members and groups working on the conservation of raised bogs has recently been established. The CTCCS (CC02), established in April 2011 to compensate land owners and turbary right holders within raised bogs affected by the restrictions on turf cutting continues for SACs and was extended to NHAs in 2014. Over 3,300 applications within SACs and 640 within NHAs have been received by the DCHG to date, indicating both the significant amount of resources allocated to it and the high level of success. Turf cutting relocation programme (CC02): This is as an alternative to financial compensation under the CTCCS where turf-cutters at raised bogs could move from their plot within a designated site to a nearby non-designated bog where they could continue to source turf for their domestic use. According to DCHG figures approximately 12% (or 500 CTCCS applicants) had expressed an interest in relocation. To date arrangements have been made for the relocation of 67 turf-

	cutters to non-designated bog. In addition, relocation sites are in the advance stages of the process to relocate another approximately 94 turf-cutters. Restoration works: overall a limited number of restoration works have been undertaken in the reporting period within raised bogs. BnM undertook the largest raised bog restoration project in this period and restoration works (CI03, CI05, CJ03) have been initiated and are ongoing at many other sites. The SAC Management Plan commits to implementing restoration works within the network (64 SACs and 61 NHAs) in less than 20 years (2017-2036). The Raised Bog LIFE project (2016-2020) is aiming to implement all restoration works needed at 12 SACs. DCHG also initiated a programme of restoration works within State-owned land within SACs and NHAs and also commenced further restoration works within three other sites in partnership with Coillte. The Collaborative Action for the Natura Network (CANN) and Co-operation across Borders for Biodiversity (CABB) projects, both funded by the European Union's INTERREG VA Programme, commenced in 2017 and include effective repair and restoration works on blanket bog degraded areas (CJ03, CA05). Further conservation management actions specific to blanket bogs have been initiated as follows (see Article 17 7130 assessment for further detail): - Promotion of sustainable agriculture practices (e.g. management of grazers in upland habitats) via the implementation of three European Innovation Partnerships (EIPs) which commenced in 2018 and the EU KerryLIFE project (CA03, CA05, CA06), as well as control trespass of stock (CA05) as part of general National Parks (NPs) management; - Actions aimed at the control of *Rhododendron* (CI03) and the management of deer, and the implementation of actions as part of the EIPs projects, as well as general NPs management; - Management of problematic native species (CI05), by the implementation of actions within one of the EIPs projects, as well as general NPs management; - Reduction of the impact of outdoor sports, leisure and recreational activities and more specifically All Terrain and Off-Road Vehicles (CF03) as part of the implementation of EIPs projects, as well as general NPs management; - Reduction of the impact of transport operations and infrastructure and, more specifically, the maintenance of tracks and trails to prevent damage to sensitive habitats (CE01) as part of the implementation of EIPs projects, as well as general NPs management; - Regulation of peat extraction in designated sites (CC02); - Two Forest Service Circulars (10/2010 and 18/2011) currently advise against afforestation from large areas of upland sites containing sensitive habitats (CB01); - Work towards a reduction in small-scale illegal dumping through the PURE project (CH03) as part of general NPs management.

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	*Good / **Poor** / Bad / Unknown*
	b) Area	*Good / Poor / **Bad** / Unknown*
	c) Structure and functions	*Good / Poor / **Bad** / Unknown*
9.2 Additional information *Optional*	The Future prospects for *Rhynchosporion* depressions have been assessed at 28 raised bogs in the reporting period. A total of 20 sites have been given an Unfavourable-Bad/declining assessment, 2 sites were Unfavourable-Bad/stable and 6 sites Unfavourable-Bad/improving. Due to the relatively limited number of sites assessed in this reporting period, it is considered more appropriate to extrapolate the Future prospects of *Rhynchosporion* depressions when found associated with ARB (7110) from the latter habitat's national Future prospects assessment. This national assessment has taken into account the balance between both positive and negative impacting activities affecting ARB and their future trends (section 7.3) in the next two reporting periods. As a result, Future prospects for 7150 when associated with ARB (7110) are assessed as follows: Range – Poor; Area – Bad; Structure and functions – Bad; Overall – Bad (see new Article 17 7110 conservation status assessment). The new proposed network of raised bogs is expected to better protect the habitat's geographical range. However, to date, the designation of the proposed new SACs and NHAs has not taken place. Therefore, presently, the proposed new sites have no statutory protection to regulate negatively impacting activities. As a result, taking into account the balance between negative and positive actions described above, Future prospects for Range are assessed as Poor. Future prospects of Area and Structure and functions are assessed as Bad, in line with the reported decreasing and declining trends. Overall, despite the significant resources put in place by DCHG, a comparison between the recorded intensity of negatively impacting activities and the implementation of management actions within the reporting period suggests that Future prospects for 7150 when associated with ARB are Bad. However, Future prospects for both ARB and therefore *Rhynchosporion* depressions are likely to significantly improve in the next conservation status assessment report provided actions proposed in the SAC Management Plan are implemented in the next reporting period. In the new reporting period Future prospects for 7150 have been only assessed at one site where it is associated with blanket bog (7130), as part of the NSUH (Perrin *et al*., 2014d). This concluded that the Future prospects were Unfavourable-Inadequate. This assessment is not considered to represent the overall condition of the habitat's Future prospects when associated with blanket bogs in Ireland and thus Future prospects for 7150 is based on the overall blanket bog (7130) assessment for Future prospects. Numerous conservation actions which are expected to improve the conservation status of blanket bog have been initiated and are planned in Ireland (see section 8.6). In spite of these initiatives, all current pressures affecting blanket bogs were retained as threats to	

	the habitat with the same level of importance in the next two reporting periods (new Article 17 7130 assessment). As a result, 7130 Future prospects have been given the following assessment: Range – Good; Area – Bad; Structure and functions – Bad; Overall Future prospects – Bad. The Future prospects of *Rhynchosporion* depressions when associated with blanket bogs are therefore given a similar assessment. Based on the above, with an emphasis on the rankings of Future prospects for 7110 and 7130, Future prospects for *Rhynchosporion* depressions are given the following assessments: Range – Poor; Area – Bad; Structure and functions – Bad; Overall Future prospects – Bad.

10 Conclusions

Assessment of conservation status at end of reporting period

10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving /* ***deteriorating*** */ stable / unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	***YES****/NO*	*YES/****NO***
	b) yes, due to genuine change	*YES/****NO***	*YES/NO*
	c) yes, due to improved knowledge/more accurate	*YES/****NO***	*YES/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	***YES****/NO*	*YES/NO*
	e) yes, but there is no information on nature of change	*YES/****NO***	*YES/NO*

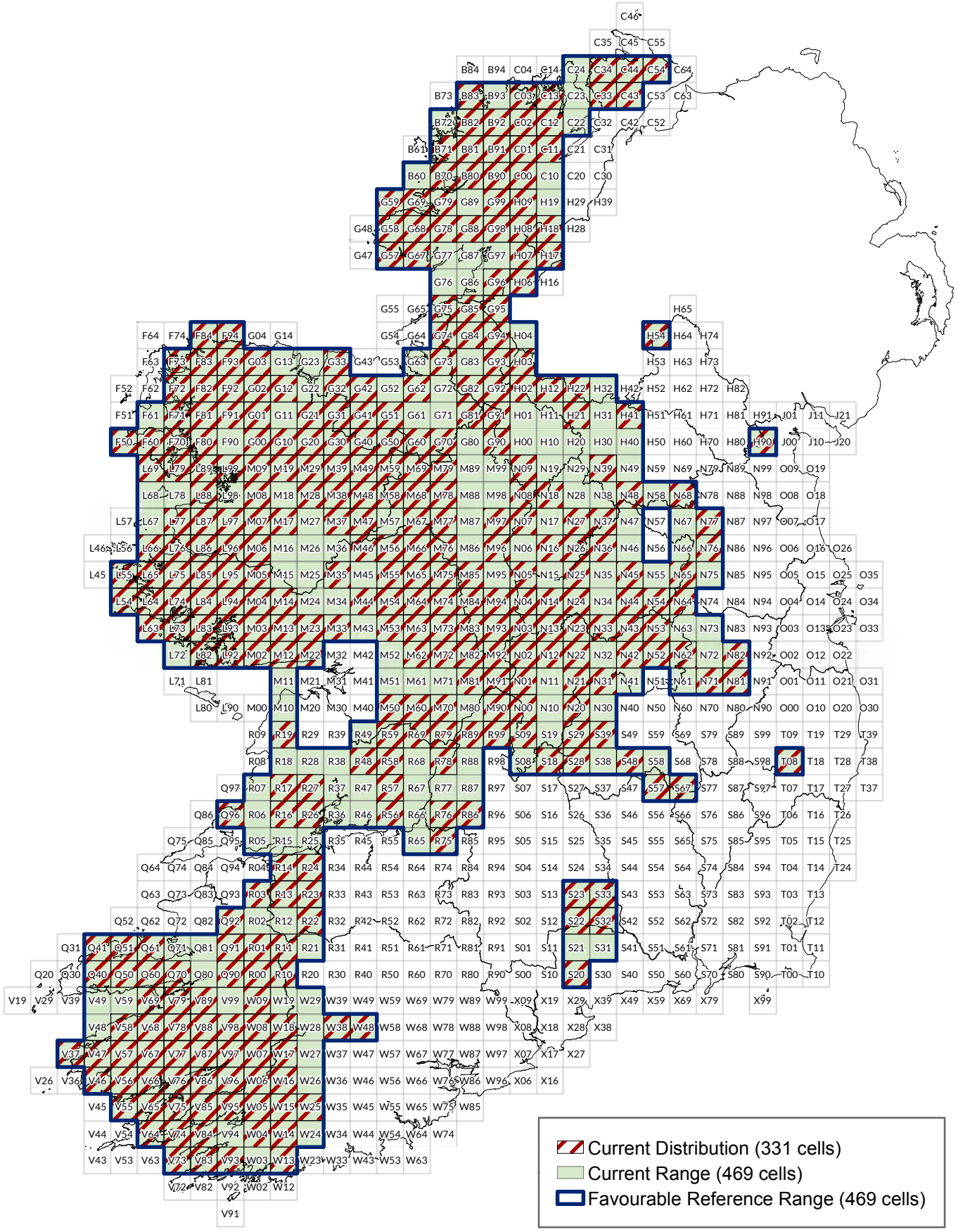
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / **the use of a different method***	*genuine change / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	Site-specific habitat condition assessments have been undertaken at 28 raised bogs and 1 blanket bog in the new reporting period. The results show that 7150 is Unfavourable-Bad/declining at 22 of the 28 raised bogs assessed and 7150 has been given an Unfavourable-Inadequate/declining assessment at the only blanket bog site where an assessment took place. However, an overall habitat assessment needs to consider the trends within the reporting period (and the next two reporting periods) of the main impacting activities (both negative and positive) affecting associated habitats (7110 and 7130), as well as these habitats conservation status assessments within the new reporting period. ARB (7110) has been given the following assessment: Range – Unfavourable-Bad/stable; Area – Unfavourable-Bad/decreasing; Structure and functions – Unfavourable-Bad/declining; Future prospects – Unfavourable-Bad; Overall Conservation Status: Unfavourable-Bad/declining. Blanket Bog (7130) has been given the following assessment: Range – Favourable/stable; Area – Unfavourable-Bad/decreasing; Structure and functions – Unfavourable-Bad /declining); Future prospects Unfavourable-Bad; Overall Conservation Status: Unfavourable-Bad/declining. Taking the above into account, 7150 is given the following assessment: Range – Favourable/stable; Area – Unfavourable-Bad /decreasing); Structure and functions – Unfavourable-Bad /declining; Future prospects – Unfavourable-Bad. *Rhynchosporion depressions* are thus given an overall Unfavourable-Bad/declining assessment. A different assessment was given in 2013 (NPWS, 2013): Range – Favourable/stable; Area – Unfavourable-Inadequate/decreasing, Structure and functions – Unfavourable-Inadequate/declining; Overall Conservation Status – Unfavourable-Inadequate/declining. The change on the assessment from Unfavourable-Inadequate to Unfavourable-Bad is due to a change in the method. The new method extrapolates the 7150 assessment from the assessments given to the two associated habitats (7110 and 7130). Note: ARB Range was given an Unfavourable-Bad assessment as the current range is below the FRR, which corresponds with the current and favourable reference range of DRB. The actual range of ARB has not changed since 1994. As a result, the Range of 7150 when associated with ARB is deemed to be Favourable/stable. Although it can be expected that there will be a decrease in negatively and an increase in positively impacting activities affecting 7150 when associated with 7110, this will mostly depend on the implementation of the National Raised Bog SAC Management Plan.		

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***13.66 km²***
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* *stable / increasing /* ***decreasing*** */ uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.6 Additional information *Optional*	The figure above, which represents 63.74% of the entire national extent (21.43 km²), corresponds with the extent of the habitat within the entire Natura 2000 network. This figure is based on the extent of the habitat within the two main host habitats as follows: - *Rhynchosporion depressions* within 7110: ARB area within Natura 2000 network (11.95 km²) x 5% = 0.598 km². - *Rhynchosporion depressions* within 7130: blanket bog area within Natura 2000 network (1,632.37 km²) x 0.8% (see Art.17 7130 2018 assessment) = 13.059 km². [The extent of the habitat within the Natura 2000 network for which the habitat is a QI is 12.68 km².] The figure of 13.66 km² is smaller than the one reported in 2013 (NPWS, 2013) (18.2943 km²). The main reason for this discrepancy is the new interpretation of the habitat (see section 2.5i) and the review of the current extent of the host habitats (7110 and 7130) in the new Article 17 assessment. Therefore, it does not correspond with an actual reduction of the habitat's extent, but is rather the result of improved knowledge. Nevertheless, an overall national decreasing trend for Area has been assigned to both 7110 and 7130 in the current reporting period. Pressures (i.e. peat cutting, drainage, grazing, forestry, burning) continue to negatively impact both the host habitats within the SAC network (see section 5.15), despite the implementation of conservation measures. As a result, a decreasing trend is also given to *Rhynchosporion* depressions within the Natura	

	2000 network in the 2013-2018 period. The actual extent of this decrease is unknown. SSCOs have been developed by NPWS for all original 53 raised bog SACs (see https://www.npws.ie/protected-sites). ARB habitat area is deemed to be below the FRA for all 53 raised bog SACs and thus the overall habitat condition for each of them is Unfavourable. In addition, SSCOs are currently being developed for the 9 SACs designated in late 2016, as part of the objectives being prepared for designated NHAs which encompass the smaller SAC sites. It is considered that, should Favourable conservation condition for ARB be achieved on a site then, as a consequence, Favourable conservation condition for *Rhynchosporion* depressions would also be achieved. As a result, *Rhynchosporion* depressions are not considered to be in good condition in any of the 53 raised bog SACs. Since SACs support the best quality examples of *Rhynchosporion* depressions in the country, and based on the condition within SACs and after extrapolating the assessment for SACs, the 0.829 km^2 (16.59 km^2 x 5%) of 7150 within ARB is assumed to be in Bad condition. The recent Article 17 assessment for blanket bog (7130) has generated the following figures for the extent of 7130 in good and not-good condition: - Area in good condition: min. 1340.93 km² and max. 1443.78 km². - Area in not-good condition: min. 1130.80 km² and max. 1233.65 km². As a result, and after applying the 0.8% factor (see section 5.15), 7150 figures, when associated with 7130, are as follows: - Area in good condition: min. 10.727 km² and max. 11.550 km². - Area in not-good condition: min. 9.046 km² and max. 9.869 km². In summary, the Structure and functions are assigned the following values: - Area in good condition: min. 10.727 km² and max. 11.550 km² - Area in not-good condition: min. 9.876 km² and max. 10.699 km². *Rhynchosporion* depressions have been given a decreasing trend in the short term at national level based on site condition assessments, mostly relating to SACs (Fernandez *et al.*, 2014). As a result, a decreasing trend is also given to *Rhynchosporion* depressions within the Natura 2000 network in the 2007-2018 period. The actual extent of this decrease is unknown.

12 Complementary information

Rhynchosporion depressions (7150) Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Habitat code / name	**7210 Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae****
1.2i Habitat short name	***Cladium* fens**
1.3i Habitat description	The Annex I habitat *Cladium* fens refers to *Cladium mariscus* beds which are in contact with species-rich vegetation of small-sedge fens (i.e. *Cladium mariscus* and species of the *Caricion davallianae*). This can occur where there are species-rich open swards of *Cladium mariscus* with elements of small-sedge fen, fen meadow and tall-herb fen. These may be naturally species-rich or managed to prevent dominance of *Cladium mariscus.* However, the Annex I habitat can also occur where species-poor or mono-dominant stands of *Cladium mariscus* transition to species-rich alkaline fen vegetation types at their margins or occur in a mosaic of species-poor and species-rich vegetation. This latter situation tends to be more common in Ireland. In these instances, the whole stand of *Cladium mariscus*, including areas that support species-poor vegetation, is referable to the Annex I habitat. *Cladium* fen can occur in a wide range of habitats, in both topogenous and soligenous situations, such as the emergent zone of calcareous lakes, valley fens, floodplains, wet meadows and calcium-rich flush areas within blanket bogs in the west. The habitat is characterised by waterlogged peat soils, a high water table (at or above the surface), and near neutral to alkaline oligotrophic to mesotrophic water. A fuller account of the vegetation of *Cladium* fens is provided in the accompanying backing document (Long *et al.*, 2018), and a preliminary vegetation classification of fens in Ireland has just recently been made available as part of the Irish Vegetation Classification (http://www.biodiversityireland.ie/projects/national-vegetation-database/). *Cladium* fens are found throughout Ireland, most commonly in lowland areas in the midlands, west and south-east. They are occasional elsewhere.

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***2005-2018***
2.2 Distribution map	Submitted

2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range map submitted
2.5i	A baseline, national field survey of fen habitats has not been conducted in Ireland to date. The distribution map for 7210 is based on the Article 17 point and polygon master shapefiles from 2013, augmented with polygons, points and other data which have been collected in the interim (coming from a variety of sources – see Long *et al.*, 2018). For 2013, the habitat distribution was based to a large extent on the NPWS Fen Study Database compiled as part of the 'Study of the extent and conservation status of springs, fens and flushes in Ireland' (Foss, 2007b), with additional sites extracted from a variety of relatively recent field and desk-based surveys (Kimberley, 2013). To compile the 2013-2018 map, a thorough review of all of these points and polygons was carried out in the first instance, and decisions on whether to remove any of these features from the 2013-2018 map were made where any new information has since become available that indicated that these features were no longer valid with respect to this Annex I habitat, or conversely, where new information allowed us to upgrade the confidence of the fen type present. This dataset was then augmented by a variety of new sources, predominantly habitat surveys which recorded Annex I habitats, and others where the species being surveyed are considered to be suitable indicators of this Annex I habitat, or the habitats mapped are considered to be analogous to Annex I fen types. Often multiple sources of information were used to form an opinion on a particular feature. The sources used are listed in section 3.2 and in Long *et al.* (2018). Some data sources were polygons that represented habitat mosaics, including some proportions of 7210. Consistent with the approach used in 2013, the locations of these sites for mapping purposes were represented by centroids.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
3.2 Sources of information	Barron, S.J., O'Neill, F.H. and Martin, J.R. (2015) N6 Galway City Transport Project – Habitat mapping and assessment of a section

of Lough Corrib cSAC and surrounding areas. Unpublished report by BEC Consultants Ltd.

Blockeel, T.L., Bosanquet, S.D.S. Bosanquet, Hill, M.O. and Preston, C.D. (2014a) *Atlas of British and Irish bryophytes. Volume 1*. British Bryological Society (Pisces Publications, Newbury).

Blockeel, T.L., Bosanquet, S.D.S. Bosanquet, Hill, M.O. and Preston, C.D. (2014b) *Atlas of British and Irish bryophytes. Volume 2.* British Bryological Society (Pisces Publications, Newbury).

Bord na Móna (2017a) Draft Rehabilitation Plan 2017: Blackwater Bog.

Bord na Móna (2017b) Draft Rehabilitation Plan 2017: Clongawny Bog.

Bord na Móna (2017c) Draft Rehabilitation Plan 2017: Oughter Bog.

Brophy, J.T. and Long, M.P. (in prep. a) Monitoring of sites and habitat for three Annex II species of whorl snail (*Vertigo*). Volume 3: *Vertigo geyeri* site reports. *Irish Wildlife Manuals*, No. XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

Brophy, J.T. and Long, M.P. (in prep. b) Monitoring of sites and habitat for three Annex II species of whorl snail (*Vertigo*). Volume 4: *Vertigo moulinsiana* site reports. *Irish Wildlife Manuals*, No. XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

Campbell, C., Hodgetts, N. and Lockhart, N. (2015) Monitoring methods for *Hamatocaulis vernicosus* Mitt. Hedenäs (Slender Green feather-moss) in the Republic of Ireland. *Irish Wildlife Manuals*, No. 91. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.

Campbell, C., Hodd, R.L. and O'Neill, F. (in prep.) The monitoring and assessment of *Hamatocaulis vernicosus* (Slender Green feather-moss) in the Republic of Ireland 2015-2017. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland.

Crushell, P., Foss, P.J. and Kirwan, B. (2014) County Kerry Wetland Survey. Report prepared for Kerry County Council.

Crushell, P., Foss, P.J. and Kirwan, B. (2015) Kerry Wetland Survey II. Report prepared for Kerry County Council.

EC (2007) Interpretation Manual of European Union Habitats. Version EUR27, European Commission, Brussels.

EU Collated typical species. Version 1.0: provides a list of typical species reporting by the Member States as a part of the 2007-2012 Article 17 report.

Foss, P. (2007a) *Cladium* fen (7210) conservation status assessment. Unpublished report to the National Parks and Wildlife Service.

Foss, P. (2007b) Study of the extent and conservation status of springs, fens and flushes in Ireland. Report for the National Parks and Wildlife Service of Ireland.

Foss, P.J. and Crushell, P. (2013) County Kildare Wetland Survey II. Report prepared for Kildare County Council and The Heritage

Council.

Foss, P.J. and Crushell, P. (2014) County Kildare Wetland Survey III. Report prepared for Kildare County Council and The Heritage Council.

Foss, P.J., Crushell, P., Kirwan, B., O'Loughlin, B. and Wilson, F. (2014) Louth Wetland Survey III. Report prepared for Louth County Council and The Heritage Council.

Foss, P.J., Crushell, P. and Kirwan, B. (2015) County Waterford Wetland Survey. Report prepared for Waterford City and County Council.

Fossitt, J.A. (2000) *A guide to habitats in Ireland*. Heritage Council, Kilkenny.

Hájek, M., Horsák, M., Hájková, P. and Dítě, D. (2006) Habitat diversity of central European fens in relation to environmental gradients and an effort to standardise fen terminology in ecological studies. *Perspectives in Plant Ecology, Evolution and Systematics* 8: 97–114

Joint Nature Conservation Committee (2004) *Common Standards Monitoring Guidance for Lowland Wetlands Habitats.* Version August 2004. ISSN 1743-8160 (online).

Jones, P.S., Stevens, J., Bosanquet, S.D.S., Turner, A.J., Birch, K.S. and Reed, D.K. (2013) Distribution, extent and status of Annex I wetland habitats in Wales: Supporting material for the 2013 Article 17 assessment. CCW Staff Science Report No 13/7/1.

Joosten, H., Tanneberger, F. and Moen, A. (eds.) (2017) *Mires and peatlands of Europe: Status, distribution and conservation.* Schweizerbart Science Publishers, Stuttgart.

Kimberley, S. (2013) Conservation status assessments of three fen habitat types. Unpublished NPWS report.

Kimberley, S. and Coxon, C. (2013) Environmental supporting conditions for Groundwater-Dependent Terrestrial Ecosystems. A report for the Environmental Protection Agency, Ireland

Long, M.P. and Brophy, J.T. (in prep.) Monitoring of sites and habitat for three Annex II species of whorl snail (*Vertigo*). Volume 1: Final Report. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

Long, M.P., Crowe, O., Kimberley, S. and Denyer, J. (2018) Backing document – National Conservation Status Assessments (NCAs) for three fen habitat types: 7140 – Transition mires and quaking bogs, 7210 – Calcareous fens with *Cladium mariscus* and species of Caricion davallianae, 7230 – Alkaline fens. Unpublished report to NPWS.

Northern Ireland Environment Agency (2013) Supporting documentation for the Third Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2007 to December 2012 for Habitat: H7210 - Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae.

Northern Ireland Environment Agency (2015) Magheraveely Marl

	Loughs SAC Conservation Objectives. NPWS (2008) The Status of EU Protected Habitats and Species in Ireland. Backing Documents, Article 17 forms, Maps Volumes 1, 2 and 3. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Species Assessments Volume 3. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland. Ó Críodáin, C. and Doyle, G.J. (1994) An overview of Irish small-sedge vegetation: syntaxonomy and a key to communities belonging to the Scheuchzerio-Caricetea nigrae (Nordh. 1936) Tx. 1937. *Biology and Environment: Proceedings of the Royal Irish Academy* 94B (2): 127-144. O'Neill, F.H. and Martin, J.R. (2015) Summary of findings from the Survey of Potential Turloughs 2015. Unpublished report for National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Regan, S. and Conaghan, J. (2016) Eco-Hydrological Investigation of Tory Hill fen SAC, Co. Limerick. Report prepared for The Office of Public Works. Regan, S., Gill, L., Conaghan, J., Brew, T. and Gilligan, N. (2016) 05 - Assessing the conservation status of GWDTEs under the Habitats Directive and Water Framework Directive; A case study from Tory Hill Fen SAC. National Hydrology Conference 2016. Rodwell, J.S. (ed.) (1991) *British Plant Communities. Volume 2. Mires and heath.* Cambridge University Press. Rodwell, J.S. (ed.) (1995) *British Plant Communities. Volume 4. Aquatic communities, swamps and tall-herb fens.* Cambridge University Press. Wheeler, B.D. and Proctor, M.C.F. (2000) Ecological gradients, subdivisions and terminology of north-west European mires. *Journal of Ecology* 88: 187-203. White, J. and Doyle, G.J. (1982) The vegetation of Ireland. A catalogue raisonné. *Journal of Life Sciences, Royal Dublin Society* 3: 289-368.
3.2i Additional information	BBS (2009) *Checklist of British and Irish bryophytes*. The British Bryological Society, Stafford, U.K. Lockhart, N., Hodgetts, N. and Holyoak, D. (2012) *Ireland Red List No.8: Bryophytes*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Otte, M.L. (ed.) (2003) *Wetlands of Ireland: Distribution, ecology, uses and economic value.* University College Dublin Press, Dublin. Proctor, M. (2013) *Vegetation of Britain and Ireland*. Harper Collins, London. Stace, C.A. (2010) *New Flora of the British Isles*. 3rd edition. Cambridge University Press, Cambridge. Some shapefiles and other data provided did not have associated

	reports. They include: Blanket bog study habitat maps, shapefiles received from NPWS. British Bryological Society Atlas dataset (2014) Fen habitat polygons for some raised bog sites, shapefiles received from Raised Bog LIFE team. Fen habitat polygons, shapefiles received from Coillte. IPCC list of fen and potential fen sites, received as excel spreadsheet from IPCC. Note also that sources used and listed in Kimberley (2013) were also drawn upon, but are not listed separately in this report.

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***18,800 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	1994-2018	
4.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

4.10 Favourable reference range	*a) In km^2 or*	
	b) Operator ≈ (approximately equal to) *or*	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/**NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/**NO***
	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of 7210. A maximum gap distance of two 10km grid cells was used when running the range tool. Short-term trend direction was estimated as 'stable' based on expert opinion – while there may have been some losses of both habitat area and habitat quality within the reporting period, these are unlikely to be large and the range is unlikely to be affected by such losses/decreases in quality. The number of 10km squares in the range (188) differs from the last monitoring period (172) due to the integration of new information. A suite of new datasets were assessed and integrated as appropriate as part of this work, meaning that the understanding of the range of *Cladium* fen habitat in Ireland has been improved. The Favourable Reference Range (FRR) has been set as approximately equal to the current range as it is based on more complete data being available on the distribution of fens across Ireland (though still incomplete) than was available in the last monitoring round. The FRR is considered to encompass all ecological and geographical variation of the habitat and is likely to be sufficiently large to allow the long-term viability of the habitat. Further notes on range (e.g. comparisons with previous assessments) are available in the accompanying backing document (Long *et al.*, 2018).	

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2005-2018***	
5.2 Surface area	**a) Minimum**	

(in km²)	**b) Maximum**	
	c) Best single value	***69.71 km²***
5.3 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	*1994-2018*	
5.10 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator > (greater than) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	

	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
5.15 Additional information *Optional*	The areas generated for points and polygons for the 2013 submission were used in the first instance (Kimberley, 2013). Additional data sources listed above were treated as follows: Polygon datasets listed as including this habitat: Area Habitat = Total Polygon Area. Polygons which represented habitat mosaics, and proportions given: Area Habitat = Area Polygon x Proportion 7210 habitat. Points: Area = Median Area, which for 7210 was calculated as the median area across all high-quality habitat polygons (Habitat Confidence A, B1 and B2 as defined by Kimberley, 2013). This median value for 7210 was calculated as 10,717 m^2, and was applied to all new points (since 2013), as well as any points from the 2013 submission where a default median value had been provided. See Long *et al.* (2018) for a fuller discussion on median areas. A thorough assessment of all resulting points and polygons was undertaken to ensure no duplication of areas from points and polygons representing the same habitat location. The total area was then calculated as the sum of the areas. The maximum area was based as the total area across all points and polygons of Habitat Confidence A, B1, B2 and C1. Points and polygons classified as C2 and D were excluded from the area calculations and from the maps, as per Kimberley (2013). Specific data on loss of habitat area are not available. However, when discussing reclamation as a high-level pressure and threat on all three fen habitat types, Kimberley (2013) notes: “Land reclamation for agricultural and forestry purposes has resulted in significant loss of wetland habitat in Ireland.” Other pressures are also likely to be causing some habitat loss. Short-term trend direction was estimated as ‘stable’ based on both expert opinion and survey reports. There may have been some losses of habitat quality within the reporting period, but data on loss of habitat area are not available. The trend estimate is largely based on expert interpretation of the data sources available since there are no field-validated baseline data with which to compare the present area. The difference in habitat extent between this reporting period and	

	the last is due to the inclusion of new information relating to sites that were submitted as part of the 2013 report (particularly pertaining to area), together with the integration of new datasets. Further information, including figures and findings from the previous two reporting periods, can be found in Long *et al.* (2018). The FRA is set as greater than the current area. It is unlikely that >10% of the resource has been lost since 1994. An additional 1-10% of the current area is considered adequate to ensure the long-term viability of the habitat. Overall, the extent (and condition) of *Cladium* fens within most counties remains unmapped and poorly known. A national fen survey could lead to a reduction or increase in the stated area of the habitat.

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***57.15 km²***
		Maximum	***57.15 km²***
	b) Area in not-good condition	**Minimum**	***12.54 km²***
		Maximum	***12.54 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	*stable / increasing / decreasing /* ***uncertain****/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period?* ***YES****/NO*		
6.7 Typical species Method used	The updated list of typical species is as follows. Vascular plants: *Anagallis tenella, Caltha palustris, Carex demissa,*		

Optional	*C. diandra, C. dioica, C. echinata, C. flacca, C. hostiana, C. lasiocarpa, C. lepidocarpa, C. nigra, C. panicea, C. paniculata, C. pulicaris, C. riparia, C. rostrata, Cirsium dissectum, Cladium mariscus, Comarum palustre, Eleocharis multicaulis, Eleocharis quinqueflora, Equisetum fluviatile, Eriophorum latifolium, Galium palustre, Hydrocotyle vulgaris, J. articulatus, J. bulbosus, J. subnodulosus, Lythrum salicaria, Mentha aquatica, Menyanthes trifoliata, Molinia caerulea, Parnassia palustris, Pedicularis palustris, Phragmites australis, Pinguicula vulgaris, Ranunculus flammula, Schoenus nigricans, Selaginella selaginoides, Silene flos-cuculi* and *Succisa pratensis.* Bryophytes: *Aneura pinguis, Bryum pseudotriquetrum, Calliergon giganteum, Calliergonella cuspidata, Campylium stellatum, Ctenidium molluscum, Fissidens adianthoides, Palustriella commutata, P. falcata, Plagiomnium elatum, Philonotis calcarea, Scorpidium cossonii* and *S. scorpioides.* High-quality indicator species: *Dactylorhiza incarnata, Dactylorhiza traunsteineri* and *Epipactis palustris.* Typical species were not specifically assessed in this reporting period. In the absence of a national survey and dataset, this revised list of typical species is based on previous Article 17 reporting for this habitat (Kimberley, 2013 and Foss, 2007a,b, and references cited in these accounts), updated using additional references and expert opinion. Full details on the thorough review of typical species can be found in Long *et al.* (2018), particularly Appendix 3. The review of additional references included scientific papers and books on the classification of fen habitats from Ireland, UK and elsewhere in Europe, and data from Irish national habitat and species surveys (e.g. National Survey of Upland Habitats and Article 17 reporting from Northern Ireland, Scotland and Wales). Expert opinion included consultation with NPWS, Northern Ireland Environment Agency, Natural Resources Wales, Scottish Natural Heritage and a range of experienced wetland ecologists within Ireland. The amendments to the list from the previous reporting period include changes such as the removal of *Blindia acuta* (an upland flush species not found in *Cladium* fens), the addition of a number of small sedges (*Carex* spp.) and bryophytes (which are good indicator species) and identification of species considered to characterise particularly high quality *Cladium* fen habitat. Nomenclature was updated where relevant to follow Stace (2010) for vascular plants and the bryophyte nomenclature adopted by Lockhart *et al.* (2012) is used; this is based on the Checklist of British and Irish bryophytes (Hill *et al.*, 2009) with minor modifications to reflect recent taxonomic changes.
6.8 Additional information *Optional*	Due to the lack of a comprehensive, targeted survey of *Cladium* fens in Ireland, detailed information on what constitutes 'good' or 'not-good' condition is not available. Lack of data meant that it was not possible to define 'good' and 'not-good' condition during this project. However, during the detailed review of all existing sources of information, some information relating to habitat condition was

	available. Wetland Surveys Ireland, as part of the work on the Galway City Transport Plan in conjunction with BEC Consultants, developed criteria for assessing the conservation status of *Cladium* fens (Crushell and Foss, 2014a – presented as Appendix 1 in Barron *et al*., 2015). These focus on the presence or absence of positive indicator species and the presence or absence of certain negative indicators, as well as their percentage covers. Vegetation and physical structure is also assessed, with measures such as vegetation height, disturbed ground and drainage included. In the Galway City Transport Project (Barron *et al*., 2015), 34 points from four sites were assessed, and 15% of these were considered to be in 'not-good' condition due to lack of positive indicator species, cover of woody species and presence of negative indicator species. The County Wetland Surveys do not provide explicit information relating to condition assessment of *Cladium* fen sites. The National Survey of Upland Habitats did not record this habitat type. Some of the other data sources reviewed provided information on condition, and issues affecting condition, while not explicitly assessing these. In particular, a four-year study on *Vertigo* snails assessed habitats with respect to suitability for the molluscs, and this information has been informative in terms of fen condition and issues affecting it (Long and Brophy, in prep.). Based on this dataset, some of the main issues influencing fen condition are (in alphabetical order): Climate change – where drainage or hydrological regime are already compromised at a site, the problems are likely to be exacerbated; Drainage; Drying out; Dumping of spoil, garden waste, household and other waste; Eutrophication – from fertiliser application nearby, from excessive access for stock; Habitat change to wet grassland; Low diversity of vegetation; Scrub invasion; Succession; Water table lower than 5 cm below ground level. On review of all datasets available for the reporting period, with particular reference to those which contained information on habitat condition, it is estimated that 18% of sites/points were deemed to be in 'not-good' condition. As the data are both limited and variable, it is difficult to extrapolate this result to the national level. However, it can be stated with moderate confidence that the structure and functions of nearly one-fifth of the national resource of *Cladium* fen (7210) are impaired. These estimations are used to derive the figures in 6.1.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A06** Abandonment of grassland management (H) **A09** Intensive grazing or overgrazing by livestock (H) **K01** Abstraction from groundwater, surface water or mixed water (H) **K02** Drainage (H) **K04** Modification of hydrological flow (H) **J01** Mixed source pollution to surface and ground waters (M)	**A06** Abandonment of grassland management (H) **A09** Intensive grazing or overgrazing by livestock (H) **K01** Abstraction from groundwater, surface water or mixed water (H) **K02** Drainage (M) **K04** Modification of hydrological flow (M) **J01** Mixed source pollution to surface and ground waters (M) **C05** Peat extraction (M)

7.2 Sources of information *Optional*

See sections 3.2 and 7.3

7.3 Additional information *Optional*

All available data sources (see section 3.2) from within the monitoring period were inspected for information on pressures and threats. Those containing relevant information were carefully checked, and data were collated primarily from the following sources (for all three fen types):

- Eco-hydrological Investigation of Tory Hill fen SAC (2016);
- Galway City Transport Project (2014);
- Kerry Wetland Surveys (2014 and 2015);
- Kildare Wetland Surveys (2013 and 2014);
- Louth Wetland Survey (2014);
- National Survey of Upland Habitats: Caha Mountains SAC (2014);
- National Survey of Upland Habitats: Slieve Mish Mountains SAC (2014);
- NPWS data collated on wildfires (2017);
- *Vertigo* monitoring surveys (2014-2017);
- Waterford Wetland Survey (2015).

Pressures and threats data were available from 10 sites with *Cladium* fen.

The data are limited and detailed information relates only to a relatively small number of sites.

Pressures and threats were ranked according to their recorded impact level and number of sites or area impacted. Not all data

	sources listed impact codes or impact level. In these cases the most appropriate impact code was selected and text in the report consulted to assist in assigning impact level. As the data are limited, expert judgement was also used in the selection and ranking of pressures and threats. Fuller information on pressures and threats, and on the ranking process, is available in the backing document which accompanies this report (Long *et al*., 2018). The main pressures (and mostly regarded as threats also) facing *Cladium* fen in Ireland, based on the data available, are 1) human induced changes in hydraulic conditions such as current and historic drainage, and 2) changes in species composition as a result of natural succession due to lack of grazing. Non-intensive grazing was recorded as a positive impact. Pollution of ground and surface waters was not recorded during the limited survey work in the current reporting period. However, it is considered highly likely that such pollution is a moderate negative pressure on this habitat and that its omission is as a result of the small survey sample size. Climate change has not been added as an impact but it is likely to affect this habitat in Ireland in decades to come (e.g. warmer temperatures and changes to rainfall and flood events may increase drying out and vegetation succession). In 2013, water abstraction, reclamation and pollution were deemed to be the pressures with the highest impact, and also the biggest threats. The apparent changes since 2013 are most likely due to new information being available, and differences between surveys and between surveyors may also account for some of the apparent differences in categories chosen when assigning pressures and threats.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* ***a) Measures identified, but none yet taken** or* *b) Measures identified and taken or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*

8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	None taken
8.6 Additional information *Optional*	Due to the lack of a dedicated fen survey in Ireland, few data exist on conservation measures, and particularly those aimed at conserving or restoring *Cladium* fens. However, some data sources which were accessed during this work mention examples of conservation measures, and other examples are known from within the current project team. These are listed below (not limited to *Cladium* fens), and form the basis of a list which can be considered for further development into the future. Overall, however, there is a lack of dedicated conservation action being implemented for *Cladium* fens in Ireland. Bord na Móna mention allowing areas of bare peat and open water to recolonise naturally as a conservation measure. Both Coillte and Bord na Móna have designated a number of sites within their land holdings as being important for biodiversity, and this includes some areas of fen. Drain blocking and other attempts at restoring favourable hydrological regimes at and near areas of fen is a conservation measure which they have undertaken at some sites, though often not directly relating to fen habitat. Some sites have had boardwalks installed to help encourage members of the public to engage with the area (and thus potentially to get involved in its conservation), and also to manage public use of the sites. Signage at sites also has a similar function. Examples (not limited to *Cladium* fens) include Pollardstown Fen in Co. Kildare, BirdWatch East Coast Nature Reserve in Co. Wicklow, Abbeyleix Bog in Co. Laois and Fenor Bog in Co. Waterford. In order to better understand fen hydrology, a number of hydrometric studies are currently taking place (e.g. at Tory Hill in Co. Limerick, Scragh Bog in Co. Westmeath and at Pollardstown Fen, Co. Kildare) – again, not limited to *Cladium* fens. The Raised Bog LIFE project which is actively working to restore areas of raised bog, and at whose sites there are examples of Annex I fen habitats, has noted that they are not actively applying conservation measures to areas of fen. Rather, they are aiming to ensure that any measures they might apply to support raised bog functioning do not negatively impact on the adjacent fen.

	Non-intensive grazing by cattle, sheep and horses was mentioned as a management measure at a number of sites. This was reported to have a low neutral to low positive impact on these sites. These grazing measures mainly take the form of passive measures which involve maintaining the management practices currently in place that benefit the habitat. It should be noted that the management regimes of most fen sites in Ireland are driven by the landowner rather than by any formal management plan or policy; therefore the continued operation of the management regimes currently in place is not guaranteed. Note that there may be other examples of conservation measures being taken for *Cladium* fens in Ireland – this list is not conclusive and should be added to in future years. In Ireland, drainage of large sites is controlled by EIA agricultural regulations (S.I. No. 456/2011 – European Communities (Environmental Impact Assessment) (Agriculture) Regulations 2011). Many fen sites are smaller than the threshold value of 15ha but often the wetland systems associated with them are large enough to bring the wetlands as a whole above the threshold. Also worth noting is that under the Planning and Development Regulations (2001-2011) planning permission is required for the drainage or reclamation of wetlands in excess of 0.1ha (or below that if having a significant effect on the environment). It should be noted that these are policy instruments rather than conservation measures, but they should confer a degree of protection to fen sites. Based on the list of threats identified for *Cladium* fens in Ireland (see section 7.1), below are listed the associated suite of potential conservation measures. Passive measures such as maintaining grazing are excluded. There is little information available currently on the extent to which measures such as these are taking place in Ireland, but it is suggested that future fen studies and assessments should aim to systematically review and identify suitable conservation measures. This list should not be taken as exhaustive, but should be considered as part of a thorough and systematic review of suitable measures. CA04 Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures; CA05 Adapt mowing, grazing and other equivalent agricultural activities; CA06 Stop mowing, grazing and other equivalent agricultural activities; CC01 Adapt/manage extraction of non-energy resources; CC02 Adapt/manage exploitation of energy resources; CC07 Habitat restoration/creation from resources, exploitation areas or areas damaged due to installation of renewable energy infrastructure; CJ01 Reduce impact of mixed source pollution; CJ02 Reduce impact of multi-purpose hydrological changes; CJ03 Restore habitats impacted by multi-purpose hydrological changes.

	Conservation measures are needed for *Cladium* fen sites due to the fact that it is estimated that approximately one-fifth of sites in Ireland may be in 'not-good' condition. There are a number of pressures acting on these sites, and a number of threats which are likely to act on the sites in the future (see section 7). To counteract the potential negative effects, conservation measures are needed. Few data are available on conservation measures currently underway, and less still on their effectiveness. Re-wetting and natural recolonisation are measures that are both likely to have been implemented at some Coillte, Bord na Móna and Raised Bog LIFE sites. However these are likely to be small in scale (as they are mostly aimed at bog, not fen), and dedicated surveys are needed to assess their effectiveness at improving the conservation status of *Cladium* fens. Hydrological studies like that at Tory Hill will help scientists and decision-makers better understand fen hydrology, but will not in themselves help to improve conservation status. Signage and boardwalks help to involve local communities, and also to protect sites from damage, but again are not measures which usually help to improve the conservation status of *Cladium* fens. Many areas of *Cladium* fen in Ireland are likely to be in private ownership, and due to the nature of the habitat (very wet) these areas are generally unmanaged, with the exception perhaps of some occasional minimal management such as light grazing. There is therefore a need for a broad-reaching education programme for landowners and other relevant bodies (NPWS, Teagasc, IFA, Coillte, Bord na Móna, etc.) as to what measures are needed. In summary, an evidence-based programme of conservation measures is urgently needed for *Cladium* fens in Ireland, and should follow quickly from a national survey of this habitat type.

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	*Good /* ***Poor*** */ Bad / Unknown*
	c) Structure and functions	*Good /* ***Poor*** */ Bad / Unknown*
9.2 Additional information *Optional*	The Future prospects for the Range of the habitat have been assessed as good. A number of pressures and threats have been identified, and there is a lack of conservation measures in place to counteract these. However, given the relatively wide range for this habitat, based on multiple sites, it is likely to be more than 12 years before these pressures and threats might start taking a toll on the range of the habitat. The Future prospects for Area of the habitat are assessed as poor. This is based on the fact that we assume that losses have occurred since the Directive came into force and there are no measures currently in place to restore these areas. There is no evidence to suggest that there will be further losses in the next 12 years. The	

	future projection of the conservation status of Area remains poor because of its current status. The Future prospects for the Structure and functions of *Cladium* fen habitats in Ireland are assessed as poor. Currently Structure and functions for this habitat type are assessed as having Amber (Inadequate) status, with an uncertain trend. This, coupled with the fact that little has happened in the interim in terms of putting in place conservation measures (either broadscale or site-specific) to counteract pressures and threats, means that the Future prospects are poor. Thus, overall, the Future prospects for *Cladium* fen in Ireland have been assessed as Inadequate given that a significant proportion of the habitat is damaged (deemed to be >25% in a review in 2013, and based on expert judgement and a review of interim studies, deemed still to be in the order of 20 to 25%), coupled with the fact that there are few to no conservation measures in place.

10 Conclusions

Assessment of conservation status at end of reporting period

10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	***YES****/NO*	***YES****/NO*
	b) yes, due to genuine change	*YES/****NO***	*YES/****NO***
	c) yes, due to improved knowledge/more accurate	***YES****/NO*	*YES/****NO***

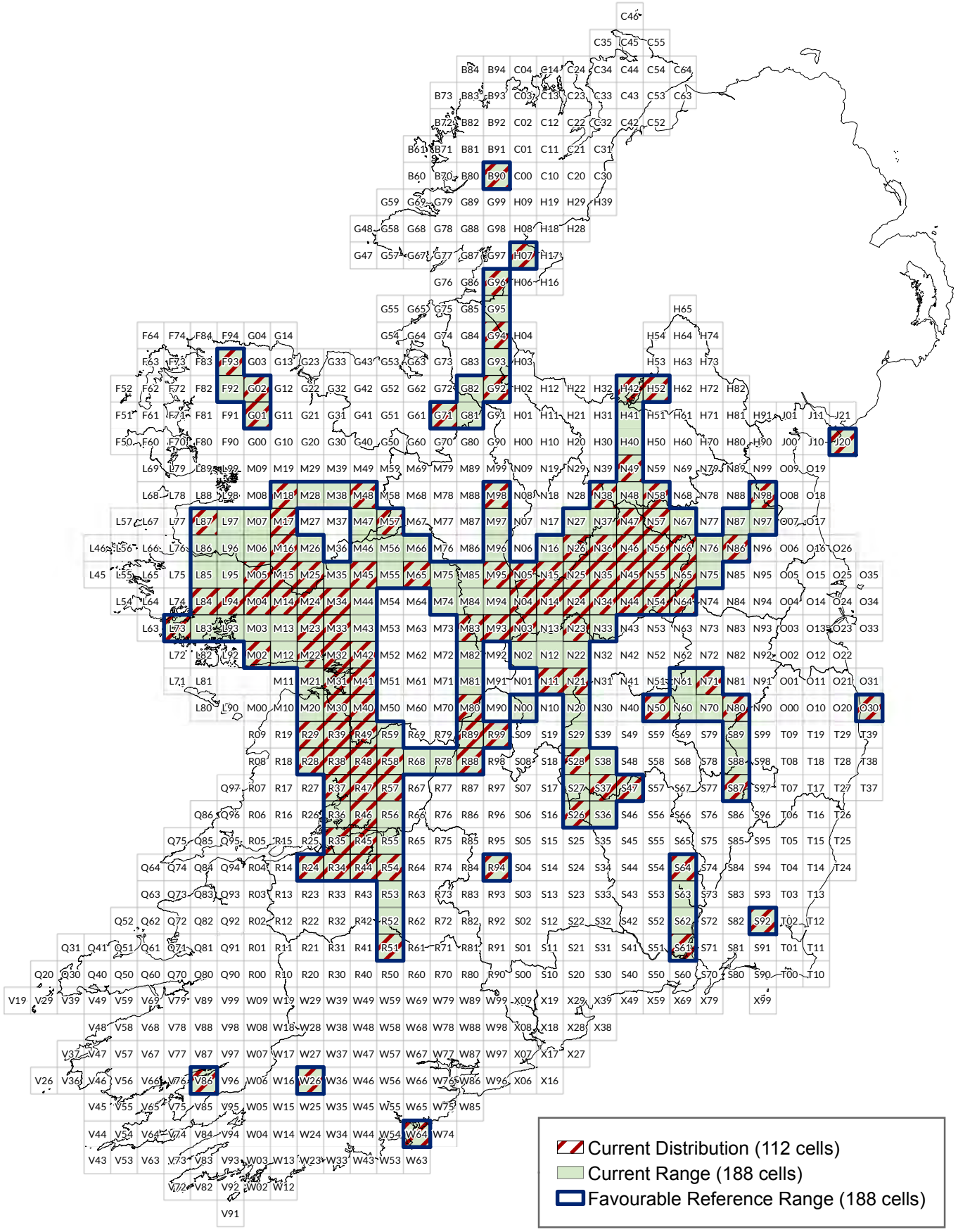
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/**NO***	*YES/**NO***
	e) yes, but there is no information on nature of change	*YES/**NO***	***YES**/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / **improved knowledge or more accurate data** / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	Range: While there may have been some losses of both habitat area and habitat quality within the reporting period, these are unlikely to be large, and as this is an uncommon but relatively widespread habitat, the range is unlikely to have been affected by such losses/decreases in quality since the Directive came into force. Thus Range was assessed as Favourable. Area: There are no field-validated data currently available to accurately quantify area or changes in area. Short-term trend was assessed as stable because changes are thought to be mostly related to habitat quality rather than area. However, there are likely to have been some losses of habitat area since the Directive came into force, and there is a lack of effective conservation measures, therefore, overall, Area was assessed as Inadequate. Structure and functions: This parameter was assessed as Bad in the 2013 reporting period. Information, though variable in nature, was gleaned from surveys carried out within the last reporting period which suggest that 18% of the habitat is in 'not-good' condition, resulting in an assessment of Inadequate. Future prospects: Based on the Future prospects assessments in section 9 (Range = good; Area = poor; Structure and functions = poor), the overall assessment of Future prospects for *Cladium* fen is Inadequate. Overall: Based on the results above, a combined overall Conservation Status of Inadequate applies. Overall trend direction: Based on the fact that two of the assessment parameters have a trend of stable (Range and Area), with one uncertain (Structure and functions), the overall trend for the habitat is stable. Expert judgement and experience have been used to inform the decisions made on the above at all stages, and available data, while often piecemeal and collected for a variety of purposes (i.e. not with fen conservation assessments as a focus), have been used at every opportunity to inform decision-making.		

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***40.72 km²***
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* *stable / increasing / decreasing /* ***uncertain****/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network was estimated by performing a union between the polygon distribution shapefile and the SAC shapefile, and a spatial join between the point distribution shapefile and the SAC shapefile. Any sites represented by points that were found to sit within the boundaries of the SAC were assumed to be wholly located within the SAC and an area was assigned to these points as described in section 5.15. The area given in section 11.1 is the total area of 7210 habitat in SACs in the country, including some SACs where 7210 is not listed as a qualifying interest (QI). The area of 7210 within the Natura 2000 (SAC) network where it is listed as a QI is 13.19 km^2, and this is from across 17 SACs. This compares with 13.52 km^2 in 2013. Better quality and more data are the reasons for the slightly decreased figure, rather than a decline in the habitat or a change in designations. The trend was assigned as 'uncertain' due to lack of detailed data.	

12 Complementary information

Cladium fen* (7210)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Habitat code / name	**7220 Petrifying springs with tufa formation (*Cratoneurion*)***
1.2i Habitat short name	**Petrifying springs**
1.3i Habitat description	Petrifying springs are lime-rich water sources which deposit tufa (or travertine). The emerging spring water is rich in carbon dioxide and dissolved calcium carbonate. On contact with the atmosphere, carbon dioxide is outgassed and calcium carbonate is deposited as tufa. The resulting ecological conditions, with high pH and constant inundation by water and deposition of precipitated calcium carbonate, constitute a challenging environment for plants and animals to colonise, and the communities associated with petrifying springs are therefore highly specialised. The ecological significance of petrifying springs is seldom confined to a point source; rather, there is often a continuum of intergrading hydrological conditions from the spring head, through a flushed slope and into small streams. Spring heads may be distinct point locations giving rise to small streams immediately below the point of emergence, or water may seep to the surface in a more diffuse pattern over a larger area. (From Lyons and Kelly, 2016.) Irish petrifying spring vegetation has been classified into eight plant communities (Lyons and Kelly, 2016). These groups encompass a broad range of variation within petrifying springs as they occur in Ireland and include lowland, upland, wooded, unwooded and coastal springs. Ecologically significant species of petrifying springs which serve as positive indicators of habitat status consist largely of mosses and liverworts, with a smaller number of vascular plants. The mosses *Palustriella commutata, P. falcata, Philonotis calcarea, Eucladium verticillatum, Didymodon tophaceus, Campylium stellatum, Scorpidium cossonii, S. scorpioides, Bryum pseudotriquetrum* and *Fissidens adianthoides* are highly characteristic, positive indicators, along with the liverworts *Pellia endiviifolia, Aneura pinguis* and *Jungermannia atrovirens.* Forbs which serve as positive indicators are *Pinguicula vulgaris*, *Parnassia palustris* and *Anagallis tenella*, and, especially in woodland springs, *Chrysosplenium oppositifolium* and *Crepis paludosa*. The graminoids *Festuca rubra, Carex lepidocarpa, C. panicea* and *Eriophorum latifolium* are positive indicators, as are the pteridophytes *Equisetum telmateia, E. variegatum* and *Selaginella selaginoides*. Stoneworts, especially *Chara vulgaris*, may also be present and serve as positive indicators. (Adapted from Lyons and Kelly, 2016.)

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***2007-2018***

2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range map was submitted
2.5i	A baseline national field survey of petrifying springs was carried out by Melinda Lyons as part of her PhD (Lyons, 2015). During her PhD, she compiled the 2013 National Conservation Assessment for this habitat (Lyons and Kelly, 2013; NPWS, 2013). The distribution map presented here is based on the Article 17 point and polygon master shapefiles from 2013, augmented with data which have been collected in the interim. These data comes from a variety of sources, including from M. Lyons *after* the 2013 assessment. NPWS collated data on petrifying springs from 17 datasets and these are listed in Denyer and Long (2018). A range of further sources were reviewed as part of the work by Denyer and Long (2018). This included a thorough review of bryological datasets, and also involved contacting a range of ecologists and the subsequent inclusion of multiple sites known to ecologists but not previously included in assessments. A total of 77 new spring sites were added. Full details on the data review can be found in Denyer and Long (2018). Once all the data were collated, a thorough review of points and polygons was carried out. Often multiple sources of information were used to form an opinion on a particular feature. Decisions were made on whether to remove any features where new information had since become available, or where there was replication of information, or conversely, for the addition of sites or upgrading of confidence, where new information allowed. During the current project, all points and polygons were assigned a confidence level as follows: A: point/polygon known to be Annex I Petrifying Spring, visited by field ecologist; B: point/polygon probably represents Annex I Petrifying Spring, information inferred from data such as habitat-specific bryophyte records, or use of Fossitt (2000) habitat classification category FP1; C: point/polygon possibly represents Annex I Petrifying Spring, information available suggests this but is not conclusive (e.g. tufa mentioned, but little other information provided; Fossitt category FP mentioned, but little further information). A total of 465 points or polygons have thus been collated relating to the occurrence of petrifying springs across Ireland, of which: 11 points were dropped (typically due to being replicates); 21 points/polygons were retained within the database, but not mapped or used for area calculations due to having been assigned the lowest

	level of confidence, C, typically due to a lack of information. This results in 433 mappable points/polygons relating to petrifying springs in Ireland, of which 378 had confidence level A and 55 level B.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
3.2 Sources of information	Blockeel, T.L., Bosanquet, S.D.S. Bosanquet, Hill, M.O. and Preston, C.D. (2014a) *Atlas of British and Irish bryophytes*. Volume 1. British Bryological Society (Pisces Publications, Newbury). Blockeel, T.L., Bosanquet, S.D.S. Bosanquet, Hill, M.O. and Preston, C.D. (2014b) *Atlas of British and Irish bryophytes*. Volume 2. British Bryological Society (Pisces Publications, Newbury). Brophy, J.T. and Long, M.P. (in prep.) Monitoring of sites and habitat for three Annex II species of whorl snail (*Vertigo*). Volume 3: *Vertigo geyeri* site reports. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of the Culture, Heritage and the Gaeltacht, Ireland. Denyer, J. and Long, M.P., (2018) Backing document – National Conservation Status Assessments (NCAs) for Petrifying Springs with Tufa Formation (Cratoneurion) (7220). Unpublished report to NPWS. EC (2007) Interpretation Manual of European Union Habitats. Version EUR27, European Commission, Brussels. EU Collated typical species. Version 1.0: provides a list of typical species reporting by the Member States as a part of the 2007-2012 Article 17 report. Farr, G, Graham, J and Stratford, C. (2014). *Survey characterisation and condition assessment of* Palustriella *dominated springs H7220 Petrifying springs with tufa formation* (Cratoneurion). Centre for Ecology and Hydrology and the British Geological Survey (NERC). Fossitt, J.A. (2000) *A guide to habitats in Ireland.* Heritage Council. Heery, S., Moorkens, E. and Campbell, C. (2014) An Account of Tufa-Forming (Petrifying) Spring Habitats in the Slieve Bloom Mountains, Ireland. *Biology and Environment: Proceedings of the Royal Irish Academy* 114B (1): 1-11. Long, M.P. and Brophy, J.T. (in prep.) Monitoring of sites and habitat for three Annex II species of whorl snail (*Vertigo*). Volume 1: Final Report. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of the Culture, Heritage and the Gaeltacht, Ireland. Li P, Stuart EA, Allison DB. (2015) Multiple Imputation: A Flexible Tool for Handling Missing Data. *JAMA* 314(18): 1966-7.

	Lyons, M.D. and Kelly, D.L. (2017) Plant community ecology of petrifying springs (*Cratoneurion*) – a priority habitat. *Phytocoenologia* 47 (1): 13–32. Lyons, M.D. and Kelly, D.L. (2016) Monitoring guidelines for the assessment of petrifying springs in Ireland. *Irish Wildlife Manuals*, No. 94. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Ireland. Lyons, M.D. (2015) The flora and conservation status of petrifying springs in Ireland. Ph.D. Thesis, Trinity College Dublin. Lyons, M.D. and Kelly, D.L. (2013) Conservation Status Assessment for Petrifying Springs – backing document. Unpublished report to National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Ireland. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Species Assessments Volume 3. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland. O'Neill, F.H. and Barron, S.J. (2015) N6 Galway City Transport Project: Report on the presence of Annex I habitat *7220 Petrifying springs with tufa formation. Unpublished report by BEC Consultants Ltd. R Core Team (2018). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.
3.2i Additional information	BBS (2009) *Checklist of British and Irish bryophytes*. The British Bryological Society, Stafford, U.K. Lockhart, N., Hodgetts, N. and Holyoak, D. (2012) *Ireland Red List No.8: Bryophytes.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Stace, C.A. (2010) *New Flora of the British Isles*. 3rd Edition. Cambridge University Press, Cambridge. Some shapefiles and other data provided did not have associated reports. They include: British Bryological Society Atlas dataset (2014) Petrifying springs site data received from 21 Irish ecologists Note also that sources used and listed in Lyons and Kelly (2013) were also drawn upon but are not listed separately in this report.

4 Range

Range within the biogeographical/marine region concerned

4.1 Surface area	***18,900 km²***
4.2 Short-term trend Period	***2007–2018***

4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	*1994-2018*	
4.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	*a) In km² or*	
	b) Operator ≈ (approximately equal to) *or*	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	

4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of 7220. Short-term trend direction was estimated as 'stable' based on expert opinion. While there may have been some losses of both habitat area and habitat quality within the reporting period, these are thought to be small in comparison to the overall range size. This habitat generally occupies a small area within what is often unproductive and/or inaccessible land, making it difficult to farm or develop. Also, this is an uncommon but yet relatively widespread habitat type in Ireland. These factors combined suggest that the range is unlikely to be affected by such losses/decreases in quality. The number of 10km squares in the range (189) differs from the last monitoring period (132) due to the integration of new information. Some new data were assessed and integrated as part of this work, meaning that our understanding of the range of petrifying springs in Ireland has been improved. The Favourable Reference Range has been set as approximately equal to the current range as it is based on more complete data being available on the distribution of petrifying springs across Ireland than was available in the last monitoring round. The FRR is considered to encompass all ecological and geographical variation of the habitat and is likely to be sufficiently large to allow the long-term viability of the habitat.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2007-2018***	
5.2 Surface area *(in km^2)*	**a) Minimum**	***0.1379 km^2***
	b) Maximum	***0.1549 km^2***
	c) Best single value	***0.1441 km^2***
5.3 Type of estimate	*Best estimate / **95% confidence interval** / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude	**a) Minimum**	
	b) Maximum	

Optional	**c) Confidence interval**	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	*1994 – 2018*	
5.10 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator ≈ (approximately equal to) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
5.15 Additional information *Optional*	As mentioned above, there are 433 mappable data points in the database on petrifying springs. Of these, 43 had no area assigned. In order to be able to calculate the total area for the habitat, a subset of	

	those points/polygons with known areas was used to help generate a median area (with confidence intervals) for those points with unknown area (via multiple imputation method, see Denyer and Long (2018) for further details). Short-term trend direction was estimated as 'stable' based on both expert opinion and survey reports. Expertise within the team, as well as data sources available, suggest that there have been losses at a few sites, but mostly the changes relate to condition rather than loss of area. The difference in habitat extent between this reporting period and the last is due to new information being available, as well as a new method used for calculation of area for those data points without an area available. Although some small losses of habitat area may have occurred since the Directive came into force, and during the current reporting period, the magnitude of the decline is thought to be small. It is unlikely that >10% of the resource has been lost since 1994. Most changes are likely to be relating to condition, rather than area. Thus the Favourable Reference Area is set as ≈ the current area.

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***0.1035 km²***
		Maximum	***0.1162 km²***
	b) Area in not-good condition	**Minimum**	***0.0345 km²***
		Maximum	***0.0387 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	*stable / increasing /* ***decreasing*** */ uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		

6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***
6.7 Typical species Method used *Optional*	
6.8 Additional information *Optional*	Lyons and Kelly (2016) report that a total of 157 petrifying spring locations were assessed for Structure and functions during the PhD project, with a combined area of 8.76 ha. They reported that Structure and functions were favourable at 74% of sites (6.5 ha). Condition assessment data following the same methodology were available for a further 16 spring sites (surveyed by Denyer in 2017 and 2018). The total area of these sites was 0.097 ha, and the area in good condition was 0.075 ha (9 springs). This equates to 77% of the area. Using a weighted average calculation based on 157 sites being 90% of the total number which were assessable for Structure and functions, and 16 being 10%, gives a result of 74.3% in good condition [(74x0.9) + (77x0.1) = 74.3%]. Expert judgement was used to round this up to 75%, the lower end of the threshold for an overall assessment for Structure and functions of Inadequate. This figure of 75% was applied to the total habitat area in the country because the survey by Lyons was a representative sample of the national resource, and its findings are bolstered by the similar findings in the more recent assessments by Denyer. Among the main issues encountered when assessing the Structure and functions of petrifying springs were (here Lyons and Denyer sites are combined): phosphate levels too high (21 sites); alteration of natural water flow (14 sites); negative woody indicator species presence in non-wooded springs (13 sites); nitrate levels too high (13 sites); positive indicator species number too low (12 sites); negative bryophyte indicator species cover/ frequency too high (8 sites); vegetation height was too tall (6 sites); trampling/ dung too high (e.g. overgrazing) (5 sites); invasive species present (4 sites); and negative herbaceous indicator species cover/ frequency too high (2 sites). Short-term trend direction was estimated as 'decreasing' based on data available in site reports from both Lyons and Denyer, and on experience in the field. These sources suggest that there are ongoing issues and pressures at many spring sites, and that these issues are having, and will continue to have, an effect on habitat condition. For detailed information on what constitutes good condition for petrifying springs in Ireland, section 4.2 of Lyons and Kelly (2016) should be consulted. Detailed information is provided on: species

	composition; high-quality indicator species; positive indicator species; typical accompanying species; invasive species; negative indicator species; algae and cyanobacteria; spring water composition and flow; and impacts of grazing.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
	A06 Abandonment of grassland management (e.g. cessation of grazing of mowing) (M) **A10** Extensive grazing or undergrazing by livestock (M) **E01** Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (H) **F07** Sports, tourism and leisure activities (M) **J01** Mixed source pollution to surface and ground waters (limnic and terrestrial) (H) **K02** Drainage (H) **K04** Modification of hydrological flow (H)	**A06** Abandonment of grassland management (e.g. cessation of grazing of mowing) (M) **A10** Extensive grazing or undergrazing by livestock (M) **E01** Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (M) **F07** Sports, tourism and leisure activities (M) **H08** Other human intrusions and disturbance not mentioned above (H) **J01** Mixed source pollution to surface and ground waters (limnic and terrestrial) (H) **K02** Drainage (H) **L02** Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices) (M)
7.2 Sources of information *Optional*		
7.3 Additional information *Optional*	A total of 76 sites surveyed by Lyons had pressures and threats information associated. There was generally no separation of pressures and threats for these data, so the same list was used for both pressures and threats. A total of 23 pressures and threats were recorded by Lyons, all of which were converted to the new coding system as part of this project. Information from a further 21 sites was reviewed to obtain additional information on pressures and threats impacting 7220 spring habitat. This included NPWS survey reports, condition	

	assessment data recorded by Denyer, and survey notes from a number of other spring sites surveyed by Denyer. These data presented pressures and threats separately, and so information was summarised for pressures and threats for each site separately. Details relating to the collation and ranking of pressure and threats data are available in Denyer and Long (2018), including tables listing all recorded (negative) pressures and threats. From the long lists of negative pressures/threats, a short list of those affecting the most sites and/or with the highest impact were selected for inclusion here following a thorough review and analysis. Due to the wide-ranging list of pressures/threats, often affecting only small numbers of sites, a cut-off of 3% was chosen – i.e. generally only those pressures/threats which had a medium or high impact on over 3% of sites were included here. This allowed the production of a manageable list. Note that when a pressure/threat was recorded as having different levels of impact on different sites, the impact level which had the greatest number of sites was used. The short lists of the most important pressures and threats are provided in alphanumeric order above, but are ranked according to importance (i.e. impact) in Denyer and Long (2018), with those with the highest negative impact at the top. J01 (water pollution) ranks highest as both a pressure and a threat. A06 (abandonment) ranks as the second highest pressure, and third highest threat. K02 (drainage) also ranks highly in both lists. Additional notes and observations on pressures and threats, including citing recent examples of impacts, are provided in Denyer and Long (2018). In the 2013 assessment, the list of categories, and their ranking as high or medium, was the same for pressures and threats. The highest impact was deemed to be from 'Landfill, land reclamation and drying out, general (J02.01)'. This ties in with E01, H08 and K02 identified in the current assessment. Other important impacts included those relating to abandonment, water pollution, trampling/overuse/ intensive grazing. All of these have strong parallels in the current assessment (e.g. J01, A06, H08). Climate change has not been included as an impact but it is likely to affect this habitat in Ireland in decades to come.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* ***a) Measures identified, but none yet taken** or* *b) Measures identified and taken or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or*

	b) Expand the current range of the habitat type (related to 'Range') or *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	None taken
8.6 Additional information *Optional*	Conservation measures are needed for petrifying springs in Ireland due to the fact that it is estimated that approximately a quarter of sites in Ireland may be in 'not-good' condition. There are a large number of pressures acting on these sites, and a number of threats which are likely to act on the sites in the future (see section 7). To counteract the potential negative effects, conservation measures are needed. There is relatively little information available relating directly to dedicated or targeted conservation measures for petrifying springs in Ireland (e.g. they are not covered in Lyons and Kelly, 2016, which is the most up-to-date and comprehensive account available). The 2013 assessment listed 'Legal protection of habitats and species (6.3)' as a conservation measure of high importance, and mentioned the potential importance of the EIA agricultural regulations. The following was stated and is largely still relevant: "Petrifying springs listed as qualifying interests in SACs are protected by the 2011 Habitat Regulations; this regulates any plans or projects that may negatively impact on the habitat. There is also an NPWS list of Activities Requiring Consent (ARCs) that are only granted if they do not negatively impact on the Qualifying features within an SAC. Drainage of large sites is controlled by EIA agricultural regulations (S.I. No. 456/2011 – European Communities (Environmental Impact Assessment) (Agriculture) Regulations 2011.). Petrifying springs are considerably smaller than the threshold value of 15ha but often the wetland systems associated with petrifying springs are large enough to bring the wetlands as a whole above the threshold." Also worth noting is that under the Planning and Development Regulations (2001-2011) planning permission is required for the drainage or reclamation of wetlands in excess of 0.1ha (or below that if having a

	significant effect on the environment). While reviewing data for all other parts of this project, mentions of conservation measures were sought for collation. These were found to be very few. Some examples of conservation measures are known from within the project team. All are listed below and form a starting point from which this area could be developed in the future. Overall, it is possible to say that there is a lack of dedicated conservation action being implemented for petrifying springs in Ireland, and that an evidence-based programme of conservation measures is needed. List of known conservation measures taking place: At a windfarm site in Faughary, Manorhamilton, sheep are fenced out for three months (in summer) as a direct conservation measure due to damage from past over-grazing. Vegetation has been seen to recover. The local authority, community groups and local business (e.g. Intel) have been working together to keep the springs and fens at Louisa Bridge, Leixlip, tidy (litter removal, sensitive scrub/vegetation clearance). It is unknown if any direct conservation measures are taking place. Conservation grazing at small area at Pollardstown Fen – may or may not impact on springs. At least two local authorities (South Dublin and Dún Laoghaire - Rathdown County Councils) have commissioned significant amounts of work on survey and assessment of petrifying springs within their area. Conservation measures are being drafted as part of a farm plan for springs at Clonaslee Eskers and Derry Bog SAC under the National Parks and Wildlife Service Farm Plan Scheme. It should be noted that the management regimes of most petrifying spring sites in Ireland are driven by the landowner rather than by any formal management plan or policy; therefore the continued operation of the management regimes currently in place is not guaranteed. Note that there are likely to be other examples of conservation measures being taken for petrifying springs in Ireland - the list above is not conclusive and should be added to in future years. List of potential conservation measures: Based on the list of pressures identified for petrifying springs in Ireland (see section 7.1), below are listed the associated suite of potential conservation measures. Passive measures such as maintaining grazing are excluded. There is little information available currently on the extent to which measures such as these are taking place in Ireland, but it is suggested that future studies and assessments should aim to systematically review and identify suitable conservation measures. This list should not be taken as exhaustive.

	CA03 Maintain existing extensive agricultural practices and agricultural landscape features CA04 Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures CA05 Adapt mowing, grazing and other equivalent agricultural activities CE01 Reduce impact of transport operation and infrastructure CE06 Habitat restoration of areas impacted by transport CF03 Reduce impact of outdoor sports, leisure and recreational activities CJ01 Reduce impact of mixed source pollution CJ02 Reduce impact of multi-purpose hydrological changes CJ03 Restore habitats impacted by multi-purpose hydrological changes

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	*Good /* ***Poor*** */ Bad / Unknown*
9.2 Additional information *Optional*	The Future prospects for the Range and the Area of the habitat have both been assessed as good, because while there may continue to be some small losses of habitat area and/or habitat quality in the next 12 years, these are likely to be relatively small in comparison with the overall range and area, and so these parameters are unlikely to be affected by such losses/decreases in quality. The Future prospects for the Structure and functions are assessed as poor. Available data, coupled with expertise and experience within the team, suggest that there are ongoing issues and pressures at many spring sites, and that these issues are having, and will continue to have, an effect on habitat condition. Thus, overall, the Future prospects for petrifying springs in Ireland have been assessed as poor given that a significant proportion of the habitat is in 'not-good' condition (~25%), coupled with the fact that there are few to no conservation measures in place.	

10 Conclusions

Assessment of conservation status at end of reporting period	
10.1 Range	***Favourable*** *(FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.2 Area	***Favourable*** *(FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) /* ***Inadequate*** *(U1) / Bad (U2) / Unknown (XX)*

<table>
<tr><td>10.4 Future prospects</td><td colspan="3">Favourable (FV) / <u>Inadequate</u> (U1) / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>10.5 Overall assessment of Conservation Status</td><td colspan="3">Favourable (FV) / <u>Inadequate</u> (U1) / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>10.6 Overall trend in Conservation Status</td><td colspan="3">Indicate the trend (qualifier) for FV, U1 and U2:

improving / <u>deteriorating</u> / stable / unknown</td></tr>
<tr><td rowspan="8">10.7 Change and reasons for change in conservation status and conservation status trend</td><td colspan="3">Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.</td></tr>
<tr><td></td><td>Overall assessment of conservation status (10.5)</td><td>Overall trend in conservation status (10.6)</td></tr>
<tr><td>a) no, there is no difference</td><td>YES/<u>NO</u></td><td><u>YES</u>/NO</td></tr>
<tr><td>b) yes, due to genuine change</td><td>YES/NO</td><td><u>YES</u>/NO</td></tr>
<tr><td>c) yes, due to improved knowledge/more accurate</td><td>YES/NO</td><td><u>YES</u>/NO</td></tr>
<tr><td>d) yes, due to the use of different methods (including use of different thresholds)</td><td>YES/NO</td><td>YES/<u>NO</u></td></tr>
<tr><td>e) yes, but there is no information on nature of change</td><td>YES/NO</td><td>YES/<u>NO</u></td></tr>
<tr><td>The change is mainly due to (select one of the reasons above):</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td><td>genuine change / <u>improved knowledge or more accurate data</u> / the use of a different method</td></tr>
<tr><td>10.8 Additional information

Optional</td><td colspan="3">Range: While there may have been some losses of both habitat area and habitat quality within the reporting period, these are unlikely to be large, and as this is an uncommon but widespread habitat, the range is unlikely to have been affected by such losses/decreases in quality since the Directive came into force. Thus Range was assessed as Favourable, with a ‘stable’ trend.

Area: There have been some losses of habitat area since the Directive came into force, but the effect on habitat area is thought to be small. Area was assessed as Favourable, with a ‘stable’ trend.

Structure and Functions: Information from both survey reports and expert knowledge suggest that pressures acting on petrifying springs are affecting Structure and functions, and so this was assessed as Inadequate. These continuing pressures and threats, particularly in the absence of a suite of wide-ranging conservation measures, results in a trend of ‘decreasing’.</td></tr>
</table>

	Future prospects: Based on the assessments in section 9 (in summary: range = good; area = good; structure and functions = poor), the overall assessment for the Future prospects for petrifying springs is Inadequate. Overall: Based on the results above, a combined overall Conservation Status of Inadequate applies. Overall trend direction: Based on the fact that two of the assessment parameters have a trend of stable (Range, Area), with one decreasing (Structure and functions), the overall trend for the habitat is 'deteriorating'.

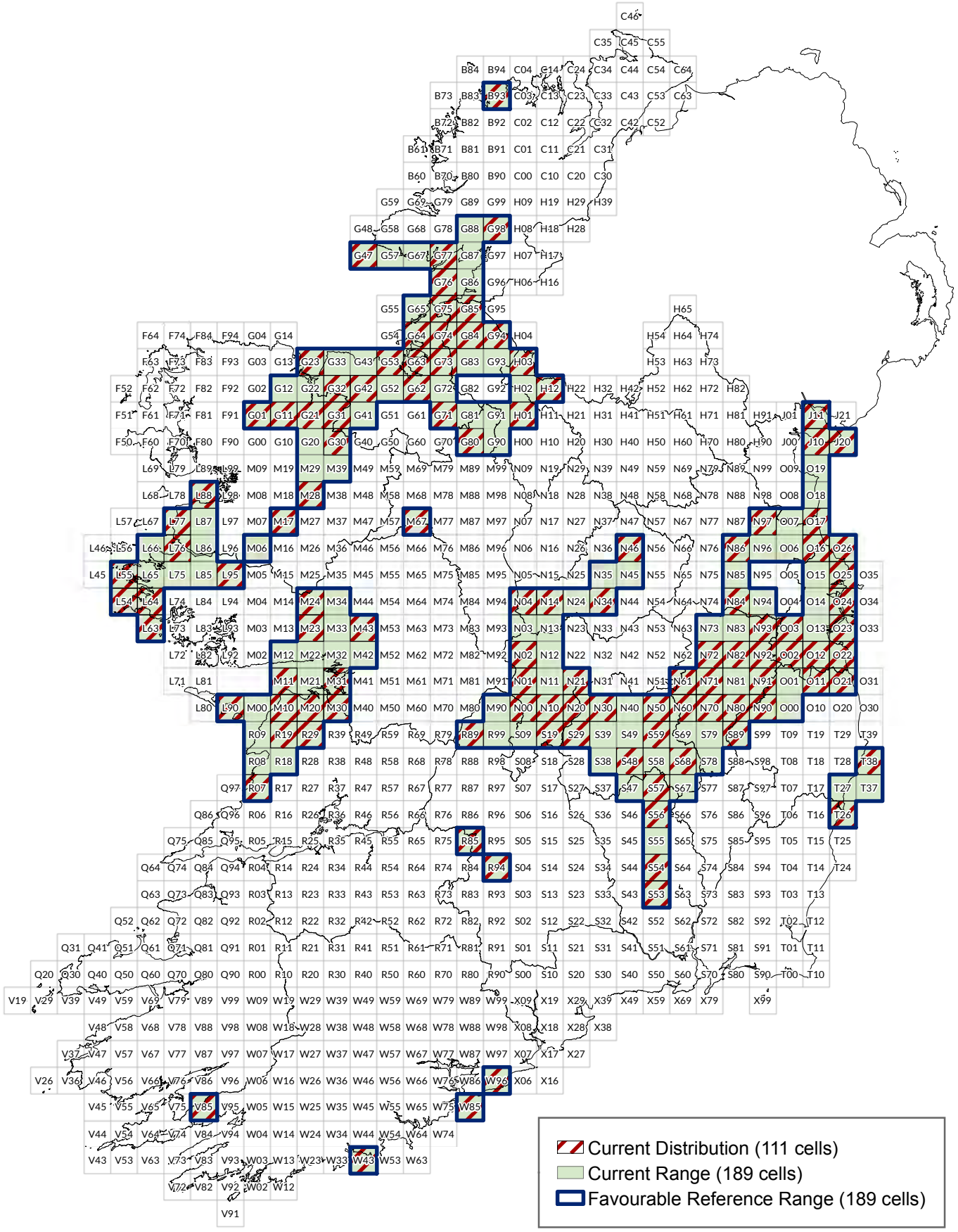
11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	***0.1154 km²***
	b) Maximum	***0.1224 km²***
	c) Best single value	***0.1164 km²***
11.2 Type of estimate	*Best estimate / **95% confidence interval** / minimum*	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* *stable / increasing / decreasing / **uncertain**/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
11.6 Additional information *Optional*	The area within the network was estimated by performing a union between the polygon distribution shapefile and the SAC shapefile (after having applied an arbitrary buffer of 0.5m to allow conversion of points to polygons to allow the analysis). The area figures given in section 11.1 relate to the total area of 7220 habitat in SACs in the country (including min and max), whether the habitat is listed as a qualifying interest (QI) or not. There were 242 points/polygons within SACs. Of these 242 points, 235 had a known area, and 7 did not. In order to calculate the total area for the habitat within SACs, those points/polygons with known areas were used to generate a median area (with confidence intervals) for those points without a known	

	area (via multiple imputation method, see Denyer and Long (2018) for further details). Lists of SACs which contain petrifying spring habitat, both QI (20 sites) and non-QI (24 sites), are given in Denyer and Long (2018). The trend was assigned as 'uncertain' due to lack of detailed data.

12 Complementary information

Petrifying springs* (7220)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Mapáil V 2.0
Dáta June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Habitat code / name	**7230 Alkaline fens**
1.2i Habitat short name	**Alkaline fens**
1.3i Habitat description	Alkaline fens are groundwater-fed, generally peat-forming systems with extensive areas of species-rich small sedge and brown moss communities. They occur in areas where there is a high water table and a base-rich, often calcareous water supply. Alkaline fens can develop in areas where vertical water movement predominates (topogenous), such as poorly drained basins or hollows and open water transitions; or where horizontal water movement is also important (soligenous), such as flushes, valley fens and the laggs of raised bogs. However, this distinction is not always clear (such as in large floodplain fens which can include both elements). Fen systems are often a complex mosaic of habitats, with tall sedge beds, reedbeds, wet grasslands, springs and open-water co-occurring. A fuller account of the vegetation of alkaline fens in Ireland is provided in the accompanying backing document (Long *et al.*, 2018), and a preliminary vegetation classification of fens in Ireland has just recently been made available as part of the Irish Vegetation Classification (http://www.biodiversityireland.ie/projects/national-vegetation-database/). Alkaline fens are relatively widespread in Ireland. The most extensive areas of alkaline fens are thought to occur in lowland basins associated with limestone groundwater bodies (often in midland areas). Alkaline fens associated with flushes and open water transitions tend to be smaller, but may be more widespread than those in lowland basins.

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***2005-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range map submitted

2.5i	A baseline, national field survey of fen habitats has not been conducted in Ireland to date. The distribution map for 7230 is based on the Article 17 point and polygon master shapefiles from 2013, augmented with polygons, points and other data which have been collected in the interim (coming from a variety of sources – see Long *et al.*, 2018). For 2013, the habitat distribution was based to a large extent on the NPWS Fen Study Database compiled as part of the 'Study of the extent and conservation status of springs, fens and flushes in Ireland' (Foss, 2007b), with additional sites extracted from a variety of relatively recent field and desk-based surveys (Kimberley, 2013). To compile the 2013-2018 map, a thorough review of all of these points and polygons was carried out in the first instance, and decisions on whether to remove any of these features from the 2013-2018 map were made where any new information has since become available that indicated that these features were no longer valid with respect to this Annex I habitat, or conversely, where new information allowed us to upgrade the confidence of the fen type present. This dataset was then augmented by a variety of new sources, predominantly habitat surveys which recorded Annex I habitats, and others where the species being surveyed are considered to be suitable indicators of this Annex I habitat, or the habitats mapped considered to be analogous to Annex I fen types. Often multiple sources of information were used to form an opinion on a particular feature. The sources used are listed in section 3.2, and in Long *et al.* (2018). Some data sources were polygons that represented habitat mosaics, including some proportions of 7230. Consistent with the approach used in 2013, the locations of these sites for mapping purposes were represented by centroids.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
3.2 Sources of information	Barron, S.J. and Daly, O.H. (2015) Surveys of possible Marsh Fritillary sites and habitat in Cos. Clare (outside the Burren) and Kerry, Final report. Unpublished report to National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Barron, S.J., O'Neill, F.H. and Martin, J.R. (2015) N6 Galway City Transport Project – Habitat mapping and assessment of a section of Lough Corrib cSAC and surrounding areas. Unpublished report by BEC Consultants Ltd. Blockeel, T.L., Bosanquet, S.D.S. Bosanquet, Hill, M.O. and Preston, C.D. (2014a) *Atlas of British and Irish bryophytes. Volume 1*.

British Bryological Society (Pisces Publications, Newbury).

Blockeel, T.L., Bosanquet, S.D.S. Bosanquet, Hill, M.O. and Preston, C.D. (2014b) *Atlas of British and Irish bryophytes. Volume 2.* British Bryological Society (Pisces Publications, Newbury).

Bord na Móna (2017a) Draft Rehabilitation Plan 2017: Blackwater Bog.

Bord na Móna (2017b) Draft Rehabilitation Plan 2017: Clongawny Bog.

Bord na Móna (2017c) Draft Rehabilitation Plan 2017: Oughter Bog.

Brophy, J.T. and Long, M.P. (in prep. a) Monitoring of sites and habitat for three Annex II species of whorl snail (*Vertigo*). Volume 3: *Vertigo geyeri* site reports. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

Brophy, J.T. and Long, M.P. (in prep. b) Monitoring of sites and habitat for three Annex II species of whorl snail (*Vertigo*). Volume 4: *Vertigo moulinsiana* site reports. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

Campbell, C., Hodgetts, N. and Lockhart, N. (2015) Monitoring methods for *Hamatocaulis vernicosus* Mitt. Hedenäs (Slender Green feather-moss) in the Republic of Ireland. *Irish Wildlife Manuals*, No. 91. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.

Campbell, C., Hodd, R.L. and O'Neill, F. (in prep.) The monitoring and assessment of *Hamatocaulis vernicosus* (Slender Green feather-moss) in the Republic of Ireland 2015-2017. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland.

Crushell, P., Foss, P.J. and Kirwan, B. (2014) County Kerry Wetland Survey. Report prepared for Kerry County Council.

Crushell, P., Foss, P.J. and Kirwan, B. (2015) Kerry Wetland Survey II. Report prepared for Kerry County Council.

Daly, O.H. (2016) Surveys of possible Marsh Fritillary sites and habitat in the mid-west (Roscommon and Longford), Draft report. Unpublished report to National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Daly, O.H. and Barron, S.J. (2015) Surveys of possible Marsh Fritillary sites and habitat in Cos. Galway and Mayo, Final report. Unpublished report to National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Daly, O.H. and Barron, S. (2014) Surveys of possible Marsh Fritillary sites and habitat in Cos Louth, Meath and Monaghan, Final report. Unpublished report to National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

EC (2007) Interpretation Manual of European Union Habitats. Version EUR27, European Commission, Brussels.

EU Collated typical species. Version 1.0: provides a list of typical species reporting by the Member States as a part of the 2007-

2012 Article 17 report.

Foss, P. (2007a) Alkaline fen (7230) conservation status assessment. Unpublished report to the National Parks and Wildlife Service.

Foss, P. (2007b) Study of the extent and conservation status of springs, fens and flushes in Ireland. Report for the National Parks and Wildlife Service of Ireland.

Foss, P.J. and Crushell, P. (2013) County Kildare Wetland Survey II. Report prepared for Kildare County Council and The Heritage Council.

Foss, P.J. and Crushell, P. (2014) County Kildare Wetland Survey III. Report prepared for Kildare County Council and The Heritage Council.

Foss, P.J., Crushell, P., Kirwan, B., O'Loughlin, B. and Wilson, F. (2014) Louth Wetland Survey III. Report prepared for Louth County Council and The Heritage Council.

Foss, P.J., Crushell, P. and Kirwan, B. (2015) County Waterford Wetland Survey. Report prepared for Waterford City and County Council.

Fossitt, J.A. (2000) *A guide to habitats in Ireland*. Heritage Council, Kilkenny.

Hájek, M., Horsák, M., Hájková, P. and Dítě, D. (2006) Habitat diversity of central European fens in relation to environmental gradients and an effort to standardise fen terminology in ecological studies. *Perspectives in Plant Ecology, Evolution and Systematics* 8: 97–114

Joint Nature Conservation Committee (2004) *Common Standards Monitoring Guidance for Lowland Wetlands Habitats.* Version August 2004. ISSN 1743-8160 (online).

Jones, P.S., Stevens, J., Bosanquet, S.D.S., Turner, A.J., Birch, K.S. and Reed, D.K. (2013) Distribution, extent and status of Annex I wetland habitats in Wales: Supporting material for the 2013 Article 17 assessment. CCW Staff Science Report No 13/7/1.

Joosten, H., Tanneberger, F. and Moen, A. (eds.) (2017) *Mires and peatlands of Europe: Status, distribution and conservation.* Schweizerbart Science Publishers, Stuttgart.

Kimberley, S. (2013) Conservation status assessments of three fen habitat types. Unpublished NPWS report.

Kimberley, S. and Coxon, C. (2013) Environmental supporting conditions for Groundwater-Dependent Terrestrial Ecosystems. A report for the Environmental Protection Agency, Ireland

Long, M.P. and Brophy, J.T. (in prep.) Monitoring of sites and habitat for three Annex II species of whorl snail (*Vertigo*). Volume 1: Final Report. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

Long, M.P., Crowe, O., Kimberley, S and Denyer, J. (2018) Backing document – National Conservation Status Assessments (NCAs) for three fen habitat types: 7140 – Transition mires and quaking bogs, 7210 – Calcareous fens with Cladium mariscus and species of Caricion davallianae, 7230 – Alkaline fens. Unpublished report

to NPWS.

Northern Ireland Environment Agency (2013) Supporting documentation for the Third Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2007 to December 2012 for Habitat: H7230 – Alkaline fens.

Northern Ireland Environment Agency (2015) Magheraveely Marl Loughs SAC Conservation Objectives.

Northern Ireland Environment Agency (2015) West Fermanagh Scarplands SAC Conservation Objectives.

Northern Ireland Environment Agency (2017) Garron Plateau SAC Conservation Objectives.

NPWS (2008) The Status of EU Protected Habitats and Species in Ireland. Backing Documents, Article 17 forms, Maps Volumes 1, 2 and 3. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.

NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Species Assessments Volume 3. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland.

Ó Críodáin, C. and Doyle, G.J. (1994) An overview of Irish small-sedge vegetation: syntaxonomy and a key to communities belonging to the Scheuchzerio-Caricetea nigrae (Nordh. 1936) Tx. 1937. *Biology and Environment: Proceedings of the Royal Irish Academy* 94B (2): 127-144.

O'Neill, F.H., Martin, J.R., Devaney, F.M. and Perrin, P.M. (2013) The Irish semi-natural grasslands survey 2007-2012. *Irish Wildlife Manuals*, No. 78. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

O'Neill, F.H. and Martin, J.R. (2015) Summary of findings from the Survey of Potential Turloughs 2015. Unpublished report for National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

O'Neill, F.H. and Martin, J.R. (2018) The Irish Juniper Monitoring Survey 2017. *Irish Wildlife Manuals*, No. 101. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland.

Perrin, P.M., Barron, S.J., Roche, J.R. and O'Hanrahan, B. (2010) Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland. Version 1.0. *Irish Wildlife Manuals*, No. 48. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Perrin, P.M., Barron, S.J., Roche, J.R. and O'Hanrahan, B. (2014a) Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland. Version 2.0. *Irish Wildlife Manuals*, No. 79. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. and Devaney, F.M. (2014b) National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 15: Slieve Mish Mountains cSAC

	(002185), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., and Devaney, F.M. (2014c) National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 16: Caha Mountains cSAC (000093), Cos. Cork and Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Regan, S. and Conaghan, J. (2016) Eco-Hydrological Investigation of Tory Hill fen SAC, Co. Limerick. Report prepared for The Office of Public Works. Regan, S., Gill, L., Conaghan, J., Brew, T. and Gilligan, N. (2016) 05 - Assessing the conservation status of GWDTEs under the Habitats Directive and Water Framework Directive; A case study from Tory Hill Fen SAC. National Hydrology Conference 2016. Regan, S. and Conaghan, J. (2017) Eco-Hydrological Investigation of Ballymore Fen SAC, Co. Westmeath. Report prepared for The Office of Public Works. Rodwell, J.S. (ed.) 1991. *British Plant Communities. Volume 2. Mires and heath*. Cambridge University Press. Rodwell, J.S. (ed.) 1995. *British Plant Communities. Volume 4. Aquatic communities, swamps and tall-herb fens.* Cambridge University Press. Wheeler, B.D. and Proctor, M.C.F. (2000) Ecological gradients, subdivisions and terminology of north-west European mires. *Journal of Ecology* 88: 187-203. White, J. and Doyle, G.J. (1982) The vegetation of Ireland. A catalogue raisonné. *Journal of Life Sciences, Royal Dublin Society* 3: 289-368. Dublin. Woodrow, W. and McNicholas, D. (2014) Surveys of possible Marsh Fritillary sites and habitats in Co Cavan and Co Leitrim – 2013. Report to National Parks and Wildlife Service, Dublin.
3.2i Additional information	BBS (2009) *Checklist of British and Irish bryophytes*. The British Bryological Society, Stafford, U.K. Lockhart, N., Hodgetts, N. and Holyoak, D. (2012) *Ireland Red List No.8: Bryophytes.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Otte, M.L. (ed.) (2003) *Wetlands of Ireland: Distribution, ecology, uses and economic value*. University College Dublin Press, Dublin. Proctor, M. (2013) *Vegetation of Britain and Ireland.* Harper Collins, London. Stace, C.A. (2010) *New Flora of the British Isles*. 3rd edition. Cambridge University Press, Cambridge. Some shapefiles and other data provided did not have associated reports. They include: Blanket bog study habitat maps, shapefiles received from NPWS. British Bryological Society Atlas dataset (2014) Fen habitat polygons for some raised bog sites, shapefiles received

	from Raised Bog LIFE team. Fen habitat polygons, shapefiles received from Coillte. IPCC list of fen and potential fen sites, received as excel spreadsheet from IPCC. NPWS data collated on wildfires (2017), data received from NPWS. Note also that sources used and listed in Kimberley (2013) were also drawn upon, but are not listed separately in this report.

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***48,800 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	1994-2018	
4.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	*a) In km² or*	
	b) Operator ≈ (approximately equal to) *or*	

	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods? **YES**/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/**NO***
	b) yes, due to improved knowledge/more accurate data	***YES**/NO*
	c) yes, due to the use of different method	*YES/**NO***
	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of 7230. A maximum gap distance of two 10km grid cells was used when running the range tool. Short-term trend direction was estimated as 'stable' based on expert opinion – while there may have been some losses of both habitat area and habitat quality within the reporting period, these are unlikely to be large, and as this is an uncommon but widespread habitat, the range is unlikely to be affected by such losses/decreases in quality. The number of 10km squares in the range (488) differs from the last monitoring period (329) due to the integration of new information. A suite of new datasets were assessed and integrated as appropriate as part of this work, meaning that our understanding of the range of alkaline fen habitat in Ireland has been improved. The Favourable Reference Range (FRR) has been set as approximately equal to the current range as it is based on more complete data being available on the distribution of fens across Ireland (though still incomplete) than was available in the last monitoring round. The FRR is considered to encompass all ecological and geographical variation of the habitat and is likely to be sufficiently large to allow the long-term viability of the habitat. Further notes on range (e.g. comparisons with previous assessments) are available in the accompanying backing document (Long *et al.*, 2018).	

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2005-2018***	
5.2 Surface area *(in km²)*	**a) Minimum**	
	b) Maximum	

	c) Best single value	***125.31 km²***
5.3 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	*1994-2018*	
5.10 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator > (greater than) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	

<table>
<tr><td rowspan="6">5.14 Change and reason for change in surface area</td><td colspan="2">Is there a change between reporting periods? <u>YES</u>/NO

If yes, provide the nature of that change. More than one option (a to d) can be chosen.</td></tr>
<tr><td>a) yes, due to genuine change</td><td><u>YES</u>/NO</td></tr>
<tr><td>b) yes, due to improved knowledge/more accurate data</td><td><u>YES</u>/NO</td></tr>
<tr><td>c) yes, due to the use of different method</td><td>YES/<u>NO</u></td></tr>
<tr><td>d) yes, but there is no information on the nature of change</td><td>YES/<u>NO</u></td></tr>
<tr><td colspan="2">The change is mainly due to (select one of the reasons above):

genuine change / <u>improved knowledge or more accurate data</u> / the use of a different method</td></tr>
<tr><td>5.15 Additional information

Optional</td><td colspan="2">The areas generated for points and polygons for the 2013 submission were used in the first instance (Kimberley, 2013). Additional data sources listed above were treated as follows:

Polygon datasets listed as including this habitat: Area Habitat = Total Polygon Area.

Polygons which represented habitat mosaics, and proportions given: Area Habitat = Area Polygon x Proportion 7230 habitat.

Points: Area = Median Area, which for 7230 was calculated as the median area across all high-quality habitat polygons (Habitat Confidence A, B1 and B2 as defined by Kimberley, 2013). This median value for 7230 was calculated as 165 m^2, and was applied to all new points (since 2013), as well as any points from the 2013 submission where a default median value had been provided. See Long et al. (2018) for a fuller discussion on median areas, and in particular, why the median area for 7230 is quite low.

A thorough assessment of all resulting points and polygons was undertaken to ensure no duplication of areas from points and polygons representing the same habitat location.

The total area was then calculated as the sum of the areas. The maximum area was based as the total area across all points and polygons of Habitat Confidence A, B1, B2 and C1. Points and polygons classified as C2 and D were excluded from the area calculations and from the maps, as per Kimberley (2018).

Specific data on loss of habitat area are, for the most part, not available. However, when discussing reclamation as a high-level pressure and threat on all three fen habitat types, Kimberley (2013) notes: “Land reclamation for agricultural and forestry purposes has resulted in significant loss of wetland habitat in Ireland.”) Other pressures are also likely to be causing some habitat loss. Both the Louth and the Waterford County Wetland Surveys report that sites supporting 7230 have been lost - two in Louth and one in Waterford.

Short-term trend direction was estimated as ‘decreasing’. The trend estimate is largely based on expert interpretation of the data sources available since there are no field-validated baseline data with which to compare the present area.

The difference in habitat extent between this reporting period and</td></tr>
</table>

	the last is due to the inclusion of new information relating to sites that were submitted as part of the 2013 report (particularly pertaining to area), together with the integration of new datasets. Further information, including figures and findings from the previous two reporting periods, can be found in Long *et al.* (2018). Although losses of habitat area are considered to have occurred since the Directive came into force, and during the current reporting period, the magnitude of the decline is unknown. The FRA is set as greater than the current area. It is unlikely that >10% of the resource has been lost since 1994. An additional 1-10% of the current area is considered adequate to ensure the long-term viability of the habitat. Overall, the extent (and condition) of alkaline fen within most counties remains unmapped and poorly known. A national fen survey could lead to a reduction or increase in the stated area of the habitat.

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***31.33 km²***
		Maximum	***31.33 km²***
	b) Area in not-good condition	**Minimum**	***93.98 km²***
		Maximum	***93.98 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	*stable / increasing / decreasing /* ***uncertain*** */ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period?* ***YES****/NO*		
6.7 Typical species	The updated list of typical species is as follows.		

Method used *Optional*	Vascular plants: *Anagallis tenella, Briza media, Carex demissa, C. dioica, C. flacca, C. hostiana, C. lasiocarpa, C. lepidocarpa, C. nigra, C. panicea, C. pulicaris, C. rostrata, Chara spp., Eleocharis quinqueflora, Equisetum palustre, Eriophorum latifolium, Galium palustre, Hydrocotyle vulgaris, Juncus articulatus, Juncus bulbosus, Juncus subnodulosus, Linum catharticum, Mentha aquatica, Molinia caerulea, Parnassia palustris, Pedicularis palustris, Pinguicula grandiflora, P. vulgaris, Ranunculus flammula, Schoenus nigricans, Selaginella selaginoides, Succisa pratensis* and *Triglochin palustre.* Bryophytes: *Aneura pinguis, Blindia acuta, Bryum pseudotriquetrum, Calliergon giganteum, Calliergonella cuspidata, Campylium stellatum, Ctenidium molluscum, Fissidens adianthoides, Palustriella commutata, Palustriella falcata, Plagiomnium elatum, Philonotis calcarea, Rhizomnium pseudopunctatum, Sarmentypnum sarmentosum, Scorpidium cossonii, Scorpidium revolvens* and *Scorpidium scorpioides.* High-quality indicator species: *Cinclidium stygium, Dactylorhiza incarnata, D. traunsteineri, Epipactis palustris, Pseudocalliergon lycopodioides, Pseudocalliergon trifarium, Stellaria palustris, Tomentypnum nitens.* Typical species were not specifically assessed in this reporting period. In the absence of a national survey and dataset, this revised list of typical species is based on previous Article 17 reporting for this habitat (Kimberley, 2013 and Foss, 2007a, b, and references cited in these accounts), updated using additional references and expert opinion. Full details on the thorough review of typical species can be found in Long *et al.* (2018), particularly Appendix 3. The review of additional references included scientific papers and books on the classification of fen habitats from Ireland, UK and elsewhere in Europe, and data from Irish national habitat and species surveys (e.g. National Survey of Upland Habitats) and Article 17 reporting from Northern Ireland, Scotland and Wales. Expert opinion included consultation with NPWS, Northern Ireland Environment Agency, Natural Resources Wales, Scottish Natural Heritage and a range of experienced wetland ecologists within Ireland. The amendments to the list from the previous reporting period include changes such as the addition of a number of fen vascular plant indicators (e.g. *Pedicularis palustris*), common fen bryophyte indicator species (e.g. *Philonotis calcarea*) and species considered to characterise particularly high-quality habitat. Nomenclature was updated where relevant to follow Stace (2010) for vascular plants and the bryophyte nomenclature adopted by Lockhart *et al.* (2012) is used; this is based on the Checklist of British and Irish bryophytes (Hill *et al.*, 2009) with minor modifications to reflect recent taxonomic changes.
6.8 Additional information *Optional*	Due to the lack of a comprehensive, targeted survey of alkaline fens in Ireland, detailed information on what constitutes 'good' or 'not-good' condition is not available. Lack of data meant that it was not possible to define 'good' and 'not-good' condition during this project. However, during the detailed review of all existing sources of information, some information relating to habitat condition was

	available. BEC Consultants, as part of the National Survey of Upland Habitats (NSUH), developed criteria for assessing the conservation status of upland examples of alkaline fen (Perrin *et al*., 2014a; p. 87). These focus on the presence or absence of positive indicator species for a suite of vegetation types, as well as the presence of the so-called 'brown mosses'. Also considered is the presence or absence of certain negative indicators, non-native species and trees/scrub. Vegetation and physical structure is also assessed, with measures such as vegetation height, disturbed ground and drainage included. While these are useful, they were designed primarily for upland habitats, and so further survey of lowland alkaline fen is needed to develop more broadly applicable criteria. Assessments were carried out at two alkaline fen sites as part of the NSUH during the current reporting period (Perrin *et al*., 2014b, c). Both were reported to be in good condition. In the Galway City Transport Project (Barron *et al*., 2015), nine points from five sites were assessed, and 78% of these were considered to be in 'not-good' condition due to lack of positive indicator species, high cover of negative indicator species and the presence of non-native species. Both the Louth and the Waterford County Wetland Surveys report that sites supporting 7230 have been lost - two in Louth, one in Waterford, the latter due to forestry (details not available for other sites). Some of the other data sources reviewed provided information on condition, and issues affecting condition, while not explicitly assessing these. In particular, a four-year study on *Vertigo* snails assessed habitats with respect to suitability for the molluscs, and this information has been informative in terms of fen condition and issues affecting it (Long and Brophy, in prep.). There were 27 alkaline fen sites in this dataset, of which 17 were considered to be in 'not-good' condition. The main issues influencing fen condition were deemed to be (only those affecting two or more sites are given here): Succession (11 sites); Drying out (8 sites); Overgrazing by cattle (5 sites); Drainage (4 sites); Scrub clearance (3 sites); Groundwater abstraction (2 sites); Dumping (2 sites); Over grazing (2 sites); Fertilisation (2 sites). On review of all datasets available for the reporting period, with particular reference to those which contained information on habitat condition, it is estimated that 75% of sites/points were deemed to be in 'not-good' condition. As the data are both limited and variable, it is difficult to extrapolate this result to the national level. However, it can be stated with moderate confidence that the structure and

	functions of perhaps up to three-quarters of the national resource of alkaline fen (7230) are impaired. These estimations are used to derive the figures in 6.1.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A06** Abandonment of grassland management (H) **A09** Intensive grazing or overgrazing by livestock (H) **K02** Drainage (H) **K04** Modification of hydrological flow (H) **L02** Natural succession resulting in species composition change (H) **J01** Mixed source pollution to surface and ground waters (M) **K01** Abstraction from groundwater, surface water or mixed water (M) **A26** Agricultural activities generating diffuse pollution to surface or ground waters (M)	**A06** Abandonment of grassland management (H) **A09** Intensive grazing or overgrazing by livestock (H) **K02** Drainage (M) **K04** Modification of hydrological flow (M) **J01** Mixed source pollution to surface and ground waters (M) **K01** Abstraction from groundwater, surface water or mixed water (M) **N02** Droughts and decrease in precipitation due to climate change (M) **N03** Increases or changes in precipitation due to climate change (M)
7.2 Sources of information *Optional*	See sections 3.2 and 7.3	
7.3 Additional information *Optional*	All available data sources (see section 3.2) from within the monitoring period were inspected for information on pressures and threats. Those containing relevant information were carefully checked, and data were collated primarily from the following sources (for all three fen types): Eco-hydrological Investigation of Tory Hill fen SAC (2016); Galway City Transport Project (2014); Kerry Wetland Surveys (2014 and 2015); Kildare Wetland Surveys (2013 and 2014); Louth Wetland Survey (2014); National Survey of Upland Habitats: Caha Mountains SAC (2014); National Survey of Upland Habitats: Slieve Mish Mountains SAC (2014);	

	NPWS data collated on wildfires (2017); *Vertigo* monitoring surveys (2014-2017); Waterford Wetland Survey (2015). Pressures and threats data were available from 36 sites with alkaline fen. The data are limited and detailed information relates only to a relatively small number of sites. However, they reflect a range of different geographic locations; upland and lowland sites; different site ownership and site management; and therefore give a reasonable overview. Pressures and threats were ranked according to their recorded impact level and number of sites or area impacted. Not all data sources listed impact codes or impact level. In these cases the most appropriate impact code was selected and text in the report consulted to assist in assigning impact level. As the data are limited, expert judgement was also used in the selection and ranking of pressures and threats. Fuller information on pressures and threats, and on the ranking process, is available in the backing document which accompanies this report (Long *et al*., 2018). The main pressures (and also threats) facing alkaline fens in Ireland, based on the data available, are abandonment (and consequent succession), overgrazing, drainage and pollution. Climate change is likely to affect this habitat due to warmer temperatures and changes to rainfall and flood events, which may increase drying out and vegetation succession. In 2013, many similar threats were identified, but land reclamation and invasion by non-native species were both deemed to be significant pressures (and threats). The apparent changes since 2013 are most likely due to new information being available and differences between surveys and between surveyors may also account for some of the apparent differences in categories chosen when assigning pressures and threats.

8 Conservation measures

8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* ***a) Measures identified, but none yet taken** or* *b) Measures identified and taken or* *c) Measures needed but cannot be identified*

8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'range') or* *c) Increase the surface area of the habitat type (related to 'area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	None taken
8.6 Additional information *Optional*	Due to the lack of a dedicated fen survey in Ireland, few data exist on conservation measures. However, some data sources which were accessed during this work mention examples of conservation measures, and other examples are known from within the current project team. These are listed below (not limited to alkaline fens), and form the basis of a list which can be considered for further development into the future. Overall, however, there is a lack of dedicated conservation action being implemented for alkaline fens in Ireland. Bord na Móna mention allowing areas of bare peat and open water to recolonise naturally as a conservation measure. Both Coillte and Bord na Móna have designated a number of sites within their land holdings as being important for biodiversity, and this includes some areas of fen. Drain blocking and other attempts at restoring favourable hydrological regimes at and near areas of fen is a conservation measure which they have undertaken at some sites, though often not directly relating to fen habitat. Some sites have had boardwalks installed to help encourage members of the public to engage with the area (and thus potentially to get involved in its conservation), and also to manage public use of the sites. Signage at sites also has a similar function. Examples (not limited to alkaline fens) include Pollardstown Fen in Co. Kildare, BirdWatch East Coast Nature Reserve in Co. Wicklow, Abbeyleix Bog in Co. Laois and Fenor Bog in Co. Waterford. In order to better understand fen hydrology, a number of

	hydrometric studies are currently taking place (e.g. at Tory Hill in Co. Limerick, Scragh Bog in Co. Westmeath and at Pollardstown Fen, Co. Kildare) – again, not limited to alkaline fens. Water level management takes place at a small number of sites (e.g. BirdWatch East Coast Nature Reserve in Co. Wicklow and Fenor Bog in Co. Waterford), but there are usually a number of conservation and other aims, not just the conservation of Annex I fen habitats, and rigorous scientific assessment of impacts of measures is generally not carried out. The Raised Bog LIFE project which is actively working to restore areas of raised bog, and at whose sites there are examples of Annex I fen habitats, has noted that they are not actively applying conservation measures to areas of fen. Rather, they are aiming to ensure that any measures they might apply to support raised bog functioning do not negatively impact on the adjacent fen. Removal of non-native trees and planting of natives is known to be taking place at one site with conservation as the aim (Fenor Bog, Co. Waterford). Non-intensive grazing by cattle and horses was mentioned as a management measure at a number of sites. These grazing measures are mainly passive, involve maintaining the management practices currently in place that benefit the habitat, and generally have an impact deemed to be neutral. Cattle have been introduced to graze on a small area of NPWS-owned alkaline fen at Pollardstown, with a view to keeping the habitat open, in good condition, and suitable for *Vertigo geyeri*. Conservation grazing by ponies at a fen site owned by BirdWatch Ireland has been taking place for a number of years. There have been issues with getting the grazing level right at this site. It should be noted that the management regimes of most fen sites in Ireland are driven by the landowner rather than by any formal management plan or policy; therefore the continued operation of the management regimes currently in place is not guaranteed. Note that there are likely to be other examples of conservation measures being taken for alkaline fens in Ireland – this list is not conclusive and should be added to in future years. In Ireland, drainage of large sites is controlled by EIA agricultural regulations (S.I. No. 456/2011 – European Communities (Environmental Impact Assessment) (Agriculture) Regulations 2011). Many fen sites are smaller than the threshold value of 15ha but often the wetland systems associated with them are large enough to bring the wetlands as a whole above the threshold. Also worth noting is that under the Planning and Development Regulations (2001-2011) planning permission is required for the drainage or reclamation of wetlands in excess of 0.1ha (or below that if having a significant effect on the environment). It should be noted that these are policy instruments rather than conservation measures, but they should confer a degree of protection to fen sites. Based on the list of threats identified for alkaline fens in Ireland (see section 7.1), below are listed the associated suite of potential conservation measures. Passive measures such as maintaining grazing are excluded. There is little information available currently

	on the extent to which measures such as these are taking place in Ireland, but it is suggested that future fen studies and assessments should aim to systematically review and identify suitable conservation measures. This list should not be taken as exhaustive, but should be considered as part of a thorough and systematic review of suitable measures. CA04 Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures; CA05 Adapt mowing, grazing and other equivalent agricultural activities; CA06 Stop mowing, grazing and other equivalent agricultural activities; CA11 Reduce diffuse pollution to surface or ground waters from agricultural activities; CJ01 Reduce impact of mixed source pollution; CJ02 Reduce impact of multi-purpose hydrological changes; CJ03 Restore habitats impacted by multi-purpose hydrological changes; CL01 Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes. Conservation measures are needed for alkaline fen sites due to the fact that it is estimated that approximately three-quarters of sites in Ireland may be in 'not-good' condition. There are a large number of pressures acting on these sites, and a number of threats which are likely to act on the sites in the future (see section 7). To counteract the potential negative effects, conservation measures are needed. Few data are available on conservation measures currently underway, and less still on their effectiveness. Re-wetting and natural recolonisation are measures that are both likely to have been implemented at some Coillte, Bord na Móna and Raised Bog LIFE sites. However these are likely to be small in scale (as they are mostly aimed at bog, not fen), and dedicated surveys are needed to assess their effectiveness at improving the conservation status of alkaline fens. Hydrological studies like that at Tory Hill will help scientists and decision-makers better understand fen hydrology, but will not in themselves help to improve conservation status. Signage and boardwalks help to involve local communities, and also to protect sites from damage, but again are not measures which usually help to improve the conservation status of alkaline fens. Most areas of alkaline fen in Ireland are likely to be in private ownership. There is therefore a need for a broad-reaching education programme for landowners and other relevant bodies (NPWS, Teagasc, IFA, Coillte, Bord na Móna, etc.) as to what measures are needed. In summary, an evidence-based programme of conservation measures is urgently needed for alkaline fens in Ireland, and should follow quickly from a national survey of this habitat type.

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	*Good /* ***Poor*** */ Bad / Unknown*
	c) Structure and functions	*Good / Poor /* ***Bad*** */ Unknown*
9.2 Additional information *Optional*	The Future prospects for the Range of the habitat have been assessed as good. A number of pressures and threats have been identified, and there is a lack of conservation measures in place to counteract these. However, given the wide range for this habitat, based on multiple sites, it is likely to be more than 12 years before these pressures and threats might start taking a toll on the range of the habitat. The Future prospects for Area of the habitat are assessed as poor. This is based on the fact that we assume that losses have occurred since the Directive came into force and there are no measures currently in place to restore these areas. There is no evidence to suggest that there will be further losses in the next 12 years. The future projection of the conservation status of Area remains poor because of its current status. The Future prospects for the Structure and functions of alkaline fen habitats in Ireland are assessed as bad. This is based on the assessment result in 2013, and the fact that little has happened in the interim in terms of putting in place conservation measures (either broadscale or site-specific) to counteract pressures and threats that have been identified as acting on the habitat. Thus, overall, the Future prospects for alkaline fen in Ireland have been assessed as Bad given that a significant proportion of the habitat is damaged (deemed to be >25% in a review in 2013, and based on expert judgement and a review of interim studies, it is thought to have increased), coupled with the fact that there are few to no conservation measures in place.	

10 Conclusions	
Assessment of conservation status at end of reporting period	
10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.2 Area	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*
10.4 Future prospects	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*
10.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving /* ***deteriorating*** */ stable / unknown*

<table>
<tr><td rowspan="8">10.7 Change and reasons for change in conservation status and conservation status trend</td><td colspan="3">Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.</td></tr>
<tr><td></td><td>Overall assessment of conservation status (10.5)</td><td>Overall trend in conservation status (10.6)</td></tr>
<tr><td>a) no, there is no difference</td><td>YES/<u>NO</u></td><td><u>YES</u>/NO</td></tr>
<tr><td>b) yes, due to genuine change</td><td>YES/NO</td><td>YES/<u>NO</u></td></tr>
<tr><td>c) yes, due to improved knowledge/more accurate</td><td>YES/NO</td><td>YES/<u>NO</u></td></tr>
<tr><td>d) yes, due to the use of different methods (including use of different thresholds)</td><td>YES/NO</td><td>YES/<u>NO</u></td></tr>
<tr><td>e) yes, but there is no information on nature of change</td><td>YES/NO</td><td><u>YES</u>/NO</td></tr>
<tr><td>The change is mainly due to (select one of the reasons above):</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td></tr>
<tr><td>10.8 Additional information

Optional</td><td colspan="3">Range: While there may have been some losses of both habitat area and habitat quality within the reporting period, these are unlikely to be large, and as this is a relatively widespread habitat, the range is unlikely to have been affected by such losses/decreases in quality since the Directive came into force. Thus Range was assessed as Favourable.

Area: There have been some losses of habitat area within the reporting period, and these are likely to continue, particularly in light of a lack of effective conservation measures. Thus the area of the habitat will probably continue to decrease, even if losses are relatively small, but there are no field-validated baseline data currently available to quantify this. Area was assessed as Inadequate.

Structure and functions: This parameter was assessed as Bad in the 2013 reporting period, and while there is still a lack of concrete data from, for example, a national fen survey, expert knowledge suggests that this is still the case. Information, though variable in nature, was gleaned from surveys produced within the last reporting period which support this view, and thus this parameter was again assessed as Bad.

Future prospects: Based on the Future prospects assessments in section 9 (Range = good; Area = poor; Structure and functions = bad), the overall assessment of Future prospects for alkaline fen is Bad.</td></tr>
</table>

	Overall: Based on the results above, a combined overall Conservation Status of Bad applies. Overall trend direction: Based on the fact that one assessment parameter has a trend of stable (Range), one uncertain (Structure and functions), and one decreasing (Area), the overall trend for the habitat, if strictly following the guidance, should be 'unknown'. However, it is felt that, based on both the data available and expert judgement, the losses of both area and quality that are likely to have occurred, as well as the pressures and threats faced, are sufficient for an assessment of deteriorating to be applied. Expert judgement and experience have been used to inform the decisions made on the above at all stages, and available data, while often piecemeal and collected for a variety of purposes (i.e. not with fen conservation assessments as a focus), have been used at every opportunity to inform decision-making.

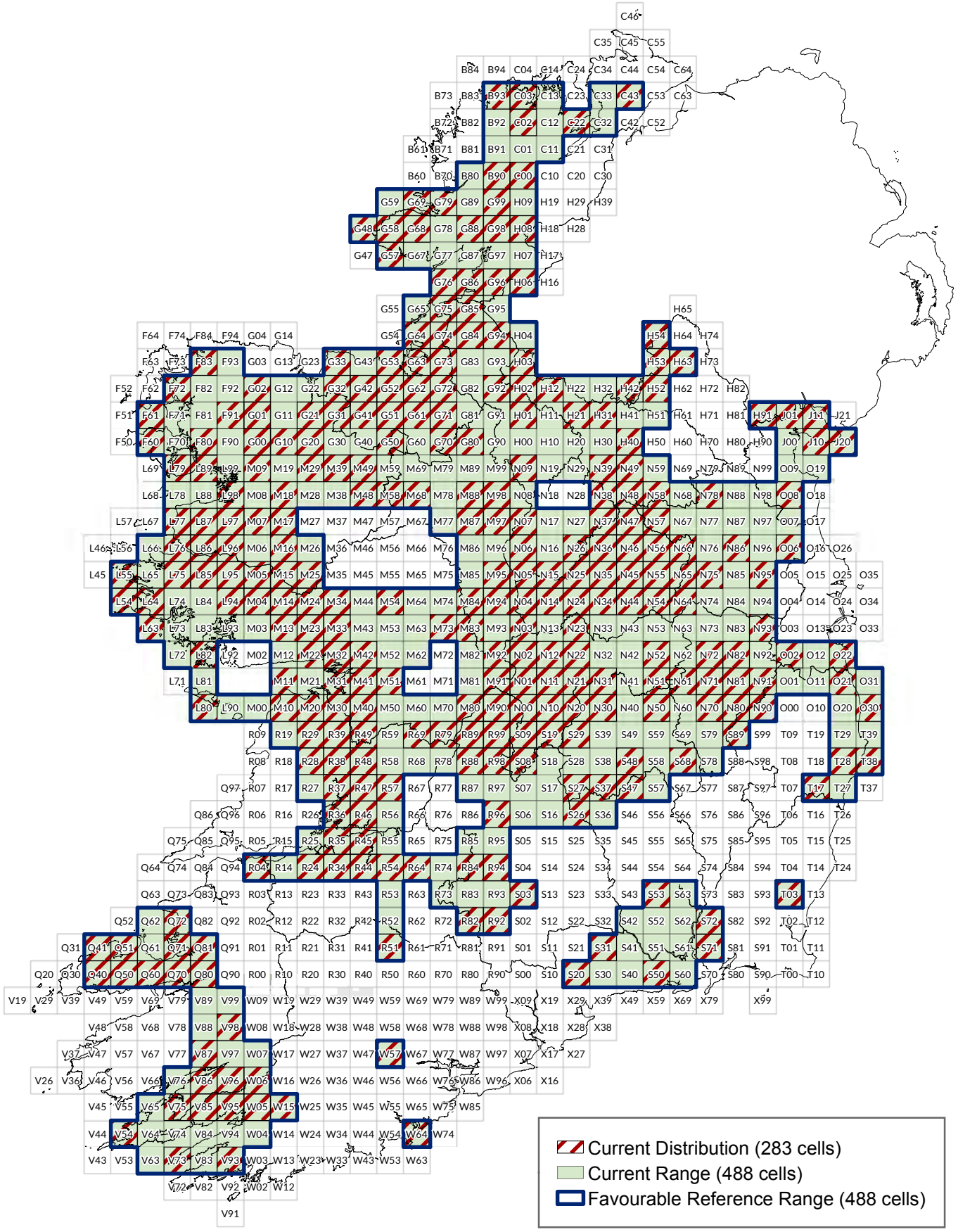
11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***64.83 km²***
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* *stable / increasing / decreasing /* ***uncertain****/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network was estimated by performing a union between the polygon distribution shapefile and the SAC shapefile, and a spatial join between the point distribution shapefile and the SAC shapefile. Any sites represented by points that were found to sit within the boundaries of the SAC were assumed to be wholly located within the SAC and an area was assigned to these points as described in section 5.15.	

	The area given in section 11.1 is the total area of 7230 habitat in SACs in the country, including some SACs where 7230 is not listed as a qualifying interest (QI). The area of 7230 within the Natura 2000 (SAC) network where it is listed as a QI is 34.98 km^2, and this is from across 38 SACs. This compares with 33.11 km^2 in 2013. Better quality and more data are the reasons for the increased figure, rather than an expansion of the habitat or a change in designations. The trend was assigned as 'uncertain' due to lack of detailed data.

12 Complementary information

Alkaline fens (7230)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Habitat code / name	**8110 Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*)**
1.2i Habitat short name	**Siliceous scree**
1.3i Habitat description	Guidance on interpretation of habitat 8110 Siliceous scree in an Irish upland context is provided by Perrin *et al*. (2014a). It consists of accumulations of siliceous rock fragments on slopes below upland cliffs or on exposed / frost-shattered mountain summits or ridges. Whilst there is no strict lower altitudinal threshold, this habitat is interpreted as referring to examples of scree occurring in a broadly upland landscape context. Rock sizes may vary from large blocks (also known as talus) that can be very stable to smaller fragments that may be highly mobile. Areas of loose rock on summits or plateaux exposed by erosion of peat and areas akin to fell-field are not included in habitat 8110 nor are screes beneath a vegetation cover that indicates other habitats (e.g. dry heath or scrub). Whilst the presence of arctic-alpine species on siliceous scree indicates high-quality examples of 8110, they are not deemed an essential requisite. Siliceous scree vegetation can be very sparse and consist chiefly of bryophyte and lichen assemblages, though calcifuge ferns (e.g. *Dryopteris dilatata* and *Hymenophyllum wilsonii)* and the saxifrage species *Saxifraga spathularis* are typically present. The habitat may support species belonging to the *Androsacion alpinae* association and the scree communities *Racomitrium fasciculare-Festuca vivipara* (RH2B) and *Racomitrium lanuginosum-Hypnum jutlandicum* (RH2C) of Perrin (2017). Siliceous scree supports several species of high conservation value including legally protected (Flora (Protection) Order 2015) and Red-listed bryophytes (Lockhart *et al.* 2012)), particularly species of the 'mixed northern hepatic mat' community including *Adelanthus lindenbergianus,* which are also considered rare or threatened on a European scale (Hodd *et al.* 2014). This sensitive community is reported by Long (2010) to be sheltered not only by *Calluna* heaths but also by scree habitat.

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***1975-2016***
2.2 Distribution map	Submitted

2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was derived from a polygon shapefile and a point shapefile. These shapefiles were created by compiling relevant data which referred to habitat 8110 or Fossitt code ER3 (Fossitt 2000) or a relevant NPWS habitat code in their attributes. Sources include Coillte Biodiversity Dataset (various dates), Foss *et al.* (2014, 2015), Hodd (2007, 2015a, 2015b), Clubmoss Monitoring Survey (O'Neill et al., in prep.), Perrin (2017), Perrin *et al.* (2014b, 2014c) and Tubridy *et al.* (2015). In addition to these, sources utilised for the distribution map from the last reporting period (NPWS 2013a) were also included: 13 National Survey of Upland Habitats (NSUH) sites (Perrin *et al.* 2011, 2012, 2013a-e; Roche *et al.* 2009, 2010a, 2010b, 2011a, 2011b, 2012), Barron & Perrin (2010, 2011), Connemara and Glenveagh National Park Habitat Maps, DTM data analysis (NPWS 2007) and aerial photograph interpretation based on pers. comm. with C. Douglas (NPWS), NPWS (2013b) and the NPWS Habitat Assignment Project (original survey work for the Habitat Assignment Project commenced in 1975). All references are detailed below in Section 3.2. A certainty rating system was applied to all data that informed the distribution map. This system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1 the lowest. The new data sources added since the last round of reporting (NPWS 2013a) – Foss *et al.* (2014, 2015), Hodd (2007, 2015a, 2015b), Clubmoss Monitoring Survey (O'Neill *et al*., in prep.), Perrin *et al.* (2014b, 2014c) and Tubridy *et al.* (2015) – were all judged to be a high certainty of 3. The majority of points from Perrin (2017) were also assigned a certainty of 3 (Annex I habitat recorded), while two points were assigned a certainty of 2 (no habitat data included, only affinity to the 8110 habitat) and a final point assigned a certainty of 1 (higher affinity to another Annex I habitat over habitat 8110). The Coillte Biodiversity Dataset polygons were assigned a certainty of 2 for those which were ground-truthed and a certainty of 1 for those where 8110 was not listed as present under the Annex I habitats section in the shapefile but 8110 was listed as present within the biomanagement plans. Certainty 3s were not assigned to the Coillte Biodiversity Dataset due to the age of the data (surveyed in early 2000s). Certainty values from the datasets utilised during the last reporting period were not reassigned for the purposes of the distribution map as the classes within the certainty rating system are fairly broad, and the 8110 habitat itself is relatively stable. All polygons and points with certainty 1 to 3 were used to map the distribution for the 8110 habitat.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Aerial photograph interpretation and pers. comm. C. Douglas (NPWS). For the previous reporting period (NPWS 2013a) a number of points were added for the Inishowen and Fanad peninsulas in Donegal and Mount Leinster. These points were carried through for this reporting period. Barron, S. & Perrin, P. (2010) Review and amendment of GIS mapping for blanket bog NHAs. Unpublished report to National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Barron, S. & Perrin, P. (2011) Production of a habitat map for Killarney National Park, Co. Kerry. Unpublished report to National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Coillte Biodiversity Dataset. GIS files and individual site management plans were made available by Coillte. Datasets used were from 2002 to 2004. Connemara National Park Habitat Map is an NPWS map based on aerial photographic interpretation and field visits conducted by G. Kaule from the University of Stuttgart in 2008. EPA (2017) A Summary of the State of Knowledge on Climate Change Impacts for Ireland: Report 11 (2010-2016). Prepared for the Environmental Protection Agency by MaREI Centre, Environmental Research Institute, University College Cork. M. Desmond, P. O'Brien and F. McGovern. EPA, Wexford. https://www.epa.ie/researchandeducation/research/researchpublications/researchreports/EPA%20RR%20223_web.pdf Flora (Protection) Order (2015) Statutory Instrument No. 356 of 2015. Dublin: Stationery Office. Foss, P.J., Crushell, P., Kirwan, B., O'Loughlin, B. & Wilson, F. (2014) Louth Wetland Survey III. Part 1: Main Report. Report prepared for Louth County Council and The Heritage Council. Foss, P.J., Crushell, P. & Kirwan, B. (2015) County Waterford Wetland Survey. Part 1: Main Report. Report prepared for Waterford City & County Council. Fossitt, J.A. (2000) *A guide to habitats in Ireland*. The Heritage Council, Kilkenny. https://www.npws.ie/sites/default/files/publications/pdf/A%20Guide%20to%20Habitats%20in%20Ireland%20-%20Fossitt.pdf Glenveagh National Park Habitat Map is an NPWS map produced in 2010 based on the NHA survey data collected between 1991 and 1994. The map is derived from the best information available at the time, site visits and aerial photograph interpretation. Habitat Assignment Project. An NPWS spreadsheet noting the

qualifying interest of SACs and other habitats which occur in SACs, NHAs and pNHAs. This table was used as a reference for incorporating polygon data for SACs, NHAs and pNHAs.

Hodd, R.L. (2007) The Vegetation and Ecology of the Scree Slopes of the Macgillycuddy's Reeks, Co. Kerry. BSc. Thesis, Department of Botany, NUI Galway.

Hodd, R.L. (2015a) Survey of Flora Protection Order Bryophytes 2015. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.

Hodd, R.L. (2015b) Survey of Flora Protection Order Bryophytes in Cork and Kerry (H1-H5). Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.

Hodd, R.L., Bourke, D. & Skeffington, M.S. (2014) Projected Range Contractions of European Protected Oceanic Montane Plant Communities: Focus on Climate Change Impacts Is Essential for Their Future Conservation. *PLoS ONE* 9(4): e95147. doi:10.1371/journal.pone.0095147. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0095147

JNCC (2009) Common Standards Monitoring Guidance for Upland Habitats. Joint Nature Conservation Committee, Peterborough.

Lockhart, N, Hodgetts, N. & Holyoak, D. (2012) Ireland Red List No. 8: Bryophytes. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/content/publications/ireland-red-list-no8-bryophytes

Long, D. (2010) The tragedy of the Twelve Bens of Connemara: is there a future for *Adelanthus lindenbergianus*? *Field Bryology* 100: 2-8. http://rbg-web2.rbge.org.uk/bbs/Activities/field%20bryology/FB100/FB100%20Long.pdf

NPWS (2007) The status of EU protected species and habitats in Ireland, Volume 3. Unpublished Report, National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. DTM data. For the 2001-2006 reporting period (NPWS 2007), analysis of a DTM was used to produce a polygon shapefile identifying areas above 350 m in altitude with a north or northeast aspect and over 40° in slope. These polygons identify areas of 8220 Siliceous rocky slopes rather than 8110 habitat, but it is logical to assume that there is a good chance of scree occurring in association with these areas. Points representing the centroids of these polygons were therefore added to the 8110 habitat point shapefile in 2012 (NPWS 2013a) and were carried through for this reporting period.

NPWS (2013a) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin. https://www.npws.ie/sites/default/files/publications/pdf/Article_17_Print_Vol_2_report_habitats_v1_1_0.pdf

NPWS (2013b) Management Planning Support Unit Maps

2405_imap95 (CPU_Habitats_March_2012.shp)

NPWS_Approx_Wildfire_Locations_Polygon_2017.shp. An NPWS derived shapefile based on data received from NPWS field staff on wildfires which occurred in Spring 2017.

O'Neill, F.H., Long, M.P. & Hodd, R.L. (2018) Monitoring of the Annex V Clubmoss group (*Lycopodium* spp.) in Ireland 2015-2018. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland.

Perrin, P. (2017) Irish Vegetation Classification: Technical Progress Report No. 3. Report submitted to National Biodiversity Data Centre. http://www.biodiversityireland.ie/projects/national-vegetation-database/irish-vegetation-classification/explore/

Perrin, P.M., Roche, J.R. & Barron, S.J. (2011) National Survey of Upland Habitats (Phase 1, 2010 - 2012) Site Report No 1: Mweelrea, Sheeffry, Erriff Complex cSAC (001932), Co. Mayo. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH10_Mweelrea_Sheeffry_Erriff_Report_01c_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J. & Daly, O.H. (2012) National Survey of Upland Habitats (Phase 2, 2011-2012), Site Report No. 7: Mount Brandon cSAC (000375), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH11_Mount_Brandon_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013a). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 10: Ox Mountains Bogs cSAC (002006), Cos. Mayo and Sligo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Ox_Mountains_Bogs_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013b). National Survey of Upland Habitats (Phase 3, 2012-2013), Draft Site Report No. 11: Ben Bulben, Gleniff and Glenade Complex cSAC (000623), Co. Sligo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013c). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 12: Arroo Mountain cSAC (001403), Co. Leitrim. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Arroo_Mountain_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013d). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 13: Cuilcagh – Anierin Uplands cSAC (000584), Cos. Cavan and Leitrim. National Parks

and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Cuilcagh_Anierin_Uplands_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013e). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 14: Slieve League cSAC (000189), Co. Donegal. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Slieve_League_Report_01b_M.pdf

Perrin, P.M., Barron, S.J., Roche, J.R. & O'Hanrahan, B. (2014a) Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland. Version 2.0. *Irish Wildlife Manuals*, No. 79. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/IWM79.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014b). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 15: Slieve Mish Mountains cSAC (002185), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH13_Slieve_Mish_Mountains_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014c). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 16: Caha Mountains cSAC (000093), Cos. Cork and Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH13_Caha_Mountains_01b_M.pdf

Roche, J.R., Perrin, P.M. & Barron, S.J. (2009) National Survey of Upland Habitats (Pilot Survey Phase, 2009-2010), Site Report No. 2: Corraun Plateau cSAC (000485), Co. Mayo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/SPEU09_Corraun_Plateau_Report_01b_M.pdf

Roche, J.R., Perrin, P.M. & Barron, S.J. (2010a) National Survey of Upland Habitats (Pilot Survey Phase, 2009-2010), Site Report No. 3: Comeragh Mountains cSAC (001952), Co. Waterford. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/SPEU09_Comeragh_Mountains_Report_01b_M.pdf

Roche, J.R., Perrin, P.M. & Barron, S.J. (2010b) National Survey of Upland Habitats (Pilot Survey Phase, 2009-2010), Site Report No. 4: Carlingford Mountain cSAC (000453), Co. Louth. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland.

	https://www.npws.ie/sites/default/files/publications/pdf/SPEU09_Carlingford_Mountain_Report_01b_M.pdf Roche, J.R., Perrin, P.M. & Barron, S.J. (2011a) National Survey of Upland Habitats (Phase 1, 2010 - 2012), Site Report No. 6: Croaghaun / Slievemore cSAC (001955), Co. Mayo. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH10_Croaghaun_Slievemore_Report_01b_M.pdf Roche, J.R., Perrin, P.M. & Barron, S.J. (2011b) National Survey of Upland Habitats (Phase 1, 2010 - 2012), Draft Site Report No. 5: Nephin Mountain, Co. Mayo. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland. Roche, J.R., Perrin, P.M., Barron, S.J. & Daly, O.H. (2012) National Survey of Upland Habitats (Phase 2, 2011-2012), Site Report No. 9: Galtee Mountains cSAC (000646), Cos. Tipperary and Limerick. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH11_Galtee_Mountains_Report_01b_M.pdf Tubridy, M., Iremonger, S., Hickey, B. & O'Hanrahan, B. (2015) Blackstairs Habitat Mapping and Biodiversity Audit 2015. Report for the Blackstairs Farming Group. Wyse Jackson, P.S. (2007) The potential impact of climate change on native plant diversity in Ireland. https://www.bgci.org/resources/article/0571/ (accessed 03/05/2018).
3.2i Additional information	

4 Range

Range within the biogeographical/marine region concerned

4.1 Surface area	***15,600 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 15,600 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable Reference Range has been increased since the last reporting period (NPWS 2013a) to reflect the improved level of knowledge. There is no evidence of loss of range since the Directive came into force and the geographic spread is considered sufficient for the long-term survival of the habitat.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 8110 habitat. A maximum gap distance of two 10km grid cells was used when running the range tool. Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS 2013a). There were no recorded losses of area at the sample sites covered by the NSUH during these two reporting periods. The short-term trend assessed over the period 2007-2016 is stable and this is assumed to be valid over the default period of 2007-2018. Similarly the long-term	

	trend, assessed as stable over the period 1994-2016, is assumed to be also valid over the default long-term trend 1994-2018. It should be noted that the NSUH surveyed two 8110 habitat sites within this reporting period compared with 13 sites in the last reporting period, therefore limiting the conclusions that can be made. The number of 10km squares in the Range (156) is eight squares higher than the last monitoring period (NPWS 2013a). These changes are due to improved knowledge within the current reporting period. The Blackstairs Mountains (Tubridy *et al.* 2015) (one square), Cushbawn, Wicklow (Coillte Biodiversity Dataset) (one square), Knockmealdown Mountains (Foss *et al.* 2015) (five squares) and Caha Mountains SAC (000093) (Perrin *et al.* 2014c) (one square), all with data utilised from surveys in this reporting period, added to the range. Favourable Reference Range has been increased since the last reporting period (NPWS 2013a) to reflect the improved level of knowledge. The Favourable Reference Range is the current range, reported in Section 4.1.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***1975-2016***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***15.50 km^2***
5.3 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007-2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994-2018***	
5.10 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator ≈ (approximately equal to) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 1975 when original survey work for the Habitat Assignment Project commenced and incorporates updates made by surveys between 1998 and 2016 that are listed in Section 3.2. Area was calculated from the polygon shapefile and point shapefile used for distribution. For each point record not intersecting within a	

	polygon that was yielding an area, 400 m^2 of habitat was estimated. This was based on expert opinion applied in the previous reporting period and carried over to this reporting period in order to maintain consistency. Points intersecting within site boundaries of surveys carried out within the current reporting period, but not within 8110 habitat polygons, were examined, with the majority not included for area. During the current reporting period 14 datasets with 8110 habitat recorded within them were utilised; Area was only fully assessed by the NSUH datasets (Perrin *et al.* 2014b, 2014c). The two NSUH sites (Caha Mountains SAC (000093) and Slieve Mish Mountains SAC (002185)) represent 6.7% of the total area of 8110 habitat recorded in Ireland, limiting the conclusions that can be made. More detailed survey work of the 8110 habitat is needed, and it is expected that the area listed in Section 5.2 will be refined as more in-depth mapping of the 8110 habitat is completed. In particular, any area represented within the dataset by only a point needs to be surveyed in more detail. In addition to refining the areas of 8110 habitat currently known, there are probably still areas of unmapped 8110 habitat within the country. The area value entered is therefore a minimum. Short-term trend in Area was deemed to be stable. At the sample of sites covered by the NSUH there is no evidence of loss of habitat since 2005. The trend was examined over the period 2005-2014 but is assumed to be the same for the default short-term trend period of 2007-2018. Long-term trend was examined over the period 1995-2014 but is assumed to be the same for the default long-term trend period of 1994-2018. Favourable Reference Area (FRA) is deemed to be approximately equal to the current area. There is no information showing that an enlarged area is necessary for either typical species to reach favourable conservation status or for the necessary structures and functions to exist, therefore the surface area of the habitat when the Directive came into force in 1994 is taken to be the FRA. Whilst this figure is unknown it is deemed to be approximately equal to the current area as there is no evidence of significant declines since this time. The difference in habitat extent between this reporting period and the last is due to the availability of more accurate knowledge of the area of habitat 8110, resulting in the refinement of some large area estimates based on CPU and DTM analysis data in the last reporting period. The majority of this refinement occurred in the Slieve Mish Mountains SAC (002185), County Kerry, with smaller area refinements in the Caha Mountains SAC (000093), Counties Cork and Kerry, and Carlingford Mountain, County Louth. Collectively there was a nett decrease in reported 8110 habitat of 7.19km^2 between the previous reporting period and this reporting period due to the availability of more accurate data. Additional surveys in this reporting period resulted in a further addition of 2.36 km^2 8110 habitat which was previously unmapped. There has been no genuine change in area of 8110 habitat ((20.33-7.19) + 2.36 = 15.50 km^2).

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***11.30 km²***
		Maximum	***15.50 km²***
	b) Area in not-good condition	**Minimum**	***0 km²***
		Maximum	***4.20 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***		
6.7 Typical species Method used *Optional*	The list of typical species is the same as the last reporting period (NPWS 2013a). Typical species were assessed as an assemblage at the monitoring stop level within sites surveyed by the NSUH. At each block scree monitoring stop, at least one typical species was required to be present. As this was a baseline survey, trends for the assemblage and for individual species were not assessed. Typical species were not assessed for small clast size scree.		
6.8 Additional information *Optional*	The NSUH (Perrin *et al.* 2014a) assesses Structure and functions at a monitoring stop level, using criteria to assess vegetation composition (including typical species), vegetation structure and physical structure. Criteria were adapted from the UK's Common Standards Monitoring (JNCC 2009) using expert judgement. The NSUH primarily assesses SACs and is currently incomplete. A total of eight monitoring stops were recorded across both NSUH sites surveyed within this reporting period. There were no failures of any criteria. For full details see the NSUH site reports (Perrin *et al.* 2014b, 2014c). Three relevés recorded in 8110 habitat as part of the Clubmoss Monitoring Survey (O'Neill *et al.*, in prep.) were also utilised to assess		

	the Structure and functions. These relevés lack details pertaining to criteria that assess vegetation composition and structure, and physical structure, within the local vicinity of stops, and therefore represent a "best case" situation in these areas for Structure and functions of 8110 habitat. There were no failures of any criteria assessed using the data from the Clubmoss Monitoring Survey (O'Neill *et al.*, in prep.). Of the sites assessed (area of approximately 1.04 km^2) for Structure and functions in this reporting period, 100% of the area was assessed as being in good condition (Favourable). Equal weighting was given to each of the stops as each one assesses a comparable area of habitat. For the relevés from the Clubmoss Monitoring Survey (O'Neill *et al.*, in prep.) however, only the actual footprint of the relevé (1 m^2) could be used as no data from the local vicinity were recorded. The proportion in good (100%) and not-good condition (0%) was scaled up to the national estimate (15.50 km^2 in good condition and 0 km^2 not in good condition); however as the area assessed for Structure and functions in this reporting period only represents 6.7% of the national area of habitat 8110, data from the last reporting period were also utilised. During the last reporting period 72.92% of the 8110 habitat was assessed as Favourable (NPWS 2013a). This equates to 11.30 km^2 of the current area of 8110 habitat and this figure is used as the minimum area in good condition. 27.08% of the 8110 habitat was assessed as Unfavourable (NPWS 2013a). This equates to 4.20 km^2 of the current area of 8110 habitat and this figure is used as the maximum area that is in not-good condition. The most frequent criteria to fail the Structure and functions assessment in the last reporting period were 'cover of bryophyte species and non-crustose lichens', 'proportion of vegetation composed of non-native species', 'number of positive indicator species' and 'cover of grass species and dwarf shrubs' (NPWS 2013a). One relevé recorded in this reporting period (Clubmoss Monitoring Survey (O'Neill *et al.*, in prep.) had more than 20% cover of grass species and dwarf shrubs, however as this criterion should be assessed at the scale of the local vicinity rather than the relevé, it was passed on expert judgement. The short-term trend of habitat area in good condition was assessed over the period 2007-2016 but the trend was assumed to be the same for the default period of 2007-2018. The trend was taken to be stable as, based on the data recorded during this reporting period, there is no evidence that status has declined since the last reporting period. In fact, based on limited data, conclusions could be made that the status has improved; however, as this is based mainly on data from one part of the country (southwest Ireland: Cork and Kerry) with a poor national sample size, the trend was taken as stable based on expert opinion. Typical indicator species for the 8110 habitat are: *Asplenium adiantum-nigrum, Athyrium filix-femina, Blechnum spicant, Dryopteris* spp. (count separately), *Hymenophyllum tunbridgense, Hymenophyllum wilsonii, Saxifraga spathularis* and *Sedum rosea*.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A09** Intensive grazing or overgrazing by livestock (M) **A10** Extensive grazing or undergrazing by livestock (M) **L02** Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices) (M)	**A09** Intensive grazing or overgrazing by livestock (M) **A10** Extensive grazing or undergrazing by livestock (M) **L02** Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices) (M)

7.2 Sources of information

Optional

Pressures were sourced from the following reports and accompanying data:

Hodd, R.L. (2015a) Survey of Flora Protection Order Bryophytes 2015. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.

Hodd, R.L. (2015b) Survey of Flora Protection Order Bryophytes in Cork and Kerry (H1-H5). Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.

Long, D. (2010) The tragedy of the Twelve Bens of Connemara: is there a future for *Adelanthus lindenbergianus*? *Field Bryology* 100: 2-8. http://rbg-web2.rbge.org.uk/bbs/Activities/field%20bryology/FB100/FB100%20Long.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014b). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 15: Slieve Mish Mountains cSAC (002185), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014c). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 16: Caha Mountains cSAC (000093), Cos. Cork and Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

NPWS (2013a) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin.

NPWS_Approx_Wildfire_Locations_Polygon_2017.shp

O'Neill, F.H., Long, M.P. & Hodd, R.L. (2018) Monitoring of the Annex V Clubmoss group (*Lycopodium* spp.) in Ireland 2015-2018. *Irish*

	Wildlife Manuals, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland.
7.3 Additional information *Optional*	Pressures and threats presented in 7.1 were selected and ranked based on intensity (high, medium, low), frequency of occurrence, and area of impact where data were available. Data gathered from the sources listed in Section 7.2 are summarised in the backing document '1601_NSUH17_IMPACTS'. For the current reporting period, data on pressures were available for two NSUH sites – Slieve Mish Mountains SAC (002185) and Caha Mountains SAC (000093) (Perrin *et al.* 2014b, 2014c). Data from a shapefile on locations of wildfires, which was provided by NPWS, were also utilised, with relevant data for 8110 habitat located at Kilgarrylander within the Slieve Mish Mountains. Additional data from Hodd (2015a, 2015b) and Clubmoss Monitoring Survey (O'Neill *et al*., in prep.) were also used. As the data from the current reporting period only represent a small proportion of the data collected to inform NPWS (2013a), the pressures and threats information presented in NPWS (2013a) were called upon to inform the current reporting period. In the previous reporting period sheep grazing in the uplands, both undergrazing and overgrazing, was recorded under 'A04.02.02 non-intensive sheep-grazing'. It was recorded as a medium-importance pressure and threat for the 8110 habitat (NPWS 2013a). Using the crosswalk referenced in the backing document '1601_NSUH17_IMPACTS' to convert old impact codes to the new impact recording scheme, A04.02.02 crosswalks to A10 (Extensive grazing or undergrazing by livestock) in the new scheme. However at times the recorded impact should be considered under A09 (Intensive grazing or overgrazing by livestock). Both A10 and A09 have therefore been retained as medium-importance pressures and threats. A10 (Extensive grazing or undergrazing by livestock) was recorded four times during the current reporting period, all as a neutral impact. A10 (undergrazing) has wide implications for the 8110 habitat in terms of scrub/heath (L02) and bracken (I04) encroachment, with dense bracken recorded in the Caha Mountains SAC (000093) as a high-intensity negative impact (Perrin *et al.* 2014c) in this reporting period and L02 recorded as a medium-importance pressure in the previous reporting period. Although A10 was recorded as a neutral impact during the current reporting period it has been retained as a medium-importance pressure and threat based on evidence from the previous reporting period and expert judgement. A09 (Intensive grazing or overgrazing by livestock) was recorded at six sites by Hodd (2015a, 2015b), with either medium or high intensity in this reporting period. Overgrazing can lead to erosion (L01, recorded as a high-intensity negative impact during this reporting period (Clubmoss Monitoring Survey (O'Neill *et al*., in prep.)), damage to the vegetation of the 8110 habitat and can also result in nitrogen enrichment of the soil. Nitrogen is highly toxic to many bryophyte species and scree habitats support important bryophyte communities (e.g. leafy liverwort communities of the so-called northern hepatic mat vegetation) (Long 2010). The degree of

	threat of nitrogen enrichment should have reduced in line with stock density reductions, but this varies across sites, and sheep, even if reduced in number, can favour upper mountain slopes (Long 2010), thus stock densities can still be locally high. Ongoing impacts or legacy effects of nitrogen enrichment at affected sites must include depletion of sensitive species with poor dispersal (especially bryophytes) and hence poor recovery potential. A09 (overgrazing) was therefore assessed as a medium-importance pressure and threat based on evidence from the previous and current reporting periods and expert opinion. All remaining pressures presented in NPWS (2013a) were considered for the current reporting period. For four of these there was additional evidence provided for their importance by the data collected during the current reporting period. These four pressures crosswalked to F07 (Sports, tourism and leisure activities) (recorded three times during the current reporting period, once as negative and twice as neutral), I02 (Other invasive alien species (other than species of Union concern)) (recorded twice during the current reporting period, once as a neutral pressure and once as a negative pressure), I04 (Problematic native species) and L01 (Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization)) (both recorded once during the current reporting period as negative pressures). Based on evidence collected over the last two reporting periods and expert opinion, F07, I02, I04 and L01 were retained as low-importance pressures and threats. L02 (Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices)) was retained as a medium-importance pressure for the 8110 habitat based on evidence from the previous reporting period and expert opinion. Although L02 was not recorded as a pressure within this reporting period, only two sites, both in the southwest of Ireland, were assessed as part of the NSUH as compared to thirteen NSUH sites for the previous reporting period. With no new data to suggest that this pressure has been addressed and impacts reduced, it is retained as a medium-importance pressure. It is also considered to be a threat to the 8110 habitat. The low-importance impact J03 (Mixed source air pollution, air-borne pollutants), recorded in NPWS (2013a) but not in this reporting period, was retained as a low-importance pressure for the current reporting period. A11 (Burning for agriculture), recorded within the current reporting period only, was also assessed as low importance for 8110 habitat due to low frequency and area impacted upon. Climate change (N) was ranked as a low importance threat in NPWS (2013a). It is predicted to impact on the occurrence of arctic-alpine plants in Ireland (EPA 2017; Wyse Jackson 2007) and some of these are found in high-quality examples of the 8110 habitat. A predictive modelling study by Hodd *et al.* (2014) reports that oceanic bryophytes of hepatic mat and oceanic montane species groups, such as *Anastrepta orcadensis* and *Scapania ornithopodioides* (the latter occurs in scree habitat), may lose climate space to the south and gain space in northerly areas of Ireland, suggesting a northward shift in their distribution (this scenario assumes unlimited dispersal potential). However topography as well as climate plays a key role in

	the distribution of these species. Hodd *et al.* (2014) admit that it is possible that by modelling at the 10km x 10km resolution they are losing potential to identify local climate refugia for species persistence and rapid migration, particularly in areas such as the west coast of Ireland where there are large, local-scale variations both in elevation and climate. In any case, it is the habitats that are degraded from inappropriate land uses, and currently in inadequate or unfavourable condition, that will have the least resilience to the additional pressures of predicted climate changes. However, without more habitat-specific quantitative research data it is very difficult to predict the time-frame for significant effects of climate change to manifest, and small but incremental changes may already be occurring. The key action must be to improve resilience of habitats by reducing the impact of inappropriate land uses and undertaking habitat restoration where potential is highest (C. Douglas, NPWS, pers. comm.). Until further information is available, climate change is thus retained as a low-importance pressure for this reporting period, although in the longer term it is likely be a more significant pressure. A critical review of current protected areas in the light of modelled predicted changes in climate space for species (accompanied by a risk assessment related to the uncertainties of the stated modelling approach) associated with scree and associated upland habitats by Hodd *et al.* (2014) could be carried out to identify gaps, which the authors note could arise, in the protected areas network with possible shifts in climate envelopes.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type** or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*

8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* ***a) Short-term results (within the current reporting period, 2013-2018)*** *or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	**CA03** Maintain existing extensive agricultural practices and agricultural landscape features
8.6 Additional information *Optional*	Conservation measures were selected using data gathered by Perrin *et al.* (2014b, 2014c), Hodd (2015a, 2015b) and the Clubmoss Monitoring Survey (O'Neill *et al*., in prep.), and from information provided by NPWS. Data from the NSUH, recorded in the previous reporting period, were also utilised where appropriate. The maintenance of extensive sheep grazing (recorded under CA03) as a conservation measure was recorded four times by Hodd (2015a, 2015b), while non-intensive sheep grazing was recorded twice by Perrin *et al.* (2014b, 2014c), and twice by the Clubmoss Monitoring Survey (O'Neill *et al.*, in prep.) as a neutral impact on habitat 8110. It was also recorded as a neutral impact at two 8110 NSUH sites during the previous reporting period. In some cases the maintenance of extensive sheep grazing is undertaken through the Department of Agriculture's Green, Low Carbon, Agri-Environment Scheme (GLAS). This, however, is likely to be incidental for the 8110 habitat, based on it being present within an area managed under GLAS, rather than there being a targeted measure specific to this habitat. Details of participation in the GLAS scheme and of the uptake across various measures are not currently available. It is therefore not possible to precisely assess the effects of implementation of these measures. It should be recognised that the management regimes of most areas of 8110 habitat are driven by the landowner rather than by any formal management plan or policy; therefore the continued operation of the management regimes currently in place is not guaranteed across the entire habitat. Conservation measures that are not currently being widely implemented, but whose implementation would improve the Structure and functions of the habitat, are the control or removal of non-native species (CI03), particularly *Campylopus introflexus* and *Acaena novae-zelandiae*, and to adapt grazing activities (CA05) to try to either alleviate overgrazing or remedy undergrazing.

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	*Good /* ***Poor*** */ Bad / Unknown*
9.2 Additional information	Short-term trend direction of Range is assessed as Stable.	

Optional	Current range is equal to Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as Stable, as no change in Range is expected based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Range are therefore Good. Short-term trend direction of Area is assessed as Stable. Current area is approximately equal to the Favourable Reference Area. Conservation status of Area is therefore Favourable. Future trend of Area is assessed as Stable, as no change in Area is expected based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Area are therefore Good. Short-term trend direction is Stable for habitat that is in Good condition. Current Structure and functions are assessed as Unfavourable as <90% of habitat is in "Good" condition. A maximum estimate of 27% of 8110 habitat is in poor condition, which equates to Unfavourable-Bad Structure and functions. However, due to insufficient data from this reporting period this 27% was carried over from the last reporting period and, on review with NPWS staff during the last reporting period, it was decided that an Unfavourable-Inadequate assessment was more appropriate due to the small margin on the decision and a lack of any major single impact. As there are no high-importance pressures or threats recorded within this reporting period, the assessment of Unfavourable-Inadequate was retained for this reporting period. Conservation status of Structure and functions is therefore Unfavourable-Inadequate. Future trend of Structure and functions is assessed as Stable, as although the threats of A09, A10 and L02 are expected to have a negative influence on Structure and functions, their presence is not expected to change the overall status of Structure and functions within the next 12 years. Where the conservation measure CA03 occurs it would be expected to balance the threats; however it should be noted that this is not a targeted measure for the 8110 habitat, nor is it implemented across the national distribution of the habitat. Future prospects of Structure and functions are therefore Poor.

10 Conclusions

Assessment of conservation status at end of reporting period	
10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*

<table>
<tr><td>10.4 Future prospects</td><td colspan="3">Favourable (FV) / <u>Inadequate (U1)</u> / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>10.5 Overall assessment of Conservation Status</td><td colspan="3">Favourable (FV) / <u>Inadequate (U1)</u> / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>10.6 Overall trend in Conservation Status</td><td colspan="3">Indicate the trend (qualifier) for FV, U1 and U2:

improving / deteriorating / <u>stable</u> / unknown</td></tr>
<tr><td rowspan="8">10.7 Change and reasons for change in conservation status and conservation status trend</td><td colspan="3">Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.</td></tr>
<tr><td></td><td>Overall assessment of conservation status (10.5)</td><td>Overall trend in conservation status (10.6)</td></tr>
<tr><td>a) no, there is no difference</td><td>YES/<u>NO</u></td><td><u>YES</u>/NO</td></tr>
<tr><td>b) yes, due to genuine change</td><td>YES/NO</td><td>YES/<u>NO</u></td></tr>
<tr><td>c) yes, due to improved knowledge/more accurate</td><td>YES/NO</td><td><u>YES</u>/NO</td></tr>
<tr><td>d) yes, due to the use of different methods (including use of different thresholds)</td><td>YES/NO</td><td>YES/<u>NO</u></td></tr>
<tr><td>e) yes, but there is no information on nature of change</td><td>YES/NO</td><td>YES/<u>NO</u></td></tr>
<tr><td>The change is mainly due to (select one of the reasons above):</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td><td>genuine change / <u>improved knowledge or more accurate data</u> / the use of a different method</td></tr>
<tr><td>10.8 Additional information

Optional</td><td colspan="3">The Conservation Status of Range and Area are Favourable in this reporting period, as they were in the previous reporting period.
The Conservation Status of Structure and functions and Future prospects are Unfavourable-Inadequate in this reporting period, as they were in the previous reporting period.
The Overall Conservation Status was assessed as Unfavourable-Inadequate, as it was during the last reporting period. The status of Unfavourable-Inadequate during the current reporting period was due to <90% of the area of 8110 habitat being assessed as having Favourable Structure and functions.
Overall Trend in Conservation Status was assessed as stable in this reporting period, but as improving in the last reporting period. A qualifier of “improving” was applied in the last reporting period for the Structure and functions due to the Commonage Framework Plans (CFP). It was noted in NPWS (2013a), however, that “the CFP</td></tr>
</table>

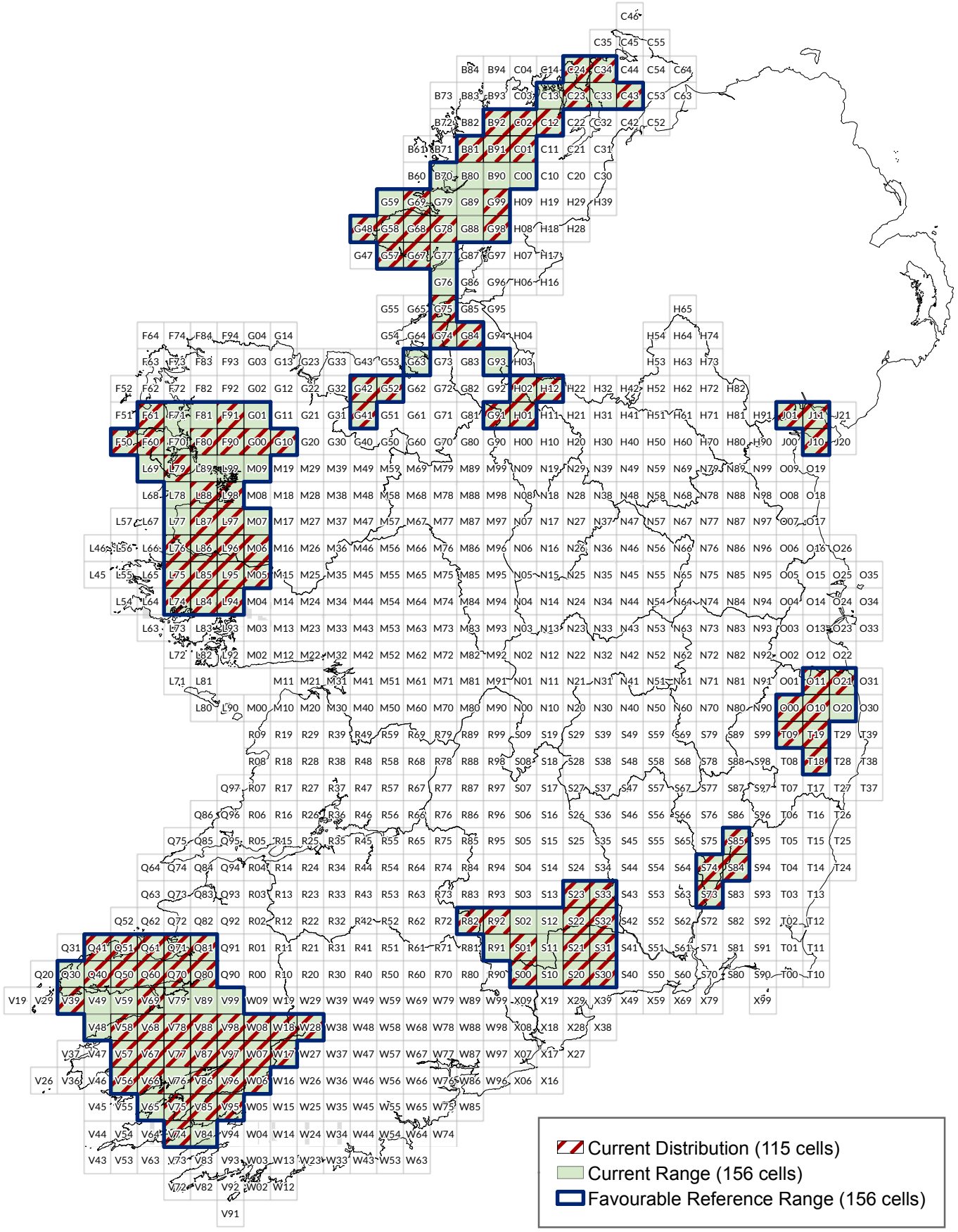
	does not provide data specific to 8110 habitat and has had limited monitoring" and "that improvements due to lower grazing levels may be tempered by other ongoing impacts, and if levels become too low heath and scrub invasion could become problems". Overgrazing, undergrazing and succession are recorded as medium-importance pressures during this reporting period, and the Structure and functions are still Unfavourable-Inadequate. As destocking took place almost two decades ago it would be rather speculative to continue to report an improving scenario. There are no data to support this but expert judgement would suggest that, at best, the Structure and functions trend over the last 12 years could be assumed to be stable. The change of trend for Structure and functions between reporting periods resulted in the change of trend in Overall Conservation Status.

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***13.66 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable** / increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing a union between the distribution polygon shapefile and the SAC shapefile, and an intersect between the distribution point shapefile and SAC shapefile. The area given in section 11.1 is the total area of 8110 habitat in SACs in the country, including some SACs where 8110 is not listed as a qualifying interest (QI). The area of 8110 within the Natura 2000 network where it is listed as a QI is 11.25 km^2. No anthropogenic loss of 8110 habitat was reported in the current	

	reporting period. There were no inconsistencies between the Natura 2000 sites where the 8110 habitat is listed as a QI and the current distribution for the habitat. The short-term trend of the 8110 habitat in good condition within the SAC network is taken to be stable, with the same trend as the 8110 habitat nationally (Section 6.4). The surface area of 8110 habitat within the Natura 2000 network has decreased since the last reporting period; this is due to improved knowledge lending itself to a refinement of area totals (see Section 5.15 for details).

12 Complementary information

Siliceous Scree (8110)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**8120 Calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*)**
1.2i Habitat short name	**Calcareous scree**
1.3i Habitat description	Guidance on interpretation of Calcareous Scree habitat (8120) in an Irish upland context has been provided by Perrin *et al.* (2014a). It consists of accumulations of calcareous rock fragments on slopes below upland cliffs or on exposed / frost-shattered mountain summits or ridges. Rocks may vary in size from large blocks (also known as talus) that can be very stable, to smaller fragments that can be highly mobile. Areas of loose rock on summits or plateaux exposed by erosion of blanket bog and areas akin to fell-field are not included, nor are areas of scree beneath a vegetation cover that assigns them to other habitats such as dry heath or scrub. Whilst there is no strict altitudinal threshold, this habitat 8120 is limited to examples of scree occurring in a broadly upland landscape context. The vegetation may be very sparse and can chiefly comprise bryophyte and lichen assemblages, although calcicole ferns, including *Asplenium viride* and *Cystopteris fragilis*, and saxifrage species are typically present. Relevant IVC communities (Perrin 2017) are the RH1A *Asplenium trichomanes-Ctenidium molluscum* crevice community, and very rarely the RH2D *Angelica sylvestris-Breutelia chrysocoma* ledge community. There are a suite of Red-listed bryophytes (Lockhart *et al*. 2012) associated with calcareous scree habitat as well the Flora Protection Order (2015) moss species *Didymodon maximus*. Whilst the presence of arctic-alpine species indicates high-quality examples of the habitat, it is not deemed a requisite.

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***1975-2017***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted

2.5i	The distribution map was derived from a polygon shapefile and a point shapefile. These shapefiles were created by compiling relevant data which referred to habitat 8120 or Fossitt code ER4 (Fossitt 2000) or a relevant NPWS habitat code in their attributes. Sources include Coillte Biodiversity Dataset (various dates), Perrin *et al.* (2014b), Perrin (2017) and Martin *et al.* (2018). In addition to these, sources utilised for the distribution map from the last reporting period (NPWS 2013a) were also included: five National Survey of Upland Habitats (NSUH) sites (Perrin *et al.* 2011, 2012, 2013a-c), Barron & Perrin (2010), Emma Glanville (NPWS), NPWS (2013b), the NPWS Habitat Assignment Project (original survey work for the Habitat Assignment Project commenced in 1975) and Webb & Scannell (1983). All references are detailed below in Section 3.2. A certainty rating system was applied to all data that informed the distribution map. This system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1 the lowest. The new data sources added since the last round of reporting (NPWS 2013a) – Perrin *et al.* (2014b), Perrin (2017) and Martin *et al.* (2018) – were judged to have a high certainty of 3. The Coillte Biodiversity Dataset polygon was assigned a certainty of 2 as it was ground-truthed. Certainty 3s were not assigned to the Coillte Biodiversity Dataset due to the age of the data (surveyed in early 2000s). Certainty values from the datasets utilised during the last reporting period were not reassigned for the purposes of the distribution map as the classes within the certainty rating system are fairly broad, and the 8120 habitat itself is relatively stable. All polygons and points with certainty 1 to 3 were used to map the distribution of the 8120 habitat.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Barron, S. & Perrin, P. (2010) Review and amendment of GIS mapping for blanket bog NHAs. Unpublished report to National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Coillte Biodiversity Dataset. GIS files and individual site management plans were made available by Coillte. The one polygon used was surveyed in 2002. Emma Glanville (NPWS). For the previous reporting period (NPWS 2013a) a number of point records of scree in the Burren were provided by a local NPWS ranger. These points were carried through for this reporting period. EPA (2017) A Summary of the State of Knowledge on Climate Change Impacts for Ireland: Report 11 (2010-2016). Prepared for the Environmental Protection Agency by MaREI Centre,

Environmental Research Institute, University College Cork. M. Desmond, P. O'Brien and F. McGovern. EPA, Wexford. https://www.epa.ie/researchandeducation/research/researchpublications/researchreports/EPA%20RR%20223_web.pdf

Flora (Protection) Order (2015). Statutory Instrument No. 356 of 2015. Dublin: Stationery Office.

Fossitt, J.A. (2000) *A guide to habitats in Ireland*. The Heritage Council, Kilkenny. https://www.npws.ie/sites/default/files/publications/pdf/A%20Guide%20to%20Habitats%20in%20Ireland%20-%20Fossitt.pdf

Habitat Assignment Project. An NPWS spreadsheet noting the qualifying interest of SACs and other habitats which occur in SACs, NHAs and pNHAs. This table was used as a reference for incorporating polygon data for SACs, NHAs and pNHAs.

Hodd, R.L., Bourke, D. & Skeffington, M.S. (2014) Projected Range Contractions of European Protected Oceanic Montane Plant Communities: Focus on Climate Change Impacts Is Essential for Their Future Conservation. PLoS ONE 9(4): e95147. doi:10.1371/journal.pone.0095147. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0095147

JNCC (2009) Common Standards Monitoring Guidance for Upland Habitats. Joint Nature Conservation Committee, Peterborough.

Lockhart, N, Hodgetts, N. & Holyoak, D. (2012) Ireland Red List No. 8: Bryophytes. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/content/publications/ireland-red-list-no8-bryophytes

Long, D. (2010) The tragedy of the Twelve Bens of Connemara: is there a future for *Adelanthus lindenbergianus*? *Field Bryology* 100: 2-8. http://rbg-web2.rbge.org.uk/bbs/Activities/field%20bryology/FB100/FB100%20Long.pdf

Martin, J.R., O'Neill, F.H. & Daly, O.H. (2018) The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats. *Irish Wildlife Manuals*, No. 102. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin.

NPWS (2013a) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin. https://www.npws.ie/sites/default/files/publications/pdf/Article_17_Print_Vol_2_report_habitats_v1_1_0.pdf

NPWS (2013b). Management Planning Support Unit Maps 2405_imap95 (CPU_Habitats_March_2012.shp)

Perrin, P. (2017) Irish Vegetation Classification: Technical Progress Report No. 3. Report submitted to National Biodiversity Data Centre. http://www.biodiversityireland.ie/projects/national-vegetation-database/irish-vegetation-classification/explore/

Perrin, P.M., Roche, J.R. & Barron, S.J. (2011) National Survey of

Upland Habitats (Phase 1, 2010 - 2012) Site Report No 1: Mweelrea, Sheeffry, Erriff Complex cSAC (001932), Co. Mayo. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH10_Mweelrea_Sheeffry_Erriff_Report_01c_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J. & Daly, O.H. (2012) National Survey of Upland Habitats (Phase 2, 2011-2012), Site Report No. 7: Mount Brandon cSAC (000375), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH11_Mount_Brandon_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013a). National Survey of Upland Habitats (Phase 3, 2012-2013), Draft Site Report No. 11: Ben Bulben, Gleniff and Glenade Complex cSAC (000623), Co. Sligo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013b). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 12: Arroo Mountain cSAC (001403), Co. Leitrim. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Arroo_Mountain_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013c). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 14: Slieve League cSAC (000189), Co. Donegal. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Slieve_League_Report_01b_M.pdf

Perrin, P.M., Barron, S.J., Roche, J.R. & O'Hanrahan, B. (2014a) Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland. Version 2.0. *Irish Wildlife Manuals*, No. 79. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/IWM79.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014b). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 16: Caha Mountains cSAC (000093), Cos. Cork and Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH13_Caha_Mountains_01b_M.pdf

Webb, D.A. & Scannell, M.J.P. (1983) Flora of Connemara and the Burren, Royal Dublin Society and Cambridge University Press, Cambridge.

Wyse Jackson, P.S. (2007) The potential impact of climate change on

	native plant diversity in Ireland. https://www.bgci.org/resources/article/0571/ (accessed 03/05/2018).
3.2i Additional information	

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***2,800 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 2,800 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	

<table>
<tr><td></td><td colspan="2">d) Indicate method used to set reference value if other than operators

The Favourable reference range has been increased since the last reporting period (NPWS 2013a) to reflect the improved level of knowledge. There is no evidence of loss of range since the Directive came into force and the geographic spread is considered sufficient for the long-term survival of the habitat.</td></tr>
<tr><td rowspan="6">4.11 Change and reason for change in surface area of range</td><td colspan="2">Is there a change between reporting periods? <u>YES</u>/NO

If yes, provide the nature of that change. More than one option (a to d) can be chosen</td></tr>
<tr><td>a) yes, due to genuine change</td><td>YES/<u>NO</u></td></tr>
<tr><td>b) yes, due to improved knowledge/more accurate data</td><td><u>YES</u>/NO</td></tr>
<tr><td>c) yes, due to the use of different method</td><td>YES/<u>NO</u></td></tr>
<tr><td>d) yes, but there is no information on the nature of change</td><td>YES/<u>NO</u></td></tr>
<tr><td colspan="2">The change is mainly due to (select one of the reasons above):

genuine change / <u>improved knowledge or more accurate data</u> / the use of a different method</td></tr>
<tr><td>4.12 Additional information

Optional</td><td colspan="2">Range was calculated using the range tool, based on the current known distribution of the 8120 habitat. A maximum gap distance of two 10 km grid cells was used when running the range tool.
Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS 2013a). There were no recorded losses of area at the sample sites covered by the NSUH during these two reporting periods. The short-term trend assessed over the period 2007-2017 is stable, and this is assumed to be the case also for the default trend period of 2007-2018. Similarly, the long-term range was assessed over the period 1994-2017 but the resulting stable trend is assumed to apply also to the default trend period of 1994-2018. It should be noted that one 8120 habitat site was surveyed through the NSUH within this reporting period compared with five sites in the last reporting period, therefore limiting the conclusions that can be made.
The number of 10km squares in the Range (28) is four squares higher than the last monitoring period (NPWS 2013a) due to 8120 habitat recorded in the Caha Mountains (Perrin et al. 2014b) (two squares) and Knocknarea, Sligo (Coillte Biodiversity Dataset) (two squares). The change in Range is due to improved knowledge within the current reporting period rather than due to genuine change.
Favourable Reference Range has been increased since the last reporting period (NPWS 2013a) to reflect the improved level of knowledge. The Favourable Reference Range is the current range, reported in Section 4.1.</td></tr>
</table>

5 Area covered by habitat		
Area covered by the habitat type within the range in the biogeographical/marine region concerned		
5.1 Year or period	***1975-2017***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***0.88 km^2***
5.3 Type of estimate	*Best estimate / 95% confidence interval / **minimum***	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007-2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994-2018***	
5.10 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data***	

	d) Insufficient or no data available	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator ≈ (approximately equal to) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 1975 when original survey work for the Habitat Assignment Project commenced and incorporates updates made by surveys between 2004 and 2017 that are listed in Section 3.2. Area was calculated from the polygon shapefile and point shapefile used for distribution. For each point record not intersecting within a polygon that was yielding an area (28 points), 400 m^2 of habitat was estimated. This was based on expert opinion applied in the previous reporting period and carried over to this reporting period in order to maintain consistency. During the current reporting period three datasets with 8120 habitat recorded within them were utilised; Area was only fully assessed by the NSUH dataset (Perrin *et al.* 2014b). The NSUH site (Caha Mountains SAC (000093)) represents 0.14% of the total area of 8120 habitat recorded in Ireland, limiting the conclusions that can be made. More detailed survey work of the 8120 habitat is needed, and it is expected that the area listed in Section 5.2 will be refined as more in-depth mapping of the 8120 habitat is completed. In particular, any area represented within the dataset by only a point needs to be surveyed in more detail. In addition to refining the areas of 8120 habitat currently known, there are probably still areas of unmapped 8120 habitat within the country. The area value entered is therefore a minimum. Short-term trend in Area was deemed to be stable. At the sample of sites covered by the NSUH (from the current and previous reporting periods) there is no evidence of loss of habitat since 2005. The period over which the short-term trend was examined was 2005-2014 but the trend is assumed to be the same for the default trend period of	

	2007-2018. Long-term trend in Area was also deemed to be stable, assessed over the period 1995–2014. This is assumed to be the case also for the default trend period 1994-2018. There were minor losses of area recorded at one NSUH site, Ben Bulben, Gleniff and Glenade Complex SAC (000623), pre-2005, due to tracks and activities associated with quarrying (Perrin *et al*. 2013a). However, there were also minor gains in 8120 habitat at the same site, post-2005, due to landslides. The overall nett loss of habitat area at this site was less than 1% per year. Scaled up to a national level, Area was assessed as Favourable in the last reporting period (NPWS 2013a), as the loss of habitat was so small it did not impact on the Favourable Reference Area (FRA). Although the loss is not considered to be significant at a national scale, small losses in area at the site level may be important and conservation measures should be implemented to counteract these losses. FRA is deemed to be approximately equal to the current area. There is no information showing that an enlarged area is necessary for either typical species to reach favourable conservation status or for the necessary structures and functions to exist, therefore the surface area of the habitat when the Directive came into force in 1994 is taken to be the FRA. Whilst this figure is unknown it is deemed to be approximately equal to the current area as there is no evidence of significant declines since this time. The difference in habitat extent between this reporting period and the last is due to the availability of more accurate knowledge of the area of habitat 8120, resulting in the refinement of some area estimates from the last reporting period. This refinement occurred in the Crockauns and Cope's Mountain area in County Sligo where in the last reporting period Blanket Bog NHA mapping data (certainty 3) recorded an estimated 0.0158 km^2 8120 habitat present, but Martin *et al.* (2018) (certainty 3) recorded and mapped 0.0257 km^2 in this reporting period resulting in a nett gain of 0.0099 km^2. Additional surveys in this reporting period resulted in an addition of 0.037 km^2 8120 habitat which was previously unmapped. There has been no genuine change in area of 8120 habitat ((0.836+0.0099) + 0.037= 0.883 km^2).

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***0.59 km²***
		Maximum	***0.59 km²***
	b) Area in not-good condition	**Minimum**	***0.29 km²***
		Maximum	***0.29 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:*		

	a) Complete survey or a statistically robust estimate *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***
6.7 Typical species Method used *Optional*	The list of typical species is the same as the last reporting period (NPWS 2013a). Typical species were assessed as an assemblage at the monitoring stop level within sites surveyed by the NSUH. At each monitoring stop at least three typical species were required to be present, with at least one of the species being a fern or saxifrage. As this was a baseline survey, trends for the assemblage and for individual species were not assessed.
6.8 Additional information *Optional*	The NSUH (Perrin *et al.* 2014a) assessed Structure and functions at a monitoring stop level, using criteria to assess vegetation composition (including typical species), vegetation structure and physical structure. Criteria were adapted from the UK's Common Standards Monitoring (JNCC 2009) using expert judgement. The NSUH primarily assesses SACs and is currently incomplete. No monitoring stops were recorded within this reporting period; however the 8120 habitat located in the Caha Mountains SAC (000093) was assessed as Favourable for Structure and functions based on expert judgement (Perrin *et al*. 2014b). As no monitoring stops were recorded within 8120 in this reporting period, and the area assessed as being in good condition based on expert judgement only represents 0.14% of the national area of 8120 habitat, data from the last reporting period were utilised. During the last reporting period 66.7% of the 8120 habitat was assessed as Favourable (NPWS 2013a). This equates to 0.59km^2 of the current area of 8120 habitat and this figure is used as both the minimum and maximum area in good condition. 33.3% of the 8120 habitat was assessed as Unfavourable (NPWS 2013a). This equates to 0.29 km^2 of the current area of 8120 habitat and this figure is used as both the minimum and maximum area that is in not-good condition. The most frequent criteria to fail the Structure and functions

	assessment in the last reporting period were 'number of indicative ferns and *Saxifraga* species', 'number of positive indicator species', 'disturbed ground in the local vicinity' and 'proportion of vegetation composed of non-native species' (NPWS 2013a). The short-term trend of habitat area in good condition was taken to be stable as there is no evidence that status has actually declined since the last reporting period. The trend was examined over the period 2007-2014 but is assumed to be the same for the default trend period of 2007-2018. In fact, based on very limited data, conclusions could be made that the status has improved. As this conclusion would be solely related to one site representing 0.14% of the national 8120 habitat area, the trend was taken as stable rather than increasing based on expert opinion. Typical indicator species for 8120 habitat are: *Asplenium adiantum-nigrum, Asplenium ruta-muraria, Asplenium trichomanes, Asplenium viride, Carex pulicaris, Ceterach officinarum, Cystopteris fragilis, Dryas octopetala, Geranium lucidum, Geranium robertianum, Hieracium* spp. (count as one), *Koeleria macrantha, Oxalis acetosella, Phegopteris connectilis, Polystichum aculeatum, Polystichum lonchitis, Polystichum setiferum, Saxifraga aizoides, Saxifraga oppositifolia, Silene acaulis, Teucrium scorodonia, Thalictrum alpinum* and *Tortella tortuosa*.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A09** Intensive grazing or overgrazing by livestock (H)	**A09** Intensive grazing or overgrazing by livestock (H)

7.2 Sources of information *Optional*	Pressures were sourced from: NPWS (2013a) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin.
7.3 Additional information *Optional*	For the current reporting period no data on pressures for the 8120 habitat were available. For this reason, the pressures and threats information presented in NPWS (2013a) were utilised to inform the current reporting period. Data gathered from NPWS (2013a) are summarised in the backing document '1601_NSUH17_IMPACTS'. Pressures and threats presented in 7.1 were selected and ranked based on intensity (high, medium, low), frequency of occurrence, and area of impact.

	In the previous reporting period, sheep grazing in the uplands – both undergrazing and overgrazing – was recorded under 'A04.02.02 non-intensive sheep-grazing'. It was recorded as a high-importance pressure and threat for the 8120 habitat (NPWS 2013a). Using the crosswalk referenced in the backing document '1601_NSUH17_IMPACTS' to convert old impact codes to the new impact recording scheme, A04.02.02 crosswalks to A10 (Extensive grazing or undergrazing by livestock) in the new scheme. However at times the recorded impact should be considered under A09 (Intensive grazing or overgrazing by livestock). A09 (Intensive grazing or overgrazing by livestock) can lead to erosion, damage to the vegetation of the 8120 habitat, and can also result in nitrogen enrichment of the soil. Nitrogen is highly toxic to many bryophyte species and scree habitats support important bryophyte communities. The degree of threat of nitrogen enrichment should have reduced in line with stock density reductions, but this varies across sites, and sheep, even if reduced in number, can favour upper mountain slopes (Long 2010), thus stock densities can still be locally high. Ongoing impacts or legacy effects of nitrogen enrichment at affected sites must include depletion of sensitive species with poor dispersal (especially bryophytes) and hence poor recovery potential. It was stated in NPWS (2013a) that "whilst grazing impacts on the existing vegetation were generally assessed as low, sheep tracks across scree slopes with associated erosion were noted" and "chronic levels of unsuitable grazing pressure may have removed indicator species from some areas". Based on evidence collected in the previous reporting period and expert opinion, A09 was retained as a high-importance pressure for this reporting period. There was no evidence from the NSUH sites surveyed in the previous reporting period that A10 was a pressure. From examining the individual site reports (Perrin *et al.* 2011, 2012, 2013a-c), all negative effects of grazing can be attributed to A09 (overgrazing) rather than A10 (undergrazing). A10 is therefore not currently considered a pressure for the 8120 habitat. Low-importance pressures listed during the last reporting period crosswalked to C01 (Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell)), E01 (Roads, paths railroads and related infrastructure (e.g. bridges, viaducts, tunnels)), J03 (Mixed source air pollution, air-borne pollutants) and I02 (Other invasive alien species (other than species of Union concern)). These were retained as low-importance pressures for the current reporting period. Climate change (N) was ranked as a low-importance threat in NPWS (2013a). It is predicted to impact on the occurrence of arctic-alpine plants in Ireland (EPA 2017; Wyse Jackson 2007) and some of these are found in high-quality examples of the 8120 habitat. A predictive modelling study by Hodd *et al*. (2014) reports that arctic-montane species in particular are likely to see areas of suitable climate either shift northwards or contract to higher elevations, while internationally important oceanic bryophytes of montane species groups may also lose climate space to the south and gain in northerly areas of Ireland, suggesting a northward shift in their distribution (though this scenario assumes unlimited dispersal potential).

	However topography as well as climate plays a key role in the distribution of these species. Hodd *et al.* (2014) admit that it is possible that by modelling at the 10km x 10km resolution they are losing potential to identify local climate refugia for species persistence and rapid migration, particularly in areas such as the west coast of Ireland where there are large, local-scale variations both in elevation and climate. In any case it is the habitats that are degraded from inappropriate land uses, and currently in unfavourable condition, that will have the least resilience to the additional pressures of predicted climate changes. Without more habitat-specific quantitative research data, it is very difficult to predict the time-frame for significant effects of climate change to manifest, and small but incremental changes may already be occurring. The key action must be to improve resilience of habitats by reducing the impact of inappropriate land uses and undertaking habitat restoration where potential is highest (C. Douglas, NPWS, pers. comm.). Until further information is available climate change is thus retained as a low-importance pressure and threat for this reporting period, although in the longer term it is likely be a more significant pressure. Hill-walking was also listed as a low-importance threat in NPWS (2013a) and has been retained as a low-importance threat for the current reporting period.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type** or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*

8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* ***a) Short-term results (within the current reporting period, 2013-2018)*** *or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	**CA03** Maintain existing extensive agricultural practices and agricultural landscape features
8.6 Additional information *Optional*	Conservation measures were selected using information provided by NPWS (A. Bleasdale, pers. comm.). As there were no data on conservation measures for 8120 habitat recorded by the NSUH within the current reporting period, data from the previous reporting period were also utilised to inform Section 8 Conservation measures for this reporting period. The maintenance of extensive sheep grazing (CA03) as a conservation measure was recorded twice by the NSUH in the previous reporting period (Perrin *et al.* (2013a, 2013c) as A04.02.02 (non-intensive sheep grazing) with a neutral effect. In some cases the maintenance of extensive sheep grazing is undertaken through the Department of Agriculture's Green, Low Carbon, Agri-Environment Scheme (GLAS). This, however, is likely to be incidental for the 8120 habitat, based on it being present within an area managed under GLAS, rather than there being a targeted measure specific to this habitat. Details of participation in the GLAS scheme and of the uptake across various measures are not currently available. It is therefore not possible to precisely assess the effects of implementation of these measures. It should be recognised that the management regimes of most areas of 8120 habitat are driven by the landowner rather than by any formal management plan or policy; therefore the continued operation of the management regimes currently in place is not guaranteed across the entire habitat. Conservation measures that are not currently being widely implemented, but whose implementation would improve the Structure and functions of the habitat, are the control or removal of non-native species (CI03), particularly *Epilobium brunnescens*, and to adapt grazing activities (CA05) to try to alleviate overgrazing. It is not known what the best strategy for removal of *Epilobium brunnescens* would be, however, and it is speculated that removal would be expensive, difficult and time-consuming, with recurrent management necessary.

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*

	c) Structure and functions	*Good / **Poor** / Bad / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as Stable. Current range is equal to Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as Stable, as no change in Range is expected based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Range are therefore Good. Short-term trend direction of Area is assessed as Stable. Current area is approximately equal to the Favourable Reference Area. Conservation status of Area is therefore Favourable. Future trend of Area is assessed as Stable, as no change in Area is expected based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Area are therefore Good. Short-term trend direction is Stable for habitat that is in Good condition. Current Structure and functions are assessed as Unfavourable as <90% of habitat is in "Good" condition. In fact, approximately 33.3% of 8120 habitat is in poor condition, which equates to Unfavourable-Bad Structure and functions. However, due to insufficient data from this reporting period this 33.3% was carried over from the last reporting period. It was decided during the previous reporting period (NPWS 2013a) that an Unfavourable-Inadequate assessment was more appropriate "on the basis of an imprecise understanding of the ecology and the requirement to review the assessment criteria" (NPWS 2013a). The assessment of Unfavourable-Inadequate was retained for this reporting period as the pressures and threats have been carried over from the previous reporting period, there has been no enhancement of the understanding of the ecology of the habitat, and no review of the assessment criteria has been undertaken. Conservation status of Structure and functions is therefore Unfavourable-Inadequate. Future trend of Structure and functions is assessed as Negative, as the threat of A09 (overgrazing) is expected to have a negative influence on Structure and functions, irrespective of the conservation measure CA03, as this is not a targeted measure for the 8120 habitat, nor is it implemented across the national distribution of the habitat. Future prospects of Structure and functions are therefore Poor.	

10 Conclusions	
Assessment of conservation status at end of reporting period	
10.1 Range	***Favourable (FV)** / Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.2 Area	***Favourable (FV)** / Inadequate (U1) / Bad (U2) / Unknown (XX)*

<table>
<tr><td>10.3 Specific structure and functions (incl. typical species)</td><td colspan="3">Favourable (FV) / <u>Inadequate (U1)</u> / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>10.4 Future prospects</td><td colspan="3">Favourable (FV) / <u>Inadequate (U1)</u> / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>10.5 Overall assessment of Conservation Status</td><td colspan="3">Favourable (FV) / <u>Inadequate (U1)</u> / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>10.6 Overall trend in Conservation Status</td><td colspan="3">Indicate the trend (qualifier) for FV, U1 and U2:
improving / deteriorating / <u>stable</u> / unknown</td></tr>
<tr><td rowspan="8">10.7 Change and reasons for change in conservation status and conservation status trend</td><td colspan="3">Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.</td></tr>
<tr><td></td><td>Overall assessment of conservation status (10.5)</td><td>Overall trend in conservation status (10.6)</td></tr>
<tr><td>a) no, there is no difference</td><td>YES/<u>NO</u></td><td>YES/<u>NO</u></td></tr>
<tr><td>b) yes, due to genuine change</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>c) yes, due to improved knowledge/more accurate</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>d) yes, due to the use of different methods (including use of different thresholds)</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>e) yes, but there is no information on nature of change</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>The change is mainly due to (select one of the reasons above):</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td></tr>
<tr><td>10.8 Additional information

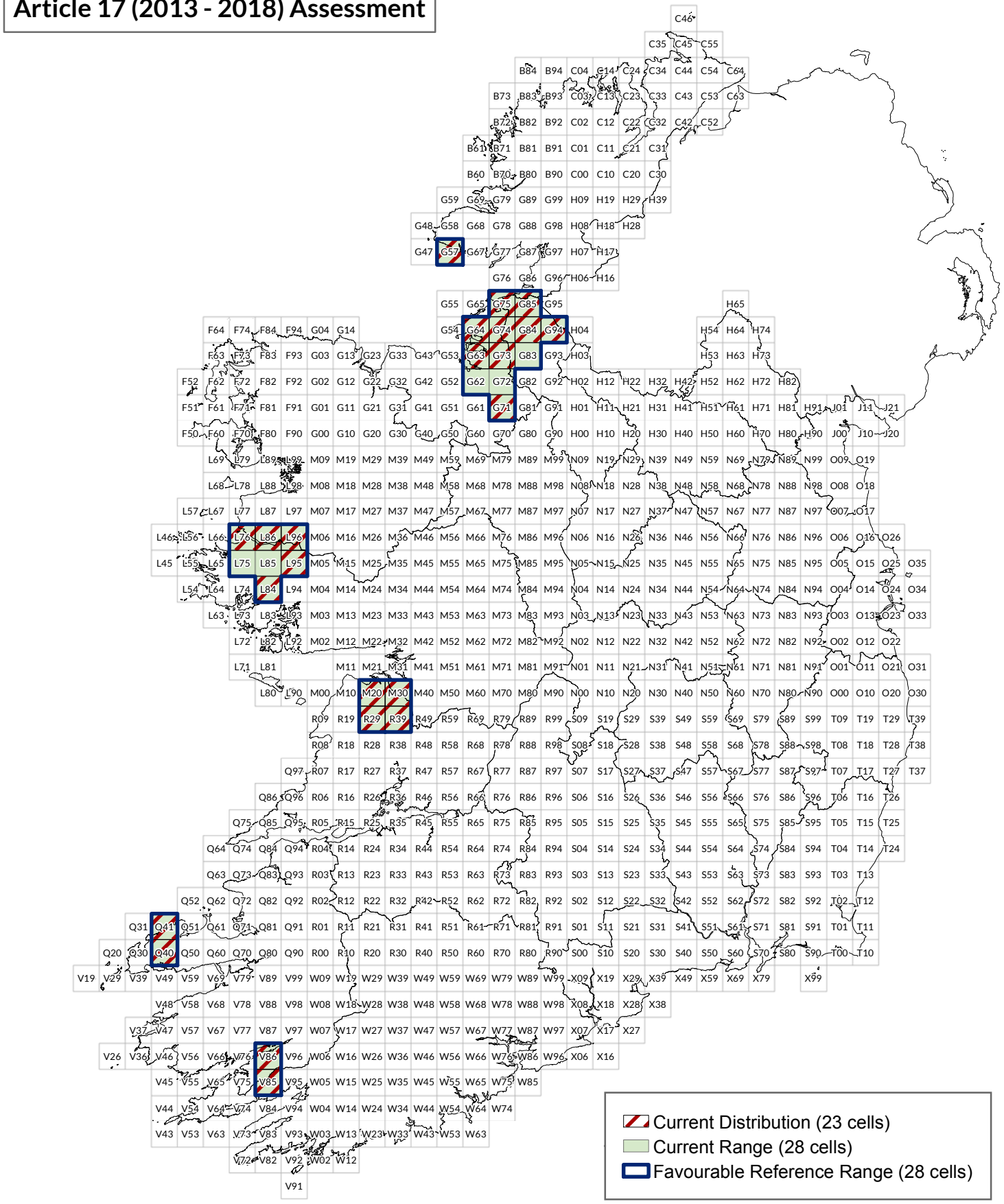
Optional</td><td colspan="3">The Conservation Status of Range and Area are Favourable in this reporting period, as they were in the previous reporting period.
The Conservation Status of Structure and functions and Future prospects are Unfavourable-Inadequate in this reporting period, as they were in the previous reporting period.
The Overall Conservation Status was assessed as Unfavourable-Inadequate, as it was during the last reporting period. The status of Unfavourable-Inadequate during the current reporting period was due to <90% of the area of 8120 habitat being assessed as having Favourable Structure and functions.
Overall Trend in Conservation Status was assessed as stable in this reporting period, as it was during the last reporting period.</td></tr>
</table>

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***0.70 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable** / increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing a union between the distribution polygon shapefile and the SAC shapefile, and an intersect between the distribution point shapefile and SAC shapefile. The area given in section 11.1 is the total area of 8120 habitat in SACs in the country, including some SACs where 8120 is not listed as a qualifying interest (QI). The area of 8120 within the Natura 2000 network where it is listed as a QI is 0.69 km^2. No anthropogenic loss of 8120 habitat was reported in the current reporting period. There were no inconsistencies between the Natura 2000 sites where the 8120 habitat is listed as a QI and the current distribution for the habitat. The short-term trend of the 8120 habitat in good condition within the SAC network is taken to be stable, with the same trend as the 8120 habitat nationally (Section 6.4). The surface area of 8120 habitat within the Natura 2000 network has not changed since last reporting period.	

12 Complementary information

Calcareous and calcshist screens of the montane to alpine levels (*Thlaspietea rotundifolii*) (8120) Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**8210 Calcareous rocky slopes with chasmophytic vegetation**
1.2i Habitat short name	**Calcareous rocky slopes**
1.3i Habitat description	Guidance on interpretation of habitat 8210 Calcareous Rocky Slopes in an Irish upland context is provided by Perrin *et al.* (2014a). It consists of vertical or near vertical exposures of calcareous bedrock with cracks, fissures and overhangs that support chasmophytic vegetation. It may also occur on wet siliceous cliffs where there is some base enrichment in the water or where such rock has been metamorphosed. Whilst there is no strict altitudinal threshold, habitat 8210 is limited to examples of chasmophytic vegetation in a broadly upland landscape context. Areas of heath, grassland or tall herb communities on rock faces or ledges are not considered part of the habitat. The vegetation is characterised by calcicole ferns *Asplenium viride, A. trichomanes* and *Cystopteris fragilis;* saxifrages *(Saxifraga oppositifolia* and *S. aizoides*); and saxicolous bryophytes including *Tortella tortuosa* and *Orthothecium rufescens*. Relevant IVC communities (Perrin, 2017) are the RH1A *Asplenium trichomanes-Ctenidium molluscum* crevice community and the RH2D *Angelica sylvestris-Breutelia chrysocoma* ledge community. Species of restricted distribution in Ireland associated with this habitat include *O. rufescens* and *S. aizoides* and several Flora (Protection) Order, 2015 (FPO) bryophytes including *Bartramia halleriana, Encalypta rhaptocarpa, E. ciliata, Myurella julacea, Gymnomitrion corallioides* and *Lejeunea mandonii*. Whilst the presence of arctic-alpine species indicates high-quality examples of this community, it is not deemed a requisite.

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***1959-2016***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was derived from a polygon shapefile and a point shapefile. These shapefiles were created by compiling relevant data which referred to habitat 8210 or Fossitt code ER2 (Fossitt

	2000) or a relevant NPWS habitat code in their attributes. Sources include Coillte Biodiversity Dataset (various dates), Hodd (2015a, 2015b, 2016), Perrin *et al.* (2014b, 2014c), Perrin (2017) and the updated BSBI map scheme for 2010 records onwards. In addition to these, sources utilised for the distribution map from the last reporting period (NPWS, 2013a) were also included: 10 National Survey of Upland Habitats (NSUH) sites (Perrin *et al.,* 2011, 2012, 2013a-2013e; Roche *et al.* 2009, 2010a, 2012), Barron & Perrin (2010), BSBI map scheme for pre-2010 records, Burren National Park Habitat Maps, National Biodiversity Data Centre (NBDC) biodiversity data (species records, with the earliest date of the species records data used from 1959), NPWS (2013b), NPWS Habitat Assignment Project, Rory Hodd (pers. comm.) and Webb & Scannell (1983). All references are detailed below in Section 3.2. A certainty rating system was applied to all data that informed the distribution map. This system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1 the lowest. Of the new data sources added since the last round of reporting (NPWS, 2013a), Perrin *et al.* (2014b, 2014c) and Perrin (2017) were judged to be a high certainty of 3, while Hodd (2015a, 2015b, 2016) were assigned a certainty of 2 due to habitat information only containing the Fossitt code ER2. The Coillte Biodiversity Dataset polygons were assigned a certainty of 2 for those which were ground-truthed and a certainty of 1 for those where 8210 was not listed as present under the Annex I habitats section in the shapefile but 8210 was listed as present within the biomanagement plans. Certainty 3s were not assigned to the Coillte Biodiversity Dataset due to the age of the data (surveyed in early 2000s). The point from the BSBI map scheme was assigned a certainty of 1 as habitat assignment of 8210 in this case was based solely on the presence of an indicator species (*Polystichum lonchitis*). Certainty values from the datasets utilised during the last reporting period were not reassigned for the purposes of the distribution map as the classes within the certainty rating system are fairly broad, and the 8210 habitat itself is relatively stable. All polygons and points with certainty 1 to 3 were used to map the distribution of the 8210 habitat.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
3.2 Sources of information	Barron, S. & Perrin, P. (2010) Review and amendment of GIS mapping for blanket bog NHAs. Unpublished report to National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. BSBI Maps Scheme: https://database.bsbi.org/maps/. For the previous reporting period (NPWS 2013a) hectads were included

where the online BSBI Maps Scheme indicated records for any of the following species since 1987: *Saxifraga oppositifolia, Saxifraga aizoides, Asplenium viride, Polystichum lonchitis* and *Alchemilla alpina*. Hectads were included as centroids for the relevant squares in the point shapefile. These points were carried through for this reporting period, with one additional record for *Polystichum lonchitis*, recorded post-2010, included.

Burren National Park Habitat Map. An NPWS habitat mapping project. Habitat information is based on a broad habitat map of the wider Burren area, which was prepared in 2006, together with other maps of varying age.

Coillte Biodiversity Dataset. GIS files and individual site management plans were made available by Coillte. Datasets used were from 2001 to 2002.

EPA (2017) A Summary of the State of Knowledge on Climate Change Impacts for Ireland: Report 11 (2010-2016). Prepared for the Environmental Protection Agency by MaREI Centre, Environmental Research Institute, University College Cork. M. Desmond, P. O'Brien and F. McGovern. EPA, Wexford. https://www.epa.ie/researchandeducation/research/researchpublications/researchreports/EPA%20RR%20223_web.pdf

Flora (Protection) Order (2015) Statutory Instrument No. 356 of 2015. Dublin: Stationery Office.

Fossitt, J.A. (2000) *A guide to habitats in Ireland*. The Heritage Council, Kilkenny. https://www.npws.ie/sites/default/files/publications/pdf/A%20Guide%20to%20Habitats%20in%20Ireland%20-%20Fossitt.pdf

Habitat Assignment Project. An NPWS spreadsheet noting the qualifying interest of SACs and other habitats which occur in SACs, NHAs and pNHAs. This table was used as a reference for incorporating polygon data for SACs, NHAs and pNHAs.

Hodd, R.L. (2015a) Survey of Flora Protection Order Bryophytes 2015. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.

Hodd, R.L. (2015b) Survey of Flora Protection Order Bryophytes in Cork and Kerry (H1-H5). Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.

Hodd, R.L. (2016) Survey of Flora Protection Order Bryophytes 2016. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.

Hodd, Rory (pers. comm.). Additional locations of 8210 habitat were added to the point shapefile in the previous reporting period after discussion with Dr. R. Hodd. These points were carried through for this reporting period.

Hodd, R.L., Bourke, D. & Skeffington, M.S. (2014) Projected Range Contractions of European Protected Oceanic Montane Plant Communities: Focus on Climate Change Impacts Is Essential for Their Future Conservation. PLoS ONE 9(4): e95147. doi:10.1371/journal.pone.0095147. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0095147

JNCC (2009) Common Standards Monitoring Guidance for Upland Habitats. Joint Nature Conservation Committee, Peterborough.

National Biodiversity Data Centre (NBDC) online database. In the previous reporting period hectad records of *Orthothecium rufescens* were included as centroids for the relevant squares in the point shapefile. These points were carried through for this reporting period.

NPWS_Approx_Wildfire_Locations_Polygon_2017.shp. An NPWS derived shapefile based on data received from NPWS field staff on wildfires which occurred in Spring 2017.

NPWS (2013a) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin. https://www.npws.ie/sites/default/files/publications/pdf/Article_17_Print_Vol_2_report_habitats_v1_1_0.pdf

NPWS (2013b) Management Planning Support Unit Maps 2405_imap95 (CPU_Habitats_March_2012.shp)

Perrin, P.M., Roche, J.R. and Barron, S.J. (2011) National Survey of Upland Habitats (Phase 1, 2010 - 2012) Site Report No 1: Mweelrea, Sheeffry, Erriff Complex cSAC (001932), Co. Mayo. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH10_Mweelrea_Sheeffry_Erriff_Report_01c_M.pdf

Perrin, P. (2017) Irish Vegetation Classification: Technical Progress Report No. 3. Report submitted to National Biodiversity Data Centre. http://www.biodiversityireland.ie/projects/national-vegetation-database/irish-vegetation-classification/explore/

Perrin, P.M., Roche, J.R., Barron, S.J. & Daly, O.H. (2012) National Survey of Upland Habitats (Phase 2, 2011-2012), Site Report No. 7: Mount Brandon cSAC (000375), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH11_Mount_Brandon_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013a). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 10: Ox Mountains Bogs cSAC (002006), Cos. Mayo and Sligo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Ox_Mountains_Bogs_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013b). National Survey of Upland Habitats (Phase 3, 2012-2013), Draft Site Report No. 11: Ben Bulben, Gleniff and Glenade Complex cSAC (000623), Co. Sligo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon,

C.S. & Leyden, K.J. (2013c). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 12: Arroo Mountain cSAC (001403), Co. Leitrim. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Arroo_Mountain_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013d). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 13: Cuilcagh – Anierin Uplands cSAC (000584), Cos. Cavan and Leitrim. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Cuilcagh_Anierin_Uplands_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013e). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 14: Slieve League cSAC (000189), Co. Donegal. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Slieve_League_Report_01b_M.pdf

Perrin, P.M., Barron, S.J., Roche, J.R. & O'Hanrahan, B. (2014a) Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland. Version 2.0. *Irish Wildlife Manuals*, No. 79. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/IWM79.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014b). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 15: Slieve Mish Mountains cSAC (002185), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH13_Slieve_Mish_Mountains_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014c). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 16: Caha Mountains cSAC (000093), Cos. Cork and Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH13_Caha_Mountains_01b_M.pdf

Roche, J.R., Perrin, P.M. & Barron, S.J. (2009) National Survey of Upland Habitats (Pilot Survey Phase, 2009-2010), Site Report No. 2: Corraun Plateau cSAC (000485), Co. Mayo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/SPEU09_Corraun_Plateau_Report_01b_M.pdf

Roche, J.R., Perrin, P.M. & Barron, S.J. (2010a) National Survey of Upland Habitats (Pilot Survey Phase, 2009-2010), Site Report No.

	3: Comeragh Mountains cSAC (001952), Co. Waterford. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/SPEU09_Comeragh_Mountains_Report_01b_M.pdf Roche, J.R., Perrin, P.M. & Barron, S.J. (2010b) National Survey of Upland Habitats (Pilot Survey Phase, 2009-2010), Site Report No. 4: Carlingford Mountain cSAC (000453), Co. Louth. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/SPEU09_Carlingford_Mountain_Report_01b_M.pdf Roche, J.R., Perrin, P.M., Barron, S.J. & Daly, O.H. (2012) National Survey of Upland Habitats (Phase 2, 2011-2012), Site Report No. 9: Galtee Mountains cSAC (000646), Cos. Tipperary and Limerick. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH11_Galtee_Mountains_Report_01b_M.pdf Webb, D.A. & Scannell, M.J.P. (1983) Flora of Connemara and the Burren, Royal Dublin Society and Cambridge University Press, Cambridge. Wyse Jackson, P.S. (2007) The potential impact of climate change on native plant diversity in Ireland. https://www.bgci.org/resources/article/0571/ (accessed 03/05/2018).
3.2i Additional information	

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***12,400 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 12,400 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable reference range has been increased since the last reporting period (NPWS, 2013a) to reflect the improved level of knowledge. There is no evidence of loss of range since the Directive came into force and the geographic spread is considered sufficient for the long term survival of the habitat.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 8210 habitat. A maximum gap distance of two 10km grid cells was used when running the range tool. Short-term trend was estimated over the period 2007-2016, based on data from the current reporting period and the previous reporting period (NPWS, 2013a). There were no recorded losses of area at the sample sites covered by the NSUH during these two reporting periods. The trend is assumed to be the same over the default period of 2007-2018. A similar assumption was made for the long-term	

	trend, which was assessed over the period 1994-2016. The short-term and long-term trends are stable. It should be noted that the NSUH surveyed two 8210 habitat sites within this reporting period compared with 10 sites in the last reporting period, therefore limiting the conclusions that can be made. The number of 10km squares in the Range (124) is 14 squares higher than the last monitoring period (NPWS, 2013a) due to 8210 habitat recorded in the Slieve Mish Mountains SAC (002185) (five squares) and Caha Mountains SAC (000093) (six squares) by Perrin *et al*. (2014b, 2014c) and in The Devil's Glen, Wicklow (from Coillte Biodiversity Dataset) (three squares). The change in range is due to improved knowledge within the current reporting period rather than due to genuine change. Favourable Reference Range has been increased since the last reporting period (NPWS, 2013a) to reflect the improved level of knowledge. The Favourable Reference Range is the current range, reported in Section 4.1.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***1975-2016***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***3.10 km^2***
5.3 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007-2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994-2018***	
5.10 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator ≈ (approximately equal to) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 1975 when original survey work for the Habitat Assignment Project commenced and incorporates updates made by surveys between 2004 and 2016 that are listed in Section 3.2. Points representing hectad species records (dating from 1959 onwards) did not contribute to area.	

	Area was calculated from the polygon shapefile and point shapefile used for distribution. For each point not intersecting within a polygon that was yielding an area, and located outside of a designated area, 100 m^2 of habitat was estimated. This was based on expert opinion applied in the previous reporting period and carried over to this reporting period in order to maintain consistency. For points representing 8210 habitat within a designated site, a habitat percentage of 0.01% was used (in the case of multiple points within the one SAC, only one point was assigned area); this estimate is based on the mean percentage coverage for 8210 habitat for the NSUH sites where it is recorded from predominantly siliceous bedrock areas. For more details refer to NPWS (2013a). During the current reporting period 11 datasets with 8210 habitat recorded within them were utilised; Area was only fully assessed by the NSUH datasets (Perrin *et al.,* 2014b, 2014c). The two NSUH sites (Caha Mountains SAC (000093) and Slieve Mish Mountains SAC (002185)) represent 2.3% of the total area of 8210 habitat recorded in Ireland, limiting the conclusions that can be made. More detailed survey work of the 8210 habitat is needed, and it is expected that the area listed in Section 5.2 will be refined as more in-depth mapping of the 8210 habitat is completed. In particular, any area represented within the dataset by only a point needs to be surveyed in more detail. In addition to refining the areas of 8210 habitat currently known, there are probably still areas of unmapped 8210 habitat within the country. The area value entered is therefore a minimum. Short-term trend in Area was deemed to be stable over the period 2005-2014. At the sample of sites covered by the NSUH there is no evidence of loss of habitat since 2005.This trend is assumed to be valid also for the default trend period of 2007-2018. A similar assumption was made for the long-term trend, which was assessed as stable over the period 1995-2014. Favourable Reference Area (FRA) is deemed to be approximately equal to the current area. There is no information showing that an enlarged area is necessary either for typical species to reach favourable conservation status or for the necessary structure and functions to exist, therefore the surface area of the habitat when the Directive came into force in 1994 is taken to be the FRA. Whilst this figure is unknown it is deemed to be approximately equal to the current area as there is no evidence of significant declines since this time. The difference in habitat extent between this reporting period and the last is due to the availability of more accurate data of the area of habitat 8210, resulting in a refinement of some area estimates from the last reporting period. This refinement occurred at Knocknarea, County Sligo and Crockauns, County Leitrim. Collectively there was a nett increase in reported 8210 habitat of 0.0814 km^2 between the previous reporting period and this reporting period due to the availability of more accurate data. A calculation error in the previous reporting period was detected in this reporting period, and resulted in a reduction of the previously reported area by 0.0008 km^2. An addition of 0.1722 km^2 of previously unmapped 8210 habitat added to the reported surface area in the previous reporting period. There

	is no evidence of genuine change in area of 8210 habitat during the current reporting period ((2.846 – 0.0008) + 0.0814 + 0.1722 = 3.10 km^2).

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***1.98 km²***
		Maximum	***2.21km²***
	b) Area in not-good condition	**Minimum**	***0.89 km²***
		Maximum	***1.12km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***		
6.7 Typical species Method used *Optional*	The list of typical species is the same as the last reporting period (NPWS, 2013a). Typical species were assessed as an assemblage at the monitoring stop level within sites surveyed by the NSUH. At each monitoring stop at least three typical species were required to be present, with at least one of the species being a fern or saxifrage. As this was a baseline survey, trends for the assemblage and for individual species were not assessed.		
6.8 Additional information *Optional*	The NSUH (Perrin *et al.,* 2014a) assesses Structure and functions at a monitoring stop level, using criteria to assess vegetation composition (including typical species), vegetation structure and physical structure. Criteria were adapted from the UK's Common Standards Monitoring (JNCC, 2009) using expert judgement. The NSUH primarily assesses SACs and is currently incomplete. A total of seven		

	monitoring stops were recorded across the two NSUH sites surveyed within this reporting period. Two of the seven stops (28.6% of stops) failed the criteria assessing the number of positive indicator species present and / or the proportion of vegetation composed of non-native species. For full details see the NSUH site reports (Perrin *et al.,* 2014b, 2014c). Of the sites assessed for Structure and functions in this reporting period (measuring an area of 0.07 km^2), 71.4% of the area was assessed as being in good condition (Favourable). Equal weighting was given to each of the stops as each one assesses a comparable area of habitat. The proportion in good and not-good condition was scaled up to the national estimate (2.21 km^2 in good condition and 0.89 km^2 in not-good condition), however as the area assessed for Structure and functions in this reporting period only represents 2.3% of the national area of habitat 8210, data from the last reporting period were also utilised. During the last reporting period 64% of the 8210 habitat was assessed as Favourable (NPWS, 2013a). This equates to 1.98 km^2 of the current area of 8210 habitat and this figure is used as the minimum area in good condition. 36% of the 8210 habitat was assessed as Unfavourable (NPWS, 2013a). This equates to 1.12 km^2 of the current area of 8210 habitat and this figure is used as the maximum area that is in not-good condition. The most frequent criteria to fail the Structure and functions assessment in the last reporting period were the 'proportion of vegetation composed of non-native species' and 'number of indicative ferns and *Saxifraga* species' (NPWS, 2013a). The short-term trend of habitat area in good condition was taken to be stable as, based on the data recorded during this reporting period, there is no evidence that status has actually declined since the last reporting period. In fact, based on limited data, conclusions could be made that the status has improved; however, as this is based mainly on data from one part of the country (southwest Ireland: Cork and Kerry), the trend was taken as stable based on expert opinion. The trend was assessed over the period 2007-2014 but is assumed to be valid also for the default period of 2007-2018. Typical indicator species for 8210 habitat are: *Alchemilla alpina, Asplenium adiantum-nigrum, Asplenium ruta-muraria, Asplenium trichomanes, Asplenium viride, Carex pulicaris, Ceterach officinarum, Cystopteris fragilis, Draba incana, Dryas octopetala, Hieracium* spp. (count as one), *Koeleria macrantha, Neckera crispa, Orthothecium rufescens, Persicaria vivipara, Phegopteris connectilis, Phyllitis scolopendrium, Polystichum aculeatum, Polystichum lonchitis, Polystichum setiferum, Preissia quadrata, Saxifraga aizoides, Saxifraga hypnoides, Saxifraga oppositifolia, Selaginella selaginoides, Silene acaulis, Thalictrum alpinum* and *Tortella tortuosa*.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A09** Intensive grazing or overgrazing by livestock (M) **A27** Agricultural activities generating air pollution (H) **I02** Other invasive alien species (other than species of Union concern) (M)	**A09** Intensive grazing or overgrazing by livestock (M) **A27** Agricultural activities generating air pollution (H) **I02** Other invasive alien species (other than species of Union concern) (M)

7.2 Sources of information *Optional*

Pressures were sourced from the following reports and accompanying data:

Aherne, J., Burton, A., Scott, H., Whitfield, C. & Wolniewicz, M. (2014) Influence of Transboundary Air Pollution on Acid-sensitive Ecosystems. Environmental Protection Agency, Ireland URL: www.epa.ie/pubs/reports/research/air.

Baker, M.E. & King, R.S. (2010) A new method for detecting and interpreting biodiversity and ecological community thresholds: Threshold Indicator Taxa ANalysis (TITAN). *Methods in Ecology and Evolution* 1(1): 25–37.

Bobbink, R. & Hettelingh, J.P., (eds.) (2011) *Review and revision of empirical critical loads and dose-response relationships*. Coordination Centre for Effects, National Institute for Public Health and the Environment (RIVM). www.rivm.nl/cce.

Cathcart, H., Wilkins, K. & Aherne, J. (2018) High spatio-temporal resolution maps of atmospheric dry deposition velocities using the MÉRA dataset. MÉRA Workshop, National Botanic Gardens, Glasnevin May 17, 2018. URL: www.met.ie/science/events/mera-workshop.

EPA (2018) Ireland's Transboundary Gas Emissions 1990-2016. URL: www.epa.ie/pubs/reports/air/airemissions.

Hodd, R.L. (2016) Survey of Flora Protection Order Bryophytes 2016. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014b). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 15: Slieve Mish Mountains cSAC (002185), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014c). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 16: Caha Mountains cSAC (000093), Cos. Cork and Kerry. National Parks and Wildlife

	Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. NPWS (2013a) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin. NPWS_Approx_Wildfire_Locations_Polygon_2017.shp. Slootweg, J., Posch, M. & Hettelingh, J-P. (2015) Modelling and mapping the impacts of atmospheric deposition of nitrogen and sulphur: CCE Status Report, Coordination Centre for Effects, www.wge-cce.org. Wilkins, K., Aherne, J. & Bleasdale, A. (2016) Vegetation community change points suggest that critical loads of nutrient nitrogen may be too high. *Atmospheric Environment* 146: 324–331.
7.3 Additional information *Optional*	Pressures and threats presented in 7.1 were selected and ranked based on intensity (high, medium, low), frequency of occurrence, and area of impact where data were available. Data gathered from the sources listed in Section 7.2 are summarised in the backing document '1601_NSUH17_IMPACTS'. For the current reporting period data on pressures were available for two NSUH sites – Slieve Mish Mountains SAC (002185) and Caha Mountains SAC (000093) (Perrin *et al*., 2014b, 2014c). Data from a shapefile on locations of wildfires, which was provided by NPWS, were also utilised, with relevant data for 8210 habitat located at Kilgarrylander within the Slieve Mish Mountains. Additional data from Hodd (2016) were also used. As the data from the current reporting period only represent a small proportion of the data collected to inform NPWS (2013a), the pressures and threats information presented in NPWS (2013a) were called upon to inform the current reporting period. In the previous reporting period sheep grazing in the uplands, both undergrazing and overgrazing, was recorded under 'A04.02.02 non-intensive sheep-grazing'. It was recorded as a medium-importance pressure and threat for the 8210 habitat (NPWS, 2013a). Using the crosswalk referenced in the backing document '1601_NSUH17_IMPACTS' to convert to the new impact recording scheme, A04.02.02 crosswalks to A10 (Extensive grazing or undergrazing by livestock). However at times the recorded impact should be considered under A09 (Intensive grazing or overgrazing by livestock). A09 (Intensive grazing or overgrazing by livestock) can lead to erosion and damage to the vegetation of the 8210 habitat. It was stated in NPWS (2013a) that "sheep grazing is widespread at most of the sites surveyed by the NSUH and often problematic", while Hodd (2016) recorded A09 twice within this reporting period. Based on evidence collected in the previous and current reporting periods and expert opinion, A09 was retained as a medium-importance pressure for this reporting period. There was no evidence from the NSUH sites surveyed in the previous reporting period, or from this reporting period, that A10 (undergrazing) was a pressure. A10 is therefore not currently considered a pressure for the 8210 habitat.

	All remaining pressures presented in NPWS (2013a) were considered for the current reporting period. For one of the pressures presented in NPWS (2013a) there was additional evidence provided for its importance by the data collected during the current reporting period. This pressure crosswalked to I02 (Other invasive alien species (other than species of Union concern)) (recorded twice during the current reporting period, both times as a negative pressure). Based on evidence collected over the last two reporting periods and expert opinion, this pressure was retained as a medium-importance pressure for the 8210 habitat for this reporting period. The low-importance impact J03 (Mixed source air pollution, air-borne pollutants), recorded in NPWS (2013a) but not in this reporting period, was retained as a low-importance pressure for the current reporting period. A11 (Burning for agriculture), recorded within the current reporting period only, was also assessed as low importance for 8210 habitat. Climate change (N) was ranked as a low-importance threat in NPWS (2013a). It is predicted to impact on the occurrence of arctic-alpine plants in Ireland (EPA, 2017; Wyse Jackson, 2007) and some of these are found in high-quality examples of the 8210 habitat. A predictive modelling study by Hodd *et al*. (2014) reports that arctic-montane species in particular are likely to see areas of suitable climate either shift northwards or contract to higher elevations, while internationally important oceanic bryophytes of montane species groups may also lose climate space to the south and gain in northerly areas of Ireland, suggesting a northward shift in their distribution (though this scenario assumes unlimited dispersal potential). However, topography as well as climate plays a key role in the distribution of these species. Hodd *et al*. (2014) admit that it is possible that by modelling at the 10km x 10km resolution they are losing potential to identify local climate refugia for species persistence and rapid migration, particularly in areas such as the west coast of Ireland where there are large, local-scale variations both in elevation and climate. In any case it is the habitats that are degraded from inappropriate land uses, and currently in unfavourable condition, that will have the least resilience to the additional pressures of predicted climate changes. Without more habitat-specific quantitative research data it is very difficult to predict the time-frame for significant effects of climate change to manifest, and small but incremental changes may already be occurring. The key action must be to improve resilience of habitats by reducing impact of inappropriate land uses and undertaking habitat restoration where potential is highest (C. Douglas, NPWS, pers. comm.). Until further information is available climate change is thus retained as a low-importance pressure and threat for this reporting period, although in the longer term it is likely be a more significant pressure. A critical review of current protected areas, in the light of the modelled predicted changes in climate space for species (accompanied by a risk assessment related to the uncertainties of the stated modelling approach) associated with calcareous rocky and related upland habitats, could be carried out to identify gaps, which the authors note could arise, in the protected areas network with possible shifts in climate envelopes.

	Mining and quarrying (C01) and mountaineering and rock-climbing (F07) were also listed as low-importance threats in NPWS (2013a), and they have been retained as low-importance threats for the current reporting period. L01 (Erosion) was recorded as another low-importance threat to the 8210 habitat within this reporting period. Empirical critical loads of nutrient nitrogen have been recommended for a number of European habitats (Bobbink & Hettelingh, 2011). These recommended ranges were refined and extended using plant species diversity for habitat-specific positive indicators species. The influence of nitrogen deposition on plant species diversity was assessed using Threshold Indicator Taxa Analysis (TITAN; Baker & King, 2010) following Wilkins *et al*. (2016) and the Probability of Plant Species occurrence (PROPS-CLF; Slootweg *et al*., 2015). The spatial distribution of total nitrogen deposition was mapped on a 2.5 km x 2.5 km grid resolution using observations of atmospheric nitrogen during the last decade, a period with limited changes in national emissions of nitrogen (EPA, 2018). Total nitrogen deposition included dry ammonia deposition based on network of passive gaseous ammonia samplers and modelled dry deposition velocity (Cathcart *et al*., 2018), and observations of wet deposition for nitrate and ammonium in rainfall (Aherne *et al*., 2014). The observations were mapped using regression kriging which used maps of nitrogen emissions (URL: projects.au.dk/mapeire) and climate (URL: www.met.ie/climate/available-data/mera) as spatial predictors. The proportion of each habitat that exceeded the lower critical load value of the recommended range was calculated. The importance of the impact of Nitrogen Deposition based on this proportion was determined as follows: Low-importance pressure/threat: 5-10%; Medium-importance pressure: 10-25%; High-importance pressure: >25%. Calcareous rocky slopes was assigned a Critical value of 5; 42% of the habitat area exceeded this value. Therefore the pressure *A27 Agricultural activities generating air pollution* was assigned a high importance, as approximately 75 to 80% of total nitrogen deposition can be attributed to agricultural sources nationally.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type** or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area*

	covered by habitat') or *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000*** *or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* ***a) Short-term results (within the current reporting period, 2013-2018)*** *or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	**CA03** Maintain existing extensive agricultural practices and agricultural landscape features
8.6 Additional information *Optional*	Conservation measures were selected using data from Hodd (2015a, 2015b, 2016) and from information provided by NPWS. Data from the NSUH, recorded in the previous reporting period, were also utilised where appropriate. The maintenance of extensive sheep grazing (recorded under CA03) as a conservation measure was recorded three times by Hodd (2015a, 2015b, 2016), while non-intensive sheep grazing was recorded as a neutral impact at two 8210 NSUH sites during the previous reporting period. In some cases the maintenance of extensive sheep grazing is undertaken through the Department of Agriculture's Green, Low Carbon, Agri-Environment Scheme (GLAS). This, however, is likely to be incidental for the 8210 habitat, based on it being present within an area managed under GLAS, rather than there being a targeted measure specific to this habitat. Details of participation in the GLAS scheme and of the uptake across various measures are not currently available. It is therefore not possible to precisely assess the effects of implementation of these measures. It should be recognised that the management regimes of most areas of 8210 habitat are driven by the landowner rather than by any formal management plan or policy; therefore the continued operation of the management regimes currently in place is not guaranteed across the entire habitat. Conservation measures that are not currently being implemented, but whose implementation would improve the Structure and functions of the habitat, are the control or removal of non-native species (CI03), particularly *Epilobium brunnescens*, and to adapt grazing activities (CA05) to try to alleviate overgrazing. It is not known what the best strategy for removal of *Epilobium brunnescens* would be, however, and it is speculated that removal would be expensive, difficult and time-consuming, with recurrent management necessary.

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	*Good /* ***Poor*** */ Bad / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as Stable. Current range is equal to Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as Stable, as no change in range is expected based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Range are therefore Good. Short-term trend direction of Area is assessed as Stable. Current area approximately equal to the Favourable Reference Area. Conservation status of Area is therefore Favourable. Future trend of Area is assessed as Stable, as no change in area is expected based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Area are therefore Good. Short-term trend direction is Stable for habitat that is in Good condition. Current Structure and functions are assessed as Unfavourable as <90% of habitat is in Good condition. It is estimated based on data from the current and previous reporting periods that somewhere between 28.6% and 36% of 8210 habitat is in poor condition, which equates to Unfavourable-Bad Structure and functions. During the previous reporting period it was decided that an Unfavourable-Inadequate assessment was more appropriate due to a lack of information on the severity of the threat posed by *Epilobium brunnescens,* the presence of which was one of the main reasons for stops failing in both this reporting period and the last. As the pressures and threats recorded within the previous reporting period were carried over to this reporting period, the assessment of Unfavourable-Inadequate was retained for this reporting period. Conservation status of Structure and functions is therefore Unfavourable-Inadequate. Future trend of Structure and functions is assessed as Negative, as the threat of A09 (overgrazing) is expected to have a negative influence on Structure and functions, irrespective of the conservation measure CA03, as this is not a targeted measure for the 8210 habitat, nor is it implemented across the national distribution of the habitat. In addition to this threat, there is no current conservation measure in place to control the spread of *Epilobium brunnescens* within the 8210 habitat. Future prospects of Structure and functions are therefore Poor.	

10 Conclusions

Assessment of conservation status at end of reporting period

10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/****NO***	*YES/****NO***
	b) yes, due to genuine change	*YES/NO*	*YES/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	*YES/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	The Conservation Status of Range and Area are Favourable in this reporting period, as they were in the previous reporting period. The Conservation Status of Structure and functions and Future prospects are Unfavourable-Inadequate in this reporting period, as they were in the previous reporting period. The Overall Conservation Status was assessed as Unfavourable-		

	Inadequate, as it was during the last reporting period. The status of Unfavourable-Inadequate during the current reporting period was due to <90% of the area of 8120 habitat being assessed as having Favourable Structure and functions. Overall Trend in Conservation Status was assessed as stable in this reporting period, as it was during the last reporting period.

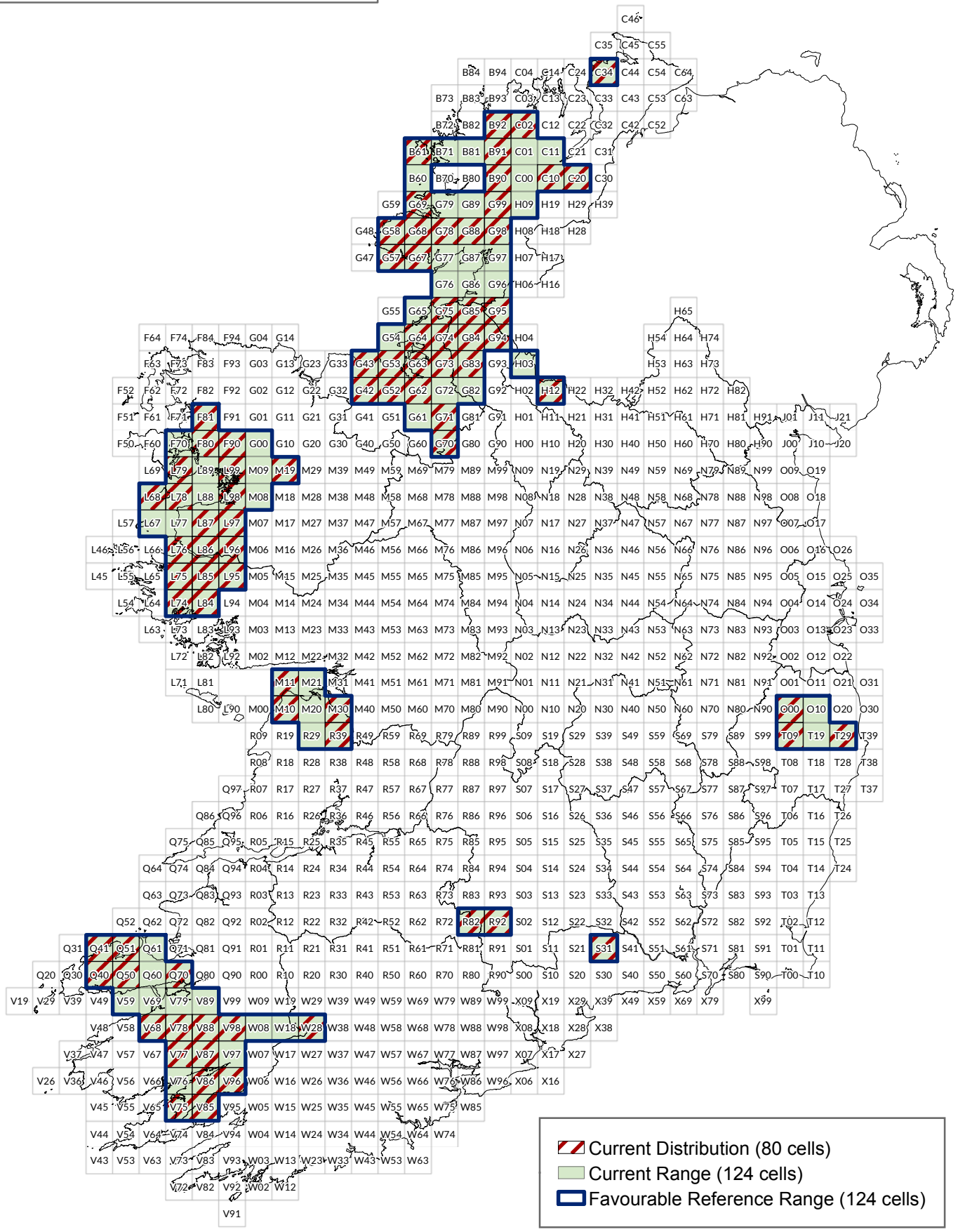
11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***2.59 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable** / increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing a union between the distribution polygon shapefile and the SAC shapefile, and an intersect between the distribution point shapefile and SAC shapefile. The area given in section 11.1 is the total area of 8210 habitat in SACs in the country, including some SACs where 8210 is not listed as a qualifying interest (QI). The area of 8210 within the Natura 2000 network where it is listed as a QI is 2.22 km^2. No anthropogenic loss of 8210 habitat was reported in the current reporting period. There was one inconsistency found between the Natura 2000 sites where the 8210 habitat is listed as a QI and the current distribution for the habitat. SAC IE0000453 (Carlingford Mountain SAC) has 8210 listed as a QI; however this SAC was surveyed by the NSUH (Roche *et al*. 2010b), with no 8210 habitat recorded during the survey. The short-term trend of the 8210 habitat in good condition within	

	the SAC network is taken to be stable, with the same trend as the 8210 habitat nationally (Section 6.4). The surface area of 8210 habitat within the Natura 2000 network has increased since last reporting period; this is due to the availability of more accurate data of the area of habitat 8210.

12 Complementary information

Calcareous rocky slopes with chasmophytic vegetation (8210) Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**8220 Siliceous rocky slopes with chasmophytic vegetation**
1.2i Habitat short name	**Siliceous rocky slopes**
1.3i Habitat description	Guidance on interpretation of habitat 8220 Siliceous Rocky Slopes in an Irish upland context has been provided by Perrin *et al.* (2014a). It comprises vertical or near vertical exposures of siliceous bedrock with clefts, crevices, fissures, and overhangs that support chasmophytic vegetation. Whilst there is no strict lower altitudinal threshold, this habitat is interpreted as referring to examples of chasmophytic vegetation occurring in a broadly upland landscape context. The vegetation is characterised by calcifuge ferns (e.g. *Dryopteris dilatata, Hymenophyllum wilsonii*), saxifrages (especially *Saxifraga spathularis*) and saxicolous bryophytes (e.g. *Andreaea* spp. and *Racomitrium heterostichum*) that require moist, shaded, infertile microhabitats. The habitat may include communities with affinities to the *Androsacion alpinae* association. According to the Irish Vegetation Classification (IVC) of Perrin (2017), most examples of the *Hymenophyllum wilsonii-Isothecium myosuroides* crevice community (RH2A) occur in habitat 8220 and elements of the *Angelica sylvestris-Breutelia chrysocoma* ledge community (RH2D) can also occur. Note that areas of heath, grassland or tall herb communities growing on rock faces or ledges are not included in habitat 8220 and while the presence of arctic-alpine species indicates high-quality examples of the habitat, they are not deemed an essential requisite.

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***1975-2016***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was derived from a polygon shapefile and a point shapefile. These shapefiles were created by compiling relevant data that referred to habitat 8220 or Fossitt code ER1 (Fossitt 2000) or a relevant NPWS habitat code in their attributes. Sources include Coillte Biodiversity Dataset (various dates), Hodd (2015a, 2015b, 2016), Perrin *et al.* (2014b, 2014c), Perrin (2017), and

	the Clubmoss Monitoring Survey (O'Neill *et al*., in prep.). In addition to these, sources utilised for the distribution map from the last reporting period (NPWS 2013a) were also included: 13 sites from the National Survey of Upland Habitats (NSUH) (Perrin *et al.* 2011, 2012, 2013a-e; Roche *et al.* 2009, 2010a, 2010b, 2011a, 2011b, 2012), Barron & Perrin (2011), Ballycroy, Connemara and Glenveagh National Park Habitat Maps, NPWS (2007, 2013b), the NPWS Habitat Assignment Project (original survey work for the Habitat Assignment Project commenced in 1975) and aerial photograph interpretation based on pers. comm. with C. Douglas (NPWS). All references are detailed below in Section 3.2. A certainty rating system was applied to all data that informed the distribution map. This system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1 the lowest. Of the new data sources added since the last round of reporting (NPWS 2013a), Perrin *et al.* (2014b, 2014c) and Clubmoss Monitoring Survey (O'Neill *et al*., in prep.) were judged to be a high certainty of 3. Hodd (2015a, 2015b, 2016) were assigned a certainty of 2 due to the habitat information only containing the Fossitt code ER1. The majority of points from Perrin (2017) were also assigned a certainty of 2 as there were no habitat data included, only affinities to Annex I habitats. One point from Perrin (2017) was assigned a certainty of 3 as the Annex I habitat was recorded. The Coillte Biodiversity Dataset polygons were assigned a certainty of 2 for those which were ground-truthed and a certainty of 1 for those where 8220 was not listed as present under the Annex I habitats section in the shapefile but was listed as present within the biomanagement plans. Certainty 3s were not assigned to the Coillte Biodiversity Dataset due to the age of the data (surveyed in early 2000s). Certainty values from the datasets utilised during the last reporting period were not reassigned for the purposes of the distribution map as the classes within the certainty rating system are fairly broad, and the 8220 habitat itself is relatively stable. All polygons and points with certainty 1 to 3 were used to map the distribution of the 8220 habitat.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Aerial photograph interpretation and pers. comm. C. Douglas (NPWS). For the previous reporting period (NPWS 2013a) a number of points were added for slopes on Slieve Snaght, Slieve Main, the Knockalla Mountains, Bulbin and the Urris Hills in northeast Donegal. These points were carried through for this reporting period. Ballycroy National Park Habitat Map is an NPWS project which compiled habitat data from available information. Datasets used

were from 1991-2009.

Barron, S. & Perrin, P. (2011) Production of a habitat map for Killarney National Park, Co. Kerry. Unpublished report to National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin.

Coillte Biodiversity Dataset. GIS files and individual site management plans were made available by Coillte. Datasets used were from 2001 to 2004.

Connemara National Park Habitat Map is an NPWS map based on aerial photographic interpretation and field visits conducted by G. Kaule from the University of Stuttgart in 2008.

EPA (2017) A summary of the state of knowledge on climate change impacts for Ireland: Report 11 (2010-2016). Prepared for the Environmental Protection Agency by MaREI Centre, Environmental Research Institute, University College Cork. M. Desmond, P. O'Brien and F. McGovern. EPA, Wexford. https://www.epa.ie/researchandeducation/research/researchpublications/researchreports/EPA%20RR%20223_web.pdf

Fossitt, J.A. (2000) *A guide to habitats in Ireland*. The Heritage Council, Kilkenny. https://www.npws.ie/sites/default/files/publications/pdf/A%20Guide%20to%20Habitats%20in%20Ireland%20-%20Fossitt.pdf

Glenveagh National Park Habitat Map is an NPWS map produced in 2010 based on the NHA survey data collected between 1991 and 1994. The map is derived from the best information available at the time, site visits and aerial photograph interpretation.

Habitat Assignment Project. An NPWS spreadsheet noting the qualifying interest of SACs and other habitats which occur in SACs, NHAs and pNHAs. This table was used as a reference for incorporating polygon data for SACs, NHAs and pNHAs.

Hodd, R.L. (2015a) Survey of Flora Protection Order Bryophytes 2015. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.

Hodd, R.L. (2015b) Survey of Flora Protection Order Bryophytes in Cork and Kerry (H1-H5). Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.

Hodd, R.L. (2016) Survey of Flora Protection Order Bryophytes 2016. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.

Hodd, R.L., Bourke, D. & Skeffington, M.S. (2014) Projected Range Contractions of European Protected Oceanic Montane Plant Communities: Focus on Climate Change Impacts Is Essential for Their Future Conservation. *PLoS ONE* 9(4): e95147. doi:10.1371/journal.pone.0095147. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0095147

JNCC (2009) Common Standards Monitoring Guidance for Upland Habitats. Joint Nature Conservation Committee, Peterborough.

NPWS (2007) GIS shapefiles created during the 2001-2006 assessment of this habitat.

NPWS (2013a) The Status of EU Protected Habitats and Species in

Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin. https://www.npws.ie/sites/default/files/publications/pdf/Article_17_Print_Vol_2_report_habitats_v1_1_0.pdf

NPWS (2013b) Management Planning Support Unit Maps 2405_imap95 (CPU_Habitats_March_2012.shp)

NPWS_Approx_Wildfire_Locations_Polygon_2017.shp. An NPWS derived shapefile based on data received from NPWS field staff on wildfires which occurred in Spring 2017.

O'Neill, F.H., Long, M.P. & Hodd, R.L. (in prep.) Monitoring of the Annex V Clubmoss group (*Lycopodium* spp.) in Ireland 2015-2018. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland.

Perrin, P. (2017) Irish Vegetation Classification: Technical Progress Report No. 3. Report submitted to National Biodiversity Data Centre. http://www.biodiversityireland.ie/projects/national-vegetation-database/irish-vegetation-classification/explore/

Perrin, P.M., Roche, J.R. & Barron, S.J. (2011) National Survey of Upland Habitats (Phase 1, 2010 - 2012) Site Report No 1: Mweelrea, Sheeffry, Erriff Complex cSAC (001932), Co. Mayo. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH10_Mweelrea_Sheeffry_Erriff_Report_01c_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J. & Daly, O.H. (2012) National Survey of Upland Habitats (Phase 2, 2011-2012), Site Report No. 7: Mount Brandon cSAC (000375), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH11_Mount_Brandon_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013a). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 10: Ox Mountains Bogs cSAC (002006), Cos. Mayo and Sligo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Ox_Mountains_Bogs_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013b). National Survey of Upland Habitats (Phase 3, 2012-2013), Draft Site Report No. 11: Ben Bulben, Gleniff and Glenade Complex cSAC (000623), Co. Sligo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013c). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 12: Arroo Mountain cSAC (001403), Co. Leitrim. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Arroo_Mountain_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013d). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 13: Cuilcagh – Anierin Uplands cSAC (000584), Cos. Cavan and Leitrim. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Cuilcagh_Anierin_Uplands_Report_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon, C.S. & Leyden, K.J. (2013e). National Survey of Upland Habitats (Phase 3, 2012-2013), Site Report No. 14: Slieve League cSAC (000189), Co. Donegal. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH12_Slieve_League_Report_01b_M.pdf

Perrin, P.M., Barron, S.J., Roche, J.R. & O'Hanrahan, B. (2014a) Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland. Version 2.0. *Irish Wildlife Manual*s, No. 79. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/IWM79.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014b). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 15: Slieve Mish Mountains cSAC (002185), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH13_Slieve_Mish_Mountains_01b_M.pdf

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014c). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 16: Caha Mountains cSAC (000093), Cos. Cork and Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH13_Caha_Mountains_01b_M.pdf

Roche, J.R., Perrin, P.M. & Barron, S.J. (2009) National Survey of Upland Habitats (Pilot Survey Phase, 2009-2010), Site Report No. 2: Corraun Plateau cSAC (000485), Co. Mayo. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/SPEU09_Corraun_Plateau_Report_01b_M.pdf

Roche, J.R., Perrin, P.M. & Barron, S.J. (2010a) National Survey of Upland Habitats (Pilot Survey Phase, 2009-2010), Site Report No. 3: Comeragh Mountains cSAC (001952), Co. Waterford. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/SPEU0

	9_Comeragh_Mountains_Report_01b_M.pdf Roche, J.R., Perrin, P.M. & Barron, S.J. (2010b) National Survey of Upland Habitats (Pilot Survey Phase, 2009-2010), Site Report No. 4: Carlingford Mountain cSAC (000453), Co. Louth. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/SPEU09_Carlingford_Mountain_Report_01b_M.pdf Roche, J.R., Perrin, P.M. & Barron, S.J. (2011a) National Survey of Upland Habitats (Phase 1, 2010 - 2012), Site Report No. 6: Croaghaun / Slievemore cSAC (001955), Co. Mayo. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH10_Croaghaun_Slievemore_Report_01b_M.pdf Roche, J.R., Perrin, P.M. & Barron, S.J. (2011b) National Survey of Upland Habitats (Phase 1, 2010 - 2012), Draft Site Report No. 5: Nephin Mountain, Co. Mayo. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland. Roche, J.R., Perrin, P.M., Barron, S.J. & Daly, O.H. (2012) National Survey of Upland Habitats (Phase 2, 2011-2012), Site Report No. 9: Galtee Mountains cSAC (000646), Cos. Tipperary and Limerick. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. https://www.npws.ie/sites/default/files/publications/pdf/NSUH11_Galtee_Mountains_Report_01b_M.pdf Wyse Jackson, P.S. (2007) The potential impact of climate change on native plant diversity in Ireland. https://www.bgci.org/resources/article/0571/ (accessed 03/05/2018).
3.2i Additional information	

4 Range

Range within the biogeographical/marine region concerned		
4.1 Surface area	***18,100 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** / *increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data***	

	c) Based mainly on expert opinion with very limited data *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 18,100 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable reference range has been increased since the last reporting period (NPWS, 2013a) to reflect the improved level of knowledge. There is no evidence of loss of range since the Directive came into force and the geographic spread is considered sufficient for the long term survival of the habitat.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 8220 habitat. A maximum gap distance of two 10km grid cells was used when running the range tool. Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS 2013a).	

	There were no recorded losses of area at the sample sites covered by the NSUH during these two reporting periods. The short-term trend assessed over the period 2007-2016 is stable and it is assumed that this is valid also over the default trend period of 2007-2018. Similarly, long-term trend was assessed as stable over the period 1994-2016 and this is assumed to be valid over the default long-term period of 1994-2018. It should be noted that the NSUH surveyed two 8220 habitat sites within this reporting period compared with 13 sites in the last reporting period, therefore limiting the conclusions that can be made. The number of 10km squares in the range (181) is 23 squares higher than the last monitoring period (NPWS 2013a) due to 8220 habitat recorded at Horn Head, Donegal (Hodd 2016) (five squares), Nowen Hill, Cork (Hodd 2015b) (one square), Slieve Mish Mountains (Perrin *et al.* 2014b) (three squares), Tibradden Mountain and Barnaslingan, Wicklow (three squares), the Vale of Avoca, The Devil's Glen, Carrick Mountain and Ballinastraw, Wicklow (three squares), Crownarad, Donegal (one square) and Doomore, Slieve Daeane and Carran Hill, Sligo (seven squares) (Coillte Biodiversity Dataset). The change in range is due to improved knowledge within the current reporting period rather than due to genuine change. Favourable Reference Range has been increased since the last reporting period (NPWS 2013a) to reflect the improved level of knowledge. The Favourable Reference Range is the current range, reported in Section 4.1.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***1975-2016***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***15.42 km^2***
5.3 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend	**a) Minimum**	

Magnitude *Optional*	**b) Maximum**	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator ≈ (approximately equal to) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
5.15 Additional information	The period over which the surface area of the habitat was determined begins in 1975 when original survey work for the Habitat	

Optional	Assignment Project commenced and incorporates updates made by surveys between 2006 and 2016 that are listed in Section 3.2. Area was calculated from the polygon shapefile and point shapefile used for distribution. For each point record not intersecting within a polygon that was yielding an area, 2000 m^2 of habitat was estimated. This was based on expert opinion applied in the previous reporting period and carried over to this reporting period in order to maintain consistency. Points intersecting within site boundaries of surveys carried out within the current reporting period, but not within 8220 habitat polygons, were examined individually, with all excluded for area. During the current reporting period 22 datasets with 8220 habitat recorded within them were utilised; Area was only fully assessed by the NSUH datasets (Perrin *et al.* 2014b, 2014c). The two NSUH sites (Caha Mountains SAC (000093) and Slieve Mish Mountains SAC (002185)) represent 5.5% of the total area of 8220 habitat recorded in Ireland, limiting the conclusions that can be made. More detailed survey work of the 8220 habitat is needed, and it is expected that the area listed in Section 5.2 will be refined as more in-depth mapping of the 8220 habitat is completed. In particular, any area represented within the dataset by only a point needs to be surveyed in more detail. In addition to refining the areas of 8220 habitat currently known, there are probably still areas of unmapped 8220 habitat within the country. The area value entered is therefore a minimum. Short-term trend in Area was deemed to be stable over the period 2005-2014 and this is assumed to be valid also over the default trend period of 2007-2018. At the sample of sites covered by the NSUH there is no evidence of loss of habitat since 2005. Similarly, long-term trend in Area was assessed as stable over the period 1995-2014 and is assumed to be stable over the default long-term trend period of 1994-2018. Favourable Reference Area (FRA) is deemed to be approximately equal to the current area. There is no information showing that an enlarged area is necessary for either typical species to reach favourable conservation status or for the necessary structures and functions to exist, therefore the surface area of the habitat when the Directive came into force in 1994 is taken to be the FRA. Whilst this figure is unknown it is deemed to be approximately equal to the current area as there is no evidence of significant declines since this time. The difference in habitat extent between this reporting period and the last is due to the availability of more accurate knowledge of the area of habitat 8220, resulting in the refinement of some large area estimates from the last reporting period. The majority of this refinement occurred in the Slieve Mish Mountains SAC (002185) and Caha Mountains SAC (000093) in Counties Cork and Kerry, with smaller refinements made to habitat 8220 area estimates in the Ox Mountains in County Sligo and Djouce Mountain in County Wicklow. Collectively there was a nett decrease of 1.536 km^2 in the reported area of 8220 habitat between the previous reporting period and this reporting period due to the availability of more accurate information.

	Additional surveys in this reporting period resulted in an addition of 0.820 km^2 8220 habitat which was previously unmapped. There has been no genuine change in area of 8220 habitat ((16.135-1.536) + 0.820 = 15.42 km^2).

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***13.27 km²***
		Maximum	***15.42 km²***
	b) Area in not-good condition	**Minimum**	***0 km²***
		Maximum	***2.15 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***		
6.7 Typical species Method used *Optional*	The list of typical species is the same as the last reporting period (NPWS 2013a). Typical species were assessed as an assemblage at the monitoring stop level within sites surveyed by the NSUH. At each monitoring stop at least one typical species was required to be present. As this was a baseline survey, trends for the assemblage and for individual species were not assessed.		
6.8 Additional information *Optional*	The NSUH (Perrin *et al.* 2014a) assessed Structure and functions at a monitoring stop level, using criteria to assess vegetation composition (including typical species), vegetation structure and physical structure. Criteria were adapted from the UK's Common Standards Monitoring (JNCC 2009) using expert judgement. The NSUH primarily		

	assesses SACs and is currently incomplete. A total of eight monitoring stops were recorded across both NSUH sites surveyed within this reporting period. There were no failures of any criteria. For full details see the NSUH site reports (Perrin *et al.* 2014b, 2014c). One relevé located in Co. Kerry, recorded in 8220 habitat as part of the Clubmoss Monitoring Survey (O'Neill *et al*., in prep.), was also utilised to assess the Structure and functions. This relevé lacks details pertaining to criteria which assess vegetation composition and structure, and physical structure, within the local vicinity of stops, and therefore represents a "best case" situation in this area for Structure and functions of 8220 habitat. There were no failures of any criteria assessed using the data from the Clubmoss Monitoring Survey (O'Neill *et al*., in prep.). Of the sites assessed for Structure and functions in this reporting period (covering an area of approximately 0.85 km^2), 100% of the area was assessed as being in good condition (Favourable). Equal weighting was given to each of the stops as each one assesses a comparable area of habitat. For the relevé from the Rare Plant Species Monitoring Survey, only the actual footprint of the relevé (1 m^2) could be used as no data from the local vicinity were recorded. The proportion in good condition (100%) and not-good condition (0%) was scaled up to the national estimate (15.42 km^2 in good condition and 0 km^2 in not-good condition); however as the area assessed for Structure and functions in this reporting period only represents 5.5% of the national area of habitat 8220, data from the last reporting period were also utilised. During the last reporting period 86.05% of the 8220 habitat was assessed as Favourable (NPWS 2013a). This equates to 13.27 km^2 of the current area of 8220 habitat and this figure is used as the minimum area in good condition. 13.95% of the 8220 habitat was assessed as Unfavourable (NPWS 2013a). This equates to 2.15 km^2 of the current area of 8220 habitat and this figure is used as the maximum area that is in not-good condition. The most frequent criteria to fail the Structure and functions assessment in the last reporting period were 'proportion of vegetation composed of non-native species' and 'number of positive indicator species present' (NPWS 2013a). The short-term trend of habitat area in good condition was taken to be stable as, based on the data recorded during this reporting period, there is no evidence that status has declined since the last reporting period. In fact, based on limited data, conclusions could be made that the status has improved; however, as this is based mainly on data from one part of the country (southwest Ireland: Cork and Kerry) with a poor national sample size, the trend was taken as stable based on expert opinion. The period over which the trend was examined was 2007-2016, and the assessment of stable is assumed to be valid also for the default trend period of 2007-2018. Typical indicator species for the 8220 habitat are: *Asplenium adiantum-nigrum*, *Athyrium filix-femina*, *Blechnum spicant*, *Dryopteris* spp. (count separately), *Hymenophyllum tunbridgense*, *Hymenophyllum wilsonii*, *Saxifraga spathularis* and *Sedum rosea*.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**I02** Other invasive alien species (other than species of Union concern) (M)	**I02** Other invasive alien species (other than species of Union concern) (M)

7.2 Sources of information

Optional

Pressures were sourced from the following reports and accompanying data:

Hodd, R.L. (2015a) Survey of Flora Protection Order Bryophytes 2015. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.

Hodd, R.L. (2015b) Survey of Flora Protection Order Bryophytes in Cork and Kerry (H1-H5). Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.

Hodd, R.L. (2016) Survey of Flora Protection Order Bryophytes 2016. Unpublished report to National Parks and Wildlife Service, Dublin, Ireland.

NPWS (2013a) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin.

NPWS_Approx_Wildfire_Locations_Polygon_2017.shp

O'Neill, F.H., Long, M.P. & Hodd, R.L. (in prep.) Monitoring of the Annex V Clubmoss group (*Lycopodium* spp.) in Ireland 2015-2018. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland.

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014b). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 15: Slieve Mish Mountains cSAC (002185), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014c). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 16: Caha Mountains cSAC (000093), Cos. Cork and Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

7.3 Additional information

Optional

Pressures and threats presented in 7.1 were selected and ranked based on intensity (high, medium, low), frequency of occurrence, and area of impact where data were available. Data gathered from the sources listed in Section 7.2 are summarised in the backing document '1601_NSUH17_IMPACTS'. For the current reporting

	period, data on pressures were available for two NSUH sites – Slieve Mish Mountains SAC (002185) and Caha Mountains SAC (000093) (Perrin *et al*. 2014b, 2014c). Data from a shapefile on locations of wildfires, which was provided by NPWS, were also utilised, with relevant data for 8220 habitat located at Kilgarrylander within the Slieve Mish Mountains and Breencorragh, Co. Sligo. Additional data from Hodd (2015b) and the Clubmoss Monitoring Survey (O'Neill *et al*., in prep.) were also used. As the data from the current reporting period only represent a small proportion of the data collected to inform NPWS (2013a), the pressures and threats information presented in NPWS (2013a) were also called upon to inform the current reporting period. In the previous reporting period sheep grazing in the uplands, both undergrazing and overgrazing, was recorded under 'A04.02.02 non-intensive sheep-grazing'. It was recorded as a low-importance pressure and threat for the 8220 habitat (NPWS 2013a). Using the crosswalk referenced in the backing document '1601_NSUH17_IMPACTS' to convert the old impact codes to the new impact recording scheme, A04.02.02 crosswalks to A10 (Extensive grazing or undergrazing by livestock). However at times the recorded impact should be considered under A09 (Intensive grazing or overgrazing by livestock). A10 (Extensive grazing or undergrazing by livestock) was recorded 11 times during the current reporting period, all as a neutral impact. For this reason, A10 was not assessed as a pressure for 8220 habitat for the current reporting period. A09 (Intensive grazing or overgrazing by livestock) was recorded at one site by Hodd (2015b), with medium intensity in this reporting period. Overgrazing can lead to erosion, nitrogen enrichment and damage to the vegetation of the 8220 habitat, with erosion (L01) also recorded once as a negative impact within the current reporting period. A09 was assessed as a low-importance pressure due to the lack of frequency of occurrence on 8220 habitat based on evidence from the previous and current reporting periods and expert opinion. All remaining pressures presented in NPWS (2013a) were considered for the current reporting period. For two of these there was additional evidence for their importance provided by the data collected during the current reporting period. These two pressures crosswalked to F07 (Sports, tourism and leisure activities) (recorded once during the current reporting period as a negative pressure) and I02 (Other invasive alien species (other than species of Union concern)) (recorded twice during the current reporting period as a negative pressure). Based on evidence collected over the last two reporting periods and expert opinion, F07 was retained as a low-importance pressure for 8220 habitat. The presence of *Epilobium brunnescens* was the main reason for 8220 habitat monitoring stops failing the Structure and functions assessment in the previous reporting period. With no new data to suggest that this pressure has been addressed and impacts reduced, it is retained as a medium-importance pressure. It is also considered to be a threat to the 8220 habitat. The low-importance impact J03 (Mixed source air pollution, air-borne pollutants) was recorded in NPWS (2013a) but not in this

	reporting period. It was retained as a low importance pressure for the current reporting period. A11 (Burning for agriculture), recorded within the current reporting period only, was also assessed as low-importance for 8220 habitat due to low frequency and area impacted upon. I04 (Problematic native species) (goats) was recorded once during the current reporting period as a negative pressure (Hodd 2015b). Based on evidence from the current reporting period and on expert opinion, it was assessed as a low-importance pressure for the 8220 habitat for this reporting period due to low frequency and area impacted upon. L01 (Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization)) in the form of erosion was also recorded once during the current reporting period. It was assessed as a low-importance pressure for the 8220 habitat due to low frequency and area impacted upon when scaled up to a national level. Climate change (N) was ranked as a low-importance threat in NPWS (2013a) but is predicted to impact on the occurrence of arctic-alpine plants in Ireland (EPA 2017; Wyse Jackson 2007) and some of these are found in high-quality examples of the 8220 habitat. The results of a recent study, based on predictive modelling, by Hodd *et al.* (2014) on potential impacts of climate change on oceanic montane plant communities suggest that there will be a reduction in area of all true montane habitats in Ireland, as defined by their characteristic species. This study, which largely focused on montane heath habitats, reports that many of the plant communities potentially impacted occur within a number of the habitats listed under Annex I of the EU Habitats Directive, including significant elements of Siliceous Rocky Slopes (8220). Arctic-montane species in particular are reported in this study to see areas of suitable climate either shift northwards or contract to higher elevations, while internationally important bryophyte communities are also considered to be under threat. The study points to a possible need to review current distribution of protected areas in the light of potential impacts of climate change on species geographic distribution. It is the habitats that are degraded from inappropriate land uses, and which are currently in inadequate or unfavourable condition, that will have the least resilience to the additional pressures of predicted climate changes. However without more habitat-specific quantitative research data it is very difficult to predict the time-frame for significant effects of climate change to manifest, and small but incremental changes may already be occurring. The key action must be to improve resilience of habitats by reducing the impact of inappropriate land uses and by undertaking habitat restoration where potential is highest in sufficient time to minimise impacts (C. Douglas, NPWS, pers. comm.). Until further information is available climate change is thus retained as a low-importance pressure for this reporting period, although in the longer term it is likely be a significant pressure and threat. Erosion (L01) and overgrazing were also recorded as low-importance threats to the 8220 habitat within this reporting period based on data from Hodd (2015a, 2015b, 2016).

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type** or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* ***a) Short-term results (within the current reporting period, 2013-2018)** or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	**CA03** Maintain existing extensive agricultural practices and agricultural landscape features
8.6 Additional information *Optional*	Conservation measures were selected using data from Hodd (2015a, 2015b, 2016), Clubmoss Monitoring Survey (O'Neill *et al*., in prep.), Perrin *et al.* (2014c) and from information provided by NPWS. Data from the NSUH, recorded in the previous reporting period, were also utilised where appropriate. The maintenance of extensive sheep grazing (recorded under CA03) as a conservation measure was recorded five times by Hodd (2015a, 2015b, 2016), while non-intensive sheep grazing was recorded as a neutral impact at the Caha Mountains SAC (000093) NSUH site and by the Clubmoss Monitoring Survey (O'Neill *et al.*, in prep.). It was also recorded at three other NSUH sites during the previous reporting period. In some cases the maintenance of extensive sheep grazing is undertaken through the Department of Agriculture's Green, Low Carbon, Agri-Environment Scheme (GLAS). This, however, is likely to be incidental for the 8220 habitat, based on it

	being present within an area managed under GLAS, rather than there being a targeted measure specific to this habitat. Details of participation in the GLAS scheme and of the uptake across various measures are not currently available. It is therefore not possible to precisely assess the effects of implementation of these measures. It should be recognised that the management regimes of most areas of 8220 habitat are driven by the landowner rather than by any formal management plan or policy; therefore the continued operation of the management regimes currently in place is not guaranteed across the entire habitat. A conservation measure that is not currently being implemented, but whose implementation would improve the Structure and functions of the habitat, is the control or removal of non-native species (CI03), particularly *Epilobium brunnescens*.

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	*Good /* ***Poor*** */ Bad / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as Stable. Current range is equal to Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as Stable, as no change in range is expected based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Range are therefore Good. Short-term trend direction of Area is assessed as Stable. Current area is approximately equal to the Favourable Reference Area. Conservation status of Area is therefore Favourable. Future trend of Area is assessed as Stable, as no change in Area is expected based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Area are therefore Good. Short-term trend direction is Stable for habitat that is in Good condition. Current Structure and functions are assessed as Unfavourable as <90% of habitat is in “Good” condition. A maximum estimate of 14% of 8220 habitat is in poor condition which equates to Unfavourable-Inadequate Structure and functions. As there are no high-importance pressures or threats recorded within this reporting period, the assessment of Unfavourable-Inadequate was retained for this reporting period. Conservation status of Structure and functions is therefore Unfavourable-Inadequate. Future trend of Structure and functions is assessed as Negative, as	

	the threat of I02 is expected to have a negative influence on Structure and functions. There is only a small niche for plant species representative of 8220 habitat, so even if a small area within the 8220 habitat is taken up by an invasive species, the native indicator species are displaced. This pressure will only become more significant when combined with the effects of climate change on the 8220 habitat. There is no current conservation measure in place to control the spread of *Epilobium brunnescens* within the 8220 habitat. Future prospects of Structure and functions are therefore Poor.

10 Conclusions

Assessment of conservation status at end of reporting period

10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/****NO***	*YES/****NO***
	b) yes, due to genuine change	*YES/NO*	*YES/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	*YES/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/NO*

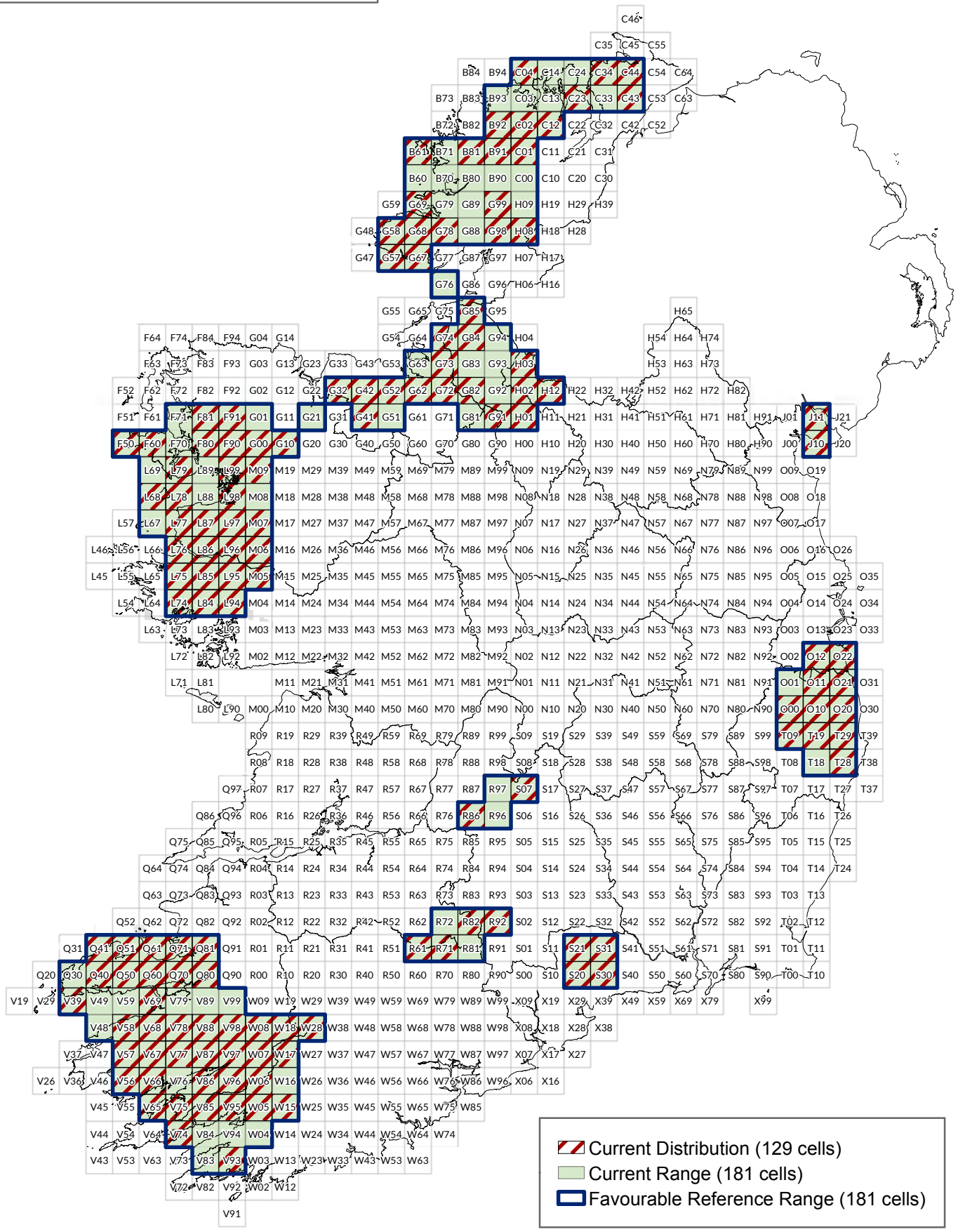
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	The Conservation Status of Range and Area are Favourable in this reporting period, as they were in the previous reporting period. The Conservation Status of Structure and functions and Future prospects are Unfavourable-Inadequate in this reporting period, as they were in the previous reporting period. The Overall Conservation Status was assessed as Unfavourable-Inadequate, as it was during the last reporting period. The status of Unfavourable-Inadequate during the current reporting period was due to <90% of the area of 8220 habitat being assessed as having Favourable Structure and functions. Overall Trend in Conservation Status was assessed as stable in this reporting period, as it was during the last reporting period.		

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***14.43 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable*** */ increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing a union between the distribution polygon shapefile and the SAC shapefile, and an intersect between the distribution point	

	shapefile and SAC shapefile. The area given in section 11.1 is the total area of 8220 habitat in SACs in the country, including some SACs where 8220 is not listed as a qualifying interest (QI). The area of 8220 within the Natura 2000 network where it is listed as a QI is 11.41 km^2. No anthropogenic loss of 8220 habitat was reported in the current reporting period. There were no inconsistencies between the Natura 2000 sites where the 8220 habitat is listed as a QI and the current distribution for the habitat. The short term trend of the 8220 habitat in good condition within the SAC network is taken to be stable, with the same trend as the 8220 habitat nationally (Section 6.4). The reported surface area of 8220 habitat within the Natura 2000 network has decreased since the last reporting period; this is due to improved knowledge lending itself to a refinement of area totals (see Section 5.15 for details).

12 Complementary information

Siliceous rocky slopes with chasmophytic vegetation (8220) Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Habitat code / name	**8240 Limestone pavements***
1.2i Habitat short name	**Limestone pavement**
1.3i Habitat description	8240 Limestone pavements is a priority EU Annex I habitat. The structure of the 8240 Limestone pavement habitat typically consists of blocks of rock, known as clints, separated by fissures or grikes. Sometimes due to weathering this structure is less defined, especially in the 'shattered' variant of pavement. Limestone pavement can occur as areas of exposed rock with very little vegetation or in association with grassland, heath, scrub, or woodland communities. The main vascular plant species associated with the 8240 habitat include scattered low-growing woody species such as *Corylus avellana, Hedera helix, Ilex aquifolium, Rosa spinosissima* and *Rubus fruticosus,* and herbaceous species such as *Sesleria caerulea, Teucrium scorodonia, Mycelis muralis, Geranium robertianum, Senecio jacobaea, Carlina vulgaris* and *Carex flacca*. A suite of calcicole ferns are also usually found, including *Asplenium ruta-muraria, Ceterach officinarum* and, in the deeper grikes, the shade-loving *Phyllitis scolopendrium*. Characteristic bryophytes are *Ctenidium molluscum, Tortella tortuosa* and *Neckera crispa*. The wooded variant of 8240 Limestone pavement has been recorded in areas of hazel woodland with a low canopy of at least 3 m and minimal soil depth. Under canopy the surface of the limestone pavement is sometimes completely covered by bryophytes such as *Eurhynchium striatum, Neckera crispa* and *Thamnobryum alopecurum*. The 8240 habitat has been defined within Irish vegetation communities RH1A *Asplenium trichomanes-Ctenidium molluscum* crevice community, RH1B *Teucrium scorodonia-Mycelis muralis* pavement community, and the woodland community WL2E *Corylus avellana-Potentilla sterilis* (Perrin, 2018a-c).

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***2007-2017***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*

2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was compiled from 8240 polygons digitised by NPWS (2007), Wilson and Valverde (2013), O'Neill *et al*. (2013), O'Neill and Martin (2015), Galway County Council (2017), and Martin *et al*. (2018). A four-point scale of low, medium, high and certain was applied to all 8240 polygons, following the scale utilised by NPWS (2013). Data sources listed in Section 3.2 that are known to represent the 8240 habitat were assigned the highest value of certain. All data sources within the scale low to certain were used to map the current distribution for the 8240 habitat as they were in the previous reporting period (NPWS, 2013). Following a review of the 8240 data collected during NPWS (2013), using remote imagery and the data sources listed in Section 3.2, 267 of the 8240 areas were remapped as non-Annex habitat due to anthropogenic losses. These areas were removed from the current distribution and range but were utilised when calculating the Favourable Reference Range.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	EPA (2017) A Summary of the State of Knowledge on Climate Change Impacts for Ireland: Report 11 (2010-2016). Prepared for the Environmental Protection Agency by MaREI Centre, Environmental Research Institute, University College Cork. M. Desmond, P. O'Brien and F. McGovern. EPA, Wexford. Galway County Council (2017) Unpublished data collected for the Galway City Transport Project. Martin, J.R., O'Neill, F.H. and Daly, O.H. (2018) The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats. *Irish Wildlife Manuals*, No. 102. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin. NPWS (2007) Habitat assignment project. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin. O'Neill, F.H. and Martin, J.R. (2015) Summary of findings from the Survey of Potential Turloughs 2015. Volume I: Main Report.

	Unpublished Report for National Parks and Wildlife Service, Dublin. O'Neill, F.H. and Martin, J.R. (2018) The Irish Juniper Monitoring Survey 2017. *Irish Wildlife Manuals*, No. 101. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin. O'Neill, F.H., Martin, J.R., Devaney, F.M. and Perrin, P.M. (2013) The Irish Semi-natural Grasslands Survey 2007-2012. *Irish Wildlife Manuals*, No. 78. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. Perrin (2018a) Irish Vegetation Classification: Community synopsis RH1A *Asplenium trichomanes - Ctenidium molluscum* crevice community. http://www.biodiversityireland.ie/wordpress/wp-content/uploads/RH1A.pdf. Accessed February 2018. Perrin (2018b) Irish Vegetation Classification: Community synopsis RH1B *Teucrium scorodonia - Mycelis muralis* pavement community. http://www.biodiversityireland.ie/wordpress/wp-content/uploads/RH1B.pdf. Accessed February 2018. Perrin (2018c) Irish Vegetation Classification: Community synopsis WL2E *Corylus avellana - Potentilla sterilis* woodland. http://www.biodiversityireland.ie/wordpress/wp-content/uploads/WL2E.pdf. Accessed February 2018. Wilson, S. and Valverde, F. (2013) National Survey of Limestone Pavement and Associated Habitats in Ireland. *Irish Wildlife Manuals*, No. 73. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.
3.2i Additional information	

4 Range

Range within the biogeographical/marine region concerned

4.1 Surface area	***9,000 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 9,000 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable reference range established during the last reporting period (NPWS, 2013) was retained. There is no evidence of loss of range since the Directive came into force and the geographic spread is considered sufficient for the long-term survival of the habitat.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods? YES/**NO*** *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/NO*
	b) yes, due to improved knowledge/more accurate data	*YES/NO*
	c) yes, due to the use of different method	*YES/NO*
	d) yes, but there is no information on the nature of change	*YES/NO*
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data / the use of a different method*	
4.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of the 8240 habitat. A maximum gap distance of two 10 km grid cells was used when running the range tool. Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013). None of the area losses recorded during these two reporting periods led to a contraction in the range. Trend was assessed as stable over the period 2007-2017 but is assumed to be stable also over the	

	default period of 2007-2018. The Favourable Reference Range (FRR) was calculated using the range tool, based on the current known distribution of the 8240 habitat and the recorded losses since the last reporting period. The FRR was calculated to be the same as the one reported during the last reporting period (NPWS, 2013).

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2004-2017***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***320.05 km^2***
5.3 Type of estimate	*Best estimate / 95% confidence interval / **minimum***	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	*stable / increasing / **decreasing** / uncertain / unknown*	
5.11 Long-term trend	**a) Minimum**	

Magnitude *Optional*	**b) Maximum**	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Operator > (greater than) *or*	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	***YES****/NO*
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): ***genuine change*** */ improved knowledge or more accurate data / the use of a different method*	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 2007 and incorporates updates made during the last reporting period (NPWS, 2013) and surveys that have taken place during the current reporting period: O'Neill and Martin (2015), O'Neill and Martin (2017), Galway County Council (2017), and Martin *et al*. (2018). There are probably still areas of unmapped 8240 habitat within the country, hence the area value entered is a minimum. Favourable Reference Area was not determined exactly. However, it is deemed to be greater than, but <10% greater than, the current area, given that anthropogenic losses have occurred since the Directive came into force. As part of this report 73% of the 321.85 km^2 of 8240 habitat mapped during the previous reporting period (NPWS, 2013) was reviewed, mostly using 2017 remote sensing imagery, but also using survey information collected during the current reporting period (listed above). This review added areas of 8240 to the distribution that had not previously been mapped as 8240. Of the area reviewed, 2.45 km^2, representing 1% of the reviewed area, had been lost. The conversion of Limestone pavement into agricultural land was the main reason	

	for the loss of 8240 habitat, accounting for 78% of the lost area. Short-term trend in Area was deemed to be decreasing because the national area of 8240 had been reduced by 2.45 km^2 due to anthropogenic factors. Calculating the magnitude of the known loss was complicated by the fact that the previous reporting period (NPWS, 2013) relied on remote sensing imagery from 2005, as the 2011 imagery was not available until after the NPWS 2013 data had been collected. Therefore during the current reporting period both the 2011 and 2017 remote sensing imagery was examined. Of the losses reported during the current reporting period, 81% occurred between 2005 and 2011, 14% occurred between 2011 and 2017, and the remaining 5% either occurred during 2017 (Sharon Parr, pers. comm.) or took place before 2005 but were not recorded by NPWS (2013). The magnitude of the known 1% loss is approximately -0.1% per annum, measured over a weighted average period of 8.3 years.

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***255.08 km²***
		Maximum	***255.08 km²***
	b) Area in not-good condition	**Minimum**	***64.97 km²***
		Maximum	***64.97 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	*stable / **increasing** / decreasing / uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***		

6.7 Typical species Method used *Optional*	The typical species from NPWS (2013) were used.
6.8 Additional information *Optional*	The area of 8240 habitat in good condition was estimated based on three sites surveyed during the current reporting period. The main site that was surveyed was a 74.50 ha area of 8240 habitat associated with Lough Corrib SAC (site code 000297) where 83 monitoring stops were recorded (Galway County Council, 2017). Data were also collected from two smaller sites in Clare and Galway (O'Neill and Martin, 2017) and these data were used to assess 8240 areas of 8.36 ha and 5.60 ha respectively, with one monitoring stop recorded within each area. The approximate area of each site with Favourable Structure and functions was calculated based on the percentage of monitoring stops that were assessed to have Favourable Structure and functions. For the large area within the Lough Corrib SAC, 75.9% of the monitoring stops were recorded as having Favourable Structure and functions and therefore 75.9% of the area was assigned as being in good condition. For the two smaller sites, both stops passed the Structure and functions assessment and therefore 100% of both areas were assigned as being in good condition. Overall 79.7% of the surveyed 8240 area was assigned as having Favourable Structure and functions. As the three sites only represent 0.3% (88.46 ha) of the national area of 8240 the subsample is very small, however it appears to be representative of the national resource, with a similar overall result to the previous reporting period which was also in the range >75% to <100% Favourable Structure and functions. The main reason that exposed 8240 limestone pavement failed the Structure and functions assessment was high cover of scrub or negative indicator species such as *Rubus fruticosus* agg. The Burren Programme reported that the conservation measures they have applied have improved the Structure and functions of Annex I habitats, including Limestone pavement, within the areas covered by the scheme (Sharon Parr, pers. comm.).

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**A01** Conversion into agricultural land (H) **A10** Extensive grazing or undergrazing by livestock (M)	**A01** Conversion into agricultural land (H) **A10** Extensive grazing or undergrazing by livestock (M)

	C01 Extraction of minerals (M) **F01** Conversion from other land uses to housing (M) **I02** Other invasive alien species (M)	**C01** Extraction of minerals (M) **F01** Conversion from other land uses to housing (M) **I02** Other invasive alien species (M)
7.2 Sources of information *Optional*	Pressures were recorded from O'Neill and Martin (2017), Galway County Council (2017), and the 8240 habitat area review discussed above in Section 5.15, with the reviewed 8240 areas that were lost due to human impacts presented in the shapefile ISGS15_AR1719_8240_NCADist_Hist_polygons_FRR_01a.	
7.3 Additional information *Optional*	Pressures and threats were selected and ranked based on intensity (high, medium or low), frequency of occurrence, and area of impact, using the data gathered during O'Neill and Martin (2017), Galway County Council (2017) and the 8240 area review discussed above in Section 5.15. The pressure that contributed to the largest areas of 8240 habitat loss, as calculated from the data presented in the shapefile ISGS15_AR1719_8240_NCADist_Hist_polygons_FRR_01a, was A01, which accounted for 78% of the 8240 habitat loss. A01 is listed as the one high-importance pressure due to its significant impact on the 8240 habitat. C01 and F01 accounted for 11% and 7% of 8240 habitat loss respectively, as calculated from the data presented in the shapefile ISGS15_AR1719_8240_NCADist_Hist_polygons_FRR_01a, and both are listed as medium-importance pressures. The pressure A10 was not recorded within the 8240 habitat area review but was recorded twice, once by O'Neill and Martin (2017) and once by Galway County Council (2017), as a high-intensity impact. Based on expert opinion A10 is considered to be a medium-importance pressure nationally. I02 was recorded at one site by O'Neill and Martin (2017) as a high-intensity impact and was recorded twice by Galway County Council (2017) as a low-intensity impact. Based on expert opinion I02 is considered to be a medium-importance pressure nationally. A10 has been listed as an important pressure due to the fact that undergrazing leads to succession to scrub and woodland and a reduction in the area of more open 8240 Limestone pavement habitats. This results in a reduction in the ecological niches the habitat can provide and an overall reduction in the Structure and functions. Frequent alien invasive species recorded within the 8240 habitat under the medium-importance pressure I02 were *Cotoneaster* species*, Acer pseudoplatanus,* and *Berberis thunbergii.* It should be noted that the pressure of building housing (F01) on the 8240 habitat was not recorded during the previous reporting period (NPWS, 2013), but during the 8240 habitat area review instances of housing being built on areas of limestone pavement were recorded at a high enough frequency for the pressure to be ranked as medium importance nationally. Conversion from the 8240 habitat to commercial or industrial areas (F03) was also recorded during the 8240 habitat area review but at a much lower frequency and was therefore assessed as a low-importance pressure nationally and not	

	listed in Section 7.1. Problematic native species (I04), such as *Pteridium aquilinum*, were recorded as a medium-importance pressure and threat during the previous reporting period (NPWS, 2013). *Pteridium* was recorded within the 8240 habitat during the current reporting period but as a low-intensity impact and this difference is considered to be due to an interpretative change rather than any actual change in the occurrence of *Pteridium* within the habitat. The removal of small landscape features (A05), such as scrub, was recorded as a low-importance pressure during the current and the previous recording period. Although scrub clearance can also be recorded as the positive conservation measure CA05: The adaptation of agricultural activities, it is recorded as a pressure when the scrub removal results in excessive disturbance or damage to the 8240 Limestone pavement habitat. Further research on the impacts of climate change on this habitat is required. Impacts may affect the range and species composition of the habitat in the future but it is difficult to determine what level of importance should be assigned at this stage (EPA, 2017). The five current pressures listed are also considered to be the five main threats in the future.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type** or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*

8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* ***a) Short-term results (within the current reporting period, 2013-2018)*** *or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	**CA03** Maintain existing extensive agricultural practices and agricultural landscape features **CA05** Adapt mowing, grazing and other equivalent agricultural activities
8.6 Additional information *Optional*	Conservation measures were selected based on their frequency of occurrence, using the data gathered during O'Neill and Martin (2017), Galway County Council (2017), and information provided by the Burren Programme and AranLIFE project (see below). The maintenance of extensive cattle grazing and horse grazing (recorded under CA03) were the only conservation measures recorded by O'Neill and Martin (2017) and Galway County Council (2017). O'Neill and Martin (2017) recorded the positive measure of extensive cattle grazing at two sites, and Galway County Council (2017) recorded the same measure once and extensive horse grazing once. In some cases the maintenance of extensive grazing is undertaken through the Department of Agriculture's Green, Low-Carbon, Agri-Environment Scheme (GLAS). Scrub clearance (recorded under CA05) is also a frequently applied conservation measure within the Burren Programme, which covers approximately 25,000 ha of farmland (Andy Bleasdale, pers. comm.) within the most important area in the State for the habitat. Scrub clearance has also been carried out by the AranLIFE project to control encroachment in areas of Limestone pavement (Amanda Browne, pers. comm.). It should be recognised that the management regimes of most areas of 8240 habitat are driven by the landowner rather than by any formal management plan or policy; therefore the continued operation of the management regimes currently in place is not guaranteed across all of the habitat. Other conservation measures that are not currently being widely implemented, outside the Burren Programme, but whose implementation would improve the Structure and functions of the habitat, include CA04 (Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures), and the control or removal of non-native species, particularly invasive species such as *Cotoneaster* spp.

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	*Good /* ***Poor*** */ Bad / Unknown*

	c) Structure and functions	*Good / **Poor** / Bad / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as Stable. Current range is equal to the Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as Stable, as the range is expected to stay the same based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Range are therefore Good. Short-term trend direction of Area is assessed as Decreasing. Current area is <10% smaller than the Favourable Reference Area. Conservation status of Area is therefore Unfavourable-Inadequate with the magnitude of the known loss -0.1% per annum. Future trend of Area is assessed as negative, as the area is expected to decrease based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Area are therefore Poor. Current Structure and functions are assessed as Unfavourable-Inadequate as >75% but <90% of the habitat is in "Favourable" condition. Short-term trend direction is Increasing (for habitat that is in Good condition). Conservation status of Structure and functions is therefore Unfavourable-Inadequate. Future prospects of Structure and functions are therefore Poor.	

10 Conclusions

Assessment of conservation status at end of reporting period

10.1 Range	***Favourable (FV)** / Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating / **stable** / unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***

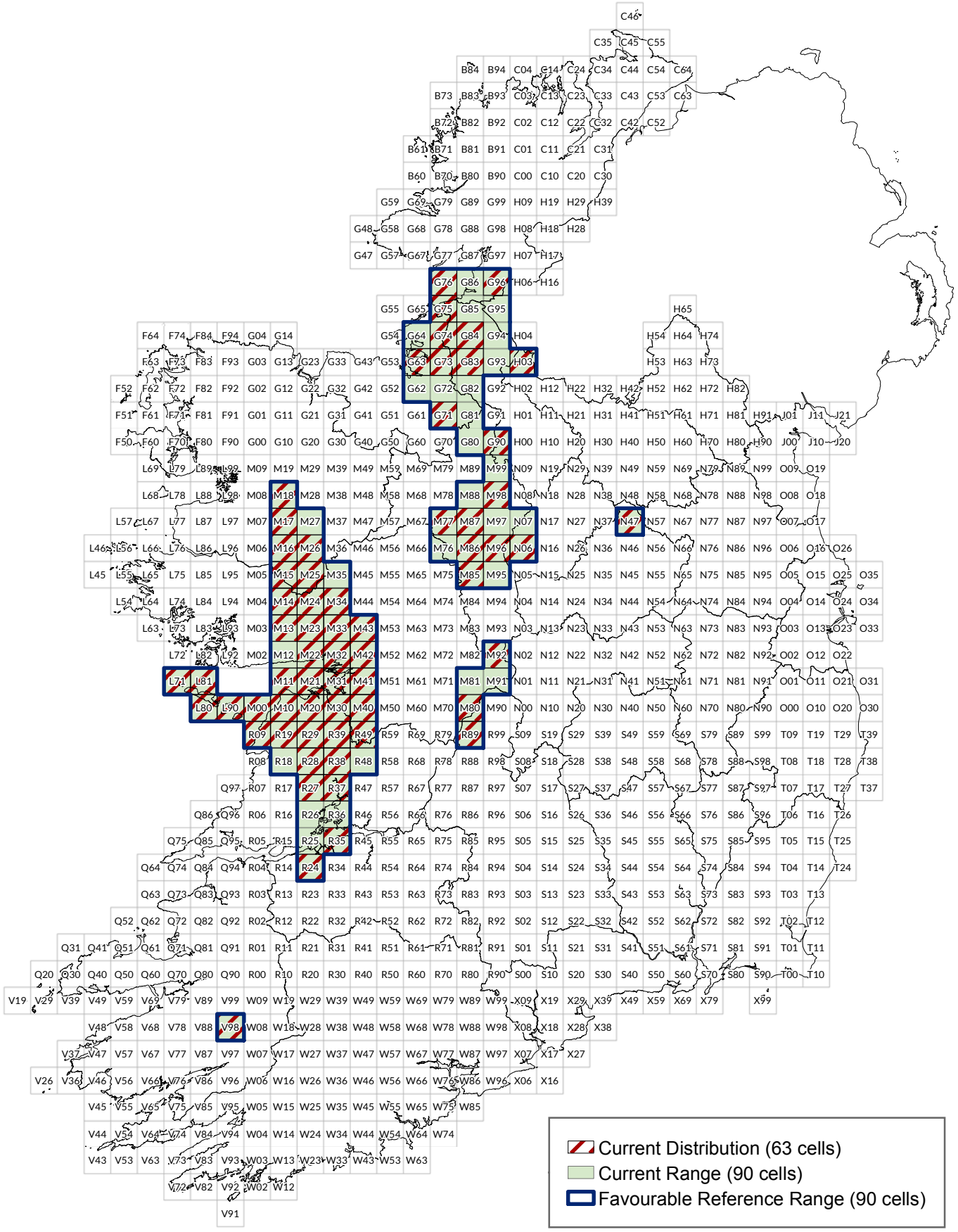
	a) no, there is no difference	*YES/**NO***	*YES/**NO***
	b) yes, due to genuine change	*YES/NO*	*YES/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	*YES/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	The Overall Conservation Status was assessed as Unfavourable-Inadequate, as it had been during the last reporting period. The status of Unfavourable-Inadequate during the current reporting period was due to a loss in area of -0.1% per annum and the fact that 79.7% of the surveyed area had Structure and functions in good condition. Overall trend in Conservation Status was assessed as Stable during the current reporting period. This is due to the fact that although areas of the 8240 habitat have been lost during the current reporting period the rate of loss is relatively low, at -0.1% per annum, and is counteracted by the increasing trend in Structure and functions. During the previous reporting period (NPWS, 2013) the overall trend had been assessed as Stable, as there had been very little data available for assessing the area of the 8240 habitat that had been lost.		

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***265.39 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval / **minimum***	

11.3 Surface area of the habitat type inside the network **Method used**	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
11.4 Short-term trend of habitat area in good condition within the network **Direction**	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* *stable / **increasing** / decreasing / uncertain/ unknown*
11.5 Short-term trend of habitat area in good condition within network **Method used**	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
11.6 Additional information *Optional*	The area within the network was estimated by performing an intersect between the 8240 distribution shapefile and the SAC shapefile. The area given in section 11.1 is the total area of the 8240 habitat in SACs in the country, including some SACs where the habitat is not listed as a qualifying interest (QI). The area of 8240 within the N2000 network where it is listed as a QI is 260.33 km^2. 10% of the 2.45 km^2 of the 8240 habitat lost during the current reporting period was within SACs. Of this loss, all except 73.19 m^2 was from twelve SACs where the 8240 habitat is listed as a QI. The largest loss of 12.13 ha was from the East Burren Complex SAC (site code 001926) where the 8240 habitat is listed as a QI representativity A. There is one inconsistency between the current distribution of the habitat and the SACs where 8240 is listed as a QI: no 8240 habitat was found in Barrigone SAC (000432), which lists 8240 as a QI. The short-term trend of the habitat area in good condition within the SAC network is taken to be increasing, with the same trend as the 8240 habitat nationally.

12 Complementary information

Limestone pavement* (8240)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Habitat code / name	**8310 Caves not open to the public**
1.2i Habitat short name	**Caves**
1.3i Habitat description	There is little evidence that Irish caves support much in the way of specialised or endemic fauna. However, the lesser horseshoe bat (*Rhinolophus hipposideros*), which is listed on Annex II of the Habitats Directive, occurs in caves in Ireland. Consequently, in practice, this EU habitat is confined in Ireland to caves which are not used for tourism and host important numbers of lesser horseshoe bat. The lesser horseshoe bat is restricted to six western counties: Mayo, Galway, Clare, Limerick, Kerry and Cork. It requires cool, stable temperatures and minimal disturbance for winter hibernation and suitable caves are selected where available. Lesser horseshoe bats may also turn up in caves at other times of year, although not in significant numbers.

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***2013-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	Dr David Drew (TCD) has compiled a database of all the known caves in Ireland. He has made this dataset available to NPWS. NPWS have a database of all known lesser horseshoe bat roosts in Ireland. The range of this habitat has been estimated by overlaying the cave dataset with the lesser horseshoe bat data from 2013 – 2018. The lesser horseshoe bat has been well surveyed over the last 30 years (e.g. Kelleher, 2004; McAney, 2016; Aughney *et al*., 2018) and NPWS holds a comprehensive and up-to-date dataset of roost locations. The Drew dataset is considered to be comprehensive. Monitoring of the lesser horseshoe bat at cave sites is carried out by staff of NPWS and the quality of the data is excellent. That said, not all caves are

	surveyed and new roosts are occasionally found; there are likely to be additional cave sites used by these bats that we are not aware of.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	***Atlantic,*** *Marine Atlantic*
3.2 Sources of information	Aughney, T., Roche, N. & Langton, S. (2018) The Irish Bat Monitoring Programme 2015-2017. *Irish Wildlife Manuals,* No. 103. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. Dool S.E., Puechmaille, S.J., Kelleher, C., McAney, K. & Teeling, E. (2016) The effects of human-mediated habitat fragmentation on a sedentary woodland-associated species (*Rhinolophus hipposideros*) at its range margin. *Acta Chiropterologica* 18(2): 377–393. Drew, D. (2004) Irish cave dataset. Kelleher, C. (2004) Thirty years, six counties, one species - an update on the lesser horseshoe bat *Rhinolophus hipposideros* (Bechstein) in Ireland. *Irish Naturalists' Journal* 27: 387-392. McAney, K. (2016) Lesser horseshoe bat (*Rhinolophus hipposideros*) Pp 71-72. In Lysaght, L. and Marnell, F. (eds) (2016) *Atlas of Mammals in Ireland 2010-2015*, National Biodiversity Data Centre, Waterford. Roche, N., Langton, S. & Aughney, T. (2012) Lesser Horseshoe Bat: Population, Trends and Threats 1986 to 2012. Unpublished report from Bat Conservation Ireland to the National Parks and Wildlife Service, Dublin, Ireland. Roche, N., Aughney, T. & Langton, S. (2015) Lesser Horseshoe Bat: population trends and status of its roosting resource. *Irish Wildlife Manuals,* No. 85. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Roche, N., Aughney, T., Marnell, F. & Lundy M. (2014) *Irish bats in the 21st Century*. Bat Conservation Ireland, Ulex House, Drumheel, Lisduff, Virginia, Co. Cavan, Ireland.
3.2i Additional information	Mitchell-Jones, A.J., Bihari, Z., Masing, M. & Rodrigues, L. (2007) Protecting and managing underground sites for bats. EUROBATS Publications Series No. 2. UNEP/EUROBATS, Bonn, Germany. Mullan, G. (ed.) (2007) *The Caves of County Clare and South Galway*. University of Bristol Speleological Society.

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***5,000 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
4.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	a) Minimum	*Percentage change over the period indicated in the field 4.6. If a precise value is known provide the same value under both minimum and maximum*
	b) Maximum	*Percentage change over the period indicated in the field 4.6. If a precise value is known provide the same value under both minimum and maximum*
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 5,000km²***	
	b) Operator (≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	

	d) Indicate method used to set reference value if other than operators The Favourable reference range has been updated to equal the current range. There is no evidence of loss of range since the Directive came into force.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	***YES****/NO*
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
4.12 Additional information *Optional*	The Drew (2004) database of all the known caves in Ireland was made available to NPWS. NPWS have a database of all known lesser horseshoe bat roosts in Ireland. The range of this habitat has been estimated by overlaying the cave dataset with the lesser horseshoe bat data from 2013-2018. Although there is no new information on cave distribution, some changes to the range of the lesser horseshoe bat have led to changes in the range envelope of this habitat. Although the bat's range has contracted in places, there were not many caves occupied in those areas. A more thorough search of bat database (see 5.15) plus the discovery of new bat sites has more than balanced the squares lost. The current range is slightly larger than the figure given in 2013. This is due to better information on lesser horseshoe bat distribution. The trend is taken as stable and the new range figure is taken as the new FRR.	

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2013-2018***	
5.2 Surface area *(in km²)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***0.0072 km²***
5.3 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	

5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
5.10 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude	a) Minimum	*Percentage change over the period indicated in field 5.9. If a precise value is known provide the same value under both minimum and maximum*
	b) Maximum	*Percentage change over the period indicated in field 5.9. If a precise value is known provide the same value under both minimum and maximum*
Optional	c) Confidence interval	*Indicate confidence interval if a statistically reliable method is used*
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	***a) 0.0072 km²***	
	b) Indicate if operators were used (≈, >, >>, <) or	
	c) If favourable reference area is unknown indicate by using 'x'	

	d) Indicate method used to set reference value if other than operators Current area is taken to represent the FRA as it is considered sufficient to support the lesser horseshoe bat population.	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	***YES****/NO*
	b) yes, due to improved knowledge/more accurate data	*YES/****NO***
	c) yes, due to the use of different method	***YES****/NO*
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data /* ***the use of a different method***	
5.15 Additional information *Optional*	The measurement of this parameter is problematic. While extensive mapping surveys of some cave systems have been done and the length and area may be known (e.g. Jones *et al*. 1997; British Speleological Society, 2007), a complete national survey has not been undertaken. Furthermore, only parts of any cave will be of value to bats and this in turn may vary from year to year. In the absence of more detailed information, which would require extensive field survey, each of the 72 caves used by lesser horseshoe bats has been given a nominal area of 100m^2. There has been no change in the area of cave habitat per se, given the geological time scale at which caves develop and evolve. Although some inter-annual population fluctuations of bats may occur in caves, e.g. as seen in certain Karst caves following winter flooding events, there is no evidence of caves being lost to the species altogether. Although there has been some contraction in the range of the lesser horseshoe bat in the current reporting period, this has not happened in areas where the bats are using caves. The area of habitat is larger than that reported in 2013 due to the use a different approach – i.e. in 2013 the bat database was only searched for "caves" whereas this time a more comprehensive examination of the "bat roost type" column revealed a number of additional caves stored under slightly different categories, e.g. "souterrain leading to cave"; "multiple connected caves"; "vadose cave". Hence the area is larger but the trend is taken as stable.	

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***0.0072 km²***
		Maximum	***0.0072 km²***
	b) Area in not-good condition	**Minimum**	***0 km²***
		Maximum	***0 km²***

	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***		
6.7 Typical species Method used *Optional*			
6.8 Additional information *Optional*	There is little evidence that Irish caves support much in the way of specialised or endemic fauna. However, the lesser horseshoe bat (*Rhinolophus hipposideros*), which is listed on Annex II of the Habitats Directive, occurs in caves in Ireland. Consequently, this bat is considered to be the only typical species for this habitat in Ireland. The assessment of favourable condition relates therefore to the suitability of the cave habitat for this bat. Lesser horseshoe bats use caves in Ireland almost exclusively for hibernation and their requirements are for cool, stable temperatures and minimal disturbance for the winter period. Caves which are open to tourism are not included in this habitat type. Nonetheless, some caves included here are subject to human disturbance as a result of ad hoc caving or related recreational activities. In particularly sensitive locations grills have been fitted to cave entrances to prevent disturbance. Some caves are also subject to occasional flooding (e.g. Kiltartan Cave) which make them temporarily unsuitable for bats. This is considered to be a natural phenomenon in karstic landscapes. Given the general good status of the lesser horseshoe bats in caves in Ireland (notwithstanding their recognised declines in certain other areas) expert opinion has been relied on to conclude that the condition of this habitat is Good overall.		

	There is no change in this parameter since the last reporting period, however focused research on the ecology and population biology of the lesser horseshoe bat in Irish cave systems would be useful to better inform our assessment here.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**Xxp** No pressures	**Xxt** No threats
7.2 Sources of information *Optional*		
7.3 Additional information *Optional*	Although individual caves may be subject to disturbance (e.g. dumping, vandalism) and winter flooding can lead to some mortalities of bats in certain caves, no significant pressures have been identified for this habitat nationally.	

8 Conservation measures

8.1 Status of measures	*Are measures needed? (YES/**NO**)*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*

8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	None taken
8.6 Additional information *Optional*	

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	***Good*** */ Poor / Bad / Unknown*
9.2 Additional information *Optional*	Although some threats have been identified, some of which might have appreciable localized effects, none of these is considered likely to have a significant impact on the range, area or structure and functions of this habitat in Ireland. Overall the future prospects for this habitat are considered to be good. Although the overall conservation assessment for the lesser horseshoe bat in Ireland is now Unfavourable - Inadequate due to a small contraction in range, these concerns do not relate to areas with bats in caves. Most of the important cave sites are protected as SACs. Many vulnerable bat caves are already protected from disturbance through grilling. Regular monitoring is underway and if further vulnerable cave sites are identified these will also be grilled.	

10 Conclusions

Assessment of conservation status at end of reporting period	
10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.3 Specific structure and functions (incl. typical species)	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*

<table>
<tr><td>10.6 Overall trend in Conservation Status</td><td colspan="3">Indicate the trend (qualifier) for FV, U1 and U2:

improving / deteriorating / <u>stable</u> / unknown</td></tr>
<tr><td rowspan="8">10.7 Change and reasons for change in conservation status and conservation status trend</td><td colspan="3">Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.</td></tr>
<tr><td></td><td>Overall assessment of conservation status (10.5)</td><td>Overall trend in conservation status (10.6)</td></tr>
<tr><td>a) no, there is no difference</td><td>YES/<u>NO</u></td><td>YES/<u>NO</u></td></tr>
<tr><td>b) yes, due to genuine change</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>c) yes, due to improved knowledge/more accurate</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>d) yes, due to the use of different methods (including use of different thresholds)</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>e) yes, but there is no information on nature of change</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>The change is mainly due to (select one of the reasons above):</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td></tr>
<tr><td>10.8 Additional information

Optional</td><td colspan="3">Although individual caves may be subject to disturbance (e.g. dumping, vandalism) and winter flooding can cause mortalities of bats in certain caves, no significant pressures have been identified for this habitat nationally.

Range, Area and Structure and functions of this habitat in Ireland are all considered to be favourable and stable. Overall the Future prospects for this habitat are considered to be good. Although the overall conservation assessment for the lesser horseshoe bat in Ireland is now Unfavourable-Inadequate, this is due to a contraction in range in Limerick and North Kerry and is not related to cave habitat quality or availability.

Most of the important cave sites are protected as SACs. Many of the vulnerable bat caves are already protected from disturbance through grilling. Regular monitoring is underway to identify further vulnerable cave sites and where necessary these will also be grilled.

Consequently, and although the Overall Status of the typical species (lesser horseshoe bat) is now considered to be Unfavourable-Inadequate, this cave habitat has been assessed as Favourable. Further research would be useful, however, to determine the</td></tr>
</table>

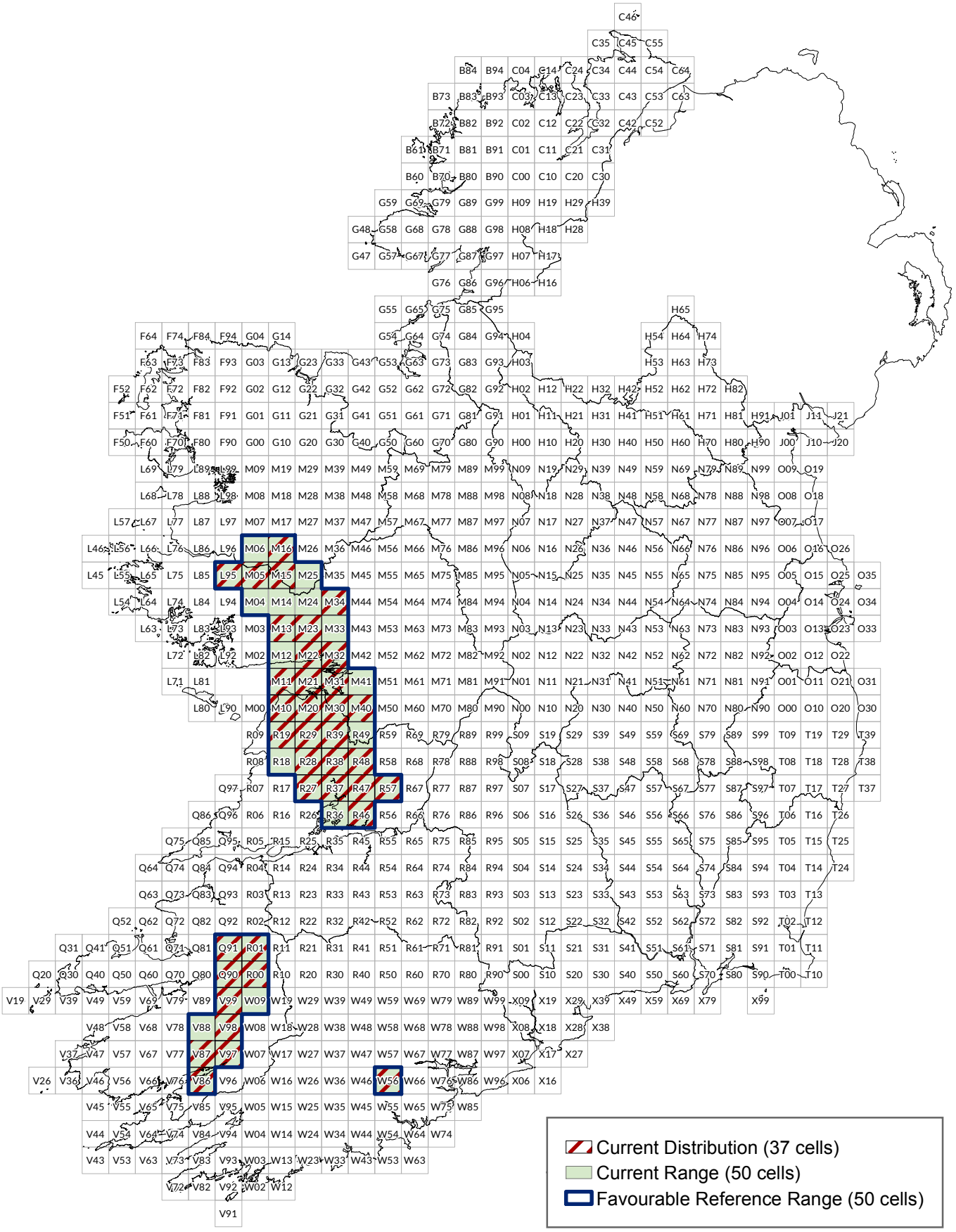
	aspects of cave structure and function (e.g. size, air-flows, light, humidity, temperature regimes, hydrology) which are critical for bat utilisation in the Irish context.

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***0.003 km²***
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable*** */ increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
11.6 Additional information *Optional*	To calculate the area within the network, lesser horseshoe bat distribution data was overlapped with the Drew (2004) cave dataset to produce the range of this habitat. A total of 72 bat caves were identified within this area. When the SAC network was overlain on top, 30 of those caves were found to fall within the overlap. As for the calculation of area of the habitat (5.2), each cave has been given a nominal area of 100m². This figure is larger than the one reported in 2013 due to use of a different method – see 5.15 for full explanation.	

12 Complementary information

Caves (8310)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Mapáil V 2.0
Dáta June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Habitat code / name	**8330 Submerged or partially submerged sea caves**
1.2i Habitat short name	**Sea caves**
1.3i Habitat description	In Ireland sea caves [8330] are defined as caves which are fully submerged below sea level, or which have an intertidal component to them (i.e. partially submerged caves). Their walls, roof and floor support species communities similar to those of reef habitats [1170] but adapted to the specific physical attributes of sea caves. The entrances of sea caves usually occur on sea cliff faces with the cave extending both above and below sea level. A number of sea caves are known to be completely submerged, others form tunnels or caverns. Some sea caves, such as An Poll na bPéist, Inis Mór, Co. Galway, have openings both below sea level and also on the surface. In Ireland while sea caves are found in association with reefs [1170], they appear to present a marked difference from the surrounding reef habitat due to their different physical characteristics such as inclination, wave surge, scour and shade. These can change rapidly from the cave entrance to the inner parts of the cave, leading to a marked zonation in the communities present. The entrance areas of sea caves are quite similar to exposed intertidal and subtidal reef communities. Where a bank of boulders or other hard substrate is present at the back of a cave and where the area is not continually submerged it may be used as a haul out area by grey seals. Sea caves appear to be extensive around the coast of Ireland. The west coast of Ireland has a varied geology that includes large areas of limestone bedrock, which is particularly suitable to the formation of sea caves. This geology, together with extreme exposure, provides one of the main physical processes required for the formation of sea caves. Sea caves are also known to occur on the south and north coasts of Ireland where they can be found on the mainland and also on many of the islands and islets surrounding the coast. While more limited in their distribution, sea caves are also known to occur in some parts of the east coast of Ireland, particularly around Lambay Island off the coast of north County Dublin. However, their distribution along the south-east coast appears to be limited due to geological factors.

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***2007-2018***
2.2 Distribution map	Submitted

2.3 Distribution map Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The primary source of data in relation to sea caves in Ireland was the 2003 oblique aerial survey of the coast of Ireland conducted by DCENR. This data was compiled to identify areas of coastal erosion but the resultant topographic imagery also provided a method to visualise potential sea caves. Some shortfalls with the use of oblique aerial imagery are associated with its lack of ability to fully distinguish between indentations in vertical reef habitats and true sea caves. This method does not provide a means to identify subtidal sea caves. However it provides a reasonable proxy for the likely distribution of sea caves in Ireland. This was supplemented by NPWS Site Specific Conservation Area spatial data where available. Manual edits were carried out based on Expert Opinion.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
3.2 Sources of information	CMRC (2006-12) Marine Irish Digital Atlas. http://mida.ucc.ie/ DCENR (2013) Spatial data for seismic surveys and hydrocarbon wells http://www.dcenr.gov.ie/Spatial+Data/Petroleum+Affairs/PAD+Spatial+Data+Downloads.htm. DCENR (2003) Coast of Ireland, 2003 Oblique Imagery Survey Viewer. http://www.coastalhelicopterview.ie. EPA (2013) EPA Ireland GeoPortal. http://gis.epa.ie/DataDownload.aspx MERC (2010) Irish Sea Reef Survey. A report to the National Parks and Wildlife Service. 32 pp. MERC (2012) Survey of Irish Sea Caves. A report to the National Parks and Wildlife Service. 43 pp. NPWS (2010) A desk study of intertidal sea caves. Unpublished report. NPWS (2011/2) Conservation Objective Series. ISSN 2009-4086.2.3. Scally, L., Pfeiffer, N.J. and Hewitt, E. (in prep.) The monitoring and assessment of six Annex I marine habitats. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

3.2i Additional information	Bell, J. J. (2001) The ecology of sponges at Lough Hyne Marine Nature Reserve, Co. Cork, Ireland. Ph.D. thesis, University College Cork. Bell, J. J. and D. K. A Barnes. (2000) A sponge diversity centre within a marine island. *Hydrobiologia* 440:55-64. Bunker, F.StP.D. and Holt, R.H.F. (2003) Survey of Sea Caves in Welsh Special Areas of Conservation 2000 to 2002. A report to the Countryside Council for Wales by Marine Seen, Pembrokeshire. CCW Marine Monitoring Report No: 6. 184pp. Connor, D.W., Allen, J.H., Golding, N., Howell, K.L., Lieberknecht, L.M., Northern, K.O. and Reker, J.B. (2004) The Marine Habitat Classification for Britain and Ireland Version 04.05. JNCC, Peterborough ISBN 1 861 07561 8 (internet version). JNCC (2004) Common Standards Monitoring Guidance for Sea Caves. Version August 2004. Joint Nature Conservation Committee, Peterborough, UK. Picton B.E., Emblow, C.S., Morrow, C.C., Sides, E.M., Tierney, P., McGrath, D., McGeough, G., McCrea, M.,Dinneen, P., Falvey, J., Dempsey, S., Dowse, J. and Costello, M. J. (1997) Marine sites, habitats and species data collected during the BioMar survey of Ireland. Renouf, Louis P.W (1934) The effect of light on the colour of *Pachymatisma johnstonia* (*Bowerbank*). *Journal of Natural History Series* 10, 13 (75).

4 Range

Range within the biogeographical/marine region concerned

4.1 Surface area	***13,100 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	

4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 13,100 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable Reference Range has been set as the current range as there is no evidence of decline since the Directive came into force. This range is likely to encompass all geographical, geological and ecological variation of Irish sea caves.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
4.12 Additional information *Optional*	Range was estimated based on partial data with some extrapolation and/or modelling. There is no evidence of any genuine change to the range of this habitat feature in Ireland.	

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2007-2018***	
5.2 Surface area	**a) Minimum**	

(in km²)	**b) Maximum**	
	c) Best single value	***Not known***
5.3 Type of estimate	*Best estimate / 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* ***d) Insufficient or no data available***	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994-2018***	
5.10 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.13 Favourable reference area	*a) In km² or*	
	b) Indicate if operators were used (≈, >, >>, <) or	
	c) Favourable reference area is unknown	

<table>
<tr><td></td><td colspan="2">d) Indicate method used to set reference value if other than operators</td></tr>
<tr><td rowspan="6">5.14 Change and reason for change in surface area</td><td colspan="2">Is there a change between reporting periods? YES/<u>NO</u>

If yes, provide the nature of that change. More than one option (a to d) can be chosen.</td></tr>
<tr><td>a) yes, due to genuine change</td><td>YES/NO</td></tr>
<tr><td>b) yes, due to improved knowledge/more accurate data</td><td>YES/NO</td></tr>
<tr><td>c) yes, due to the use of different method</td><td>YES/NO</td></tr>
<tr><td>d) yes, but there is no information on the nature of change</td><td>YES/NO</td></tr>
<tr><td colspan="2">The change is mainly due to (select one of the reasons above):

genuine change / improved knowledge or more accurate data / the use of a different method</td></tr>
<tr><td>5.15 Additional information

Optional</td><td colspan="2">A count of the apparent sea cave habitat in Ireland indicates a total of 1,603 sea caves. However, it is likely this may be an overestimate. Potential sea caves were identified based on oblique aerial imagery and it has now become evident that this method may not have had the power to distinguish between indentations in vertical or sloping reefs [1170] and vegetated sea cliffs of the Atlantic and Baltic coasts [1230] and true sea caves [8330]. Identification of sea caves which are fully submerged is particularly difficult and likely to remain a challenge into the future.

Short-term and long-term trends were estimated based on best expert judgement. It is considered highly unlikely that the area of this habitat will change significantly due to the physical and geological nature of the habitat.

Surveys completed for the habitat to date have included the likely variation in the physical (including geographical and geological) structure of the habitat and therefore the ecological variation.

The 3-dimensional structure, together with the largely inaccessible nature of many sea caves, makes the calculation of habitat area a particular challenge. Surveys of Irish sea caves undertaken since 2012 have been designed to measure the total area of the habitat within each sea cave surveyed. The total surface area of rock habitat within each sea cave was estimated based on the length, width and height of the cave measured by divers using a calibrated line. In order to capture the additional surface area created by undulating surfaces, crevices, overhangs and boulders within the cave system, a raising auxiliary to more accurately indicate the likely surface area of habitat within the cave was applied. Without more detailed surveys it was not possible to definitively suggest a suitable or appropriate auxiliary, so this was based on the reasoned instinct of the survey team. While the area of the total resource is likely to remain a challenge, the area of all sea caves monitored in the future will provide a better estimate of the resource on a local scale. Only six sea caves have been surveyed in detail and this is not considered a sufficient number to allow current areas to be scaled up to a national estimate.</td></tr>
</table>

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***Unknown***
		Maximum	***Unknown***
	b) Area in not-good condition	**Minimum**	***Unknown***
		Maximum	***Unknown***
	c) Area where condition is not known	**Minimum**	***Unknown***
		Maximum	***Unknown***
6.2 Condition of habitat Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period?* ***YES****/NO* The updated list has been provided in an additional spreadsheet and field 6.7 also contains the new list.		
6.7 Typical species Method used *Optional*	There is limited information on the typical species associated with sea caves in Ireland. The species list has been updated since the previous reporting period as surveys of additional sea caves have been conducted. However, this reflects the inclusion of further data, rather than a change in the characterising species. An accurate assessment of typical species will only be possible when survey of a greater number of sea caves, reflecting a wider range of physical, geological and geographic features, is conducted. The methodology for the survey of sea caves has not changed since the last reporting period. Prior to 2012, surveys of sea caves were conducted by recording the species present on a SACFOR (**S**uper abundant, **A**bundant, **C**ommon, **F**requent, **R**are) scale and did not record the location within the sea cave where the species recorded were found or the physical structure of the habitat. Since 2012, surveys of a limited number of additional sea caves have been conducted and the methodology has been designed to accurately		

	measure the total area of the habitat within each sea cave. The physical structure of the habitat was also measured and characterised and reproduced as a 3-dimensional drawing of each sea cave surveyed. The location (floor, roof, walls and distance from entrance) where each species was recorded on a SACFOR scale was also documented. Future surveys using this methodology will provide the data to more accurately describe the habitat and its characterising species. The typical species of sea caves in Ireland are known for only a limited number of locations. Prior to 2012 they had been found to be dominated by *Alcyonium digitatum*, *Aspersa conchilega*, *Botrylloides leachi*, *Botryllus schlosseri*, *Bugula flabellata*, *Caryophyllia smithii*, *Cerianthus lloydii*, *Clathrina coriacea*, *Cliona celata*, *Corynactis viridis*, *Crisiidae* sp., *Dendrodoa grossularia*, *Dercitus bucklandi*, *Echinus esculentus*, *Haliclona viscosa*, *Holothuria forskali*, *Obelia geniculata*, *Ophiactis balli*, *Pachymatisma johnstonia*, *Palaemon serratus*, *Peachia cylindrica*, *Sagartia elegans*, *Spirorbidae* sp., *Stelligera rigida*, *Thymosia guernei*, and *Urticina felina.* The additional surveys, conducted during the present reporting period, have found the majority of the aforementioned species to also occur in the additional sea caves surveyed. Other species recorded during these surveys with relative abundance included: *Pentapora foliacea*, *Clathrina coriacea, Aplysilla rosea, Haliclona simulans, Hemimycale columella, Palaemon serratus, Balanus balanus, Spirobranchus triqueter, Henricia oculata, Marthasterias glacialis, Nemertesia antennina*, *Antedon bifida, Tubularia indivisa, Thyone roscovita* and *Aplidium punctum.*
6.8 Additional information *Optional*	Sea caves are essentially a subclass of reef habitat [1170]. However, they have the potential to exhibit a different species assemblage from that of the surrounding reef habitat due to the unique physical characteristics of sea caves, especially with respect to shading and scour. In particular, the lack of a significant algal community in sea caves, when compared to the surrounding reef habitat, is notable. The physical 3-dimensional structure of the sea caves also creates additional micro-habitats and a much larger surface area to that of the adjacent reef habitat.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**Xxp** No pressures	**Xxt** No threats

7.2 Sources of information *Optional*	
7.3 Additional information *Optional*	Threats were considered based on best expert judgement. No threats with a ranking of medium or high were identified. Sea caves are considered to be relatively protected from direct anthropogenic impact, largely due to the inaccessibility of their locations.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (YES/**NO**)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* *b) Measures identified and taken or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, surface area or structure and functions of the habitat type or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* *c) Long-term results (after 2030)*
8.5 List of main conservation measures	None
8.6 Additional information *Optional*	

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	***Good*** */ Poor / Bad / Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as Stable. Current range is equal to Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as Stable, as no change in Range is expected based on the balancing of the threats and conservation measures that are currently in place. Further, the physical and geological nature of the habitat makes a change in range unrealistic. Future prospects of Range are therefore Good. Short-term trend direction of Area is assessed as Stable. Even though the current area is unknown, the potential for a significant change (increase or decrease) in the area is considered highly unlikely in the medium term. Conservation status of Area is therefore Favourable. Future trend of Area is assessed as Stable, as no change in area is expected based on the current threats, conservation measures and the physical structure of the habitat. Future prospects of Area are therefore Good. Current Structure and functions are assessed as Favourable. Even though the typical species composition is unknown, the information obtained from recent (1993 to 2018) surveys are considered to be the baseline to provide better information on the characterisation of the fauna and ecology of sea caves. No known pressures causing a significant impact on ecological processes have been observed. No significant threats to the habitat are known. Short-term trend direction is Stable. Conservation status of Structure and functions is therefore Favourable. Future prospects of Structure and functions are therefore Good.	

10 Conclusions	
Assessment of conservation status at end of reporting period	
10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.3 Specific structure and functions (incl. typical species)	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
10.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*

<table>
<tr><td>10.6 Overall trend in Conservation Status</td><td colspan="3">Indicate the trend (qualifier) for FV, U1 and U2:

improving / deteriorating / <u>stable</u> / unknown</td></tr>
<tr><td rowspan="8">10.7 Change and reasons for change in conservation status and conservation status trend</td><td colspan="3">Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.</td></tr>
<tr><td></td><td>Overall assessment of conservation status (10.5)</td><td>Overall trend in conservation status (10.6)</td></tr>
<tr><td>a) no, there is no difference</td><td>YES/<u>NO</u></td><td>YES/<u>NO</u></td></tr>
<tr><td>b) yes, due to genuine change</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>c) yes, due to improved knowledge/more accurate</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>d) yes, due to the use of different methods (including use of different thresholds)</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>e) yes, but there is no information on nature of change</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>The change is mainly due to (select one of the reasons above):</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td><td>genuine change / improved knowledge or more accurate data / the use of a different method</td></tr>
<tr><td>10.8 Additional information

Optional</td><td colspan="3">Sea caves remain one of the most challenging habitats to survey and therefore an assessment of their conservation status is difficult. It is likely that a very large number of sea caves around the Irish coast are completely submerged and unknown. Without considerable exploration it is unlikely that the full extent of the national resource will ever be known.

Of the known sea caves, generally those that are partially submerged, there is insufficient baseline data upon which to fully describe the habitat or its typical species and species communities. Only a small sub-sample (six caves) has been surveyed in detail. This sample is not considered large enough to accurately assess their Structure and functions or extrapolate the likely total area of the habitat.

A number of factors make sea caves unlikely to be vulnerable to change. Foremost, all sea caves in Ireland are formed from geogenic hard rock habitats. Therefore, other than minor alteration of the rock face due to the effects of natural erosion, habitat loss is highly improbable.

The inaccessible nature of sea caves also makes them less vulnerable</td></tr>
</table>

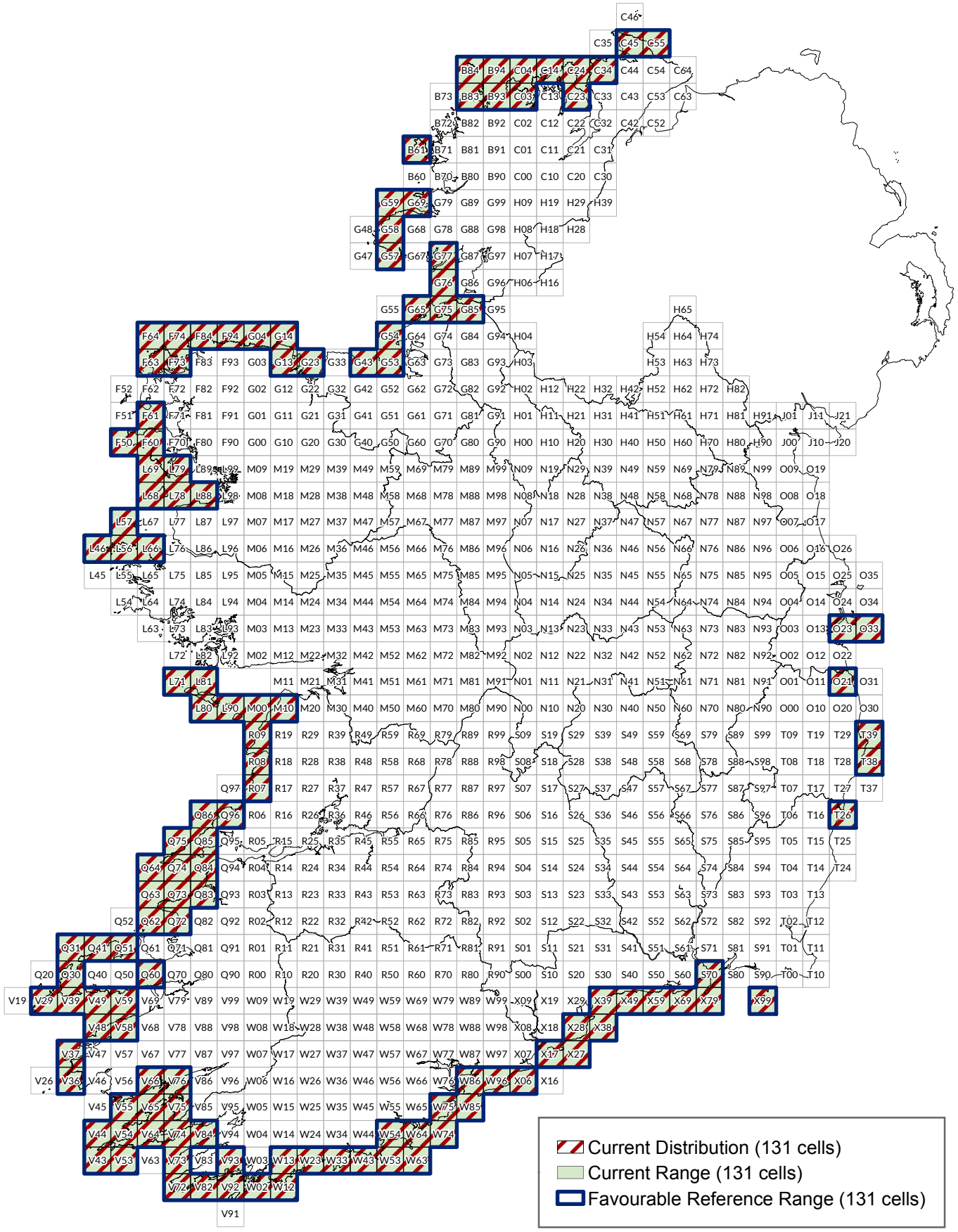
	to anthropogenic impacts. No pressures or threats have been identified with a ranking of medium or higher for this habitat. Notwithstanding the lack of detailed baseline information for submerged or partially submerged sea caves, their conservation status has been assessed as Favourable. This is based on the clear lack of pressures on the sea caves surveyed to date and the lack of any future threats which could impact on their conservations status.

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***Unknown***
11.2 Type of estimate	*Best estimate / 95% confidence interval / minimum*	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* ***d) Insufficient or no data available***	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable** / increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.6 Additional information *Optional*	The area is unknown as it is not possible to assign an area to sea caves given the noted difficulties associated with this resource. It should be noted that 685 sea caves are within the Network, with 336 caves within sites that list sea caves as a qualifying feature. Although the area in good condition has not been quantified there are no significant pressures operating and therefore the trend is set as stable.	

12 Complementary information

Sea caves (8330)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil
V 2.0
Dáta
June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Habitat code / name	**91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles**
1.2 Habitat short name	**Old oak woodland**
1.3i Habitat description	91A0 Old sessile oak woods is defined in the interpretation manual of EU habitats as "acidophilous *Quercus petraea* woods, with low, low-branched, trees, with many ferns, mosses, lichens and evergreen bushes." Three indicative species are listed: *Quercus petraea, Ilex aquifolium* and *Blechnum* ssp. (sic). The interpretation of the habitat used for this national assessment is wider, in that it also includes woods with *Quercus x rosacea* (hybrid between *Q. petraea* and *Q. robur*) and, locally, *Quercus robur*, provided the ground flora is acidic in character. Exact specifications for the habitat definition used are given in Perrin & Martin (2007) and O'Neill & Barron (2013). Effectively, it includes all three sub-associations of the Blechno-Quercetum petraeae association. The Irish Vegetation Classification (IVC; Perrin, 2016) primarily places 91A0 habitat in the WL1 *Quercus petraea – Luzula sylvatica* group. All vegetation communities in this group have an affinity to the Annex I habitat: WL1A *Quercus robur – Luzula sylvatica* woodland (78.7% affinity), WL1B *Quercus petraea – Luzula sylvatica* woodland (97.9% affinity), WL1C *Quercus petraea – Corylus avellana* woodland (66.3% affinity) and WL1D *Quercus petraea – Vaccinium myrtillus* woodland (98.7% affinity).

2 Maps	
Distribution of the habitat type within the Member State concerned	
2.1 Year or period	***1995-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was derived from a 91A0 polygon shapefile. Sources added this reporting period comprise Daly *et al.* (in prep.), Forest Service (2018), Daly *et al.* (2015), Perrin *et al.* (2014a), Crushell & Foss (2010), Lynch (2005) and the Coillte Biodiversity Dataset (various dates). In addition to this, the distribution map from the last reporting period (NPWS, 2013) was also utilised with sources comprising Perrin *et al.* (2014b), Roche *et al.* (2014), NPWS (2012),

	Cross (2012), Barron & Perrin (2011), Cross (2011a, b), O'Neill *et al.* (2010), Daly & Perrin (2010), Kearney (2008), the Habitat Assignment Project and various individual site synopses. References are detailed in Section 3.2. The 91A0 distribution was refined using the Deforestation Estimation and Mapping in Ireland (DEFORMAP) dataset. This dataset uses a combination of high-resolution aerial imagery and ancillary datasets to provide a map of deforestation in Ireland for the period 2000-2012 (Devaney *et al.,* 2017). A certainty rating system was applied to all data that informed the distribution map. This system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1 the lowest. From the data sources added this reporting period – Daly *et al.* (in prep.), Daly *et al.* (2015), Perrin *et al.* (2014a), Crushell & Foss (2010) and the Coillte Biodiversity Dataset (various dates) – all were judged to be a high certainty of 3. The Forest Service (2018), a dataset displayed at the 10 km grid square level, and Lynch (2005) were given certainty of 2 as 91A0 was assigned *post hoc* from species data and habitat extent was estimated. Certainty values from the datasets utilised during the last reporting period (NPWS, 2013) were not reassigned as the classes within the certainty rating system are fairly broad, and the 91A0 habitat itself is relatively stable. All data sources with certainty 1-3 were used to map the distribution of the 91A0 habitat.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Annett, J.A. (2015) Deer management in Ireland: A framework for action. Forest Service, Department of Agriculture, Food and the Marine, Johnstown Castle Estate, Co Wexford and National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. Anon. (2016) European Red List of Habitats. Forests Habitat Group: G1.8 Acidophilous *Quercus* woodland. https://forum.eionet.europa.eu/european-red-list-habitats/library/terrestrial-habitats/g.-forests/g1.8-acidophilous-quercus-woodland/download/en/1/G1.8%20Acidophilous%20Quercus%20woodland.pdf?action=view. Accessed 9th October 2018. Barron, S.J. & Perrin, P.M. (2011) Production of a habitat map for Killarney National Park, Co. Kerry. Unpublished report to National Parks and Wildlife Service, Dublin. Coillte (2011) Millennium Forests. http://www.millenniumforests.com/index.html. Accessed 1st October 2018.

Coillte (2018) Coillte Charter of Commitment to the People's Millennium Forests. https://www.coillte.ie/media/2018/05/Coillte-Millennium-Forest-Charter-2018.pdf. Accessed 4th September 2018.

Coillte Biodiversity Dataset (various dates) GIS files and individual site management plans made available by Coillte. Datasets used were from 2001-2005.

Cross, J. (2011a) River Barrow and River Nore SAC (site code 2162) Conservation objectives supporting document – woodland habitats. https://www.npws.ie/sites/default/files/publications/pdf/002162_Barrow%20Nore%20SAC%20Woodlands%20Supporting%20Doc_V1.pdf. Accessed September 3rd 2018.

Cross, J. (2011b) Site Synopsis Keeloges Wood (Old Oak Woodland). Unpublished report. National Parks and Wildlife Service, Dublin.

Cross, J. (2012) River Blackwater (Cork/Waterford) SAC (site code 2170) Conservation objectives supporting document – woodland habitats. https://www.npws.ie/sites/default/files/publications/pdf/002170_Blackwater%20River%20%28Cork-Waterford%29%20Woodland%20Supporting%20Doc_V1.pdf. Accessed September 3rd 2018.

Crushell, P. & Foss, P.J. (2010) Reenagross Park, Kenmare, Co. Kerry. Baseline Ecological Surveys and Biodiversity Conservation Plan. Unpublished report to Kenmare Tidy Towns.

DAFM (2015a) Native Woodland Conservation Scheme. Forest Service, Department of Agriculture, Food and the Marine, Johnstown Castle Estate, Co. Wexford.

DAFM (2015b) Native Woodland Establishment GPC9 & GPC10: Silvicultural Standards. Forest Service, Department of Agriculture, Food and the Marine, Johnstown Castle Estate, Co. Wexford.

DAFM (2018a) Forestry Programme 2014–2020, Midterm Review. https://www.agriculture.gov.ie/media/migration/forestry/forestservicegeneralinformation/2014-2020midtermreview/MidTermReview210218.pdf. Accessed 14th December 2018.

DAFM (2018b) Native Woodland Scheme Framework. Forest Service, Department of Agriculture, Food and the Marine, Johnstown Castle Estate, Co. Wexford.

Daly, O.H. & Perrin, P.M. (2010) The ancient and long-established woodlands of County Cork. Unpublished report to the Heritage Council, Kilkenny.

Daly, O.H., Barron, S.J., Perrin, P.M. & Roche, J.R. (2015) Blanket bog turf-cutting management system: Site Report No. 4 Cloghernagore Bog and Glenveagh National Park SAC (002047). Unpublished report to National Parks and Wildlife Service, Dublin.

Daly, O.H., O'Neill, F.H. & Barron, S.J. (in prep.) The monitoring and assessment of four EU Habitats Directive Annex I woodland habitats. *Irish Wildlife Manual*s, No. 1XX. National Parks and

Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin.

Devaney, J., Redmond, J., Barrett, B., Cott, G. & O'Halloran, J. (2017) 21st Century Deforestation in Ireland, EPA Research Report No. 221. Environmental Protection Agency, Johnstown Castle, Co. Wexford.

Forest Service (2018) Ireland's National Forest Inventory 2017 - Field Procedures and Methodology. Department of Agriculture, Food and the Marine, Dublin.

Habitat Assignment Project. An NPWS spreadsheet noting the qualifying interest of SACs and other habitats which occur in SACs, NHAs and cNHAs.

Kearney, P. (2008) Survey & Mapping mapping of Habitats habitats from Cratloe to Parteen, South East Clare, Survey survey Findings findings Reportreport. Report for Clare County Council.

Lynch, R. (2005) The Vegetation vegetation of the Ballyhoura Mountains, Co. Limerick. Unpublished report to the Heritage Council, Kilkenny.

McGrath, R., Nishimura, E., Nolan, P., Semmler, T., Sweeney, C. & Wang, S. (2005) Climate Change: Regional Climate Model Predictions for Ireland. Environmental Protection Agency, Johnstown Castle, Co. Wexford.

NPWS (2007) The Status of EU Protected Habitats and Species in Ireland. Volume 3. National Parks and Wildlife Service, Dublin.

NPWS (2012) Management Planning Support Unit Maps 2405_imap95. CPU_Habitats_March_2012.shp

NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.1. Unpublished Report, National Parks and Wildlife Service, Dublin.

O'Neill, F.H. & Barron, S.J. (2013) Results of a monitoring survey of old sessile oak woods and alluvial forests. *Irish Wildlife Manuals*, No. 71. National Parks and Wildlife Service, Dublin.

O'Neill, F.H., Martin, J.R. & McNutt, K.E. (2010) The digitisation of woodland habitats surveyed as part of the National Survey of Native Woodlands. Unpublished report to National Parks and Wildlife Service, Dublin.

Perrin, P. & Martin, J. (2007) Annex I assessment of Old Sessile Oak Woods, Alluvial forests and *Taxus baccata* woods. Unpublished report to the National Parks and Wildlife Service, Dublin.

Perrin, P., Martin, J., Barron, S., O'Neill, F., McNutt, K. & Delaney, A. (2008) National Survey of Native Woodlands 2003-2008. Unpublished report to the National Parks and Wildlife Service, Dublin.

Perrin, P.M. (2016) Irish Vegetation Classification Technical Progress Report No. 2. http://www.biodiversityireland.ie/wordpress/wp-content/uploads/IVC_Technical-Progress-Report-No.2.pdf. Accessed 4th September 2018.

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014a). National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 15: Slieve Mish Mountains

	cSAC (002185), Co. Kerry. National Parks and Wildlife Service, Dublin. Perrin, P.M., Roche, J.R., Barron, S.J. & Daly, O.H. (2014b) National Survey of Upland Habitats (Phase 2, 2011-2012), Site Report No. 7: Mount Brandon cSAC (000375), Co. Kerry. National Parks and Wildlife Service, Dublin. Roche, J.R., Perrin, P.M. Barron, S.J. & Daly, O.H. (2014) National Survey of Upland Habitats (Phase 1, 2010-2011) Site Report No 1: Mweelrea, Sheeffry, Erriff Complex cSAC (001932), Co. Mayo. Report to National Parks and Wildlife Service, Dublin. Woodlands of Ireland (2016) A Strategy for Native Woodlands in Ireland 2016-2020. http://www.woodlandsofireland.com/sites/default/files/WoI%20NW%20Strategy%20Final%2824July16%20LoRes%20for%20webpage%29.pdf. Accessed 12th September 2018.
3.2i Additional information	Browne, A., Dunne, F. & Roche, N. (2000) A survey of broadleaf woodland in three SACs: Barrow-Nore, River Unshin and Lough Forbes. Unpublished report to the National Parks and Wildlife Service, Dublin. Van der Sleesen, S. & Poole, A. (2002) Inventory of semi-natural woodlands in the eastern part of County Offaly, Ireland: a pilot study for the national inventory of native woodlands. Unpublished report to the National Parks and Wildlife Service, Dublin.

4 Range

Range within the biogeographical/marine region concerned		
4.1 Surface area	***40,300 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend	***stable** / increasing / decreasing / uncertain / unknown*	

Direction *Optional*		
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	*a) In km² or*	
	b) Operator ≈ (is approximately equal to current range)	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods? **YES**/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/**NO***
	b) yes, due to improved knowledge/more accurate data	***YES**/NO*
	c) yes, due to the use of different method	*YES/**NO***
	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*	
4.12 Additional information *Optional*	There is no evidence of loss of range since the Directive came into force. Range was calculated using the range tool, based on the current known distribution of the 91A0 habitat. A maximum gap distance of two 10 km grid cells was used when running the range tool. Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013). None of the area losses recorded during these two reporting periods led to a contraction in the range. The short-term trend is assessed as stable. The number of 10 km squares in the range (403) is four squares higher than the last monitoring period (NPWS, 2013). These changes are due to improved knowledge within the current reporting period. Favourable reference range is approximately equal to the current range reported in Section 4.1.	

5 Area covered by habitat		
Area covered by the habitat type within the range in the biogeographical/marine region concerned		
5.1 Year or period	***1995-2018***	
5.2 Surface area *(in km²)*	**a) Minimum**	***60.08 km²***
	b) Maximum	
	c) Best single value	
5.3 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	***a) 399 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators During the last two reporting periods, the Favourable reference area was set at 1% of the Favourable reference range (NPWS, 2007, 2013). The Favourable reference area for the previous reporting period was 399 km^2 and this was retained for the current reporting period.	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods? **YES**/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/**NO***
	b) yes, due to improved knowledge/more accurate data	***YES**/NO*
	c) yes, due to the use of different method	*YES/**NO***
	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 1995 when survey work for the Conservation Planning Unit (CPU) habitats commenced, and incorporates updates made by surveys from 2000-2018 that are listed in Section 3.2. Most of the data were initially collated during the National Survey of Native Woodlands 2003-2007 (NSNW; Perrin *et al.,* 2008). A subset of these sites was revisited by the 2011-2012 Woodland Monitoring Survey (O'Neill & Barron, 2013) and the 2017-2018 Woodland Monitoring Survey (Daly *et al.,* in prep.). There are probably still areas of unmapped 91A0 habitat within the country, hence the area value entered is a minimum. During the last two reporting periods, the Favourable reference area was set at 1% of the Favourable reference range (NPWS, 2007, 2013). The Favourable reference area for the previous reporting period was 399 km^2 and this was retained for the current reporting period. The current surface area is only 15.1% of the Favourable reference area. The high rate of fragmentation of this resource is cause for concern. As well as area increases, greater connectivity needs to be established to increase gene and species flow between woodlands (NPWS, 2013).	

	Sixty-three 91A0 sites were surveyed during 2017-2018 Woodland Monitoring Survey (Daly *et al.,* in prep.), 57 of which had previously been surveyed by the 2011-2012 Woodland Monitoring Survey (O'Neill & Barron, 2013). Six new sites were added to the monitoring programme in 2017-2018. Two of the new sites were added at the request of the NPWS, while the remaining four were replacements for sites rejected after the 2011-2012 Woodland Monitoring. The six new monitoring sites had previously been mapped by O'Neill *et al.* (2010), Barron & Perrin (2011) and Daly & Perrin (2010). The 63 sites assessed for Area during the current reporting period represent 4.8 km^2 or 8.0% of the total area of 91A0 habitat recorded in Ireland. No area losses were recorded from the 2017-2018 Woodland Monitoring sites by Daly *et al.* (in prep.), or from the 61 sites surveyed during the 2011-2012 Woodland Monitoring Survey by O'Neill & Barron (2013). The recent availability of DEFORMAP, a dataset which provides a deforestation map of Ireland covering the period 2000-2012 (Devaney *et al.,* 2017), allows us to retrospectively assess area losses during the last two reporting periods. Based on an intersect with the 91A0 distribution map, DEFORMAP data indicates 4.2 ha of 91A0 were lost during the 2007-2012 reporting period due to anthropogenic activities comprising quarrying, building on rural land, agricultural grassland conversion and golf course development. DEFORMAP data indicate that 1.5 ha was lost during the 2001-2006 reporting period to anthropogenic activities comprising road widening, quarrying, agricultural grassland conversion and building on urban and rural land. The deforestation figure for the 2001-2006 reporting period should be taken as a minimum since the NSNW (Perrin *et al.* 2008) only commenced in 2003, therefore, any areas already deforested would not have been mapped. Short-term trend in Area was deemed to be decreasing due to the anthropogenic loss of 4.2 ha during the 2007-2012 reporting period as reported by DEFORMAP. The magnitude of the known loss is -0.0058% per annum, measured over a period of 12 years from 2007-2018. This was calculated by estimating the area lost and expressing this as a per-annum percentage of the original area. This area loss is taken to be the minimum, with other undocumented losses likely within the current reporting period (at sites outside the monitoring network), as well as undocumented losses occurring at unmapped sites. There are no DEFORMAP data available for the current reporting period (i.e. post-2012). The People's Millennium Forest, the Native Woodland Scheme and various local initiatives have contributed to the conservation, restoration and establishment of new sessile oak woods in Ireland over the past two decades. Some of the 91A0 within Ireland's protected habitat network are subject to conservation restoration by the NPWS. Coillte also manage areas of 91A0 on their estate for biodiversity. Some gains in habitat will have occurred from the restoration of mixed conifer/sessile oak woods, through the selective removal of conifers. However, at the vast majority of sites, restoration activities (e.g. invasive species removal, deer control) will have resulted in better quality 91A0 woodland, rather than an actual increase in surface area. Notwithstanding the short-term benefits in

	terms of biodiversity, water, landscape, etc., newly established sessile oak woods planted under the Native Woodland Scheme, People's Millennium Forest and other initiatives cannot yet be classed as true area gains due to the length of time it takes for old sessile oak woodland to develop (NPWS, 2013), with planted sites taking 100+ years to recreate the character and functionality that is typical of this Annex I habitat (Anon., 2016). The latest available figures from the Forest Service (K. Duff, pers. comm.) put the total area of Native Woodland Scheme (NWS) Establishment for 2013-2018 at 1,211.43 ha, and the total area for 2000-2018 at 2,281.49 ha. Under the Native Woodland Conservation Scheme, the total area for NWS Conservation for 2013-2018 (approved and grant-aided) is 103.87 ha; a number of applications are still going through the approval process, or have been approved but the work is not yet completed, which will bring an additional *ca*. 100 ha into the system but these were deemed to be applicable to the next reporting period rather than the current one. The figure for NWS Conservation for 2000-2018 is 2,721.35 ha.

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***41.94 km²***
		Maximum	***41.94 km²***
	b) Area in not-good condition	**Minimum**	***18.14 km²***
		Maximum	***18.14 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		

6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? **YES**/NO*
6.7 Typical species Method used *Optional*	*Dicranum majus* was added to the list of typical species during the current reporting period by Daly *et al.* (in prep.). At the monitoring sites each plot is assessed based on the presence of typical species. For a plot to pass the typical species criterion, there needs to be at least one target species present and at least six other typical species, of which at least two must be bryophytes. The list of typical species in NPWS (2013) was used, with the addition of *Dicranum majus* this reporting period (Daly *et al.,* in prep.). A full list of typical species is presented in Section 6.8.
6.8 Additional information *Optional*	During the current reporting period, 63 sites were assessed for Structure and functions by Daly *et al.* (in prep.). Twenty-three polygons received a 'Green' (Favourable) Structure and functions assessment, 14 received an 'Amber' (Inadequate) assessment and 26 received a 'Red' (Bad) assessment. The approach used to determine the percentage of the 91A0 habitat in Favourable condition was as follows: At each monitoring site, equal weight was applied to each of the individual-plot assessment results (n=4) and the four-plot level assessment result (n=1). At the individual-plot level, a Pass=20% and a Fail=0%. At the four-plot level, a Pass=20% and a Fail=0%. For example: A site with three passes and one fail at the individual-plot level (20 + 20 + 20 + 0 = 60) and a pass at the four-plot level (20) had 80% (60 + 20 = 80) of its habitat in good condition (Favourable). During the current reporting period, 69.8% of the area was assessed as good condition (Favourable). When the proportion in good (69.8%) and in not-good condition (30.2%) was scaled up to the national estimate, 41.94 km^2 was good condition and 18.14 km^2 was not-good condition. During the previous reporting period, twenty sites received a 'Green' Structure and functions assessment, fifteen sites received an 'Amber' assessment, with 26 sites receiving a 'Red' assessment (O'Neill & Barron, 2013). When the above approach was retrospectively applied to the previous reporting period, 68.9% of the area assessed was in good condition (Favourable) and 31.1% was in not-good condition. When this was scaled up to the national estimate, 41.40 km^2 was in good condition and 18.68 km^2 was in not-good condition. Since there is only a slight increase in the area of habitat in good condition between the current reporting period (41.94 km^2) and the previous (41.40 km^2), short-term trend of habitat area in good condition was considered stable. During the current reporting period, the most frequent criteria to fail the Structure and functions assessment at the individual-plot level were 'negative species regeneration' (54% of plots), 'negative species cover' (29% of plots), 'grazing pressure' (27% of plots) and 'native shrub layer cover' (27% of plots). At the four-plot level, the most frequent criteria to fail were '*Quercus* regeneration', i.e. no *Quercus* regeneration at the sapling stage within the plots (at 56% of the

	sites), and '*Quercus* size class distribution' (at 32% of the sites) (Daly *et al.,* in prep.). During the previous reporting period, the most frequent criteria to fail at the individual-plot level were 'negative species regeneration' (47% of plots), 'grazing pressure' (31% of plots) and 'negative species cover' (26% of plots). At the four-plot level, the most frequent criterion to fail was '*Quercus* regeneration' (at 39% of the sites) (NPWS, 2013). Taxa included on the current list of typical species are as follows: *Quercus petraea* (target species), *Quercus x rosacea* (target species), *Betula pubescens, Corylus avellana, Ilex aquifolium, Lonicera periclymenum, Sorbus aucuparia, Vaccinium myrtillus, Blechnum spicant, Luzula sylvatica, Oxalis acetosella, Hyacinthoides non-scripta, Polypodium* spp.*, Dicranum majus, Dicranum scoparium, Diplophyllum albicans, Hylocomium brevirostre, Mnium hornum, Plagiothecium undulatum, Polytrichastrum formosum, Pseudotaxiphyllum elegans, Rhytidiadelphus loreus, Saccogyna viticulosa* and *Scapania gracilis*.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**I02** Other invasive alien species (other than species of Union concern) (H) **A09** Intensive grazing or overgrazing by livestock (H) **I04** Problematic native species (M) **B09** Clear-cutting, removal of all trees (M)	**I02** Other invasive alien species (other than species of Union concern) (H) **A09** Intensive grazing or overgrazing by livestock (H) **I04** Problematic native species (M) **B09** Clear-cutting, removal of all trees (M) **M07** Storm, cyclone (M)
7.2 Sources of information *Optional*	Pressures were recorded during the 2017-2018 Woodland Monitoring Survey (Daly *et al.,* in prep.).	
7.3 Additional information *Optional*	Pressures and threats were selected and ranked based on intensity (high, medium or low), frequency of occurrence, and area of impact, using the data gathered during the 2017-2018 Woodland Monitoring Survey as presented in Daly *et al.* (in prep.). I02 Other invasive alien species (other than species of Union concern) and A09 Intensive grazing or overgrazing by livestock were recorded as high-importance pressures. It should be noted that the	

	impact category A09 is primarily overgrazing by deer (not livestock). I02 was the most frequently recorded pressure, occurring at 59 of the 63 sites surveyed by Daly *et al.* (in prep.). It was recorded as high intensity at 14 sites, and affected >75% of the habitat at 14 sites (Daly *et al.,* in prep.). The most frequent invasive species comprise *Fagus sylvatica, Acer pseudoplatanus, Rhododendron ponticum* and *Abies* spp. I02 had previously been recorded as a high-importance pressure in NPWS (2013) under the code I01 invasive non-native species. A09 was the second most frequently recorded pressure, occurring at 30 of the 63 sites surveyed by Daly *et al.* (in prep.). It was recorded as high intensity at 12 sites, and affected >75% of the habitat at 29 sites. For habitat 91A0, A09 primarily refers to the overgrazing of woodlands by deer; however, other grazers were also responsible for overgrazing, i.e. sheep at three sites, cattle at two sites and horses at one site. A09 had previously been recorded as a high-importance pressure in NPWS (2013) under the code B06 Grazing in forests/ woodland. The negative impact of native plants on 91A0 was recorded under I04 Problematic native species as a medium-importance pressure. It was recorded at eight of the 63 sites surveyed, and was the fourth most frequently recorded pressure (Daly *et al.,* in prep.). It was primarily recorded as medium intensity (five sites) but was high intensity at one site; at four sites it affected ≥50% of the habitat. The main problematic native species were *Rubus fruticosus* agg. and *Pteridium aquilinum*. I04 is typically associated with undergrazing but in some cases can be associated with overgrazing, i.e. lack of native shrub layer increases light reaching the forest floor allowing opportunistic species to spread. I04 had previously been recorded as a medium-importance pressure in NPWS (2013) under the code I02 Problematic native species. B09 Clear-cutting, removal of all trees resulted in the loss of 4.2 ha of 91A0 habitat as detected by DEFORMAP during the previous reporting period (see 5.15). This area loss should be taken to be a minimum since there are probably still unmapped areas of 91A0 nationally. It is therefore considered a medium-importance pressure. M07 storm, cyclone is a low-importance pressure but a medium-importance threat. It was the sixth most frequently recorded pressure, occurring at five of the 63 sites. It was recorded as high intensity at two sites, medium intensity at two sites and low intensity at one site; all five occurrences affected ≤10% of the habitat. This pressure is likely to be under-recorded this reporting period, as the southern region of Ireland – the region hit hardest by the severe storms of 2017-2018 including Hurricane Ophelia – was surveyed prior to the storms. According to the Met Éireann Regional Climate Model for the period 2021-2060, the frequency of intense cyclones over the North Atlantic area in the vicinity of Ireland is set to increase by about 15% (McGrath *et al*., 2005). J04 Mixed source soil pollution and solid waste (excluding discharges) was listed as a low-importance pressure in NPWS (2013) under the code H05.01 Garbage and solid waste. During the current reporting period, it is a low-importance pressure, recorded at 15 of

	the 63 sites surveyed. Of the 15 sites, it was recorded as low intensity at all sites and only ever affected ≤1% of the habitat. Other pressures recorded from the 63 monitoring sites by Daly *et al.* (in prep.) comprise: E01 Roads, paths railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (6 sites); F07 Sports, tourism and leisure activities (4 sites); B21 Use of physical plant protection in forestry, excluding tree layer thinning (2 sites); A11 Burning for agriculture (2 sites); A05 Removal of small landscape features for agricultural land parcel consolidation (hedges, stone walls, rushes, open ditches, springs, solitary trees, etc.) (2 sites); B07 Removal of dead and dying trees, including debris (1 site); I05 Plant and animal diseases, pathogens and pests (1 site).

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type** or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* ***c) Long-term results (after 2030)***

8.5 List of main conservation measures	**CA05** Adapt mowing, grazing and other equivalent agricultural activities **CB02** Maintain existing traditional forest management and exploitation practices **CB04** Adapt/manage reforestation and forest regeneration **CB05** Adapt/change forest management and exploitation practices **CB08** Restoration of Annex I forest habitats **CE01** Reduce impact of transport operation and infrastructure **CI03** Management, control or eradication of other invasive alien species **CI05** Management of problematic native species **CJ01** Reduce impact of mixed source pollution
8.6 Additional information *Optional*	Conservation measures were selected using data gathered from Daly *et al.* (in prep.), the Coillte Biodiversity Dataset (various dates), Coillte (2018), DAFM (2015a, 2015b), Annett (2015), and from information provided by NPWS (pers. comm.). While the measures recorded in Daly *et al.* (in prep.) are specific to 91A0, other measures listed are likely to involve some 91A0, though they may not be specific to the habitat. Of the 63 sites surveyed by Daly *et al.* (in prep.), conservation measures were recorded from 22 sites (34.9% of the monitoring sites). Seven of these sites were NPWS-managed, four were Coillte Biodiversity Areas and eleven were privately owned. The conservation measure most frequently recorded by Daly *et al.* (in prep.) was the presence of fences to exclude grazers (9 sites); this includes both deer fences and agricultural fences to exclude livestock (agricultural fences were the only conservation measure recorded at five of the eleven privately owned sites) (CB05). Other conservation measures include invasive species control (CI03) (7 sites); native tree planting (6 sites) including planting within existing woodland and woodland establishment on former clear-fell (CB08, CB04); selective conifer removal (CB05) (2 sites); extensive horse grazing (CB05) (1 site); and sika deer control (CI03) (1 site). No conservation measures were recorded from the remaining 41 sites (65.1% of the monitoring sites). The People's Millennium Forest restored 16, primarily Coillte-owned, native woodlands, 14 of which are within the Republic of Ireland and two of which are located in Northern Ireland (Coillte, 2011). Conservation measures conducted within 91A0 habitat as part of this project comprise deer fencing (CB05), invasive species control (CI03) and selective conifer removal (CB05). It also promoted woodland establishment on former clear-fell and/or greenfield sites through both planting and natural regeneration (CB08, CB04). The recently launched Charter of Commitment to the People's Millennium Forests is a pledge by Coillte to continue to maintain and conserve these sites into the future (Coillte, 2018). Conservation measures supported by the Native Woodland Conservation/Establishment Schemes (DAFM, 2015a,b) include native tree planting within existing woodland (CB04), woodland establishment on former clear-fell and/or greenfield sites (CB08,

	CB04), deer fencing (CB05), invasive species control (CI03), selective conifer removal (CB05), maintenance of tracks/trails (CE01), and the promotion of traditional and/or positive management practices (e.g. restoration of former coppice, retention of dead wood) (CB02). Under the Forestry Programme 2014-2020 Midterm Review (DAFM, 2018a), new measures that relate to the enhancement of native woodland were introduced, including the Woodland Improvement Scheme to support the management of broadleaf woodlands, support for Continuous Cover Forestry, and increased grants for both elements of the Native Woodland Scheme (i.e. Establishment and Conservation). Additional measures were also introduced to facilitate protection against excessive deer pressure. The Native Woodland Scheme (NWS) is promoted to both the public and private sectors. The targets set under the Forestry Programme for the period 2014-2020 are 2,000 ha for NWS Conservation (i.e. the restoration of existing native woodlands) and 2,700 ha for NWS Establishment (i.e. the creation of new native woodlands) (Woodlands of Ireland, 2016). The latest available figures from the Forest Service (K. Duff, pers. comm.) put the total area of NWS Establishment for 2013-2018 at 1,211.43 ha, and the total area for 2000-2018 at 2,281.49 ha. Under the Native Woodland Conservation Scheme, the total area for NWS Conservation for 2013-2018 (approved and grant-aided) is 103.87 ha. A number of applications are still going through the approval process, or have been approved but the work is not yet completed, which will bring an additional *ca*. 100 ha into the system; however, these were deemed to be applicable to the next reporting period rather than the current one. The figure for NWS Conservation for 2000-2018 is 2,721.35 ha. Conservation measures conducted in 91A0 habitat within Coillte Biodiversity Areas comprise invasive species control (CI03), removal of conifers (CB05), and deer management using fences (CB05) and culling (CI03, CI05). NPWS implement a number of conservation measures. Within Ireland's National Parks (NPs), Killarney NP is undertaking *Rhododendron ponticum* control (CI03), maintenance of tracks/trails to prevent damage to sensitive habitats (CE01) and deer management (CI03 - Sika deer, CI05 - Red deer) (C. Douglas, pers. comm.). Connemara NP is undertaking *Rhododendron ponticum* control (CI03), maintenance of tracks and trails (CE01) and control of trespassing stock (CA05). Glenveagh NP carries out *Rhododendron ponticum* and *Gaultheria mucronata* control (CI03), maintenance of tracks/trails (CE01) and control of deer (CI05 - Red deer) (D. Duggan, pers. comm.). Wicklow Mountains NP maintains tracks/trails (CE01) and conducts deer management (CI03 - Sika deer and Fallow deer, CI05 - Red deer). Within 91A0 at Derrybawn in Wicklow Mountains NP, invasive species were controlled in 2016-17 (covering 30 ha) (CI03), a deer fence was erected (CB05) and 0.3 ha of trees were planted (either CB04 or CB08) (A. Fitzpatrick, pers. comm.). Wicklow Mountains NP also controls fires where possible (CA05) and has worked closely with local farmers and Teagasc through the Wicklow Uplands Council, with the result of a reduction in farmer-lit fires (E. Mullen, pers. comm.). In addition to these conservation measures, NPWS work towards a reduction in small-scale illegal dumping

	through the PURE project (CJ01). They also assist control of deer though the issuing of Section 42 licences, and work closely with a number of deer management groups (CI03, CI05). Of the 63 sites surveyed during the 2017-2018 Woodland Monitoring survey, fourteen sites were NPWS-managed. Active conservation measures were recorded from seven of these sites. The EU-funded KerryLIFE Project commenced in 2014 with the aim of improving selected populations of Freshwater Pearl Mussel towards Favourable conservation status through sustainable management of c. 2500 ha of farmed lands. It aims to establish approximately 30 ha of native woodland within two SACs (CB08). Within the current reporting period, one 10.1 ha site has been planted and two conifer plantations covering 13.5 ha in total have been converted to native woodland. Applications have been submitted for the conversion of two more conifer plantations covering 33 ha in total and there are plans to convert additional conifer plantations to native woodland (CB04). The project will mainly deliver Scenario 5 Pioneer birch woodland (DAFM, 2018b) which may, in the very long term, develop into Sessile oak-birch-holly woodland. Conservation measures will also be undertaken within approximately 30 ha of existing broadleaf woodlands e.g. excluding grazers (CB05). The restoration targets of these conservation measures will include 91A0 (R. O'Callaghan, pers. comm.). The Irish Deer Management Forum (IDMF) was launched in 2015 and set out a series of management actions in the document *Deer Management in Ireland: A Framework for Action*. The aim of this Framework was to manage deer responsibly in order to minimise their impact on agriculture, woodlands and other conservation habitats. It aimed to use a cross-sectoral approach to deliver deer management structures that suited spatial requirements, conformed to best practice, and complied with existing legislative and policy frameworks (CI03, CI05) (Annett, 2015). However, this forum was inactive at the time of writing.

9 Future prospects

9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	*Good / Poor /* ***Bad*** */ Unknown*
	c) Structure and functions	*Good / Poor /* ***Bad*** */ Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as stable. Current range is approximately equal to the Favourable Reference Range. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as stable, as the range is not expected to contract based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Range are therefore good. Short-term trend direction of Area is assessed as decreasing.	

	Current area is more than 10% below the Favourable Reference Area. Conservation status of Area is therefore Unfavourable-Bad. Future trend of Area is assessed as stable based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Area are therefore Bad. Short-term trend direction is stable for habitat that is in good condition. Current Structure and functions are assessed as Unfavourable-Bad as more than 25% of habitat is in "Unfavourable" condition. Conservation status of Structure and functions is therefore Unfavourable-Bad. Future trend of Structure and functions is assessed as negative, as the threats I02 and A09 are expected to have a continued negative influence on Structure and functions irrespective of the conservation measures CB05, CI03 and CI05. Their implementation is not expected to change the overall status of Structure and functions within the next 12 years as they are currently not implemented across the national distribution of the habitat. Of the 63 monitoring sites surveyed by Daly *et al.* (in prep.), no conservation measures were recorded from 65.1% of these sites. The IDMF (CI03, CI05) is currently inactive. Future prospects of Structure and functions are therefore Bad.

10 Conclusions

Assessment of conservation status at end of reporting period

10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving /* ***deteriorating*** */ stable / unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/****NO***	***YES****/NO*

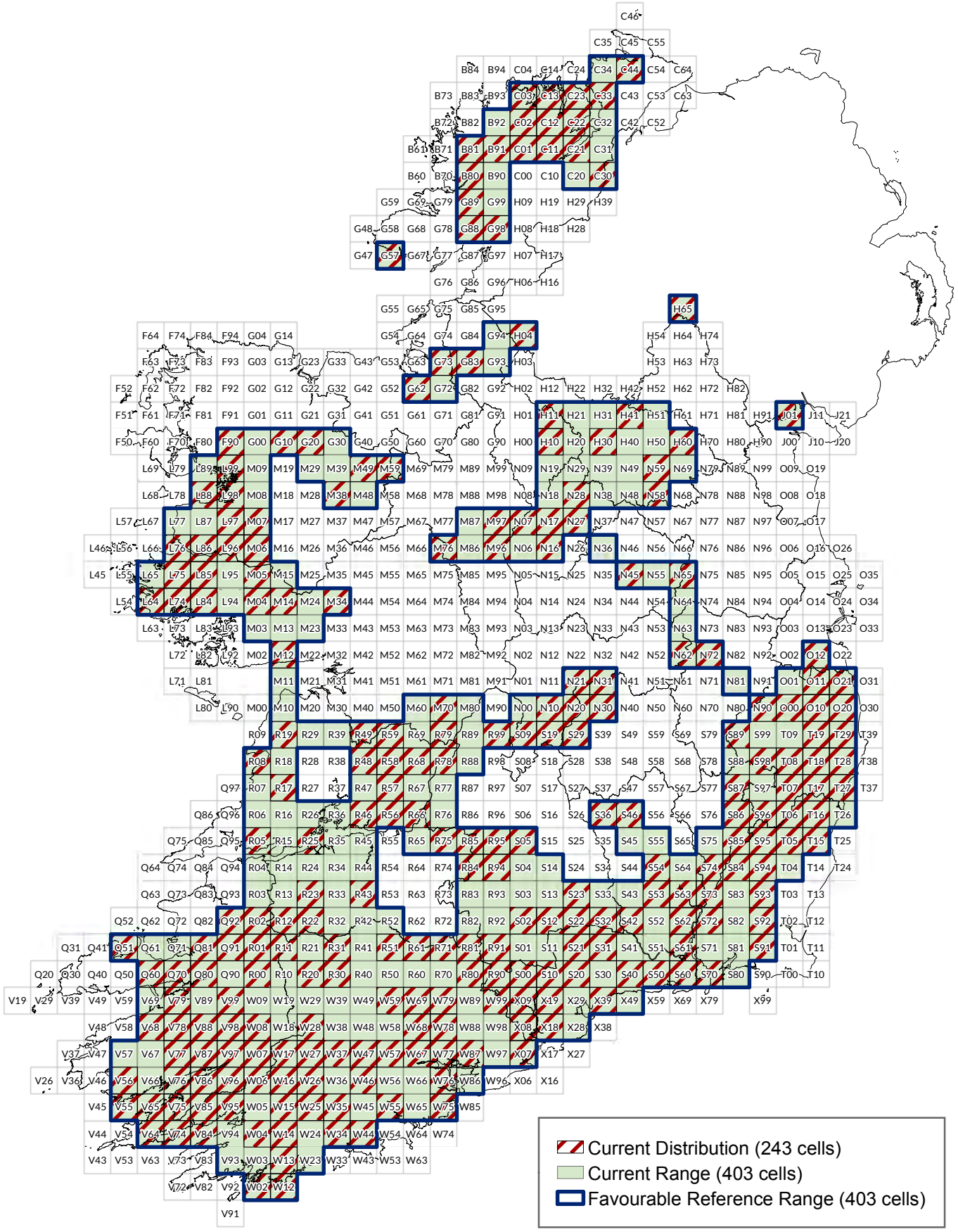
	b) yes, due to genuine change	*YES/NO*	*YES/**NO***
	c) yes, due to improved knowledge/more accurate	*YES/NO*	***YES**/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	***YES**/NO*
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/**NO***
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / **improved knowledge or more accurate data** / the use of a different method*
10.8 Additional information *Optional*	The Conservation Status of Range is Favourable in this reporting period, as it was in the previous reporting period. The Conservation Status of Area, Structure and functions and Future prospects are Unfavourable-Bad in this reporting period, as they were in the previous reporting period. The Overall Conservation Status was assessed as Unfavourable-Bad, as it was during the previous reporting period. Trend in Overall Conservation Status was assessed as deteriorating in this reporting period, but as improving in the previous reporting period. This change in trend is primarily due to the availability of more accurate data, e.g. DEFORMAP to detect anthropogenic area loss and the availability of baseline monitoring data from the previous reporting period for comparison.		

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***39.38 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval / **minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

11.4 Short-term trend of habitat area in good condition within the network **Direction**	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable*** */ increasing / decreasing / uncertain/ unknown*
11.5 Short-term trend of habitat area in good condition within network **Method used**	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing a union between the distribution polygon shapefile and the SAC shapefile. Polygons sourced from Forest Service (2018), a dataset displayed at the 10 km grid square level, were removed from the distribution shapefile prior to the union as they would artificially increase the area. The area in section 11.1 is the total area of 91A0 habitat in SACs in the country, including some SACs where 91A0 is not listed as a qualifying interest (QI). The area of 91A0 within the Natura 2000 network where it is listed as a QI is 36.46 km^2. No anthropogenic losses were reported during the current reporting period. Of the 4.2 ha of 91A0 lost during the previous reporting period as detected by DEFORMAP, 1.15 ha (27%) was lost from Natura 2000 sites, i.e. 0.3 ha lost to a golf course development within 000781 Slaney River Valley SAC, Co. Carlow; 0.62 ha lost to built land within 000365 Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC, Co. Kerry; and 0.27 ha lost to built land within 000106 St. Gobnet's Wood SAC, Co. Cork. Habitat 91A0 is listed as a QI at three sites with losses: 000781 = Representativity B, 000365 = Representativity A, 000106 = Representativity B. There were two inconsistencies between the Natura 2000 sites where the 91A0 habitat is listed as a QI and the current distribution for the habitat. These sites were excluded from the 91A0 distribution map in NPWS (2013). The relevant QIs of these sites will be reviewed. To determine the short-term trend of habitat area in good condition within the network, the approach outlined in section 6.8 was used: 74.7% (29.42 km^2) of the area assessed within the SAC network during the current reporting period was in good condition (Favourable). This compares with 75.8% (29.85 km^2) in good condition during the previous reporting period. Therefore, the short-term trend of the 91A0 habitat in good condition within the SAC network is taken to be relatively stable. This is the same trend as the 91A0 habitat nationally (Section 6.4). The surface area of 91A0 habitat within the Natura 2000 network has increased since last reporting period due to improved knowledge of 91A0.

12 Complementary information

Old oak woodlands (91A0)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Habitat code / name	**91D0 Bog woodland***
1.2i Habitat short name	**Bog woodland**
1.3i Habitat description	91D0 Bog woodland is a priority Annex I habitat. It occurs in three distinct habitats in Ireland: on intact raised bogs, where it is associated with low flow flushes on the high bog; on cutover bog, where it occurs in association with a weak ground-water influence; and within sessile oak woodlands in association with nutrient-poor flushes. They are mostly found in the midlands, the mid-west, the drumlin belt of the north midlands and in upland valleys. Bog woodlands are dominated by *Betula pubescens,* with small amounts of willow, mostly *Salix aurita* or *Salix cinerea*. Locally, there may be small amounts of *Pinus sylvestris*, especially on raised bogs. The dwarf shrub and field layers may be poorly to well developed. Dwarf shrub species can include *Calluna vulgaris*, *Vaccinium myrtillus* and *Vaccinium oxycoccos*. Field layer species can include *Molinia caerulea*, *Juncus effusus* and *Dryopteris* spp. The bryophyte layer has a characteristic luxuriant growth of *Sphagnum* species. *Polytrichum commune* and *Aulacomnium palustre* are also typical. Bog woodlands are closely linked to precise hydrological conditions that are required for both their initiation and maintenance. These conditions are characteristically restricted to small areas, and consequently the area of individual bog woodlands is typically small. The long-term dynamics of bog woodlands is still poorly understood (O'Connell, 1988; O'Connell & Doyle, 1990). Bog woodlands on raised bog and within sessile oak woodlands are considered more or less permanent, provided hydrology remains stable, whereas bog woodlands on cutover may represent a more transient community that gradually reverts to raised bog or dries out to become another woodland type (Cross & Lynn, 2013). The Irish Vegetation Classification (IVC; Perrin, 2016) places 91D0 habitat within the WL4 *Betula pubescens – Molinia caerulea* group. Two vegetation communities in this group have an affinity to the Annex I habitat comprising WL4C *Betula pubescens – Sphagnum palustre* woodland (77.8% affinity) and WL4E *Betula pubescens – Salix cinerea* woodland (17.0% affinity).

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***2003-2018***
2.2 Distribution map	Submitted

2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was derived from both a 91D0 polygon and point shapefile. Polygon sources added this reporting period comprise Daly *et al.* (in prep.), Foss & Crushell (2014), O'Neill *et al.* (2010), Bord na Móna Master Habitat Dataset and the Coillte Biodiversity Dataset. Point sources comprise a Bord na Móna record (Mark McCorry, pers. comm.). In addition, the distribution map from the last reporting period (NPWS, 2013) was also utilised, with sources comprising Fernandez *et al.* (2014), O'Neill *et al.* (2010), Fernandez *et al.* (2006) and Fernandez *et al.* (2005). Polygons were also digitised in 2013 by the former NPWS Woodlands expert, Dr John Cross. All references are detailed in Section 3.2. The 91D0 distribution was refined using the Deforestation Estimation and Mapping in Ireland (DEFORMAP) dataset. This dataset uses a combination of high-resolution aerial imagery and ancillary datasets to provide a map of deforestation in Ireland for the period 2000-2012 (Devaney *et al.,* 2017). A certainty rating system was applied that informed the distribution map. This system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1 the lowest. From the polygon data added this reporting period, i.e. Daly *et al.* (in prep.), Foss & Crushell (2014), O'Neill *et al.* (2010), Bord na Móna Master Habitat Dataset, and the Coillte Biodiversity Dataset, all were judged to be a high certainty of 3. One polygon from O'Neill *et al.* (2010) was assigned a certainty of 2, as it was listed as "Potential Habitat 91D0" in Appendix III of Cross & Lynn (2013). Point data from Bord na Móna were assigned a certainty of 3. Polygon data sources from the last reporting period (NPWS, 2013) had no numeric certainty rating. To apply certainty, Appendix III in Cross & Lynn (2013) was used. Polygons/sites from O'Neill *et al.* (2010), Fernandez *et al.* (2006) and Fernandez *et al.* (2005) that were listed as “Habitat 91D0 confirmed” in Appendix III were assigned a certainty of 3. Polygons/sites that were listed as “Potential Habitat 91D0” were assigned a certainty of 2. All data sources with a certainty of 2-3 were used to map the distribution of the 91D0 habitat. There were no data with a certainty of 1.

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned	
3 Biogeographical and marine regions	
3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Annett, J.A. (2015) Deer Management in Ireland: A Framework for Action. Prepared for Forest Service, Department of Agriculture, Food and the Marine, Johnstown Castle Estate, Co Wexford and National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. Bord na Móna (2016) Biodiversity Action Plan 2016-2021. https://www.bordnamona.ie/wp-content/uploads/2016/04/Biodiversity-Action-Plan-2016-2021.pdf. Accessed 28th September 2018. Bord na Móna Master Habitat Dataset. An extract from this dataset was made available by Bord na Móna. Coillte (2008) Bringing the Bogs Back to LIFE. http://life04.raisedbogrestoration.ie/downloads/raised-bog-project-bringing-the-bogs-back-to-life-brochure.pdf. Accessed 28th September 2018. Coillte Biodiversity Dataset (various dates) GIS files and individual site management plans were made available by Coillte. Cross, J. & Lynn, D. (2013) Results of a monitoring survey of bog woodland. *Irish Wildlife Manuals*, No. 69. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. Daly, O.H., O'Neill, F.H. & Barron, S.J. (in prep.) The monitoring and assessment of four EU Habitats Directive Annex I woodland habitats. *Irish Wildlife Manuals*, No. XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin. DCHG (2018a) The Living Bog Raised Bog Restoration Project. http://raisedbogs.ie/about-the-living-bog/. Accessed 28th September 2018. DCHG (2018b) National Raised Bog Special Areas of Conservation Management Plan 2012-2022. https://www.npws.ie/sites/default/files/files/FOR%20UPLOAD%20Plan(WEB_English)_05_02_18%20(1).pdf. Accessed 28th September 2018. Devaney, J., Redmond, J., Barrett, B., Cott, G. & O'Halloran, J. (2017) 21st Century Deforestation in Ireland, EPA Research Report No. 221. Prepared for the Environmental Protection Agency, Johnstown Castle, Co. Wexford. Fernandez, F., Fanning, M., McCorry, M. & Crowley, W. (2005) Raised Bog Monitoring Project 2004-2005. Unpublished report, National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Fernandez, F., MacGowan, F., Crowley, W., Farrell, M., Croal, Y.,

	Fanning, M. & McKee M. (2006) Assessment of the Iimpacts of turf cutting on designated Raised Bogs 2003-2006. Unpublished report, National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin. Fernandez, F., Connolly, K., Crowley, W., Denyer, J., Duff, K. & Smith, G. (2014) Raised Bog Monitoring and Assessment Survey 2013. *Irish Wildlife Manuals*, No. 81. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. Foss, P.J. & Crushell, P. (2014) County Kildare Wetland Survey III. Part 1: Main Report. Report prepared for Kildare County Council and The Heritage Council. Fuller, J. (2015) Biodiversity audit of Coillte native forest restoration sites. Unpublished report submitted to Coillte, Newtownmountkennedy. Herbert, I. (2009) Restoring Priority Woodland Habitats in Ireland: After LIFE Conservation Plan. http://www.woodlandrestoration.ie/publications.php. Accessed 21st September 2018. Mackin, F., Barr, A., Rath, P., Eakin, M., Ryan, J., Jeffrey, R. & Fernandez Valverde, F. (2017) Best practice in raised bog restoration in Ireland. *Irish Wildlife Manuals*, No. 99. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.1. Unpublished Report, National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. O'Connell, C.A. & Doyle, G.J. (1990) Local vegetation history of a pine woodland on Clonfinane Bog, County Tipperary. *Ecology and conservation of Irish peatlands* (ed. by G.J. Doyle), pp. 23-40. Royal Irish Academy, Dublin. O'Connell, C.A. (1988) A comparative palynological study of contemporary and subfossil pine and birch woodlands in Irish raised bogs. PhD Thesis, University College Dublin, Dublin. O'Neill, F.H., Martin, J.R. & McNutt, K.E. (2010) The digitisation of woodland habitats surveyed as part of the National Survey of Native Woodlands. Unpublished report submitted to National Parks and Wildlife Service, Dublin. Perrin, P.M. (2016) Irish Vegetation Classification Technical Progress Report No. 2. Report to The National Biodiversity Data Centre. http://www.biodiversityireland.ie/wordpress/wp-content/uploads/IVC_Technical-Progress-Report-No.2.pdf. Accessed 4th September 2018. Perrin, P., Martin, J., Barron, S., O'Neill, F., McNutt, K. & Delaney, A. (2008) National Survey of Native Woodlands 2003-2008. Unpublished report submitted to National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin.
3.2i Additional information	

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***9,000 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 9,000 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators Favourable Reference Range is set as the current range. There is no evidence of loss of range since the Directive came into force and the geographic spread is considered sufficient for the long term survival of the habitat.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***

	b) yes, due to improved knowledge/more accurate data	***YES**/NO*
	c) yes, due to the use of different method	*YES/**NO***
	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*	
4.12 Additional information *Optional*	There is no evidence of loss of range since the Directive came into force. Range was calculated using the range tool, based on the current known distribution of 91D0 habitat. A maximum gap distance of two 10 km grid cells was used when running the range tool. Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013). None of the area losses recorded during these two reporting periods led to a contraction in the range. The short-term trend is assessed as stable. The number of 10 km squares in the range (90) is 33 squares higher than the last monitoring period (NPWS, 2013). These changes are due to improved knowledge within the current reporting period. For example: Ten new 10 km squares were added in the vicinity of North Kildare/East Offaly during the current reporting period based on data from Foss & Crushell (2014) and Bord na Móna. Two 10 km squares that were in the range last reporting period (S28, S38) were not included in the range this reporting period as the 2017-2018 Woodland Monitoring Survey confirmed the habitat was absent from this area (Daly *et al.*, in prep.). Favourable Reference Range (FRR) has increased since the last reporting period to reflect the improved level of knowledge. The FRR is the current range reported in Section 4.1.	

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2003-2018***	
5.2 Surface area *(in km²)*	**a) Minimum**	***2.13 km²***
	b) Maximum	
	c) Best single value	
5.3 Type of estimate	*Best estimate / 95% confidence interval / **minimum***	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data*	

	d) Insufficient or no data available	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
5.13 Favourable reference area	***a) 2.13 km^2***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The FRA is set as the current area as there is no evidence of a decline since the Directive came into force and this is considered adequate to ensure the long-term viability of the habitat.	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*

	c) yes, due to the use of different method	*YES/**NO***
	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 2003 following the commencement of the National Survey of Native Woodlands (NSNW; Perrin *et al.,* 2008) and a survey to assess the impacts of turf cutting on designated raised bogs (Fernandez *et al.,* 2006), and incorporates updates made by other surveys between 2004-2018 that are listed in Section 3.2. A subset of these sites was visited by the 2011-2012 Bog Woodland Monitoring Survey (Cross & Lynn, 2013) and the 2017-2018 Woodland Monitoring Survey (Daly *et al*., in prep.). There are probably still areas of unmapped 91D0 habitat within the country, hence, the area value entered is a minimum. During the previous reporting period, the current area was taken to be the Favourable Reference Area (FRA). Using this same approach, the FRA is the current surface area as reported in Section 5.2. Fourteen 91D0 sites were surveyed during the 2017-2018 Woodland Monitoring Survey (Daly *et al.,* in prep.), eleven of which had previously been surveyed by the 2011-2012 Bog Woodland Monitoring Survey (Cross & Lynn, 2013). The fourteen monitoring sites assessed for Area during the current reporting period represent 0.67 km^2 (31.4%) of the total area of 91D0 habitat recorded in Ireland. No area losses were recorded from the 2017-2018 Woodland Monitoring sites by Daly *et al.* (in prep.). During the previous reporting period, no area losses were reported from the eleven sites surveyed by Cross & Lynn (2013) during the 2011-2012 Bog Woodland Monitoring Survey. The recent availability of the DEFORMAP, a dataset which provides a deforestation map of Ireland covering the period 2000–2012 (Devaney *et al.,* 2017), allows us to retrospectively assess area loss during the previous two reporting periods. Based on an intersect with the 91D0 distribution map, DEFORMAP data indicate 1.2 ha were lost from one site during the 2007-2012 reporting period due to road construction (0.2 ha) and woodland clearance (1.0 ha). This site was listed as "Habitat 91D0 confirmed" in Appendix III of Cross & Lynn (2013) (NSNW Site 1251 Corduff East, Co. Cavan). DEFORMAP did not detect loss of 91D0 area during the 2001-2006 reporting period. Anthropogenic loss totalling 1.2 ha from 2007-2018 was reported by DEFORMAP. The magnitude of the known loss is -0.05% per annum, measured over a period of 12 years, 2007-2018. This was calculated by estimating the area lost and expressing this as a per-annum percentage loss of the known area of 91D0. It should be noted there are no DEFORMAP data available from 2012 onwards. Therefore, this area loss is taken to be the minimum, with other undocumented losses possible within the current reporting period (at sites outside the monitoring network), as well as undocumented losses occurring	

	at unmapped sites. During the 2001-2006 reporting period, a severe fire event at All Saints Bog, Co. Offaly resulted in the loss of 0.76 ha of 91D0 habitat (Fernandez *et al.,* 2014). In relation to area, NPWS (2013) stated "field evidence suggests that the area of this habitat is declining on raised bogs due to on-going desiccation but expanding on abandoned cutaway". It concluded that "there is likely to have been a slight increase in area" but conceded that it is difficult to quantify this increase. The previous Favourable assessment for Area was dependent on expert opinion concluding that there was an increase in area in 91D0. Since there are no data in the interim to the contrary, this assessment remains unchanged this reporting period. Research efforts should however be made to quantify these increases, as the Bord na Móna estate, which would include considerable areas of cutover bog, currently supports just three 91D0 sites (Mark McCorry, pers. comm.). Therefore, it may be that the contribution of woodland on cutover bog to gains in the 91D0 habitat area may be overestimated. Since these habitat gains are unquantified, it is not possible to conclude that they exceed the losses reported above. Therefore, short-term trend is considered stable rather than increasing.

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***2.04 km²***
		Maximum	***2.04 km²***
	b) Area in not-good condition	**Minimum**	***0.09 km²***
		Maximum	***0.09 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*		

6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? **YES**/NO*
6.7 Typical species Method used *Optional*	*Salix x multinervis* and *Empetrum nigrum* were added to the list of typical species this reporting period and *Fraxinus excelsior* was excluded. Otherwise the list of typical species in NPWS (2013) was used. At the monitoring sites each plot was assessed based on the presence of a sub-set of typical species. For a plot to pass the typical species criterion, the target species *Betula pubescens* and a *Sphagnum* species needed to be present, and at least five other typical species. A full list of typical species is presented in Section 6.8 including the sub-set used in the typical species assessment by Daly *et al.* (in prep.).
6.8 Additional information *Optional*	During the current reporting period, fourteen sites were assessed for Structure and functions by Daly *et al.* (in prep.). This represents 0.67 km^2 (31.4%) of the total area of 91D0 habitat recorded in Ireland. Ten sites received a 'Green' (Favourable) Structure and functions assessment, four sites received an 'Amber' (Inadequate) assessment, with no sites receiving a 'Red' (Bad) assessment. The approach used to determine the percentage of the 91D0 habitat in Favourable condition was as follows: At each monitoring site, equal weight was applied was to each of the individual-plot assessment results (n=4) and the four-plot level assessment result (n=1). At the individual-plot level, a Pass=20% and a Fail=0%. At the four-plot level, a Pass=20% and a Fail=0%. For example: A site with three passes and one fail at the individual-plot level (20 + 20 + 20 + 0 = 60) and a pass at the four-plot level (20) had 80% (60 + 20 = 80) of its habitat in good condition (Favourable). During the current reporting period, 95.9% of the area was assessed as good condition (Favourable). When the proportion in good (95.9%) and in not-good condition (4.1%) was scaled up to the national estimate, 2.04 km^2 was in good condition and 0.09 km^2 was in not-good condition. All eleven sites surveyed for the 2011-2012 Bog Woodland Monitoring Survey received a 'Green' Structure and functions assessment (Cross & Lynn, 2013). However, Structure and functions plots were only conducted at nine sites, with only a general survey conducted at the remaining two sites. The above approach to determine the percentage of 91D0 habitat in Favourable condition could not be retrospectively applied to the previous reporting period due to differences in sub-sampling at both the site and plot level during the 2011-2012 Bog Woodland Monitoring Survey. Based on expert opinion, the short-term trend of

	habitat area in good condition was considered stable. During the current reporting period, the most frequent criteria to fail the Structure and functions assessment were 'target tree size class' (42.9% of plots) and 'old trees & dead wood ' (28.6% of plots) (Daly *et al*., in prep.). Taxa on the current list of typical species that are used in the typical species assessment by Daly *et al*. (in prep.) comprise *Betula pubescens* (target species), *Salix aurita, Salix cinerea, Salix x multinervis, Dryopteris dilatata, Dryopteris carthusiana, Carex rostrata, Juncus effusus, Molinia caerulea, Calluna vulgaris, Vaccinium oxycoccos, Vaccinium myrtillus, Empetrum nigrum, Epilobium palustre, Potentilla erecta, Polytrichum commune, Sphagnum fimbriatum, Sphagnum fallax, Sphagnum palustre, Hylocomium splendens* and *Aulacomnium palustre*. Other species not used in the assessment but considered typical comprise *Pinus sylvestris, Erica tetralix, Eriophorum vaginatum, Sphagnum squarrosum, Sphagnum capillifolium, Sphagnum teres* and *Polytrichum strictum* (NPWS, 2013).

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**K01** Abstraction from groundwater, surface water or mixed water (M) **I02** Other invasive alien species (other than species of Union concern) (M) **C05** Peat extraction (M) **A11** Burning for agriculture (M) **B09** Clear-cutting, removal of all trees (M)	**K01** Abstraction from groundwater, surface water or mixed water (M) **I02** Other invasive alien species (other than species of Union concern) (M) **C05** Peat extraction (M) **A11** Burning for agriculture (M) **B09** Clear-cutting, removal of all trees (M)
7.2 Sources of information *Optional*	Pressures were recorded during the 2017-2018 Woodland Monitoring Survey (Daly *et al*., in prep.).	
7.3 Additional information *Optional*	Pressures and threats were selected and ranked based on intensity (high, medium or low), frequency of occurrence, and area of impact, using the data gathered during the 2017-2018 Woodland Monitoring Survey as presented in Daly *et al.* (in prep.). Additionally expert judgement was used when considering impacts not recorded during the Woodland Monitoring Survey but which have resulted in recorded loss of area.	

	No high-importance pressures were recorded. Medium-importance pressures comprise K01 Abstraction from groundwater, surface water or mixed water, I02 Other invasive alien species (other than species of Union concern), C05 Peat extraction, A11 Burning for agriculture and B09 Clear-cutting, removal of all trees. K01 Abstraction from groundwater, surface water or mixed water was recorded as a medium-importance pressure. It was the most frequently recorded pressure, occurring at ten of the fourteen sites surveyed by Daly *et al.* (in prep.). It was recorded as high intensity at two sites, medium intensity at three sites and low intensity at five sites. It affected >75% of the habitat at seven sites (Daly *et al.,* in prep.). K01 had previously been recorded as a medium-importance pressure in NPWS (2013) under the code J02 Human-induced changes in hydraulic conditions. I02 Other invasive alien species (other than species of Union concern) was recorded as a medium-importance pressure. It was the second most frequently recorded pressure, occurring at nine of the fourteen sites surveyed by Daly *et al.* (in prep.). It was recorded as low intensity at all sites. It affected 75% of the habitat at one site and <3% of the habitat at eight sites (Daly *et al.,* in prep.). Frequently recorded invasive species include *Acer pseudoplatanus, Fagus sylvatica, Picea sitchensis* and *Rhododendron ponticum*. I02 had previously been recorded as a low-importance pressure in NPWS (2013) under the code I01 invasive non-native species. C05 Peat extraction was recorded as a medium-importance pressure. C05 was recorded at five of the fourteen sites surveyed, and was the third most frequently recorded pressure (Daly *et al.,* in prep.). It was high intensity at two sites, medium intensity at two sites, and low intensity at one site. At four sites it affected >75% of the habitat. C05 had previously been recorded as a medium-importance pressure in NPWS (2013) under the code C01.03 Peat extraction. A11 Burning for agriculture was recorded as a medium-importance pressure. It was medium intensity at one site where it affected 5% of the habitat. During the 2001-2006 reporting period, this pressure resulted in the loss of 0.76 ha of 91D0 habitat. A11 had previously been recorded as a low-importance pressure in NPWS (2013) under the code J01.01 burning down. B09 Clear-cutting, removal of all trees was not recorded from the monitoring sites. However, this pressure resulted in the loss of 1 ha of 91D0 habitat as detected by DEFORMAP during the previous reporting period. This area loss should be taken to be a minimum since there are probably still unmapped areas of 91D0 nationally. It is therefore considered a medium-importance pressure. A09 Intensive grazing or overgrazing by livestock was listed as a low-importance pressure in NPWS (2013) under the code B06 Grazing in forests/woodland. During the current reporting period A09 was recorded as a low-importance pressure at three of the fourteen sites. It was recorded as medium intensity and affecting 100% of the habitat at all three sites. It should be noted that the pressure recorded under impact category A09 is primarily overgrazing by deer (not livestock). A04.01 intensive grazing was recorded as a low-

	importance pressure in NPWS (2013). This pressure was recorded under the code A09 in this reporting period. Other pressures recorded from the fourteen monitoring sites by Daly *et al.* (in prep.) comprise: I04 Problematic native species (2 sites), A26 Agricultural activities generating diffuse pollution to surface or ground waters (1 site), J04 Mixed source soil pollution and solid waste (excluding discharges) (1 site) and C01 Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell) (1 site). I04 and J04 were listed as low-importance pressures in NPWS (2013) under the codes I02 problematic native species and E03.01 disposal of household/ recreational facility waste.

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type** or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* ***b) Medium-term results (within the next two reporting periods, 2019-2030) or*** *c) Long-term results (after 2030)*

8.5 List of main conservation measures	*List a maximum of 10 measures using code list provided in the Reference portal* **CA05** Adapt mowing, grazing and other equivalent agricultural activities **CB02** Maintain existing traditional forest management and exploitation practices **CB05** Adapt/change forest management and exploitation practices **CB08** Restoration of Annex I forest habitats **CB14** Manage drainage and irrigation operations and infrastructures **CC07** Habitat restoration/creation from resources, exploitation areas or areas damaged due to installation of renewable energy infrastructure **CE01** Reduce impact of transport operation and infrastructure **CI03** Management, control or eradication of other invasive alien species **CI05** Management of problematic native species **CJ01** Reduce impact of mixed source pollution
8.6 Additional information *Optional*	Conservation measures were selected using data gathered from Daly *et al.* (in prep.), DCHG (2018a), DCHG (2018b), Mackin *et al.* (2017), Bord na Móna (2016), Annett (2015), Herbert (2009) and Coillte (2008). While the measures recorded in Daly *et al*. (in prep.) are specific to 91D0, other measures listed are likely to involve some 91D0, though they may not be specific to the habitat. Of the fourteen sites surveyed by Daly *et al.* (in prep.), conservation measures were recorded from two sites. Conservation measures recorded comprise drain blocking (CB14) (2 sites) and the clear-felling of adjacent conifer plantations (CB05) (1 site). One of the monitoring sites with conservation measures recorded is an NPWS-managed Nature Reserve which is part of 'The Living Bog' LIFE Raised Bog Restoration Project (Site 606 Clara Bog, Co. Offaly). The other site is a Coillte LIFE Raised Bog Restoration Project site (Site 607 Cloonshanville, Co. Roscommon). The Coillte LIFE Restoring Priority Woodland Project 2006-2009 (LIFE05 NAT/IRL/000182) restored priority woodland at nine Coillte-owned sites within SACs. One 91D0 site was restored (Aghnaguig, Co. Cavan) with restoration works extending across 5.9 ha (CB08). Conservation measures undertaken at this site and supported by the After-LIFE Conservation Plan (Herbert, 2009) include fencing (CB05), invasive species control (CI03), selective conifer removal (CB05), maintenance of tracks/trails (CE01), retention of dead wood (CB02) and drain blocking (CB14). A monitoring survey found that the watertable was high, indicating that drain blocking was successful. Invasive species were under control, with only very small numbers of early stage regenerating conifers present. No damaging landuses were recorded and the site was assessed as having minimal risks (Fuller, 2015). As a peat-forming habitat, 91D0 is closely associated with, and is considered a component of, the raised bog environment (Mackin *et al.,* 2017). Raised bog restoration projects can reinstate natural

	hydrological conditions that can improve the Structure and functions of existing stands of 91D0 (CB08), and create conditions that may result in future 91D0 habitat gain. Some of the main organisations involved in Raised Bog Restoration Projects include NPWS, Coillte, Bord Na Móna, the Irish Peatland Conservation Council (IPCC) and Abbeyleix Bog Project Limited. The Coillte LIFE Raised Bog Restoration Project 2004-2008 (LIFE 04 NAT/IE/000121) involved the restoration of Coillte-owned afforested raised bogs within SACs (Coillte, 2008). Conservation measures conducted as part of this project include drain blocking (CB14), clear-felling of conifer plantations (CB05) and invasive species control (CI03). As part of the National Raised Bog SAC Management Plan 2017–2022, site-specific restoration plans have been drafted and will be implemented at 53 raised bog SACs on a phased basis. These SACs contain approximately 75% of the remaining national resource of 7110 Active Raised Bog (Mackin *et al.,* 2017) and approximately 26.2 ha of 91D0 Bog woodland (i.e. 12.3% of the national 91D0 resource). The draft restoration plans include restoration of high bog as well as surrounding cutover. Where relevant, site-specific conservation objectives for bog woodland have also been set (CB08) (Mackin *et al.,* 2017). 'The Living Bog' Raised Bog Restoration Project 2016-2020 (LIFE14 NAT/IE/000032) is the first project to use these draft restoration plans. This EU LIFE project involves twelve SACs across seven counties (subsequent projects will be undertaken at the remaining SACs on a phased basis). Funding is provided by EU LIFE and Department of Culture, Heritage and the Gaeltacht. 'The Living Bog' project aims to improve 2,600 ha of raised bog habitat (i.e. 18% of the national high bog area) over its five-year lifespan (DCHG, 2018a). Conservation measures supported by the National Raised Bog SAC Management Plan 2017-2022 and the associated EU LIFE project include drain blocking (CB14), removal of forestry (CB05), invasive species control (CI03), installation of bunds (CB14), inoculation with *Sphagnum* (CC07), excavation/reprofiling (CC07), fire management (CA05), waste management (CJ01), and installation of boardwalks/walking trails (CE01) (DCHG, 2018b; Mackin *et al.,* 2017). Of the mapped area of 91D0: 42.7 ha (20.2%) occur within the SAC network; 170.4 ha (79.8%) occur outside the SAC network. Approximately 29.2 ha (13.7%) occur within SACs that list 91D0 as a qualifying interest (QI). Approximately 26.4 ha (12.4%) occur within SACs that list 7110 Active Raised Bog as a QI (i.e. Raised Bog SACs that will have draft restoration plans drawn up under the National Raised Bog SAC Management Plan 2017–2022). Preliminary survey results suggest that 91D0 is present at Abbeyleix Bog (NPWS, unpublished data). Conservation measures undertaken by the community-based Abbeyleix Bog Project include *Rhododendron ponticum* clearance (CI03) and boardwalk development (CE01). As part of their Biodiversity Action Plan, Bord na Móna rehabilitate areas of cutaway for the purposes of promoting biodiversity (CC07). The main habitats emerging on the Bord na Móna cutover comprise a mosaic of wetland and woodland. Since these areas are largely

	underlain by peat soils, birch-dominated stands typically develop, with patches of willow and pine (Bord na Móna, 2016). There are currently three 91D0 sites on the Bord na Móna estate. Developing birch stands on cutover have the potential to represent future 91D0 (Mark McCorry, pers. comm.). Their development will vary and will be determined largely by local conditions (e.g. hydrological conditions, presence of Sphagna). The Irish Deer Management Forum (IDMF) was launched in 2015 and set out a series of management actions in the document *Deer Management in Ireland: A Framework for Action*. The aim of this Framework was to manage deer responsibly in order to minimise their impact on agriculture, woodlands and other conservation habitats. It aimed to use a cross-sectoral approach to deliver deer management structures that suited spatial requirements, conformed to best practice, and complied with existing legislative and policy frameworks (CI03, CI05) (Annett, 2015). However, at the time of writing this forum was inactive.

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	***Good*** */ Poor / Bad / Unknown*
	c) Structure and functions	***Good*** */ Poor / Bad / Unknown*
9.2 Additional information *Optional*	Current range is equal to the Favourable Reference Range. Conservation status of Range is therefore Favourable. Short-term trend direction of Range is assessed as stable. Future trend of Range overall is assessed as stable, as the range is not expected to contract over the next 12 years. Future prospects of Range are therefore good. Current area is equal to the Favourable Reference Area. Conservation status of Area is therefore Favourable. Short-term trend direction of Area is assessed as stable. Future trend of Area overall is assessed as stable based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Area are therefore good. Conservation status of Structure and functions is assessed as Favourable as >90% of the habitat is in Favourable condition. Short-term trend direction is stable for habitat that is in good condition. Future trend of Structure and functions overall is assessed as stable, as the structure and functions are not expected to decline based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Structure and functions are therefore good.	

10 Conclusions			
Assessment of conservation status at end of reporting period			
10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/****NO***	*YES/****NO***
	b) yes, due to genuine change	*YES/NO*	*YES/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	*YES/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
10.8 Additional information *Optional*	The assessments of Range, Area and Structure and functions were Favourable in this reporting period, as they were in the previous reporting period. The overall assessment of Conservation Status was Favourable in this reporting period, as it was in the previous reporting period. Trend in Overall assessment of Conservation Status was assessed as		

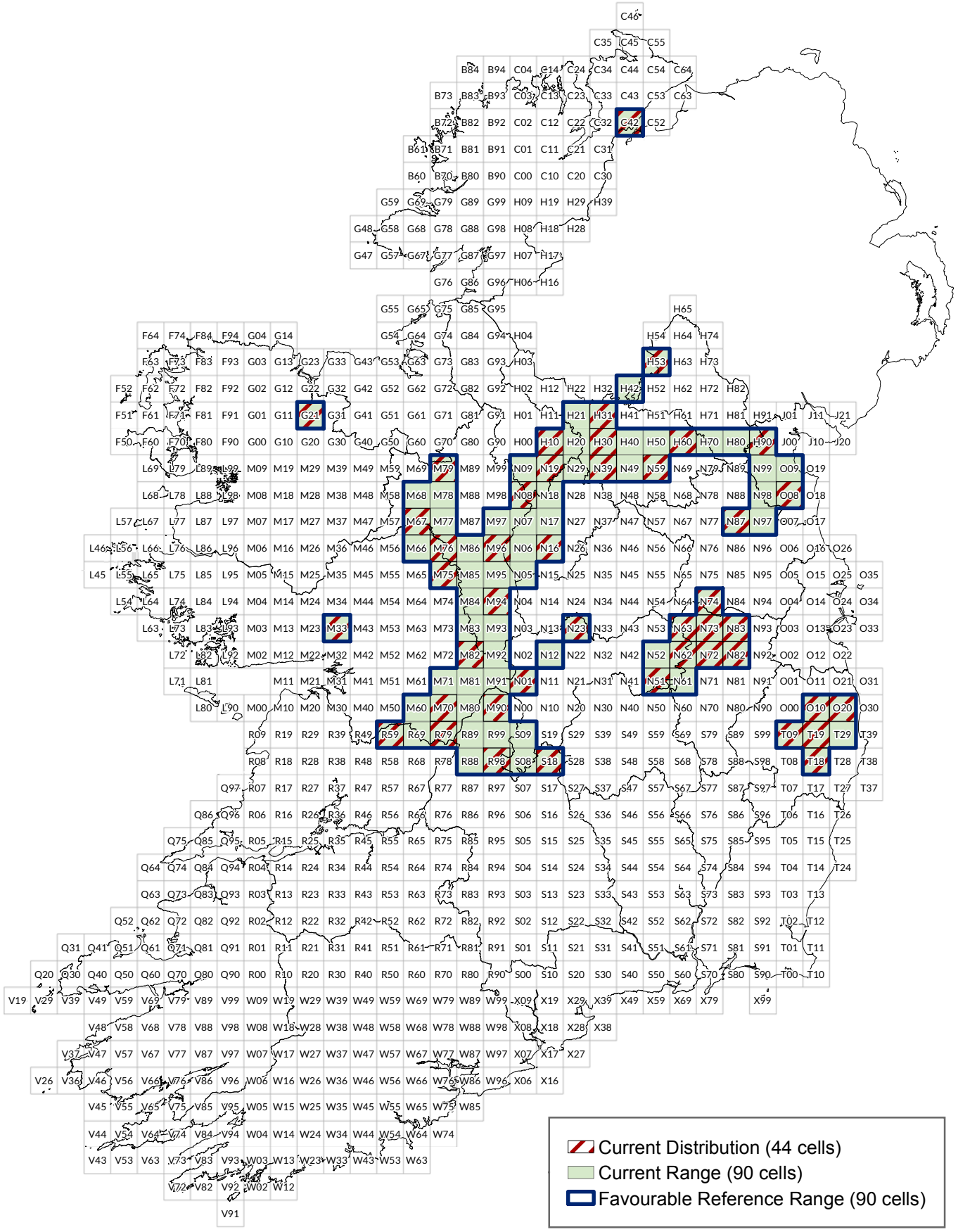
	stable in this reporting period. There were no trends associated with Favourable assessments in 2013, the Overall trend is assumed to have been stable.

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***0.43 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* *stable /* ***increasing*** */ decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing a union between the distribution polygon and point shapefiles and the SAC shapefile. The area in Section 11.1 is the total area of 91D0 habitat in SACs in the country, including some SACs where 91D0 is not listed as a qualifying interest (QI). The area of 91D0 within the Natura 2000 network where it is listed as a QI is 0.29 km^2. Anthropogenic losses of 1.2 ha were reported during the previous reporting period by DEFORMAP. None of these losses were from Natura 2000 sites. There was one inconsistency between the Natura 2000 sites where the 91D0 habitat is listed as a QI and the current distribution for the habitat. The relevant QIs of this site will be reviewed. The short-term trend of the 91D0 habitat in good condition within the SAC network is taken to be increasing. This is mainly due to the restoration projects that have/are being undertaken within SACs. Approximately 20.1% of the 91D0 habitat area is within the Natura 2000 network. The reported surface area of 91D0 habitat within the Natura 2000	

	network has decreased slightly since the last reporting period; this is due to improved knowledge of the area of 91D0 habitat in this reporting period.

12 Complementary information

Bog woodland * (91D0)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil
V 2.0
Dáta
June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Habitat code / name	**91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)***
1.2i Habitat short name	**Alluvial woodland**
1.3i Habitat description	91E0 Alluvial woodland is a priority Annex I habitat. A number of variants of this habitat exist, of which riparian forests of *Fraxinus excelsior* and *Alnus glutinosa* (Alno-Padion) of temperate and Boreal Europe lowland and hill watercourses are the most common type found in Ireland. The Interpretation Manual of EU habitats 2013 (CEC, 2013) states that all types occur on heavy soils which are periodically inundated by the annual rise of river levels, but which are otherwise well-drained and aerated during low water. The herbaceous layer includes many large species such as *Filipendula ulmaria, Angelica sylvestris, Rumex sanguineus* and *Carex* spp., vernal species such as *Ficaria verna* and *Anemone nemorosa*, and other indicative species such as *Carex remota, Lycopus europaeus, Urtica dioica* and *Geum rivale*. In addition, there are gallery forests of tall willows (Salicion albae) alongside river channels and occasionally on river islands, where the tree roots are almost continuously submerged. These are dominated by *Salix alba, S. viminalis* and *S. triandra*, sometimes with *S. cinerea,* but *Alnus glutinosa* should be rare. There is a luxuriant herb layer of species such as *Phalaris arundinacea, Urtica dioica* and *Filipendula ulmaria*. The Irish Vegetation Classification (IVC; Perrin, 2016) primarily places 91E0 habitat within the WL3 *Alnus glutinosa – Filipendula ulmaria* group. All vegetation communities in this group (WL3A-WL3F) have an affinity to the Annex I habitat.

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***1993-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was derived from both a 91E0 polygon and point shapefile. Polygon sources added this reporting period comprise the following

	17 datasets: Daly *et al.* (in prep.), Forest Service (2018), Brophy & D'Arcy (2017), Galway County Council (2017), Irish Water (2017), Martin & Brophy (2017), Brophy & D'Arcy (2016), Brophy & Martin (2015), Daly *et al*. (2015), Foss *et al.* (2015), Martin *et al.* (2015), Foss *et al*. (2014), Perrin *et al.* (2014a), Perrin *et al.* (2014b), Brophy & Devaney (2013), Maher & Hamilton (2012) and the Coillte Biodiversity Dataset (various dates). Point sources added this reporting period comprise O'Neill & Martin (2015), Martin (2006), Lynch (2005) and Browne (1998). In addition to this, the distribution map from the last reporting period (NPWS, 2013) was also utilised with sources comprising Barron & Perrin (2011), Duff & Denyer (2012), NPWS (2012), Roughan & O'Donovan (2012), O'Neill *et al.* (2010), O'Donoghue *et al.* (2009), Wilson (2009), O'Donoghue *et al.* (2008), Crushell & Foss (2008), Ó Riain *et al.* (2007), Tubridy (2006), Coillte Priority Woodland, Carlow Pilot Habitat Mapping, Fingal Habitat Survey, Uplands and Peatlands Grazing Survey and the Habitat Assignment Project. Various polygons were also digitised in 2012 by the former NPWS Woodlands Expert, Dr. John Cross. All references are detailed in Section 3.2. The 91E0 distribution was refined using the Deforestation Estimation and Mapping in Ireland (DEFORMAP) dataset. This dataset uses a combination of high-resolution aerial imagery and ancillary datasets to provide a map of deforestation in Ireland for the period 2000-2012 (Devaney *et al.,* 2017). A certainty rating system was applied to all data that informed the distribution map. This system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1 the lowest. Of the 17 polygon data sources added this reporting period and listed above, all were judged to be a high certainty of 3, with the exception of the Forest Service (2018), a polygon dataset displayed at the 10 km grid square level, which was assigned a certainty of 2. 91E0 was assigned *post hoc* from species data and habitat extent was estimated. One of the polygons associated with Daly *et al.* (in prep.) was assigned a certainty of 2, as it was not subject to a walkover survey. The point data from O'Neill & Martin (2015) were assigned a certainty of 3. The remaining point data by Martin (2006), Lynch (2005) and Browne (1998) were assigned a certainty of 2, as 91E0 was assigned *post hoc* from species data. Certainty values from the datasets utilised during the last reporting period (NPWS, 2013) were not reassigned as the classes within the certainty rating system are fairly broad, and the 91E0 habitat itself is relatively stable. All data sources with certainty 1-3 were used to map the distribution of the 91E0 habitat.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
3.2 Sources of information	Annett, J.A. (2015) Deer Management in Ireland: A Framework for Action. Prepared for Forest Service, Department of Agriculture, Food and the Marine, Johnstown Castle Estate, Co Wexford and National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. Barron, S.J. & Perrin, P.M. (2011) Production of a habitat map for Killarney National Park, Co. Kerry. Unpublished report submitted to National Parks and Wildlife Service, Dublin. Brophy, J. & Devaney, F. (2013) Ecological Study of the Royal Canal between Talbot Bridge and Maynooth Train Station. Unpublished report by BEC Consultants Ltd. Brophy, J.T. & D'Arcy, D. (2016) Baseline Ecological Survey of the Old Roosky Canal, Towpath and Adjacent Lands. Unpublished report by BEC Consultants Ltd. Brophy, J.T. & D'Arcy, D. (2017) Baseline Ecological Survey of the Killaloe Canal and Adjacent Lands. Unpublished report by BEC Consultants Ltd. Brophy, J.T. & Martin, J.R. (2015) Ecological Impact Assessment: Drumshanbo to Battlebridge Blueway. Unpublished report by BEC Consultants Ltd. Browne, A. (1998) Vegetation-Environment Interactions in the Vicinity of a Pharmaceutical Plant near Kinsale, Co.Cork. Unpublished Ph.D. Thesis, University College, Dublin. Carlow Pilot Habitat Mapping Project. GIS files for this Carlow County Council habitat survey were available. CEC (Commission of the European Communities) (2013) Interpretation manual of European Union habitats. EUR 28. European Commission, DG Environment. Coillte Biodiversity Dataset (various dates) GIS files and individual site management plans were made available by Coillte. Datasets used were from 2001 to 2005. Coillte Priority Woodland. GIS files were made available by Coillte. Cross, J.R. & Collins, K.D. (2017) *Management Guidelines for Ireland's Native Woodlands.* National Parks and Wildlife Service, Department of Arts, heritage, Regional, Rural and Gaeltacht Affairs and Forest Service, Department of Agriculture, Food and the Marine. Dublin. Crushell, P. (2018) Bandon River SAC south of Dunmanway, County Cork. Unpublished report submitted to the Office of Public Works, Trim, Co. Meath. Crushell, P. & Foss, P. (2008) The County Clare wetlands survey. Report for Clare County Council, Clare Biodiversity Forum and

The Heritage Council.

DAFM (2018a) Forestry Programme 2014 – 2020, Midterm Review. https://www.agriculture.gov.ie/media/migration/forestry/forestservicegeneralinformation/2014-2020midtermreview/MidTermReview210218.pdf. Accessed 14th December 2018.

DAFM (2018b) Ash Dieback (*Chalara*). https://www.agriculture.gov.ie/forestservice/treediseases/ashdiebackchalara/#legupdate. Accessed 5th September 2018.

DAFM (2018c) Woodland for Water: Creating new native woodlands to protect and enhance Ireland's waters. https://www.agriculture.gov.ie/media/migration/forestry/grantandpremiumschemes/2018/WoodlandWaterLoRes06June18270618.pdf. Accessed 3rd January 2019.

DAFM (2015a) Native Woodland Conservation Scheme. Published report by Forest Service, Department of Agriculture, Food and the Marine, Johnstown Castle Estate, Co. Wexford.

DAFM (2015b) Native Woodland Establishment GPC9 & GPC10: Silvicultural Standards. Published report by Forest Service, Department of Agriculture, Food and the Marine, Johnstown Castle Estate, Co. Wexford.

Daly, O.H., Barron, S.J., Perrin, P.M. & Roche, J.R. (2015) Blanket bog turf-cutting management system: Site Report No. 4 Cloghernagore Bog and Glenveagh National Park SAC (002047). Unpublished report to the National Parks and Wildlife Service.

Daly, O.H., O'Neill, F.H. & Barron, S.J. (in prep.) The monitoring and assessment of four EU Habitats Directive Annex I woodland habitats. Irish Wildlife Manuals, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin.

Devaney, J., Redmond, J., Barrett, B., Cott, G. & O'Halloran, J. (2017) 21st Century Deforestation in Ireland, EPA Research Report No. 221. Prepared for the Environmental Protection Agency, Johnstown Castle, Co. Wexford.

Duff, K. & Denyer, J. (2012) Bride's Glen Ecological Assessment. Unpublished report for Dun Laoghaire-Rathdown County Council.

Habitat Assignment Project. An NPWS spreadsheet noting the qualifying interest of SACs and other habitats which occur in SACs, NHAs and cNHAs.

Fingal Habitat Survey. GIS files for this project were made available by Fingal County Council.

Forest Service (2018) *Ireland's National Forest Inventory 2017 - Field Procedures and Methodology.* Department of Agriculture, Food and the Marine. ISBN 978-1-4064-2980-0.

Foss, P.J., Crushell, P. & Kirwan, B. (2015) County Waterford Wetland Survey. Part 1: Main Report. Report prepared for Waterford City and County Council.

Foss, P.J., Crushell, P., Kirwan, B., O'Loughlin, B. & Wilson, F. (2014) Louth Wetland Survey III. Report prepared for Louth County Council and The Heritage Council.

Galway County Council (2017) Unpublished data collected for the Galway City Transport Project.

Herbert, I. (2009) Restoring Priority Woodland Habitats in Ireland: After LIFE Conservation Plan. http://www.woodlandrestoration.ie/publications.php. Accessed 21st September 2018.

Irish Water (2017) BRDS 9C Sewer Duplication and Storage Scheme, incorporating Tolka Valley Park Pumping Station. Unpublished report by Arup.

Khela, S. & Oldfield, S. (2018) *Fraxinus excelsior*. The IUCN Red List of Threatened Species 2018. http://dx.doi.org/10.2305/IUCN.UK.2018-1.RLTS.T203367A67807718.en. Accessed 22nd September 2018.

Lawrence, R. & Cheffings, C.M. (2014) A summary of the impacts of ash dieback on UK biodiversity, including the potential for long-term monitoring and further research on management scenarios. JNCC Report No. 501.

Little, D., Collins, K., Cross, J., Cooke, D., McGinnity, P. (2017) *Native riparian woodlands – a guide to identification, design, establishment and management*. Native Woodland Information Note No. 4, 2nd ed. Woodlands of Ireland, Wicklow.

Lynch, R. (2005) The Vegetation of the Ballyhoura Mountains, Co. Limerick (Woodland relevés). Unpublished report for the Heritage Council.

Maher, C. & Hamilton, J. (2012) Report on the survey and mapping of habitats within Athlone Town. Unpublished report prepared on behalf of Athlone Tidy Towns Committee.

Martin, J. (2006) Survey of Rare/Threatened and Scarce Vascular Plants in Counties Cavan, Louth, Meath, Monaghan and Westmeath. Report for the National Parks and Wildlife Service, Dublin.

Martin, J.R, & Brophy, J.T. (2017) An ecological report on the habitats, mammals, and birds of Maddens Island, River Shannon, Co. Offaly. Unpublished report by BEC Consultants Ltd.

Martin, J.R., O'Neill, F.H & O'Neill, M. (2015) Habitat and Breeding Birds Survey for the Camphire Wetlands, Co. Waterford. Unpublished report by BEC Consultants Ltd.

Mitchell, R.J., Hewison, R.L., Hester, A.J., Broome, A. and Kirby, K.J. (2016) Potential impacts of the loss of *Fraxinus excelsior* (Oleaceae) due to ash dieback on woodland vegetation in Great Britain. *New Journal of Botany*, 6: 2–15.

NPWS (2007) The Status of EU Protected Habitats and Species in Ireland. Volume 3. Unpublished Report, National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin.

NPWS (2012) Management Planning Support Unit Maps 2405_imap95. CPU_Habitats_March_2012.shp

NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.1. Unpublished Report, National Parks and Wildlife Service, Department of Arts,

Heritage and the Gaeltacht, Dublin.

O'Donoghue, P., O'Hora, K. & Delaney, E. (2008) Blarney Electoral District Habitat Mapping 2008. Report prepared for Cork County Council by Atkins.

O'Donoghue, P., O'Hora, K., Gittings, T. & Delaney, E. (2009) Midleton Area Habitat Survey and Mapping Project 2009. Final report prepared for Cork County Council By Atkins.

O'Neill, F.H. & Barron, S.J. (2013) Results of monitoring survey of old sessile oak woods and alluvial forests. *Irish Wildlife Manuals*, No. 71. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

O'Neill, F.H. & Martin, J.R. (2015) Summary of findings from the Survey of Potential Turloughs 2015. Volume I: Main Report. Unpublished Report for National Parks and Wildlife Service, Dublin.

O'Neill, F.H., Martin, J.R. & McNutt, K.E. (2010) The digitisation of woodland habitats surveyed as part of the National Survey of Native Woodlands. Unpublished report submitted to National Parks and Wildlife Service, Dublin.

Ó Riain, G., Cullen, C. & Day, A. (2007) Survey and mapping of habitats in the Carrigaline Electoral Area. Final report to Cork County Council.

Perrin, P.M. (2016) Irish Vegetation Classification Technical Progress Report No. 2. Report to the National Biodiversity Data Centre. http://www.biodiversityireland.ie/wordpress/wp-content/uploads/IVC_Technical-Progress-Report-No.2.pdf. Accessed 4th September 2018.

Perrin, P., Martin, J., Barron, S., O'Neill, F., McNutt, K. & Delaney, A. (2008) National Survey of Native Woodlands 2003-2008. Unpublished report submitted to National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin.

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. & Devaney, F.M. (2014a) National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 15: Slieve Mish Mountains cSAC (002185), Co. Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L. and Devaney, F.M. (2014b) National Survey of Upland Habitats (Phase 4, 2013-2014), Site Report No. 16: Caha Mountains cSAC (000093), Cos. Cork and Kerry. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.

Ross, E. (2017) Survey of the freshwater pearl mussel population in a section of the Bandon River downstream of the Long Bridge, Dunmanway, arising from bank clearance works carried out by the OPW in Autumn 2015. Unpublished report submitted to the Office of Public Works, Trim, Co. Meath.

Roughan & O'Donovan (2012) Limerick Northern Distributor Road. Supplementary Constraints Information. Report for Clare County Council.

Tubridy, M. (2006) Heritage Surveys of Vulnerable Landscape 2006.

	Report commissioned by Clare County Council in association with the Heritage Council, Rural Resource Development Group (Leader Company) & Clare Biodiversity Group, Clare Heritage Forum. Uplands and Peatlands Grazing Survey. GIS files for this NPWS project, completed in 2011, were made available. Wilson, F. (2009) County Sligo Wetland Survey Phase II, County Report. Report submitted to Sligo County Council. Woodlands of Ireland (2016) A Strategy for Native Woodlands in Ireland 2016-2020. http://www.woodlandsofireland.com/sites/default/files/WoI%20NW%20Strategy%20Final%2824July16%20LoRes%20for%20webpage%29.pdf. Accessed 12th September 2018.
3.2i Additional information	

4 Range

Range within the biogeographical/marine region concerned

4.1 Surface area	***61,000 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data***	

Optional	*c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	*a) In km² or*	
	b) Operator ≈ (approximately equal to) *or*	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
4.12 Additional information *Optional*	There is no evidence of loss of range since the Directive came into force. Range for the current reporting period was calculated in two steps. Firstly, the range was calculated using the range tool, based on the current known distribution of 91E0. A maximum gap distance of two 10 km grid cells was used when running the range tool. This range output (383 grid cells) was then merged with the NPWS (2013) range (605 grid cells). The NPWS (2013) range was generated using a predictive model that estimated the full range of this habitat in Ireland by identifying native woodland stands that occur on alluvial soils. The range based on the current distribution added five grid cells to the NPWS (2013) range to give a total of 610 grid cells. Range for the current reporting period is reported in section 4.1. Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013). None of the area losses recorded during these two reporting periods led to a contraction in the range. The short-term trend is assessed as stable. The number of 10 km squares in the range (610) is five squares higher than the last monitoring period (NPWS, 2013). These changes are due to improved knowledge within the current reporting period. Favourable Reference Range is approximately equal to the current range reported in section 4.1.	

5 Area covered by habitat		
Area covered by the habitat type within the range in the biogeographical/marine region concerned		
5.1 Year or period	***1993-2018***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***19.64 km^2***
5.3 Type of estimate	*Best estimate / 95% confidence interval / **minimum***	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	*stable / increasing / **decreasing** / uncertain / unknown*	
5.11 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data*	

	d) Insufficient or no data available	
5.13 Favourable reference area	***a) 151.25 km²***	
	b) Operator >> (much more than) or	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The FRA is set at 0.25% of the Favourable Reference Range based on the area of alluvial soil within the country.	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods? **YES**/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/**NO***
	b) yes, due to improved knowledge/more accurate data	***YES**/NO*
	c) yes, due to the use of different method	*YES/**NO***
	d) yes, but there is no information on the nature of change	*YES/**NO***
	The change is mainly due to (select one of the reasons above): *genuine change / **improved knowledge or more accurate data** / the use of a different method*	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 1993 following a localised survey by Browne (1998), and incorporates updates made by surveys between 1995 and 2018 that are listed in Section 3.2. Most of the data were initially collated during the National Survey of Native Woodlands 2003-2007 (NSNW; Perrin *et al.,* 2008); a subset of these sites was then revisited by the 2011-2012 Woodland Monitoring Survey (O'Neill & Barron, 2013) and the 2017-2018 Woodland Monitoring Survey (Daly *et al.,* in prep.). To allow point files to contribute to the total area of 91E0 calculated for the current reporting period, a review of the datasets was carried out using remote imagery, and following this review a mean value of 2.5 ha was assigned to each point. There are probably still areas of unmapped 91E0 habitat within the country, hence the area value entered is a minimum. During the last two reporting periods, the Favourable Reference Area (FRA) was set at 0.25% of the Favourable Reference Range based on the area of alluvial soil within the country (NPWS, 2007, 2013). The FRA for the previous reporting period was 151.25 km^2 (NPWS, 2013). The current surface area (19.64 km^2) is only 12.9% of the FRA. Habitat 91E0 is highly fragmented. Fragmented woodlands may be too small to support woodland specialists due to edge effects, or they may cease to persist because of problems related to genetic diversity exacerbated by excessive distances between woodland parcels (NPWS, 2013). Forty 91E0 sites were surveyed during 2017-2018 Woodland Monitoring Survey (Daly *et al.,* in prep.), 38 of which had previously	

	been surveyed by the 2011-2012 Woodland Monitoring Survey (O'Neill & Barron, 2013). Two new sites were added to the monitoring programme in 2017-2018 as replacements for sites rejected after the 2011-2012 Woodland Monitoring. The two new monitoring sites had previously been mapped by O'Neill *et al*. (2010). The 40 monitoring sites assessed for Area during the current reporting period represent 2.2 km^2 (11.3%) of the total area of 91E0 habitat recorded in Ireland. At two of the sites, areas of 91E0 totalling 1.3 ha were lost to woodland clearance. Area loss of 0.15 ha was recorded during the last reporting period at one of the 40 sites surveyed by the 2011-2012 Woodland Monitoring Survey (O'Neill & Barron, 2013) An anthropogenic area loss of approximately 0.28 ha, which occurred in 2015, was recorded from one 91E0 site outside of the monitoring network (after Ross, 2017). Bank clearance works were undertaken in association with the Bandon River (Dunmanway) Drainage Scheme. Replanting was undertaken in 2018, using native tree species, and saplings have become well established (Crushell, 2018). The recent availability of the DEFORMAP, a dataset which provides a deforestation map of Ireland covering the period 2000-2012 (Devaney *et al.,* 2017), allows us to retrospectively assess area losses during the last two reporting periods. Based on an intersect with the 91E0 distribution map, DEFORMAP data indicate that 2.2 ha of 91E0 were lost during the 2007-2012 reporting period due to anthropogenic activities comprising building and agricultural grassland conversion. DEFORMAP data indicate 0.9 ha was lost during the 2001-2006 reporting period to anthropogenic activities comprising building and agricultural grassland conversion. The deforestation figure for the 2001-2006 reporting period should be taken as a minimum since the NSNW (Perrin *et al.,* 2008) only commenced in 2003, therefore any areas already deforested would not have been mapped. Short-term trend in Area was deemed to be decreasing due to anthropogenic loss totalling 3.93 ha (1.3 + 0.15 + 0.28 + 2.2) from 2007-2018 as reported by the Woodland Monitoring Surveys of 2011-2012 and 2017-2018, Ross (2017) and DEFORMAP. The magnitude of the known loss is -0.02% per annum, measured over a period of 12 years from 2007-2018. This was calculated by estimating the area lost and expressing this as a per-annum percentage loss of the known area of 91E0. It should be noted there are no DEFORMAP data available from 2012 onwards. Therefore, this area loss is taken to be the minimum, with other undocumented losses likely within the current reporting period (at sites outside the monitoring network), as well as undocumented losses occurring at unmapped sites. With regard to area gains, the Native Woodland Scheme (NWS) has contributed to the establishment of new wet woodlands in Ireland. Coillte also manage areas of 91E0 on their estate for biodiversity and have restored 91E0 as part of the Coillte LIFE Project entitled 'Restoring Priority Woodland Habitats in Ireland' (2006-2009). In December 2012, *Fraxinus excelsior* (91E0 target species) was removed from the approved list of species to plant under the afforestation grant scheme due to the presence of Ash Dieback

	disease in Ireland. Coillte also made a policy decision not to replant with *Fraxinus excelsior*. This has the potential to impact future gains in 91E0 habitat. Research on the disease is on-going both in Ireland and elsewhere in Europe to develop trees with a strong resistance to the disease (DAFM, 2018b). The latest available figures from the Forest Service (K. Duff, pers. comm.) put the total area of NWS Establishment for 2013-2018 at 1,211.43 ha, and the total area for 2000-2018 at 2,281.49 ha. Under the Native Woodland Conservation Scheme, the total area for NWS Conservation for 2013-2018 (approved and grant-aided) is 103.87 ha. A number of applications are still going through the approval process, or have been approved but the work is not yet completed, which will bring an additional *ca*. 100 ha into the system; however, these were deemed to be applicable to the next reporting period rather than the current one. The figure for NWS Conservation for 2000-2018 is 2,721.35 ha.

6 Structure and functions

6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***16.66 km²***
		Maximum	***16.66 km²***
	b) Area in not-good condition	**Minimum**	***2.98 km²***
		Maximum	***2.98 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	*stable / increasing / **decreasing** / uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? YES/**NO***		

6.7 Typical species Method used *Optional*	At the monitoring sites each plot was assessed based on the presence of typical species. For a plot to pass the typical species criterion, there needed to be at least one target species present and at least six other typical species. The list of typical species in NPWS (2013) was used. A full list of typical species is presented in section 6.8.
6.8 Additional information *Optional*	During the current reporting period, 40 sites were assessed for Structure and functions by Daly *et al.* (in prep.). This represents 2.2 km^2 (11.3%) of the total area of 91E0 habitat recorded in Ireland. Nineteen sites received a 'Green' (Favourable) Structure and functions assessment, fourteen sites received an 'Amber' (Unfavourable-Inadequate) assessment, with seven sites receiving a 'Red' (Unfavourable-Bad) assessment (Daly *et al.*, in prep.). The approach used to determine the percentage of the 91E0 habitat in Favourable condition was as follows: At each monitoring site, equal weight was applied to each of the individual-plot assessment results (*n*=4) and the four-plot level assessment result (*n*=1). At the individual-plot level, a Pass=20% and a Fail=0%. At the four-plot level, a Pass=20% and a Fail=0%. For example: A site with three passes and one fail at the individual-plot level (20 + 20 + 20 + 0 = 60) and a pass at the four-plot level (20) had 80% (60 + 20 = 80) of its habitat in good condition (Favourable). During the current reporting period, 84.8% of the area was assessed as good condition (Favourable). When the proportion in good (84.8%) and in not-good condition (15.2%) was scaled up to the national estimate, 16.66 km^2 was in good condition and 2.98 km^2 was in not-good condition. During the previous reporting period, twenty-four sites received a 'Green' Structure and Functions assessment, seven sites received an 'Amber' assessment, and nine sites received a 'Red' assessment (O'Neill & Barron, 2013). When the above approach was retrospectively applied to the previous reporting period, 86.2% of the area assessed was in good condition (Favourable) and 13.8% was in not-good condition. When this was scaled up to the national estimate, 16.93 km^2 was in good condition and 2.71 km^2 was in not-good condition. Since there is a decrease in the area of habitat in good condition between the current reporting period (16.66 km^2) and the previous (16.93 km^2), the short-term trend of habitat area in good condition was considered to be decreasing. During the current reporting period, the most frequent criteria to fail the Structure and functions assessment were 'negative species regeneration' (65.6% of plots) and 'negative species cover' (30.6% of plots) (Daly *et al.,* in prep.). During the previous reporting period, the most frequent criteria to fail the Structure and functions assessment were 'negative species regeneration' (58% of plots) and 'negative species cover' (22.5% of plots) (NPWS, 2013). Taxa included on the current list of typical species are as follows: *Alnus glutinosa* (target species), *Fraxinus excelsior* (target species), *Salix cinerea* (target species), *Salix* spp. (target species), *Betula*

	pubescens, Crataegus monogyna, Solanum dulcamara, Viburnum opulus, Agrostis stolonifera, Angelica sylvestris, Carex remota, Filipendula ulmaria, Galium palustre, Iris pseudacorus, Lycopus europaeus, Mentha aquatica, Phalaris arundinacea, Ranunculus repens, Rumex sanguineus, Urtica dioica, Calliergonella cuspidata, Climacium dendroides and *Thamnobryum alopecurum*.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**I02** Other invasive alien species (other than species of Union concern) (H) **I04** Problematic native species (M) **B09** Clear-cutting, removal of all trees (M)	**I02** Other invasive alien species (other than species of Union concern) (H) **I04** Problematic native species (M) **B09** Clear-cutting, removal of all trees (M) **I05** Plant and animal diseases, pathogens and pests (M)
7.2 Sources of information *Optional*	Pressures were recorded during the 2017-2018 Woodland Monitoring Survey (Daly *et al*., in prep.).	
7.3 Additional information *Optional*	Pressures and threats were selected and ranked based on intensity (high, medium or low), frequency of occurrence, and area of impact, using the data gathered during the 2017-2018 Woodland Monitoring Survey as presented in Daly *et al.* (in prep.). I02 Other invasive alien species (other than species of Union concern) was recorded as a high-importance pressure. It was the most frequently recorded pressure, occurring at 38 of the 40 sites surveyed by Daly *et al.* (in prep.). It was recorded as high intensity at ten sites and medium intensity at fourteen sites. It affected >75% of the habitat at seven sites, and between 26-75% of the habitat at six sites (Daly *et al*., in prep.). The most frequently recorded invasive species were *Acer pseudoplatanus, Fagus sylvatica, Aesculus hippocastanum, Impatiens glandulifera* and *Ribes* spp. (i.e. *Ribes nigrum* and *Ribes rubrum*). I02 had previously been recorded as a high-importance pressure in NPWS (2013) under the code I01 Invasive non-native species. The negative impact of native plants on 91E0 was recorded under I04 Problematic native species. I04 was recorded as a medium-importance pressure. I04 was recorded at five of the 40 sites surveyed, and was the fifth most frequently recorded pressure (Daly *et al*., in prep.). It was recorded as medium intensity at three sites,	

	and low intensity at two sites; at four sites it affected ≥75% of the habitat. The main problematic native species was *Rubus fruticosus* agg., with dense stands of *Urtica dioica* also considered problematic. Vigorous native species may temporarily reduce opportunities for tree regeneration and can impact typical ground flora (O'Neill & Barron, 2013). Increased light levels can cause their proliferation. Dense *Rubus fruticosus* agg. may also indicate undergrazing and/or sites drying out. Dense stands of *Urtica dioica* may indicate nutrient enrichment. I04 had previously been recorded as a medium-importance pressure in NPWS (2013) under the code I02 Problematic native species. B09 Clear-cutting, removal of all trees was recorded as a medium-importance pressure. B09 was recorded from six of the 40 monitoring sites surveyed, and was the fourth most frequently recorded pressure (Daly *et al*., in prep.). It was recorded as high (3 sites), medium (2 sites) and low (1 site) intensity. At three sites it affected ≤1% of the habitat, with 5%, 10% and 20% of the habitat affected at the remaining sites. During the current reporting period, this pressure resulted in habitat loss at two monitoring sites and contributes to 91E0 failing the Area parameter (see section 5.15). I05 Plant and animal diseases, pathogens and pests was recorded as a low-importance pressure but a medium-importance threat. I05 refers to the suspected presence of Ash Dieback disease at the monitoring sites. This disease affects the 91E0 target tree species *Fraxinus excelsior*. I05 was recorded from nine of the 40 sites surveyed, and was the third most frequently recorded pressure (Daly *et al.*, in prep.). The disease causes dieback of the crown, loss of leaves and can lead to tree death (Khela & Oldfield, 2018). According to DAFM (2018b) young plants are more immediately susceptible, older trees succumb to the disease more slowly, and mature trees can survive infection for several years. It was primarily recorded as low intensity (7 sites) with one incidence each of medium and high intensity. At seven sites it affected ≤1% of the habitat, with 10% and 75% of the habitat affected at the remaining two sites. As of 31st July 2017: the disease was confirmed from 384 forestry plantations across 24 counties in the Republic of Ireland; it was confirmed from native hedgerows across 17 counties, and it was confirmed from roadside landscaped plantings across 14 counties (DAFM, 2018b). Ash Dieback has the potential to drive substantial change in the canopy and ground flora composition of ash-dominated woodlands (Mitchell *et al.,* 2016; Lawrence & Cheffings, 2014). *Fraxinus excelsior* is now listed as Near Threatened on the IUCN Red List of Threatened Species (Khela & Oldfield, 2018). This pressure/threat did not feature in NPWS (2013). J04 Mixed source soil pollution and solid waste (excluding discharges) was listed as a low-importance pressure in NPWS (2013) under the code H05.01 Garbage and solid waste. During the current reporting period, it is a low-importance pressure recorded at 13 of the 40 sites surveyed. It was primarily recorded as low intensity (11 sites) and only ever affected ≤3% of the habitat. A09 Intensive grazing or overgrazing by livestock was listed as a low-importance pressure in NPWS (2013) under the code B06 Grazing in forests/ woodland. During the current reporting period, it is a low-

	importance pressure recorded at three of the 40 sites surveyed. It was recorded as both high (one site) and medium intensity (two sites); at all three sites it affected 100% of the habitat. It should be noted that the impact category A09 as reported by Daly *et al.* (in prep.) is primarily overgrazing by deer (not livestock). Other pressures recorded from the 40 monitoring sites by Daly *et al.* (in prep.) comprise: E01 Roads, paths railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (three sites), L04 Natural processes of eutrophication or acidification (one site), F12 Discharge of urban waste water (excluding storm overflows and/or urban run-offs) generating pollution to surface or ground water (one site), B03 Replanting with or introducing non-native or non-typical species (including new species and GMOs) (one site), B21 Use of physical plant protection in forestry, excluding tree layer thinning (one site), B12 Thinning of tree layer (one site), B27 Modification of hydrological conditions, or physical alteration of water bodies and drainage for forestry (including dams) (one site) and K01 Abstraction from groundwater, surface water or mixed water (one site).

8 Conservation measures	
8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*
8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type** or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* *a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or*

	c) Long-term results (after 2030)
8.5 List of main conservation measures	**CA05** Adapt mowing, grazing and other equivalent agricultural activities **CB02** Maintain existing traditional forest management and exploitation practices **CB04** Adapt/manage reforestation and forest regeneration **CB05** Adapt/change forest management and exploitation practices **CB08** Restoration of Annex I forest habitats **CB14** Manage drainage and irrigation operations and infrastructures **CE01** Reduce impact of transport operation and infrastructure **CI03** Management, control or eradication of other invasive alien species **CI05** Management of problematic native species **CI07** Controlling and eradicating plant and animal diseases, pathogens and pests
8.6 Additional information *Optional*	Only 10 conservation measures can be listed in section 8.5. An additional measure undertaken but not listed is **CJ01** Reduce impact of mixed source pollution. Conservation measures were selected using data gathered from Daly *et al.* (in prep.), the Coillte Biodiversity Dataset (various dates), Herbert (2009), DAFM (2018a, 2018b, 2015a, 2015b), Annett (2015) and from information provided by NPWS (pers. comm.). While the measures recorded in Daly *et al.* (in prep.) are specific to 91E0, other measures listed are likely to involve some 91E0, though they may not be specific to the habitat. Of the 40 sites surveyed by Daly *et al.* (in prep.), conservation measures were recorded from four sites (10% of the monitoring sites). Two of these sites were NPWS-managed, one was a Coillte Biodiversity Area, and the other was directly adjacent to a Coillte LIFE site (the conservation measure recorded was related to the adjacent site). No conservation measures were recorded from 91E0 habitat on private lands which constitute 57.5% of the sites surveyed (and much of the resource nationally). Conservation measures recorded by Daly *et al.* (in prep.) comprise removal of non-native species (CI03) (three sites), natural regeneration on adjacent clear-fell (CB04) (one site) and drain blocking as a conservation measure (CB14) (one site). The Coillte LIFE Restoring Priority Woodland Project 2006-2009 (LIFE05 NAT/IRL/000182) restored priority woodland at nine Coillte-owned sites within the SAC network. Approximately 136 ha of 91E0 was restored under the project across three sites. Conservation measures supported by the project (2006-2009) and the associated After-LIFE Conservation Plan (Herbert, 2009) include: fencing (CB05), invasive species control (CI03), selective conifer removal (CB05), maintenance of tracks/trails (CE01), retention of dead wood (CB02), and drain blocking as a conservation measure (CB14). The main objective of the After-LIFE Conservation Plan is to maintain and enhance the restored priority woodlands so that they attain Favourable condition. Improved guidance for conservation management of alluvial

	woodland in the Irish context has been published (Cross & Collins, 2017; Little *et al.*, 2017). Conservation measures supported by the Native Woodland Conservation/Establishment Schemes (DAFM, 2015a,b) include native tree planting within existing woodland (CB04), woodland establishment on former clear-fell (CB04) and/or greenfield sites (CB08), deer fencing (CB05), invasive species control (CI03), selective conifer removal (CB05), maintenance of tracks/trails (CE01), and the promotion of traditional and/or positive management practices (e.g. restoration of former coppice, retention of dead wood) (CB02). The Native Woodland Scheme (NWS) is promoted to both the public and private sectors. The targets of the scheme covering the period 2014-2020 are 2,000 ha for NWS Conservation (which supports the restoration of existing native woodlands and the conversion of conifer stands to native woodland) and 2,700 ha for Establishment (which supports the creation of new native woodlands on 'greenfield' sites) (Woodlands of Ireland, 2016). The DAFM publication 'Woodland for Water' (DAFM, 2018c) promotes the use of NWS Establishment along water bodies to create native woodland (CB08) to protect and enhance water quality. Under this measure, farmers and other landowners can avail of a planting and maintenance grant and 15-year premiums available under the scheme (DAFM, 2018c). The latest available figures from the Forest Service (K. Duff, pers. comm.) put the total area of NWS Establishment for 2013-2018 at 1,211.43 ha, and the total area for 2000-2018 at 2,281.49 ha. Under the Native Woodland Conservation Scheme, the total area for NWS Conservation for 2013-2018 (approved and grant-aided) is 103.87 ha; a number of applications are still going through the approval process, or have been approved but the work is not yet completed, which will bring an additional *ca*. 100 ha into the system but these were deemed to be applicable to the next reporting period rather than the current one. The figure for NWS Conservation for 2000-2018 is 2,721.35 ha. In December 2012, *Fraxinus excelsior* (91E0 target species) was removed from the approved list of species to plant under the afforestation grant scheme due to the presence of Ash Dieback disease in Ireland (CI07). Coillte also made a policy decision not to replant with ash (CI07, CB05) (DAFM, 2018b). As noted in section 5.15 above, research into developing disease-resistant ash trees is on-going. Conservation measures conducted in 91E0 habitat within Coillte Biodiversity Areas comprise invasive species control (CI03), selective conifer removal (CB05), fencing (CB05) and promoting natural regeneration (CB04). Of the 40 sites surveyed during the 2017-2018 Woodland Monitoring survey, seven sites were located within Coillte Biodiversity Areas. Active conservation measures were recorded from one of these sites. NPWS implement a number of conservation measures. Within Ireland's National Parks (NPs), Connemara NP is undertaking *Rhododendron ponticum* control (CI03), maintenance of tracks and trails to prevent damage to sensitive habitats (CE01) and control of trespassing stock (CA05). Killarney NP is undertaking *Rhododendron*

	ponticum control (CI03), maintenance of tracks/trails to prevent damage to sensitive habitats (CE01) and deer management (CI03 – Sika deer; CI05 – Red deer) (C. Douglas, NPWS, pers. comm.). Wicklow Mountains NP maintain tracks/trails (CE01) and conduct deer management (CI03 – Sika deer and Fallow deer; CI05 – Red deer). Wicklow Mountains NP also control fires where possible (CA05) and have worked closely with local farmers and Teagasc through the Wicklow Uplands Council, with the result of a reduction in farmer-lit fires (E. Mullen, NPWS, pers. comm.). In addition to these conservation measures, NPWS work towards a reduction in small-scale illegal dumping through the PURE project (CJ01). They also assist control of deer though the issuing of Section 42 licences, and work closely with a number of deer management groups (CI03, CI05). Of the 40 sites surveyed during the 2017-2018 Woodland Monitoring survey, five sites were NPWS-managed. Active conservation measures were recorded from two of these sites. The Irish Deer Management Forum (IDMF) was launched in 2015 and set out a series of management actions in the document *Deer Management in Ireland: A Framework for Action*. The aim of this Framework was to manage deer responsibly in order to minimise their impact on agriculture, woodlands and other conservation habitats. It aimed to use a cross-sectoral approach to deliver deer management structures that suited spatial requirements, conformed to best practice, and complied with existing legislative and policy frameworks (CI03, CI05) (Annett, 2015). However, at the time of writing, this forum was inactive. The EU KerryLIFE Project commenced in 2014. It aims to improve selected populations of Freshwater Pearl Mussel towards favourable conservation condition through sustainable management of c. 2,500 ha of farmed lands. The project aims to establish approximately 30 ha of broadleaf woodland across the two SACs in the KerryLIFE project area (Richard O'Callaghan, pers. comm.). One of the proposed conservation actions is to stabilise riparian sediment sources using broadleaf planting (CB08). If successful, this will, in the long-term, increase the area of riparian woodland. There are also plans to convert conifer plantations to native woodland (CB04). Preliminary survey results suggest that 91E0 is present at Abbeyleix Bog (NPWS, unpublished data). Conservation measures undertaken by the community-based Abbeyleix Bog Project include *Rhododendron ponticum* clearance (CI03) and boardwalk development (CE01). In 2014 funding was made available by the Department of Agriculture, Food and the Marine (DAFM) to model the airborne spread of Ash Dieback disease which affects the 91E0 target species *Fraxinus excelsior*. The University College Dublin-led project assessed the risk of Ash Dieback spread into and across Ireland. The airborne dispersal of fungal spores is an important mechanism for the spread of this disease. The modelling research sought to predict the extent and spread of spore plumes from known infected sites by combining climate data from Met Éireann and the latest information on the disease. The project recently concluded, with the results expected shortly. The findings will be used to inform policy in this regard (CB05) (DAFM, 2018b).

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Area	*Good / Poor /* ***Bad*** */ Unknown*
	c) Structure and functions	*Good / Poor /* ***Bad*** */ Unknown*
9.2 Additional information *Optional*	Short-term trend direction of Range is assessed as stable. Similar to NPWS (2013) the current range and the Favourable Reference Range are considered approximately equal. Conservation status of Range is therefore Favourable. Future trend of Range is assessed as stable, as the range is not expected to contract within the next 12 years. Future prospects of Range are therefore good. Short-term trend direction of Area is assessed as decreasing. Current area is more than 10% below the Favourable Reference Area. Conservation status of Area is therefore Unfavourable-Bad. Future trend of Area is assessed as negative based on anthropogenic losses of 91E0 over the last two reporting periods. The removal of the 91E0 target species, *Fraxinus excelsior,* from the approved list of species under the afforestation grant scheme in 2012 (due to Ash Dieback) will likely impact future gains. It is currently unknown whether the threat of I05 will drive anthropogenic loss of 91E0 within the next 12 years (e.g. woodlands may be at greater risk of clearance if they lose a large proportion of trees). Future prospects of Area are therefore bad. Short-term trend direction is decreasing for habitat that is in good condition. Current Structure and functions are assessed as Unfavourable-Inadequate as 84.8% of habitat is in good condition. Conservation status of Structure and functions is therefore Unfavourable-Inadequate. Future trend of Structure and functions is assessed as negative, as the pressures/threats of I02, I04 and I05 are expected to have a negative influence on Structure and functions, irrespective of the conservation measures currently in place. The threat I05 will likely impact the integrity of 91E0 habitat, as it has the potential to drive substantial change in the canopy and ground flora composition of ash-dominated woodlands (Mitchell *et al*., 2016; Lawrence & Cheffings, 2014). I05 has the potential to create conditions that will exacerbate the existing pressures of I02 and I04. This would negatively impact the Structure and functions of ash-dominated 91E0 habitat within the next 12 years. Future prospects of Structure and functions are therefore bad.	

10 Conclusions

Assessment of conservation status at end of reporting period

10.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
10.2 Area	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving /* ***deteriorating*** */ stable / unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/****NO***	***YES****/NO*
	b) yes, due to genuine change	*YES/NO*	***YES****/NO*
	c) yes, due to improved knowledge/more accurate	*YES/NO*	***YES****/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	***YES****/NO*
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/****NO***
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*
10.8 Additional information *Optional*	The Conservation Status of Range is Favourable in this reporting period, as it was in the previous reporting period. The Conservation Status of Area and Future prospects are Unfavourable-Bad in this reporting period, as they were in the previous reporting period. The Conservation Status of Structure and Functions are		

	Unfavourable-Inadequate this reporting period, but were reported as Unfavourable-Bad in the previous reporting period. This increase does not reflect a genuine improvement in Structure and Functions this reporting period, instead it reflects data inaccuracies in NPWS (2013). NPWS (2013) incorrectly states 37.5% (15 sites) of 2011-2012 Woodland Monitoring sites received a bad assessment; however, the figure as reported in O'Neill & Barron (2013) is 22.5% (9 sites). Structure and functions should have received an Unfavourable-Inadequate assessment in the previous reporting period. The Overall Conservation Status was assessed as Unfavourable-Bad, as it was during the previous reporting period. Overall trend Conservation Status was assessed as deteriorating in this reporting period, but as improving in the previous reporting period. This change in trend is primarily due to the availability of more accurate data, e.g. DEFORMAP to detect anthropogenic area loss, the availability of baseline monitoring data from the previous reporting period for comparison, and emergence of disease that impacts one of the 91E0 target species.

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***11.31 km²***
11.2 Type of estimate	*Best estimate / 95% confidence interval /* ***minimum***	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* *stable / increasing /* ***decreasing*** */ uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing a union between the distribution polygon and point shapefiles and the SAC shapefile. Polygons sourced from Forest Service (2018), a dataset displayed at the 10 km grid square level, were removed from the distribution shapefile prior to the union as	

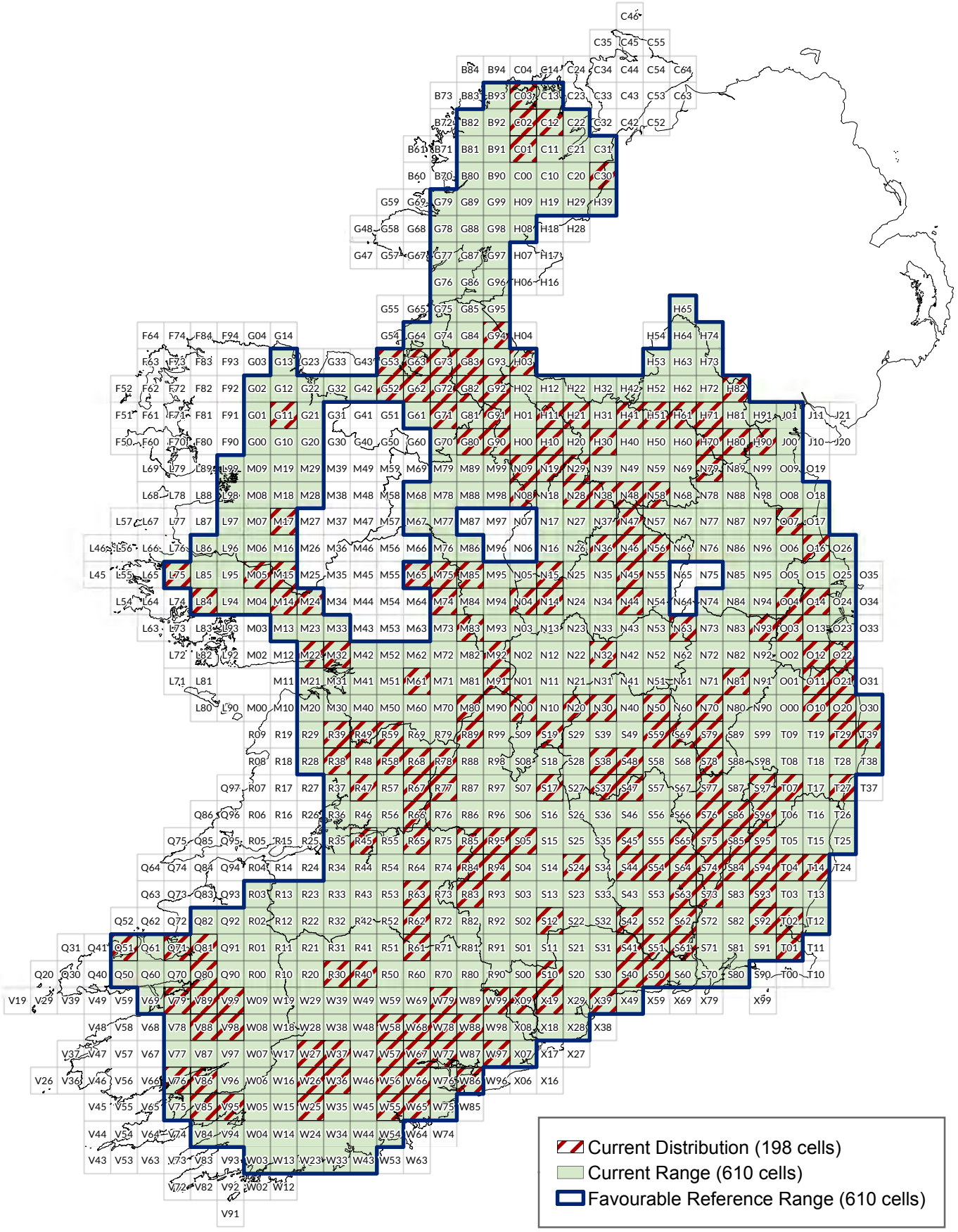
	they would artificially increase the area. The area given in section 11.1 is the total area of 91E0 habitat in SACs in the country, including some SACs where 91E0 is not listed as a qualifying interest (QI). The area of 91E0 within the Natura 2000 network where it is listed as a QI is 9.37 km^2. Anthropogenic losses of 1.3 ha were reported within the monitoring network during the current reporting period by Daly *et al.* (in prep.). None of these losses occurred within Natura 2000 sites. An anthropogenic area loss of approximately 0.28 ha occurred in 2015, during the current reporting period, within 002171 Bandon River SAC (after Ross, 2017). Bank clearance works were undertaken in association with the Bandon River (Dunmanway) Drainage Scheme. Habitat 91E0 is listed as a QI at this site as Representativity B. Replanting has been undertaken using native tree species (A. O'Connor, pers. comm.). Of the 2.35 ha of 91E0 lost during the previous reporting period as reported by DEFORMAP and O'Neill & Barron (2013), 1.75 ha (74%) was lost from 002162 River Barrow and River Nore SAC (i.e. 0.15 ha lost to development of a quay and 1.6 ha lost to agricultural grassland conversion). Habitat 91E0 is listed as a QI at this site as Representativity A. There were no inconsistencies between the Natura 2000 sites where the 91E0 habitat is listed as a QI and the current distribution for the habitat. To determine the short-term trend of habitat area in good condition within the network, the approach outlined in section 6.8 was used: 84.9% (9.62 km^2) of the area assessed within the SAC network during the current reporting period was in good condition (Favourable). This compares with 93.7% (10.61 km^2) in good condition during the previous reporting period. This implies the short-term trend of 91E0 habitat in good condition within the SAC network is decreasing. This is the same trend as the 91E0 habitat nationally (section 6.4). The surface area of 91E0 habitat within the Natura 2000 network has increased since the last reporting period; this is due to improved knowledge of the area of 91E0.

12 Complementary information

12.1 Justification of % thresholds for trends *Optional*	
12.2 Other relevant information *Optional*	**The following is an extract from Khela & Oldfield (2018) that lists *Fraxinus excelsior* (91E0 target species) as Near Threatened on the IUCN Red List of Threatened Species 2018.** Ash Dieback is an infectious disease that has caused severe dieback of Common Ash throughout much of its range. This is the most serious threat to the species, with recorded incidence in 24 countries and a high risk of spread to areas where it has not yet been observed. *F. excelsior* is considered to be seriously threatened in Hungary where there is a high incidence of infection, and is

	threatened or Near Threatened in Norway, Sweden, Finland, Albania, Serbia and Montenegro, as well as in regions of Spain. As Ash Dieback disease is spread by wind, it is extremely difficult to reduce or prevent spread of the disease and the entire population is at risk of further disease outbreaks. The overall population decline has not been quantified and little data is available to precisely estimate future decline rates, but given the dramatic declines seen in some parts of the species range, a future decline of at least 20-30% across Europe is possible. The entire natural range including Russia and south-west Asia is currently threatened by Ash Dieback. This species is therefore precautionarily listed as Near Threatened approaching criterion A3e. More information is needed on how much the population has declined from fungal infection, through mortality or felling for preventative measures, and there is a need for population monitoring, including for signs of disease. Management of infected stands for preventative spread of the disease should be attempted, though the best hope for control of the outbreak is that natural resistance will develop. Populations should be monitored for signs of resistance to the disease, in the hopes that resistant stands may be found. It is strongly recommended to collect detailed population information and decline rates from each country and to re-assess the species when all the data is available. It might warrant listing in a more threatened category in the future. **The following is an extract from Lawrence & Cheffings (2014) regarding the predicted impact of Ash Dieback on UK woodlands.** The response of woodland communities following the loss of ash was assessed, assuming natural regeneration: For woodlands where ash currently occupies less than 10% of the canopy, the other tree species currently forming the main canopy cover are expected to grow and fill the spaces left by any dead ash, resulting in little new recruitment of trees or expansion of the shrub layer. Shade-tolerant shrubs already present in the understory may grow to fill gaps in woodlands containing 10 to 20% ash in the canopy. This response is anticipated in three quarters or more of the current ash-containing woods in Scotland, Northern England and Northern Ireland. For woodlands where there is a greater component (>20%) of ash in the canopy, canopy gaps are anticipated to be larger and/or more frequent. Under these conditions, existing shrubs and particularly saplings are expected to fill the spaces in the canopy in addition to some expansion by other existing canopy tree species. Over a longer time-period, established saplings will replace shrubs and fill the canopy gaps. Sycamore is predicted to become particularly dominant in many of the sub-regions in this regard. Beech and small-leaved lime may form larger components in 'former' ash woodlands in southern England. Thus, in UK woodlands the canopy gaps left by ash dieback are not expected to be long-lived or permanent. Where ash is fairly common (>20%), and large gaps are created, they will be filled by other tree species that are currently in the woodland or surrounding area. Where gaps are smaller, created by the loss of only one or two trees, the canopies of existing trees will expand to fill the gaps.

Residual alluvial forests* (91E0)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Habitat code / name	**91J0 *Taxus baccata* woods of the British Isles***
1.2i Habitat short name	**Yew woodland**
1.3i Habitat description	91J0 Yew woodland is a priority Annex I habitat. Its distribution is highly restricted in Ireland, only occurring at a limited number of sites in the west and south-west, predominately on shallow soils over limestone pavement or outcrops. The canopy is typically dominated by *Taxus baccata*, with other canopy species including *Fraxinus excelsior* and the introduced *Fagus sylvatica*. *Corylus avellana* and *Ilex aquifolium* are components of the shrub layer, although typically occurring in small quantities. The dense evergreen canopy can restrict regeneration, which is typically limited or absent. The field layer is characteristically both species-poor and limited in cover, with the most frequent and abundant species being *Hedera helix* (which is locally dominant), *Brachypodium sylvaticum, Viola riviniana* and ferns, in particular *Asplenium scolopendrium*. The rocky woodland floor can support an extensive carpet of bryophytes, dominated by a few robust pleurocarpous mosses including *Thamnobryum alopecurum* and *Isothecium myosuroides*. Locally, in east Galway (Kylagowan), yew woodland with *Quercus petraea* and *Ilex aquifolium* occurs on podzols over acidic tills, and the associated field layer is typical of the Annex I 91A0 woodland habitat (Cross & Lynn, 2013). The Irish Vegetation Classification (IVC; Perrin, 2016) primarily places 91J0 habitat within the WL2 *Fraxinus excelsior – Hedera helix* group. Only one vegetation community in this group has an affinity to the Annex I habitat comprising WL2F *Taxus baccata – Ilex aquifolium* woodland (80.0% affinity).

2 Maps

Distribution of the habitat type within the Member State concerned

2.1 Year or period	***2011-2018***
2.2 Distribution map	Submitted
2.3 Distribution map Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
2.4 Additional maps *Optional*	Range maps were submitted
2.5i	The distribution map was derived from a 91J0 polygon shapefile. Sources added during this reporting period comprise Daly *et al.* (in prep.), which replaced the previous monitoring polygons by Cross &

	Lynn (2013). In addition to this, the distribution map from the last reporting period (NPWS, 2013) was also utilised, derived from Barron & Perrin (2011). References are detailed in Section 3.2. A certainty rating system was applied to all data that informed the distribution map. This system utilised the range of 1 to 3, whereby 3 is the highest certainty and 1 the lowest. The two data sources, Daly *et al.* (in prep.) and Barron & Perrin (2011), were judged to be a high certainty of 3.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned

3 Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
3.2 Sources of information	Annett, J.A. (2015) Deer Management in Ireland. A Framework for Action. Prepared for Forest Service, Department of Agriculture, Food and the Marine, Johnstown Castle Estate, Co Wexford and National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. Barron, S.J. & Perrin, P.M. (2011) Production of a habitat map for Killarney National Park, Co. Kerry. Unpublished report submitted to National Parks and Wildlife Service, Dublin. Coillte (2011). Millennium Forests. http://www.millenniumforests.com/index.html. Accessed 1st October 2018. Coillte (2018) Coillte Charter of Commitment to the People's Millennium Forests. https://www.coillte.ie/media/2018/05/Coillte-Millennium-Forest-Charter-2018.pdf. Accessed 4th September 2018. Cross, J. & Lynn, D. (2013) Results of a monitoring survey of yew woodland. *Irish Wildlife Manuals*, No. 72. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin. DAFM (2018) Ash Dieback (*Chalara*). https://www.agriculture.gov.ie/forestservice/treediseases/ashdiebackchalara/#legupdate. Accessed 3rd October 2018. Daly, O.H., O'Neill, F.H. & Barron, S.J. (in prep.) The monitoring and assessment of four EU Habitats Directive Annex I woodland habitats. *Irish Wildlife Manuals*, No. XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin. Devaney, J., Redmond, J., Barrett, B., Cott, G. & O'Halloran, J. (2017) 21st Century Deforestation in Ireland, EPA Research Report No. 221. Prepared for the Environmental Protection Agency, Johnstown Castle, Co. Wexford. Fuller, J. (2015) Biodiversity audit of Coillte native forest restoration sites. Unpublished report submitted to Coillte,

	Newtownmountkennedy. Herbert, I. (2009) Restoring Priority Woodland Habitats in Ireland: After LIFE Conservation Plan. http://www.woodlandrestoration.ie/publications.php. Accessed 21st September 2018. Khela, S. & Oldfield, S. (2018) *Fraxinus excelsior*. The IUCN Red List of Threatened Species 2018. http://dx.doi.org/10.2305/IUCN.UK.2018-1.RLTS.T203367A67807718.en. Accessed 3rd October 2018. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.1. Unpublished Report, National Parks and Wildlife Service, Department of Arts, Heritage, and the Gaeltacht, Dublin. Perrin, P.M. (2016) Irish Vegetation Classification Technical Progress Report No. 2. Report to the National Biodiversity Data Centre. http://www.biodiversityireland.ie/wordpress/wp-content/uploads/IVC_Technical-Progress-Report-No.2.pdf. Accessed 4th September 2018. Watts, W.A. (1984) The Holocene vegetation of the Burren, western Ireland. In: Lake Sediments and Environmental History. Haworth, E.Y. & Lund, J.W.G. (eds.) Leicester University Press, Leicester. pp. 359–376.
3.2i Additional information	

4 Range		
Range within the biogeographical/marine region concerned		
4.1 Surface area	***700 km²***	
4.2 Short-term trend Period	***2007–2018***	
4.3 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*	
4.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.5 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.6 Long-term trend Period *Optional*	***1994–2018***	
4.7 Long-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*	

Optional		
4.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
4.9 Long-term trend Method used *Optional*	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
4.10 Favourable reference range	***a) 1,200 km²***	
	b) Indicate if operators were used (using symbols ≈, >, >>) or	
	c) If favourable reference range is unknown, indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The FRR is the current Range plus small stands of yew that has the potential to develop into 91J0 habitat.	
4.11 Change and reason for change in surface area of range	*Is there a change between reporting periods? YES/**NO*** *If yes, provide the nature of that change. More than one option (a to d) can be chosen*	
	a) yes, due to genuine change	*YES/NO*
	b) yes, due to improved knowledge/more accurate data	*YES/NO*
	c) yes, due to the use of different method	*YES/NO*
	d) yes, but there is no information on the nature of change	*YES/NO*
	The change is mainly due to (select one of the reasons above): *genuine change / improved knowledge or more accurate data / the use of a different method*	
4.12 Additional information *Optional*	There is no evidence of loss of range since the Directive came into force. Due to the highly restricted nature of this habitat, the 10km distribution of this habitat is also the range. The number of 10km squares in the range (7) is the same as the last monitoring period (NPWS, 2013). Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013). No range losses occurred during these two reporting periods. Therefore, short-term trend was assessed as stable. The Favourable Reference Range (FRR) is reported in Section 4.10. The FRR is the same as the last reporting period (NPWS, 2013). The FRR incudes the current range plus five additional 10km squares. These additional squares have suitable habitat with scattered trees and/or small stands of yew that have the potential to develop into 91J0 habitat. Three 10km squares are on the eastern edge of the	

	Burren. The remaining two are on the Mayo/Galway border between Lough Mask and Lough Corrib. Coillte have opened up existing coniferous forests containing yew and also planted additional trees at several sites within these squares (NPWS, 2013). The current range is 58.3% of the FRR.

5 Area covered by habitat

Area covered by the habitat type within the range in the biogeographical/marine region concerned

5.1 Year or period	***2011-2018***	
5.2 Surface area *(in km^2)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***0.83 km^2***
5.3 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
5.4 Surface area Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.5 Short-term trend Period	***2007–2018***	
5.6 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.7 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
5.8 Short-term trend Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.9 Long-term trend Period *Optional*	***1994–2018***	
5.10 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.11 Long-term trend Magnitude	**a) Minimum**	
	b) Maximum	

Optional	**c) Confidence interval**	
5.12 Long-term trend Method used *Optional*	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.13 Favourable reference area	***a) 1.32 km²***	
	b) Indicate if operators were used (≈, >, >>, <) or	
	c) If favourable reference area is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable Reference Area is greater than the current area because of the potential for establishment of 91J0 habitat in suitable areas where small pockets of non-Annex yew woodland are currently present.	
5.14 Change and reason for change in surface area	*Is there a change between reporting periods?* ***YES****/NO* *If yes, provide the nature of that change. More than one option (a to d) can be chosen.*	
	a) yes, due to genuine change	*YES/****NO***
	b) yes, due to improved knowledge/more accurate data	***YES****/NO*
	c) yes, due to the use of different method	*YES/****NO***
	d) yes, but there is no information on the nature of change	*YES/****NO***
	The change is mainly due to (select one of the reasons above): *genuine change /* ***improved knowledge or more accurate data*** */ the use of a different method*	
5.15 Additional information *Optional*	The period over which the surface area of the habitat was determined begins in 2011 with the Killarney National Park Habitat Mapping Project (Barron & Perrin, 2011), and incorporates updates made by the 2017-2018 Woodland Monitoring Survey (Daly *et al.,* in prep.). All 91J0 within the country has been mapped, hence the area value entered is a best estimate. The Favourable reference area has been derived by adding the surface area of 91J0 habitat to 49 ha. This 49 ha represents the area where future 91J0 habitat increases are possible. These comprise: 40 ha of planted yew on the Coillte estate and 9 ha for the Burren, where the underlying substrate is suitable for natural expansion. The current surface area (0.83 km²) is 62.9% of the Favourable reference area. During the last reporting period, the Favourable reference area was set at 1.5 km², which included a nominal 30 ha for the Burren. This figure has been revised to 9 ha. Palaeoecological data on the	

	dynamics of yew in the Burren (Watts, 1984) indicate that the technical and ecological feasibility of 91J0 expansion there is lower than previously thought. Habitat 91J0 occurs at six sites nationally. All six 91J0 sites were surveyed during 2017-2018 Woodland Monitoring Survey (Daly *et al.,* in prep.). All six had previously been visited by the 2011 Yew Woodland Monitoring Survey (Cross & Lynn, 2013). No area losses were recorded during the 2017-2018 Woodland Monitoring Survey by Daly *et al.* (in prep.). No area losses were reported during the 2011 Yew Woodland Monitoring Survey by Cross & Lynn (2013). The recent availability of the DEFORMAP, a dataset which provides a deforestation map of Ireland covering the period 2000–2012 (Devaney *et al*., 2017), allows us to retrospectively assess area losses over the previous two reporting periods. Based on an intersect with the 91J0 distribution map, no area losses of 91J0 habitat were detected by DEFORMAP.

6 Structure and functions			
6.1 Condition of habitat	**a) Area in good condition**	**Minimum**	***0.29km²***
		Maximum	***0.29 km²***
	b) Area in not-good condition	**Minimum**	***0.54 km²***
		Maximum	***0.54 km²***
	c) Area where condition is not known	**Minimum**	***0 km²***
		Maximum	***0 km²***
6.2 Condition of habitat Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.3 Short-term trend of habitat area in good condition Period	***2007–2018***		
6.4 Short-term trend of habitat area in good condition Direction	***stable*** */ increasing / decreasing / uncertain/ unknown*		
6.5 Short-term trend of habitat area in good condition Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		

6.6 Typical species	*Has the list of typical species changed in comparison to the previous reporting period? **YES**/NO*
6.7 Typical species Method used *Optional*	*Viola reichenbachiana* was added to the list of typical species during the current reporting period. At the monitoring sites each plot was assessed based on the presence of typical species. For a plot to pass the typical species criterion, *Taxus baccata* needed to be present, and at least six other typical species. The list of typical species in NPWS (2013) was used with the addition of *Viola reichenbachiana* this reporting period. A full list of typical species is presented in Section 6.8.
6.8 Additional information *Optional*	Habitat 91J0 occurs at six sites nationally. All six sites were assessed for Structure and functions by Daly *et al.* (in prep.). The total area assessed represents 0.27 km² (32.7%) of the total area of 91J0 habitat. Five of the sites surveyed by Daly *et al.* (in prep.) had 100% of their 91J0 habitat assessed for Structure and functions, i.e. the monitoring polygon encompassed 100% of the habitat at that site. Due to the extent of the 91J0 habitat at the sixth site (Site 1291 Reenadina, Co. Kerry in Killarney National Park) only the monitoring polygon of 15.5ha was assessed for Structure and functions i.e. 20.0% of the 91J0 habitat in Killarney National Park. One site received a 'Green' (Favourable) Structure and functions assessment, with five sites receiving a 'Red' (Bad) assessment (Daly *et al.,* in prep.). The approach used to determine the percentage of the 91J0 habitat in Favourable condition was as follows: At each monitoring site, equal weight was applied to each of the individual-plot assessment results (n=4) and the four-plot level assessment result (n=1). At the individual-plot level, a Pass=20% and a Fail=0%. At the four-plot level, a Pass=20% and a Fail=0%. For example: A site with three passes and one fail at the individual-plot level (20 + 20 + 20 + 0 = 60) and a pass at the four-plot level (20) had 80% (60 + 20 = 80) of its habitat in good condition (Favourable). During the current reporting period, 35.1% of the area was assessed as good condition (Favourable). When the proportion in good (35.1%) and in not-good condition (64.9%) was scaled up to the national estimate, 0.29 km^2 was in good condition and 0.54 km^2 was in not-good condition. Five sites were assessed for Structure and functions by the 2011 Yew Woodland Monitoring Survey (Cross & Lynn, 2013). One site received a 'Green' Structure and functions assessment, one site received an 'Amber' (Inadequate) assessment, with three sites receiving a 'Red' assessment. The above approach to determine the percentage of 91J0 habitat in Favourable condition could not be retrospectively applied to the previous reporting period due to differences in sub-sampling during the 2011 Yew Monitoring Survey. Based on expert opinion, the short-term trend of habitat area in good condition was considered stable. During the current reporting period, the most frequent criteria to fail the Structure and functions assessment at the individual plot level

	were 'negative species regeneration' (62.5% of plots), 'negative species cover' (45.8% of plots), 'native shrub layer cover' (41.7% of plots) and 'native field layer cover & height' (41.7% of plots). The most frequent criteria to fail at the 4-plot level were '*Taxus* regeneration' i.e. no *Taxus* regeneration at the sapling stage within the plots (50.0% of plots) and '*Taxus* size class' i.e. lack of diversity in *Taxus* tree girth (33.3% of plots) (Daly *et al.,* in prep.). Taxa included on the current list of typical species are as follows: *Taxus baccata* (target species), *Fraxinus excelsior, Corylus avellana, Ilex aquifolium, Lonicera periclymenum, Quercus robur, Sorbus aucuparia, Brachypodium sylvaticum, Asplenium scolopendrium, Potentilla sterilis, Viola reichenbachiana, Viola riviniana, Carex flacca, Metzgeria furcata, Isothecium myosuroides, Thamnobryum alopecurum, Fissidens dubius, Neckera complanata* and *Neckera crispa*.

7 Main pressures and threats

7.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures and a maximum of 10 threats using code list provided on the Reference portal	**I02** Other invasive alien species (other than species of Union concern) (H) **A09** Intensive grazing or overgrazing by livestock (H)	**I02** Other invasive alien species (other than species of Union concern) (H) **A09** Intensive grazing or overgrazing by livestock (H) **I05** Plant and animal diseases, pathogens and pests (M)

7.2 Sources of information *Optional*	Pressures were recorded during the 2017-2018 Woodland Monitoring Survey (Daly *et al.,* in prep.).
7.3 Additional information *Optional*	Pressures and threats were selected and ranked based on intensity (high, medium or low), frequency of occurrence, and area of impact, using the data gathered during the 2017-2018 Woodland Monitoring Survey as presented in Daly *et al.* (in prep.). I02 Other invasive alien species (other than species of Union concern) and A09 Intensive grazing or overgrazing by livestock were recorded as high-importance pressures and threats. It should be noted that the pressure recorded as A09 is primarily overgrazing by deer (not livestock). I02 was the most frequently recorded pressure present at all six sites surveyed by Daly *et al.* (in prep.). It was recorded as high intensity at two sites, medium intensity at one site and low intensity at three sites. At two sites it affected ≥75% of the habitat. The most frequently recorded invasive species were *Acer pseudoplatanus*,

	Fagus sylvatica, Prunus laurocerasus and *Clematis vitalba.* I02 had previously been recorded as a high-importance pressure and a medium-importance threat in NPWS (2013) under the code I01 Invasive non-native species. A09 was the second most frequently recorded pressure, recorded at two of the six sites. It was recorded as high intensity at one site and medium intensity at the other. At both sites it affected 100% of the habitat. A09 refers to the overgrazing of woodlands by deer. At one site (Site 1291 Reenadina, Co. Kerry within Killarney National Park), deer were present within a deer fenced area, increasing the grazing intensity inside the fence compared to the adjacent unfenced 91J0. A09 had previously been recorded as a high-importance pressure and a medium-importance threat in NPWS (2013) under the code B06 Grazing in forests/ woodland. The recording of I02 and A09 as high-importance pressures but medium-importance threats by NPWS (2013) was based on the premise that the pressures were being addressed at the sites, therefore, warranted downgrading to medium threat status. However, since these pressures were still acting upon the 91J0 habitat within the current reporting period (e.g. heavy grazing inside a deer fence, invasive trees/shrubs still problematic), the same status was applied to both the pressure and threat categories, i.e. both high importance. I05 Plant and animal diseases, pathogens and pests was recorded as a low-importance pressure and a medium-importance threat. I05 refers to the presence of Ash Dieback disease at the monitoring sites. Ash Dieback disease affects the tree, *Fraxinus excelsior,* which is a common component of the 91J0 habitat. I05 was recorded from two of the six sites. It was recorded as low intensity at two sites where it affected ≤3% of the habitat. The disease causes dieback of the ash crown, loss of leaves and can lead to tree death (Khela & Oldfield, 2018). According to DAFM (2018) young plants are more immediately susceptible, older trees succumb to the disease more slowly, and mature trees can survive infection for several years. As of 31st July 2017, the disease was confirmed from 384 forestry plantations across 24 counties in the Republic of Ireland; it was confirmed from native hedgerows across 17 counties, and it was confirmed from roadside landscaped plantings across 14 counties (DAFM, 2018). *Fraxinus excelsior* is now listed as Near Threatened on the IUCN Red List of Threatened Species (Khela & Oldfield, 2018). This pressure did not feature in NPWS (2013).

8 Conservation measures

8.1 Status of measures	*Are measures needed? (**YES**/NO)* *If yes, indicate the status of measures:* *a) Measures identified, but none yet taken or* ***b) Measures identified and taken** or* *c) Measures needed but cannot be identified*

8.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, surface area or structure and functions of the habitat type*** *or* *b) Expand the current range of the habitat type (related to 'Range') or* *c) Increase the surface area of the habitat type (related to 'Area covered by habitat') or* *d) Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')*
8.3 Location of the measures taken	*Indicate the location of measures taken:* ***a) Only inside Natura 2000*** *or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
8.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*Indicate the time frame of the response to measures (with regard to the main purpose indicated in field 8.2):* *a) Short-term results (within the current reporting period, 2013-2018) or* *b) Medium-term results (within the next two reporting periods, 2019-2030) or* ***c) Long-term results (after 2030)***
8.5 List of main conservation measures	*List a maximum of 10 measures using code list provided in the Reference portal* **CB02** Maintain existing traditional forest management and exploitation practices **CB04** Adapt/manage reforestation and forest regeneration **CB05** Adapt/change forest management and exploitation practices **CB08** Restoration of Annex I forest habitats **CE01** Reduce impact of transport operation and infrastructure **CI03** Management, control or eradication of other invasive alien species **CI05** Management of problematic native species
8.6 Additional information *Optional*	Conservation measures were selected using data gathered from Annett (2015), Coillte (2018), Coillte (2011), Daly *et al.* (in prep.), Fuller (2015) and Herbert (2009). The six sites surveyed by Daly *et al.* (in prep.) were: Site 1291 Reenadina in Co. Kerry, Site 1594 Garryland in Co. Galway, Site 1963 Cornalack in Co. Tipperary, Site 1986 Curraghchase in Co. Limerick, Site 2021 Kylagowan in Co. Galway and Site 2025 Cahir Woods in Co. Tipperary. Of the six sites surveyed by Daly *et al.* (in prep.), conservation measures were recorded from three (50% of the monitoring sites). These comprise: control of invasive shrubs (one site; Site 1986) (CI03), planting *Taxus* adjacent with the aim of expanding the existing 91J0 habitat (two sites; Sites 1986 and 2025) (CB04, CB08) and planting native woodland on former clear-fell adjacent to the 91J0 habitat (one site; Site 2021) (CB04). The deer fence (CB05) at

	Site 1291 was exerting a negative influence on the habitat as grazing deer remained on the inside of the fence. For this reason, it was not recorded as a conservation measure by Daly *et al.* (in prep.). The conservation measures recorded from the monitoring sites correspond to conservation measures undertaken as part of the People's Millennium Forest and/or the Coillte LIFE Restoring Priority Woodland Project 2006-2009 (LIFE05 NAT/IRL/000182) as detailed below. Where these conservation measures were already recorded by Daly *et al.* (in prep.), this will be stated in the text. The People's Millennium Forest restored sixteen, primarily Coillte-owned, native woodlands, fourteen of which are within the Republic of Ireland and two of which are located in Northern Ireland (Coillte, 2011). Two of the Millennium Forests sites support 91J0 habitat. These correspond with the monitoring sites 1291 and 2021. Conservation measures undertaken at these sites as part of the People's Millennium Forest comprise deer fencing (CB05 at Site 1291), native tree planting on clear-fell (CB04 at Site 2021, as recorded in Daly *et al*., in prep.) and controlling fallow deer (CI03 at Site 2021). The recently launched Charter of Commitment to the People's Millennium Forest is a pledge by Coillte to continue to maintain and conserve these sites into the future (Coillte, 2018). The Coillte LIFE Restoring Priority Woodland Project 2006-2009 (LIFE05 NAT/IRL/000182) aimed to restore/recreate yew woodland at five sites: Attyslany, Clonbur, Cahir Park, Curraghchase and Castletaylor. As part of this project 16,400 *Taxus* seedlings were planted across 45.8 ha (CB04, CB08). Currently only two of these sites correspond to the Annex I habitat 91J0. These comprise the monitoring sites 1986 and 2025. Conservation measures undertaken at these sites during this project and supported by the After-LIFE Conservation Plan (Herbert, 2009) include planting of *Taxus* cuttings (CB08, CB04 at Sites 1986 and 2025, as recorded in Daly *et al.*, in prep.), fencing of *Taxus* seedlings until establishment (CB05), invasive species control (CI03 at Site 1986, as recorded in Daly *et al*., in prep.), selective removal of non-native trees (CB05), maintenance of tracks/trails to prevent damage to sensitive habitats (CE01) and creation and retention of dead wood (CB02). The planted yew appears to be growing very well at three of the sites listed above: Attyslaney, Cahir Park (Site 2025) and Curraghchase (Site 1986). Yew was recorded at the other two sites, Clonbur and Castletaylor, but appeared to be less abundant. However, at the latter sites, dense scrub and a lack of marker posts to denote yew planting locations may have resulted in under-recording (Fuller, 2015). NPWS implement a number of conservation measures. At Killarney National Park, *Rhododendron ponticum* control (CI03) has been undertaken in addition to maintenance of tracks/trails to prevent damage to sensitive habitats (CE01) and deer management (CI03 - Sika deer, CI05 - Red deer) (C. Douglas, NPWS, pers. comm.). Some selective felling of *Fagus sylvatica* in 91J0 woodland was undertaken within the Coole-Garryland Nature Reserve (E. Mooney, pers. comm.). The Irish Deer Management Forum (IDMF) was launched in 2015 and

	set out a series of management actions in the document *Deer Management in Ireland: A Framework for Action.* The aim of this Framework was to manage deer responsibly in order to minimise their impact on agriculture, woodlands and other conservation habitats. It aimed to use a cross-sectoral approach to deliver deer management structures that suited spatial requirements, conformed to best practice, and complied with existing legislative and policy frameworks (CI03, CI05) (Annett, 2015). However, at the time of writing, this forum was inactive.

9 Future prospects		
9.1 Future prospects of parameters	**a) Range**	*Good / Poor / **Bad** / Unknown*
	b) Area	*Good / Poor / **Bad** / Unknown*
	c) Structure and functions	*Good / Poor / **Bad** / Unknown*
9.2 Additional information *Optional*	Current range is more than 10% below the Favourable Reference Range. Conservation status of Range is therefore Unfavourable-Bad. Short-term trend direction of Range is assessed as stable. Future trend of Range is assessed as stable, as the range is not expected to contract or increase over the next 12 years. Future prospects of Range are therefore Bad. Current area is more than 10% below the Favourable Reference Area. Conservation status of Area is therefore Unfavourable-Bad. Short-term trend direction of Area is assessed as stable. Future trend of Area is assessed as stable. While future area gains in 91J0 habitat are expected, these will not occur within the next 12 years due to the slow growth rate of *Taxus baccata*. Future prospects of Area are therefore Bad. Current Structure and functions are assessed as Unfavourable-Bad as more than 25% of habitat is in “Unfavourable” condition. Conservation status of Structure and functions is therefore Unfavourable-Bad. Short-term trend direction is stable for habitat that is in good condition. Future trend of Structure and functions is assessed as stable, based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Structure and functions are therefore Bad.	

10 Conclusions			
Assessment of conservation status at end of reporting period			
10.1 Range	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
10.2 Area	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
10.3 Specific structure and functions (incl. typical species)	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
10.4 Future prospects	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
10.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
10.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating / **stable** / unknown*		
10.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (10.5)	***Overall trend in conservation status (10.6)***
	a) no, there is no difference	*YES/**NO***	***YES**/NO*
	b) yes, due to genuine change	*YES/NO*	*YES/**NO***
	c) yes, due to improved knowledge/more accurate	*YES/NO*	***YES**/NO*
	d) yes, due to the use of different methods (including use of different thresholds)	*YES/NO*	***YES**/NO*
	e) yes, but there is no information on nature of change	*YES/NO*	*YES/**NO***
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / **improved knowledge or more accurate data** / the use of a different method*
10.8 Additional information *Optional*	The Conservation Status of Range, Area, Structure and functions and Future prospects are Unfavourable-Bad in this reporting period, as they were in the previous reporting period. The Overall Conservation Status was assessed as Unfavourable-Bad, as it was during the previous reporting period. Trend in Overall Conservation Status was assessed as stable in this		

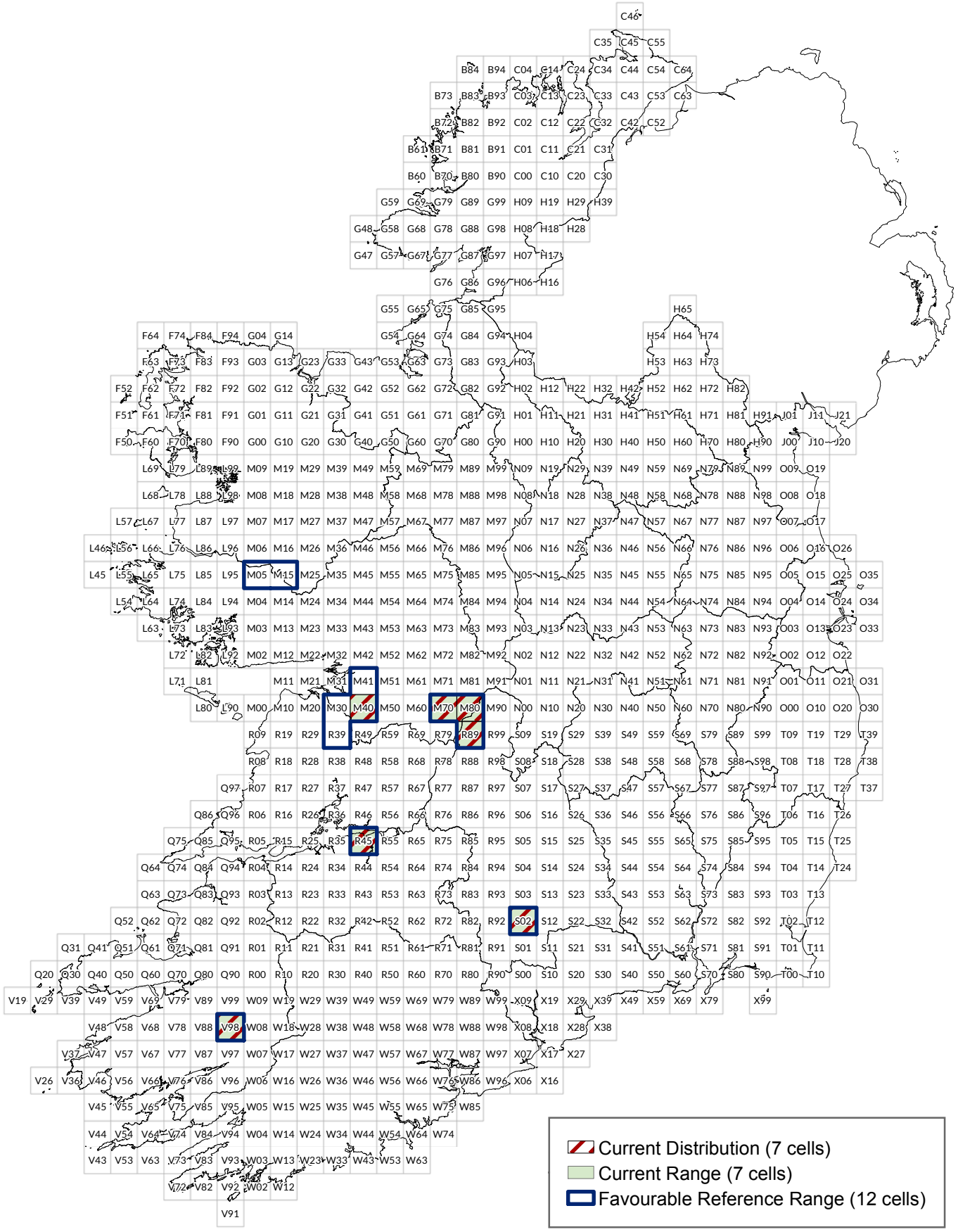
	reporting period, but as improving in the previous reporting period. This change in trend is primarily due to the availability of more accurate data, e.g. the availability of baseline monitoring data from the previous reporting period for comparison.

11 Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types		
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network *(In km² in biogeographical/ marine region including all sites where the habitat is present)*	**a) Minimum**	
	b) Maximum	
	c) Best single value	***0.83 km²***
11.2 Type of estimate	***Best estimate*** */ 95% confidence interval / minimum*	
11.3 Surface area of the habitat type inside the network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.4 Short-term trend of habitat area in good condition within the network Direction	*Short-term trend of habitat area in good condition within the network over the period indicated in the field 6.3:* ***stable*** */ increasing / decreasing / uncertain/ unknown*	
11.5 Short-term trend of habitat area in good condition within network Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
11.6 Additional information *Optional*	Area within the network and associated trend were estimated by performing a union between the distribution polygon shapefile and the SAC shapefile. The area in Section 11.1 is the total area of 91J0 habitat in SACs in the country, including one SAC where 91J0 is not listed as a qualifying interest (QI). The area of 91J0 within the Natura 2000 network where it is listed as a QI is 0.80 km². No anthropogenic losses were reported during the current or the previous reporting period. Therefore, no losses occurred within the Natura 2000 network. There are no inconsistencies between the Natura 2000 sites where the 91J0 habitat is listed as a QI and the current distribution for the habitat. The short-term trend of the 91J0 habitat in good condition within the SAC network is taken to be stable, with the same trend as the 91J0 habitat nationally (Section 6.4) since 99.7% of the mapped distribution is within Natura 2000 sites. The surface area of 91J0 habitat within the Natura 2000 network is	

	approximately the same as the last reporting period.

12 Complementary information

Taxus baccata woods* (91J0)
Article 17 (2013 - 2018) Assessment



An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

Produced by: Déanta in:
Biodiversity Monitoring Unit, Aonad Monatóireacht Bhithéagsúlachta,
National Parks and Wildlife Service, An tSeirbhís Páirceanna Náisiúnta agus Fiadhúlra

Scale - Scála
0 12.5 25 50 km

N

Ma arscáil V 2.0
Dáta June 2019

Rialtas na hÉireann
Government of Ireland