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

The Status of EU Protected Habitats and Species in Ireland

SPECIES ASSESSMENTS

Volume 3

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 68 species 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.

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COVER IMAGE

Marsh saxifrage: Maria Long

CONTENTS

SPECIES

6985 Killarney fern *(Vandenboschia speciosa)* 1
1528 Marsh saxifrage *(Saxifraga hirculus)* 24
1833 Slender naiad *(Najas flexilis)* 40
6216 Slender green feather moss *(Hamatocaulis vernicosus)* 61
1395 Petalwort *(Petalophyllum ralfsii)* 78
1376 Maërl *(Lithothamnium coralloides)* 96
1377 Maërl *(Phymatholithon calcareum)* 96
1400 White cushion moss *(Leucobryum glaucum)* 109
1409 Sphagnum genus *(Sphagnum spp.)* 118
1413 Lycopodium group *(Lycopodium spp.)* 134
1378 Cladonia subgenus cladina *(Cladonia (Cladina) subsp.)* 146
1013 Geyer's whorl snail *(Vertigo geyeri)* 154
1014 Narrow-mouthed whorl snail *(Vertigo angustior)* 169
1016 Desmoulin's whorl snail *(Vertigo moulinsiana)* 183
1024 Kerry slug *(Geomalacus maculosus)* 198
1029 Freshwater pearl mussel *(Margaritifera margaritifera)* 211
1990 Nore pearl mussel *(M. margaritifera durrovensis)*
1092 White-clawed crayfish *(Austropotamobius pallipes)* 242
1065 Marsh fritillary *(Euphydryas aurinia)* 259
1095 Sea lamprey *(Petromyzon marinus)* 276
1096 Brook lamprey *(Lampetra planeri)* 296
1099 River lamprey *(Lampetra fluviatilis)* 312
5046 Killarney shad *(Alosa killarnensis)* 330
1103 Twaite shad *(Alosa fallax)* 345
5076 Pollan *(Coregonus pollan)* 364
1106 Atlantic salmon *(Salmo salar)* 380
6284 Natterjack toad *(Epidalea calamita)* 402
1213 Common frog *(Rana temporaria)* 416
1223 Leatherback turtle *(Dermochelys coriacea)* 427
1303 Lesser horseshoe bat *(Rhinolophus hipposideros)* 440
1309 Common pipistrelle *(Pipistrellus pipistrellus)* 456
5009 Soprano pipistrelle *(Pipistrellus pygmaeus)* 468
1317 Nathusius' pipistrelle *(Pipistrellus nathusii)* 480
1322 Natterer's bat *(Myotis nattereri)* 493
1314 Daubenton's bat (Myotis daubentonii) 505
1330 Whiskered bat *(Myotis mystacinus)* 517
1326 Brown long-eared bat *(Plecotus auritus)* 529
1331 Leisler's bat *(Nyctalus leisleri)* 542
1334 Mountain hare *(Lepus timidus)* 554
1355 Otter *(Lutra lutra)* 566
1357 Pine marten *(Martes martes)* 580
1364 Grey seal *(Halichoerus grypus)* 593
1365 Harbour seal *(Phoca vitulina)* 610
1345 Humpback whale *(Megaptera novaeangliae)* 627
1349 Common bottlenose dolphin *(Tursiops truncatus)* 643
1350 Common dolphin *(Delphinus delphis)* 662
1351 Harbour porpoise *(Phocoena phocoena)* 679
2027 Killer whale *(Orcinus orca)* 698
2029 Long-finned pilot whale *(Globicephala melas)* 715
2030 Risso's dolphin *(Grampus griseus)* 731
2031 White-sided dolphin *(Lagenorhynchus acutus)* 748
2032 White-beaked dolphin *(Lagenorhynchus albirostris)* 763
2034 Striped dolphin *(Stenella coeruleoalba)* 778
2035 Cuvier's beaked whale *(Ziphius cavirostris)* 794
2038 Sowerby's beaked whale *(Mesoplodon bidens)* 811
2618 Minke whale *(Balaenoptera acutorostrata)* 828
2621 Fin whale *(Balaenoptera physalus)* 845
5020 Blue whale *(Balaenoptera musculus)* 862
2624 Sperm whale *(Physeter macrocephalus)* 877
5033 Northern bottlenose whale *(Hyperoodon ampullatus)* 893
2619 Sei whale *(Balaenoptera borealis)* 910

VAGRANTS

1348 Northern right whale *(Eubalaena glacialis)* 926
2028 False killer whale *(Pseudorca crassidens)* 935
2037 True's beaked whale *(Mesoplodon mirus)* 944
2622 Pygmy sperm whale *(Kogia breviceps)* 953
5029 Beluga/White whale *(Delphinapterus leucas)* 962
5034 Gervais' beaked whale *(Mesoplodon europaeus)* 971
1102 Allis shad *(Alosa alosa)* 980
1320 Brandt's bat *(Myotis brandtii)* 981

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***6985***
1.3 Species scientific name	*Vandenboschia speciosa* (Willd.) Kunkel
1.4 Alternative species scientific name *Optional*	*Trichomanes speciosum* Willd., *Trichomanes radicans auct. non* Sw., *Trichomanes radicans sensu* P. Fourn. *non* Sw., *Trichomanes andrewsii* Newman, *Trichomanes radicans* var. *andrewsii* (Newman) H.C. Watson & Dennes, *Hymenophyllum alatum* Sm., *Trichomanes alatum* (Sm.) Hooke, *Trichomanes brevisetum* R. Br., *Trichomanes europaeum* Sm., *Trichomanes hibernicum* Spreng., *Trichomanes pyxidiferum sensu* Huds. *non* L.
1.5 Common name *Optional*	Killarney fern; Bristle fern
1.6i Species description	*Vandenboschia speciosa* (Willd.) Kunkel is a large filmy fern in the family Hymenophyllaceae. It is restricted to damp, shady and humid habitats and is extremely sensitive to desiccation. In the previous reporting cycle (2007–2012) this species was referred to as *Trichomanes speciosum* Willd. However, the new valid name for this species for the current reporting cycle (2013–2018) is *Vandenboschia speciosa* (Willd.) Kunkel as per the updated Article 17 checklist (2018). This revision is accepted by the Catalogue of Life (World Ferns) (Hassler, 2015). Killarney Fern has a typical fern two-stage life cycle, the second, typical "fern-like", frond stage is known as the sporophyte (2n) and the first stage, the gametophyte (n), in this case a filamentous structure (rather than the more usual heart-shaped fern prothallus) which becomes interwoven to form felted mats or wefts. Both the sporophyte and gametophyte stages are capable of asexual reproduction, by mean of rhizomes in the former and gemmae in the latter. Gametophyte colonies can exist and reproduce in the absence of sporophytes. For *V. speciosa* the traditional unit for measuring population size is the colony, simply defined by Rumsey (1997) as a discrete, i.e. unconnected, "patch" or "plant". This unit is a useful and accurate measure of population size for the species, on account of the rhizomatous nature of the sporophyte and the filamentous nature of the gametophyte, both of which render identification in the field of what precisely constitutes an individual difficult and liable to error. A sporophyte colony may comprise an individual or a number of individuals. A gametophyte colony may comprise an individual or thousands of individuals. Frond numbers can fluctuate on an annual basis, therefore, presence or absence of a colony is a more reliable unit than frond counts. A colony can be one that has both sporophytes and gametophytes co-existing or either of these growing alone. In Ireland, when the sporophyte and gametophyte occur together they occupy similar habitats in dripping caves, cliffs, crevices and gullies by waterfalls, crevices in woodland, and occasionally the floor of damp

	woodland; all deeply shaded humid habitats. Sporophyte colonies, however, are more limited in their distribution in Ireland than gametophyte colonies. Niches that the gametophyte can occupy are not always suitable for the growth of sporophytes, i.e. shallow crevices in otherwise open habitats that provide adequate shade for the gametophyte, but not for the larger sporophytes. The reported rare occurrence of sporophytic recruitment in conjunction with the persistence of both generations of *V. speciosa* often occurring independently has led to the conclusion that there has been a breakdown in the link in the life cycle between the sporophyte and gametophyte generations of *V. speciosa* (Sheffield, 1994).

2 Maps

Distribution of the species within the Member State concerned.

2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***1960–2018***
2.3 Distribution map	Submitted
2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	The distribution map was compiled using points mapped during the Rare Plants Monitoring Survey 2015–2018 (Ní Dhúill *et al.*, in prep.) [RPMS] and using data held by the National Parks and Wildlife Service [NPWS] (NPWS, 2018). Historic records from the Herbarium at the National Botanic Gardens, Glasnevin, Dublin 9, the Botanical Society of Britain and Ireland (BSBI) database available from the National Biodiversity Network Gateway and available academic literature were collated and checked. The main bulk of records were obtained from NPWS digital and hard-copy files. Additional colonies recorded by NPWS staff, contractors and other individuals who provided records since the last reporting period were also included. These colonies were mapped as separate GIS points and polygons. Most populations of *V. speciosa* in Ireland occur in Co. Kerry and West Cork, with the largest known population being found in Co. Waterford (TS26). There are outlying sites with sporophytes in counties Carlow, Donegal, Limerick, Tipperary, Waterford, and Sligo (Curtis & McGough, 1988; NPWS, 2018; Wyse Jackson *et al.*, 2016; published and unpublished data held by NPWS). The gametophyte range is similar but is more widespread and also occurs in counties Galway, Mayo, Wexford, Kilkenny, Wicklow, and Cavan (NPWS, 2018; Preston *et al.* 2002; Rumsey *et al*. 1998; published and unpublished data held by

	NPWS). Since the last reporting period, there have been an additional 24 populations recorded (16 gametophyte, one gametophyte & juvenile and seven sporophyte populations) comprising 37 new colonies. Of these 24 additional populations, 15 populations fall within new 10 km grid squares, thus increasing the range of this species from 7,000 km^2 to 10,100 km^2 (an increase of 44%). These 15 populations in the new range comprise 20 colonies, of which 14 are gametophyte-only and 6 are sporophyte-only. One population (TS70, Co. Kerry) is based on a post-1960 previously unreported record, the locational details of which had been insufficient for mapping; additional details uncovered since the last reporting period have allowed it to be more accurately localised and its inclusion here extends the current range to an additional 10 km grid square. There is very little information on this population, which has not been surveyed in the past two reporting cycles. One new record for gametophytes at population TS56, Co. Wicklow, is at a location in which the sporophyte was historically recorded but is now considered extinct. At population TS16, Co. Limerick, one colony (TS16.01.02) occurs in a new 10 km grid square (R71), the remaining nearby colonies all being found in grid square R61. The overall number of populations, including those monitored during the RPMS, totals 86; these are comprised of 120 sub-populations holding a total of 290 separate colonies. During the RPMS, 40 *V. speciosa* populations, comprising 198 colonies, were surveyed and mapped.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	***Atlantic**, Marine Atlantic*
4.2 Sources of information	The main source of data was the updated monitoring manual for *V. speciosa* (Ní Dhúill *et al*., in prep.) which collates data previously collected from the following sources: Records obtained from NPWS digital and hard-copy files. Research into the Irish *V. speciosa* populations (Ní Dhúill, 2014). Data from the previous monitoring period (Ní Dhúill *et al.*, 2015). Additional colonies recorded by NPWS staff, contractors and other individuals who provided records since the last reporting

period.

Historic records from the Herbarium at the National Botanic Gardens, Glasnevin, Dublin, the Botanical Society of Britain and Ireland (BSBI) database available from the National Biodiversity Network Gateway and available academic literature were also collated and checked.

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4.2i Additional information	

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***10,100 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994–2018***	
5.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	
5.10 Favourable reference	***a) 10,100 km²***	

<table>
<tr><td rowspan="4">range</td><td colspan="2">b) Indicate if operators were used (use these 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 current range is thought to encompass the geographical range and ecological range of variation for the species in Ireland, and is considered sufficient for the long-term survival of the species.</td></tr>
<tr><td></td><td colspan="2"></td></tr>
<tr><td rowspan="6">5.11 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>5.12 Additional information

Optional</td><td colspan="2">Short-term trend was derived by comparing data from the 2015-2018 Rare Plants Monitoring Survey [RPMS] (Ní Dhúill et al., in prep.) in the current monitoring period with data from the 2007-2012 survey period (Ní Dhúill et al., 2015), along with data from PhD research into the Irish V. speciosa populations (Ní Dhúill, 2014) and historical records held by NPWS. The period over which the surface area of the species was determined dates from 1960 to 2018. This includes all additional records made during the RPMS, and records from NPWS staff, contractors and other individuals who provided records since the last reporting period.
Favourable Reference Range is set as approximately equal to the current range (10,100 km^2).
Since the last reporting period, the range of this species has increased from 7,000 km^2 to 10,100 km^2 (a 44% increase).
Short-term trend in Range was deemed to be stable. The increase in population and colony numbers is due to improved knowledge and more accurate data rather than expansion of newly established populations. In the reporting period 2007-2012, 64 populations were reported. Since that time, this number has reduced by two: a) one pre-1960 population (Poisoned Glen, Co. Donegal) was erroneously included in the current range in the previous assessment; this population has not been recorded since 1960, is considered to be extinct and is here excluded from the current range; b) the second population forms a natural part of, and is amalgamated with, population TS12, Co. Kerry. The majority of the 24 new populations recorded during the period 2007-2012 were gametophyte-only (67%).</td></tr>
</table>

	One of the new populations comprises gametophytes with juvenile sporophytes that may be recently established (TS71, Co. Kerry). The gametophyte generation has been observed more frequently in recent times as botanists and ecologists are becoming more aware of this cryptic generation and its identification. See Section 6.17 for additional information on the *V. speciosa* populations. There are currently fifty-seven 10 km grid squares (5,700 km^2) that have at least one *V. speciosa* record. Range is assessed as Favourable as there is no evidence of a decline since the Directive came into force.

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	***1960 – 2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	
	c) Maximum	
	d) Best single value	***290 individuals***
6.3 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	***Area in m^2***
	b) Minimum	***239 m^2 (area of occupancy)***
	c) Maximum	***695 m^2 (maximum area)***
	d) Best single value	
6.5 Type of estimate *Optional*	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

6.10 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*	
6.11 Long-term trend Period *Optional*	***1994 – 2018***	
6.12 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	***a) 290 mature individuals***	
	b) ≈ (approximately equal to) the current population	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators FRP is set as the current population as there is no evidence of a decline since the Directive came into force and the current population size is considered adequate for the long-term survival of the species.	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information	'Individuals' in section 6.2 (a) above refers to 'Mature individuals'. For the purposes of reporting here the population unit 'mature	

Optional	individuals' is used as a proxy for 'colonies' – see also Article 17 reporting guidelines (DG Environment, 2017). There are currently 86 known extant *V. speciosa* populations in Ireland, comprising 35 (41%) gametophyte-only populations, 20 (23%) sporophyte-only populations, 30 (35%) co-occurring generation populations and one (1%) population that has only juvenile sporophytes emerging from gametophytes. Of these 86 populations, 41 were scheduled for monitoring during the current reporting period (Ní Dhúill *et al*., in prep.); 40 were monitored, while one (TS47, Co. Kerry) was not included as the population was inaccessible due to adverse weather conditions. Population size was determined based on the number of colonies of both generations. This is considered to be the most suitable population unit for recording *V. speciosa* as it is difficult to define an individual in this rhizomatous (sporophyte) and filamentous (gametophyte) species. A sporophyte colony may comprise an individual or a number of individuals. A gametophyte colony may comprise an individual or thousands of individuals. Frond numbers can fluctuate on an annual basis, therefore, presence or absence of a colony is a more reliable unit than the number of fronds. However, although frond numbers do naturally fluctuate, the numbers are still useful for the future monitoring of each individual colony. Frond numbers were recorded at each colony following the methods described by Ní Dhúill *et al*. (in prep.). As noted above, the most suitable unit for measuring population size was considered to be the colony, which was simply defined as a discrete, i.e. unconnected, "patch" or "plant" (Ratcliffe *et al*., 1993; Rumsey, 1997). With the sporophyte generation, each colony is usually very obvious, occurring as a discrete patch in a crevice, or on a wall or woodland floor. However, with the gametophyte generation the discrete "patches" are not always obvious – the best unit for defining a gametophyte colony is the niche in which the gametophytes occur, i.e. a particular boulder or crevice, or cave, or section of cliff wall. These may contain numerous patches of gametophytes (Ní Dhúill *et al*., in prep.). The 86 populations contain 290 colonies, of which there are 142 where only gametophytes occur, 13 where juveniles emerging from gametophytes occur and 135 where mature sporophytes (either with or without gametophytes) occur. Of these 135 colonies, 60 are sporophyte-only, two are sporophyte-only with juveniles (but no gametophyte observed), 44 are co-existing sporophytes and gametophytes and 29 are co-existing sporophytes and gametophytes, with juveniles emerging from gametophytes. In the previous reporting period (2007-2012) 177 colonies were recorded. In the current reporting period this number was reduced by 28 through amalgamation of colonies with others and through losses, to leave a total of 149 (2007-2012) historical colonies, which are outlined in full in the supporting document (Ní Dhúill *et al*., in prep.). As of 2018, the total number of colonies within the 86 populations is 290, of which 141 are new records. Twelve gametophyte colonies at population TS34 (Co. Galway) were amalgamated into three colonies based on a revised definition of

	gametophyte colonies (Ní Dhúill *et al*., in prep.), two sporophyte colonies that had been reported at TS12 (Co. Kerry) were considered to comprise one colony and ten gametophyte colonies at population TS24 (Co. Kerry) were considered to represent a single large gametophyte colony that had already been recorded and monitored (TS24.01.02). A further eight sporophyte colonies were considered to have become extinct at seven different populations, most likely due to natural processes such as substrate movement (Ní Dhúill *et al*., in prep.). The populations where these colonies are considered extinct still contain other sporophyte colonies (with or without gametophytes), with the exception of population TS51 (Co. Kerry), where only gametophytes were recorded in the current reporting period and the Poisoned Glen, Co. Donegal) which no longer supports any known colony of either generation (see section 5.12 for full details on the extinct status of this population). However, the range of the species in Ireland is not impacted by the loss of these colonies. The presence of gametophytes at all but one of these locations is important for possible sporophytic recruitment under future favourable conditions. Of the 290 colonies within 86 populations, 198 colonies within 40 populations were monitored during the current RPMS (Ní Dhúill *et al*., in prep.). During the last reporting period, juvenile sporophytes were rarely observed within the Irish populations, being recorded in only five of these. During the RPMS, juvenile sporophytes were recorded at 12 populations (= 30% of the 40 monitored populations). The trigger for the development of these juvenile sporophytes from gametophytes is unclear but it may be, at least in part, due to climatic factors. During the last reporting period, 57% of the 23 populations where sporophytes occurred were fertile. In this current reporting period 37% of the 30 populations where sporophytes occurred were fertile. Fluctuation in fertility is not considered problematic, and likely represents natural turnover of fertile fronds. In addition to using colonies to determine population size, area of occupancy and maximum area were also used. Forty populations that were visited during the RPMS comprising 198 colonies had their areas measured. Estimates based on Ní Dhúill *et al.* (in prep.) and expert judgment estimates for the area of occupancy of combined generation colonies discovered recently tallied to 239 m^2 with a maximum area of 695 m^2. The area of occupancy for populations not visited since 1960 to date have been extracted from the 2012 Conservation Assessment. Colony records where there was no information on area have been set a minimum value of 0.22 m^2 for sporophyte colonies and 0.12 m^2 for gametophyte colonies. The method used to derive the assigned areas is described by Ní Dhúill *et al.* (in prep.). This has been revised from 1 m^2 for either generation assigned in 2007-2012, which, in hindsight, was considered to be excessive. The area of occupancy for the previous reporting period was 280 m^2 with a maximum area of 449 m^2. Although there was a significant increase in colony numbers since the last reporting period, the

	apparent reduction in area of occupancy of 15% does not reflect a significant loss in area, but rather accounts for the accurate measurements of previously un-monitored colonies and the use of the revised assigned areas for colonies. It is therefore due to the use of a different method. The maximum area of colonies has significantly increased by 55% since 2012 which reflects the significant number of new colonies recorded since the last reporting period (141 colonies). Population was assessed based on number of colonies present, area of occupancy of both generations, frond types, presence of associated gametophytes, number of living fronds and number of juvenile fronds. Juvenile sporophyte frond numbers are reported separately in the Individual Population Conservation Assessments (Ní Dhúill *et al*., in prep.) as, when present, these numbers may skew the overall frond numbers at a given colony, as not all juveniles would be expected to survive to reach maturity. Favourable population size is deemed to be approximately equal to the current number of colonies (290) and area of occupancy (239 m^2) with a maximum area of 695 m^2. Taking into account the losses of sporophyte colonies (outlined in section 6.17), and the fact that one or both generations of *V. speciosa* colonies are known to still occur in all but one population (Poisoned Glen, Co. Donegal), the current population size is considered to be large enough to allow the long-term survival of this species. With the wider range of distribution of gametophyte colonies and the historical occurrence of sporophytes at the Poisoned Glen, Co. Donegal population, it is highly likely that gametophytes still to be discovered occur within this site. Population is considered to have an overall Favourable assessment.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*

7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	*V. speciosa* is restricted to damp, shady and humid habitats such as dripping caves, cliffs, crevices and gullies by waterfalls and occurs in both woodland and open upland situations. Although there are many apparently suitable sites around Ireland, especially in the south-west, it is not yet fully understood as to why this species is restricted to particular sites. The habitat for the species was assessed based on the area and quality of the habitat in which the species occurs. The suitable area of habitat corresponds to the area where populations occur, such as a ravine, an area of woodland, cliff-face or crevice. Short-term trend was assessed by comparing data from the RPMS (Ní Dhúill *et al*., in prep.) with data from the 2007-2012 reporting period (Ní Dhúill *et al.*, 2015) along with data from PhD research into the Irish *V. speciosa* populations (Ní Dhúill, 2014) and historical records held by NPWS and other sources. The area of occupancy and maximum area figures (239 m^2 and 695 m^2 respectively – see section 6.4) are based on detailed research, targeted surveys and measurement of colonies conducted since the previous assessment. The maximum area of this species (area of both generations combined) is considered to be the area for the habitat (see section 6.17 for full details). Area of occupancy measurements for the 198 colonies visited were undertaken between 2009 and 2018 (Ní Dhúill *et al.,* 2015 and Ní Dhúill *et al.*, in prep.). For un-monitored colonies, data on area of occupancy in NPWS rare species files suggest that there have been no losses in the area occupied by these populations in the recent past, with the exception of those outlined in section 6.17. Other than the two sporophyte colonies (TS20.04.01, Co. Limerick; TS22.01.07, Co. Cork) there is no evidence to suggest losses since 2000. Significant reduction in area of occupancy of three colonies at

	population TS26, Co. Waterford, were likely caused by substrate movement. The effects of bank slippage in sections of population TS26 is a cause for concern. In at least one case, it is likely that the movement of *Prunus laurocerasus* is causing instability at a section of these steep banks. Although the Habitat for the Species is assessed as Favourable, the overall assessment of population TS26 is Unfavourable-Inadequate due to a significant reduction in the area of colonies TS26.01.04; 14; 19, and a significant reduction in frond numbers at colonies TS26.01.14; 19. One colony that was reported previously to have significant area and frond loss (TS01.02.01, Co. Tipperary) is now considered to be recovering. However, this population, which comprises 11 colonies, has an Unfavourable-Inadequate assessment for Habitat for the species in the Individual Conservation Assessment due to failing on the target for canopy cover and shade. Another colony is in danger of being severely impacted due to loss of canopy cover and the effects of a grey fungal attack (TS12.01.01, Co. Kerry). At this population (TS12), which comprises three monitored colonies, there is an Unfavourable-Inadequate assessment for Habitat for the species in the Individual Conservation Assessments due to loss of canopy cover and shade at this specific colony, which were lower than the target for a Favourable assessment. Recent tree fall at a colony (TS08.01.02, Co. Cork) has exposed the left-hand side of this large sporophyte colony (5 m^2) to direct sunlight. As this colony failed the target for canopy cover and shade, the overall population had an Unfavourable-Inadequate assessment for Habitat for the species in the Individual Conservation Assessment. In addition to assessing canopy cover, shade (shade index) and water source, indicators for assessing the habitat for the species also included the occurrence of vigorous native species or invasive non-native species. NÍ Dhúill *et al*. (in prep.) observed that, although there is no evidence to suggest that the extent or quality of the habitat for the species has changed significantly in the recent past for colonies and populations visited, the presence of exotic non-native invasive species at six of the populations (listed in section 8.3) where sporophytes occur is of concern due to the likely impact on the habitat where they occur. Although these exotics recorded at six populations are not currently considered to negatively impact the *V. speciosa* colonies, and in fact, often provide essential canopy cover, their presence within the habitat, and possible measures to control or manage them, may negatively impact these habitats, which in the long term may negatively impact the *V. speciosa* populations. However, at present, these are considered to be local issues and are not currently considered a threat at the national level. Population TS52, Co. Kerry, contains all generations of *V. speciosa* and occurs in a well-established, privately-owned woodland which was planted as far back as the 1830s with a collection of non-native exotics; these are not considered a threat to the *V. speciosa* colonies at this location at present, and their spread would be limited to the

	woodland where they occur. The RPMS (NÍ Dhúill *et al.*, in prep.) and other recent observations have demonstrated that there is sufficient good quality habitat to support the long-term survival of *V. speciosa* in Ireland. Habitat for the species is therefore currently assessed as Favourable, although the presence of non-native invasive species should continue to be monitored in the next reporting period.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**Xxp** No pressures	**Xxt** No threats

8.2 Sources of information *Optional*	Pressures and threats were recorded during 2015-2018 field surveys (Ní Dhúill *et al.*, in prep.) using the revised 2018 impact codes. No pressures/threats were identified as being of high or medium importance nationally. There were no high impacting pressures/threats identified at any of the individual populations monitored.
8.3 Additional information *Optional*	Pressures are activities impacting the species or habitat within the current reporting period and impacting on the long-term viability of the species or habitat. Threats are activities likely to impact the species or habitat within the next two reporting cycles and likely to affect the long-term viability of the species or habitat (DG Environment, 2017). No pressures/threats were identified as being of high or medium importance nationally. There were no high-impacting pressures/threats identified at any of the individual populations monitored. Eleven impacting activities were recorded at 24 populations out of the 40 visited (as either pressures or threats): A10 Grazing; B20 Use of plant protection chemicals in forestry (herbicides); B12 Thinning of tree layer; H08 Other human intrusions and disturbance (illegal dumping); F07 Sports, tourism and leisure activities; I02 Other invasive alien species (other than species of Union concern); I04 Problematic native species; A11 Burning for agriculture; I05 Plant and animal diseases, pathogens and pests (grey fungal attack); M05 Collapse of terrain/landslide; N03 Increases or changes in precipitation due to climate change.

	More than one impacting activity was recorded at nine of these populations: TS01, Co. Cork (B12; F07; M05; I02); TS08, Co. Cork (B12; M05); TS12, Co. Kerry (B20; I02; A11); TS17, Co. Sligo (A10; I02); TS19, Co. Kerry (A10; F07); TS20, Co. Limerick (I02; I04); TS22, Co. Cork (F07; I02; M05); TS26, Co. Waterford (I02; M05); and TS27, Co. Waterford (I02; M05); while for the remaining 15 populations only a single impacting activity was recorded. Impacting activities were considered to be having a medium-impact pressure on *V. speciosa* at seven populations: TS01, Co. Tipperary (B12); TS08, Co. Cork (M05); TS12, Co. Kerry (A11); TS20, Co. Limerick (I02); TS22, Co. Cork (M05); TS25, Co. Cork (I04); and TS26, Co. Waterford (M05). At three of these populations (TS22, Co. Cork, TS25, Co. Cork, and TS26, Co. Waterford) a positive impact on the species due to essential canopy cover provided by invasive non-native species (I02) and problematic native species (I04) was also recorded. The remaining 17 populations had impacting activities that were considered to be of low intensity. Bank slippage (M05) was reported at six populations, being considered a low-impact activity at populations TS01, Co. Tipperary, TS14, Co. Kerry, and TS27, Co. Waterford; and a medium-impact pressure at populations TS08, Co Cork, TS22, Co. Cork, and TS26, Co Waterford (Ní Dhúill *et al*., in prep.). Impacts from exposure due to thinning of tree layer (B12) were recorded as a pressure having a medium impact at a colony in population TS01, Co. Tipperary and a colony in TS08, Co. Cork. A medium-impact pressure was reported for a colony in population TS12 due to a grey fungal attack (I05). Non-native invasive species (I02) were recorded at ten populations (TS01, Co. Tipperary; TS12, Co. Kerry; TS17, Co. Sligo, TS20, Co. Limerick; TS22, Co Cork; TS24, Co. Kerry; TS26, Co. Waterford, TS27, Co Waterford; TS37, Co. Mayo; and TS60, Co. Cork). Invasive species were considered to be having a low impact at all listed colonies with the exception of population TS26 where a medium-impact pressure was reported due to movement of *Prunus laurocerasus* which significantly reduced the area and frond numbers of a colony within this population. Although the habitat for the species at this location is currently favourable, the presence of invasive non-native species here is of concern. Any potential future management to deal with these should be carried out with the utmost sensitivity and with due regard for the *V. speciosa* population, in order to avoid severe negative impacts on colonies of the species arising from possible reduction in relative humidity, bank slippage and habitat disturbance. Vigorous problematic native species (I04) was reported as a medium-impact pressure at TS25, Co. Cork. The impacts of these pressures (I02 and I04) are difficult to determine, as the species involved often provide essential canopy cover to colonies in these locations. Any impacting pressures recorded during surveys were generally considered a local issue. The main threats are loss of habitat, exposure (loss of cover) and encroachment of invasive/vigorous species, (such as *Rhododendron ponticum*, *Prunus laurocerasus* and *Rubus fruticosus* agg).

	Threats were recorded at populations outlined below (impacting activities are detailed at the beginning of this section), but are not considered to be high or medium-importance threats on a national level. Grazing (A10) is considered to be a low impact threat to sporophyte populations that are accessible to grazing livestock; however, there was no evidence of any impact from this activity at any of the populations visited during the RPMS. The use of herbicides (B20) was recorded as a low-impact threat at two populations: TS12, Co. Kerry and TS29, Co. Wexford. Illegal dumping (H08) was considered a low-impacting activity at two populations: TS07, Co. Carlow and TS57, Co. Tipperary. Four populations were identified in areas that are used for recreational purposes (F07), three that are very close to popular well-used paths (TS19, Co Kerry; TS22, Co. Cork; and TS60, Co. Cork) and one near a docking area for kayakers (TS01). Increases or changes in precipitation due to climate change (N03) leading to erosion was highlighted as a low-impacting threat due to the greater frequency of extreme weather events at five populations: TS05; TS06; TS11; TS35; TS55, all in Co. Kerry. Although the threat of deliberate collection of the species is much reduced from levels pertaining heretofore during the "Victorian Fern Craze" (see Allen (1969) and Whittingham (2009)) there remains a low-level threat to some colonies from this activity. For this reason, the precise locations of colonies of the species are not made generally available. Climate change has not been included as an impact but it is likely to affect the species and its habitat in Ireland in decades to come if average temperatures continue to rise. While the trigger for the development of juvenile sporophytes from gametophytes is unclear, it may, at least in part, be due to climatic factors, e.g. warmer temperatures, which would be considered a positive impact. On the other hand, however, the extremes in predicted weather from warm wet winters to periodic droughts in summer could negatively impact *V. speciosa* colonies, particularly the sporophyte generation which is especially sensitive to desiccation.

9 Conservation measures

To be reported only for Annex II species

9.1 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*

9.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, population and/or habitat for the species or* *b) Expand the current range of the species (related to 'Range') or* *c) Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population') or* *d) Restore the habitat of the species (related to 'Habitat for the species')*
9.3 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*
9.4 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 in field 9.2):* *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)*
9.5 List of main conservation measures	None taken
9.6 Additional information *Optional*	The following conservation measure is recommended but is not yet being taken: Conservation measure 'CI03 Management, control or eradication of other invasive alien species' is recommended to control the spread of invasive species in locations where *V. speciosa* sporophyte colonies occur. The presence of invasive non-native species at the six populations detailed in section 8.3 above is a cause for concern for the habitat where the colonies occur. The presence of invasive non-native species is a difficult impacting activity to quantify or to manage for populations where *V. speciosa* occurs. The presence of such species provides shelter and canopy cover, and helps maintain sufficient relative humidity at locations where *V. speciosa* colonies occur. Therefore, the removal of such species in the immediate vicinity of *V. speciosa* colonies is not advised, as such a drastic measure may pose a greater threat to the *V. speciosa* colonies than leaving the invasive species *in situ*. However, the control of their spread in locations where *V. speciosa* colonies occur is a conservation measure that would be expected to have a positive outcome for the future of these habitats. Any control plan implemented must be undertaken sensitively and with the requirements of *V. speciosa* in mind. The possible future effects resulting from this threat are based on expert opinion and from the results of surveys carried out where these invasive species occur.

10 Future prospects		
10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	Conservation measure 'CI03 Management, control or eradication of other invasive alien species' is recommended (section 9.5) and issues surrounding its implementation in habitats containing *V. speciosa* are highlighted (section 9.6). 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. Future prospects of Range are therefore good. Short-term trend direction of Population is assessed as stable. The current number of colonies and maximum area approximately equate to a Favourable population size. Future trend of Population is assessed as stable. Future prospects for Population are therefore good. Short-term trend direction of Habitat for the species is stable. Future trend of Habitat for the species is assessed as stable. However, the impact of the presence of invasive non-native species at a number of populations should be assessed in future surveys and, although not currently considered a national threat, the impact could become of medium importance at the habitats where they occur. Future prospects of Habitat for the species are therefore good.	

11 Conclusions	
Assessment of conservation status at end of reporting period	
11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1)/ Bad (U2) / Unknown (XX)*
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	There has been no change in the overall conservation status and conservation trend since the last reporting period. Although there have been changes in population size and range size, the conservation status remains Favourable as in 2013. Of the 40 populations monitored during the current reporting period (Ní Dhúill *et al*., in prep.), 40% are sporophyte and gametophyte co-existing, with 28% co-existing generations including juvenile sporophytes, 8% sporophyte-only populations and 25% gametophyte-only populations. During the current reporting period, juvenile sporophytes were recorded at 30% of the 40 monitored populations. Fertile colonies were recorded at 37% of the monitored populations. The recording of additional juvenile sporophytes is, in part, the result of targeted surveying, improved knowledge and more accurate data, but may also be partly due to climatic factors. Sporophyte colonies lost at pre-1994 historical sites are unlikely to be restored in the future due to likely irreversible habitat loss (see details of colony losses in section 6.17). Surviving colonies at two populations where there were losses of sporophyte colonies (TS20.04.01, Co. Limerick and TS22.01.07, Co. Cork) since the last reporting period are not considered under particular threat. As there is no other evidence of a decline in population size since the Directive came into force, Population is assessed as Favourable.		

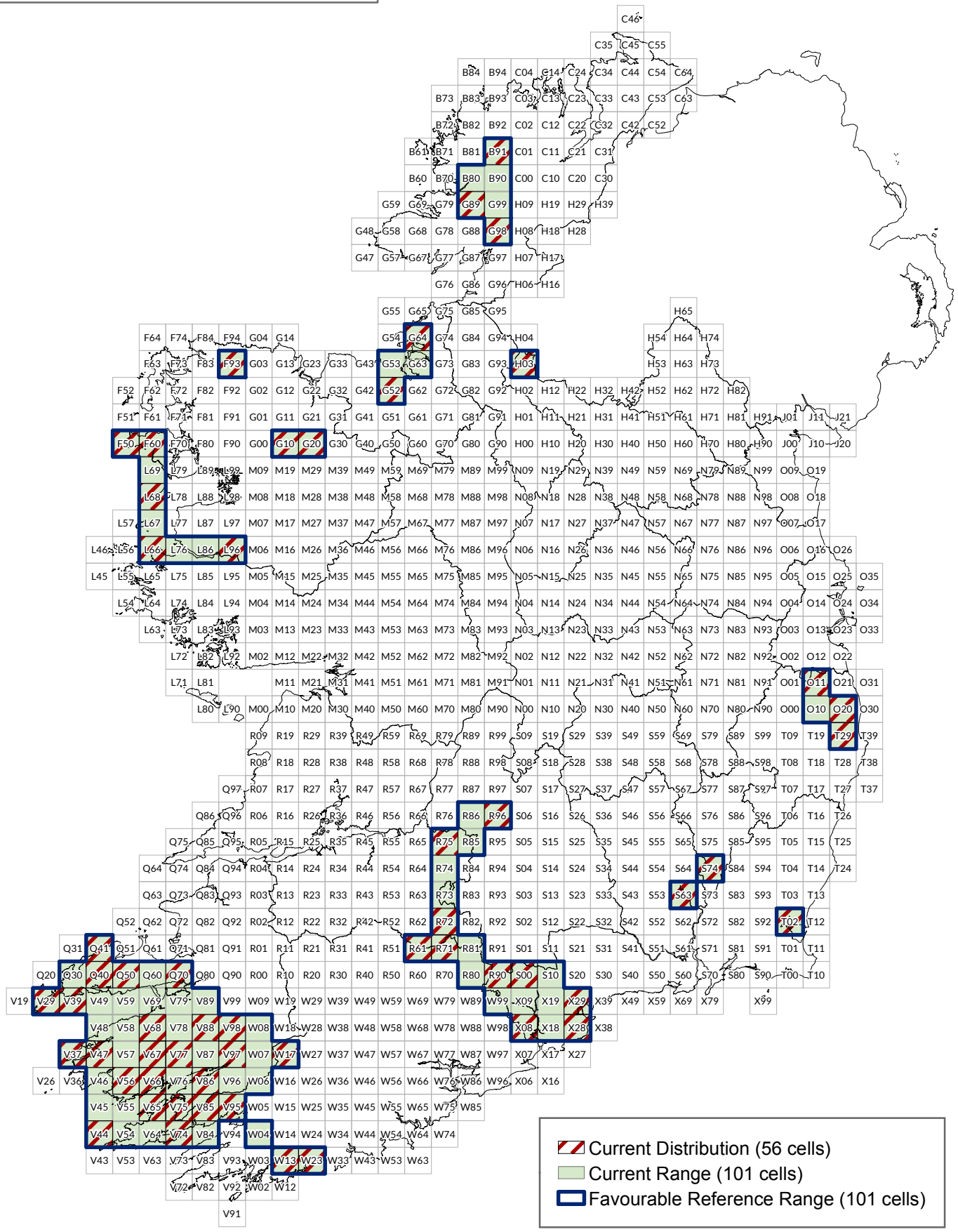
	Non-native invasive species present at certain locations are considered likely to impact the quality of the habitat; however, no evidence of negative impacts on the species or habitat since the last reporting period have been identified. The habitat of *V. speciosa* is largely in good condition, and most identified suitable areas still support *V. speciosa*. Habitat is assessed as Favourable. There is the threat posed by the presence of exotic invasive species in some sites for the species (outlined in section 8.3); however, this is considered to be a localised issue at present. The impact of invasive non-native species is difficult to assess at locations where they occur, as discussed in section 9.6. There are no other current pressures significantly impacting the *V. speciosa* populations. Most populations are within the SAC network (59 of the 86 known populations) and the Flora (Protection) Order, 2015 protects all populations. There are no reasons to believe that significant threats will present themselves in the future, therefore the Future prospects are assessed as Favourable. Considering the impacts, pressures and threats to *V. speciosa* in Ireland today and the measures in place that will assist its protection, it is expected that this species will survive. The overall Conservation Status for *V. speciosa* is Favourable and the overall Conservation Trend is stable.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species		
12.1 Population size inside the pSCIs, SCIs and SACs network *(on the biogeographical/marine level including all sites where the species is present)*	**a) Unit**	***Number of individuals***
	b) Minimum	
	c) Maximum	
	d) Best single value	***221 individuals***
12.2 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
12.3 Population size 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*	
12.4 Short-term trend of population size within the network **Direction**	*Short-term trend of population size within the network over the period indicated in field 6.5 :* ***stable*** */ increasing / decreasing / uncertain / unknown*	

12.5 Short-term trend of population size within 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*
12.6 Additional information *Optional*	'Individuals' in section 12.1 (a) above refers to 'Mature individuals'. Of the 86 known populations of *V. speciosa*, 35 are gametophyte-only, 1 is gametophyte with juveniles emerging (TS71), 20 are sporophyte-only and 30 are co-existing mature sporophytes and gametophytes. Fifty-nine of the 86 known populations and 223 of the 290 known colonies of *V. speciosa* are in SACs (69% and 77%, respectively) and of the 27 that are not, 20 are gametophyte-only and seven include sporophytes (TS13, Co. Kerry; TS30, Co. Cork [gametophyte and sporophyte population discovered in 2012]; TS52, Co. Kerry; TS67, Co. Cork; TS68, Co. Cork; TS70, Co. Kerry; TS81, Co. Kerry). Populations TS52 and TS70 are each included within a proposed Natural Heritage Area (pNHA). The species is listed as a qualifying feature in 18 of the 28 SACs in which it occurs (64%); 195 colonies are known to occur in these 18 populations. The species is protected under the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) which regulates any plans or projects that may negatively impact on the species. Protection is afforded to qualifying features of SACs and consent is required to undertake activities that may negatively impact them. Damaging activities that may impact the conservation status of *V. speciosa* populations are regulated under the European Communities (Environmental Liability) Regulations 2008 (S.I. No. 547 of 2008). In addition, protection is afforded by the Flora (Protection) Order, 2015 (S.I. No. 356 of 2015).

13 Complementary information

Killarney Fern
Vandenboschia speciosa (6985)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1528***
1.3 Species scientific name	*Saxifraga hirculus*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Marsh saxifrage
1.6i Species description	*Saxifraga hirculus* (marsh saxifrage) is a herbaceous perennial that is restricted to mineral flushes in blanket bog. The petals are bright yellow with orange spots near the base. The ovary is superior and sepals are reflexed. Leaves are alternate and oblong in shape, with long petioles on the lowest leaves. The flowering stem can vary in height from 4 to 35 cm with up to 7 flowers, although 2-3 flowers are more common. The species can reproduce sexually by insect pollination with gravity-dispersed seeds, or clonally by means of runners (normally 1-5) from the parent rhizome. Moss often covers these runners which decay after one season thus separating both plants; the clone thus becomes an independent ramet forming new rhizomes. *Saxifraga hirculus* is a weak competitor, so appropriate grazing that keeps the habitat open is important for the conservation of the species, although too high a level of grazing may adversely affect seed set. *Sagina nodosa* often grows in association with *Saxifraga hirculus*, particularly in more pristine sites. *Saxifraga hirculus* requires a stable, moving water table close to the soil surface, so maintenance of a suitable hydrological regime is also key to its conservation. *Saxifraga hirculus* is listed on the Flora (Protection) Order, 2015 (S.I. No. 356/2015), and the all-Ireland population of the species was assessed as Near Threatened, based on a decline in its area of occupancy and extent of occurrence between the two assessment periods 1930-1969 and 1987-1999 (Wyse Jackson *et al*., 2016).

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2015-2018***
2.3 Distribution map	Submitted

2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	The distribution map was compiled using points recorded by O'Neill *et al.* (in prep.) from all known *S. hirculus* sites in Ireland. All references are detailed below in Section 4.2.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
4.2 Sources of information	Muldoon, C.S. (2011) Conservation biology of *Saxifraga hirculus* L. in Ireland. Unpublished PhD thesis, University of Dublin, Trinity College, Dublin. Muldoon, C.S., Waldren, S. and Lynn, D. (2015) Monitoring recommendations for Marsh Saxifrage (*Saxifraga hirculus* L.) in the Republic of Ireland. *Irish Wildlife Manuals*, No. 88. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Species Assessments Volume 3, Version 1.0. Unpublished Report, National Parks and Wildlife Service. Department of Arts, Heritage and the Gaeltacht, Dublin. O'Neill. F.H., Hodd, R.L. and Long, M.P. (in prep.) Results of a monitoring survey of the Annex II species *Saxifraga hirculus* (Marsh Saxifrage) in Ireland 2015-2018. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, 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.

4.2i Additional information	

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***600 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	*1994–2018*	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 600 km²***	
	b) Indicate if operators were used (use these 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 a decline since the Directive came into force and there is no reason to assume that the area is not large enough to allow the long term survival of the species.	
5.11 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*	
5.12 Additional information *Optional*	The range is the same as in the previous reporting period as no new records for *Saxifraga hirculus* have been found since then. One outlier cell was not linked to the core range as there is no suitable habitat occurring between them. Short-term trend was estimated based on data from the current reporting period and the previous reporting period (NPWS, 2013). No area losses or gains affecting range were recorded during these two reporting periods and the short-term trend of Range is therefore stable. The Favourable Reference Range is the current range, reported in 5.1.	

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2016-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	
	c) Maximum	
	d) Best single value	***3,122,500***
6.3 Type of estimate	***Best estimate** / multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)*	**a) Unit**	***Number of flowering stems***
	b) Minimum	
	c) Maximum	

Optional	**d) Best single value**	***67,585***
6.5 Type of estimate *Optional*	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	*1994–2018*	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	*a) Minimum*	
	b) Maximum	
	c) Confidence interval	
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	***a) 67,585 flowering stems***	
	b) Operator or	
	c) If favourable reference population 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 Population is set at the current population, measured as the number of flowering stems, based on population estimates carried out in 2015-2018 (O'Neill et al., in prep.).</td></tr>
<tr><td rowspan="6">6.16 Change and reason for change in population size</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><u>YES</u>/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):

<u>genuine change</u> / improved knowledge or more accurate data / the use of a different method</td></tr>
<tr><td>6.17 Additional information

Optional</td><td colspan="2">Full surveys at all known locations of Saxifraga hirculus were carried out.

Two figures are provided for population size. The smaller figure is an estimate of the number of reproductively mature plants (in bud, flowering or going to seed), extrapolated from average counts of flowers (including buds and seed heads) within 1mx1m monitoring plots up to site area to estimate the total number of flowers for the site, and divided by 2.5 to estimate the number of plants in flower (based on an average of 2-3 flowers per flowering stem, as stated by Muldoon (2011) and 1 flowering stem per plant). This is significantly lower than the larger figure, which is an estimate of the number of plants (as rosettes) at all growth stages, including seedlings and juveniles, only a proportion of which are likely to reach reproductive maturity.

For two sites with smaller, patchy populations of Saxifraga hirculus, Bellacorick and Sheskin A, absolute counts of rosettes (a proxy for number of individuals) were carried out to determine the population.

For the other sites, which had dense swathes of rosettes, populations were estimated. The average rosette density per square metre was first calculated based on counts from up to five 1mx1m monitoring plots (see O'Neill et al., in prep.). The average count per plot was then multiplied by the area in square metres of occupied habitat, obtained from polygons mapped in GIS, to estimate the population (as number of rosettes) in each site. This method assumes that every square metre of the mapped area is occupied by Saxifraga hirculus. In practice this may not always be the case, so the number of rosettes thus calculated may sometimes be an overestimate.

The national population was derived by summing up the population estimates from each site.

S. hirculus is a clonal species, so the number of genetically distinct individuals is likely to be much smaller than the number of rosettes.</td></tr>
</table>

	A total of 19 populations (localities) were surveyed between 2016 and 2018. This number could be used as an alternative unit of measurement for the national metapopulation. Muldoon (2011) demonstrated high genetic diversity within and among populations and noted that, because *S. hirculus* can exist as large clonal patches, a decrease in rosette numbers is of less concern than a loss of an entire population and the genetic diversity it contains. Thus a decrease in the number of populations could have greater conservation implications than a decrease in rosette numbers, and it should therefore be reported. Short-term trends were estimated by comparing the most recent surveys with the baseline surveys. A *stable* trend was indicated rather than *improving* because, despite some population increases, there were also instances of population decline. The populations may currently be fluctuating due to recent changes in grazing levels that have occurred since the previous monitoring period. Two populations, Bellacorick and Sheskin A, appear to have decreased significantly since the previous monitoring period. Bellacorick has decreased from 700 to just 23 individuals between this monitoring period and the last, a decrease of 97%. Sheskin A has decreased from 360 individuals to 73 over the two periods, a decrease of 80%. However, both of these populations had been in equilibrium for some years prior to the 2007-2012 monitoring period and the high counts reported in the last monitoring period appear to be somewhat of an anomaly compared to previous surveys and may have been a temporary fluctuation rather than a trend. The other populations appear to be stable or increasing, with some significant increases in density noted. The overall total number of rosettes (the figure given in 6.2) is significantly higher in this monitoring period than the previous. Increases thought to be due to relaxation of grazing were noted by surveyors at some sites. The difference in numbers may also be partly due to extrapolating rosette numbers up from plots to whole populations as this method assumes that there are no gaps in coverage. However, *S. hirculus* occurs in dense swathes across most of the sites surveyed and gaps are therefore expected to be relatively few, so the main reason for the change is assumed to be because of genuine increases in rosette numbers.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*

7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	While area and quality of habitat for the species are deemed on the whole to be sufficient for the species' long-term survival, two populations are in a precarious position, with higher cover of negative species (e.g. *Holcus lanatus*), taller swards because of undergrazing, and drier hydrology than in the previous monitoring period. The most threatened population at Bellacorick (Bellacorick Iron Flush SAC) is being consistently monitored but specific action is likely to be required to prevent further deterioration of the habitat and local extinction of the population. For the other 17 sites, area and quality of occupied habitat are sufficient for long-term survival of *Saxifraga hirculus*, and the species appears to be faring well. Some populations appear to have improved slightly, at least in the short term, with higher numbers of rosettes, more suitable grazing levels and higher frequency of positive indicator species such as *Sagina nodosa*. Optimal habitat for the species is mineral flushes in ombrotrophic blanket bog. The flushes should be moderately grazed by sheep, enough to keep small areas open but not so high as to reduce flowering or fruiting. Vegetation should not be too tall or rank, and

	cover of more competitive species such as *Holcus lanatus* and *Molinia caerulea* should not be excessive. The presence of *Sagina nodosa* in the *Saxifraga hirculus* habitat is taken as a sign that the habitat is in good condition. Very wet flushes that are vulnerable to damage by even low numbers of grazers may not require any grazing as the hydrology may be sufficient to keep the habitat open for *Saxifraga hirculus*. Assessment of habitat for the species was via seven criteria: area occupied by *Saxifraga hirculus*, hydrology, frequency of *Sagina nodosa*, cover of *Molinia caerulea*, cover of *Holcus lanatus*, grazing levels, and vegetation height. Short-term trend was estimated by comparing the area and quality of the occupied habitat with baseline data.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**A06** Abandonment of grassland management (e.g. cessation of grazing or of mowing) (M) **A31** Drainage for use as agricultural land (M) **B27** Modification of hydrological conditions, or physical alternation of water bodies and drainage for forestry (including dams) (M) **C05** Peat extraction (M)	**A06** Abandonment of grassland management (e.g. cessation of grazing or of mowing) (M) **A31** Drainage for use as agricultural land (M) **B27** Modification of hydrological conditions, or physical alternation of water bodies and drainage for forestry (including dams) (M) **C05** Peat extraction (M)
8.2 Sources of information *Optional*	Information on pressures and threats was obtained from survey data recorded during the rare plants monitoring survey between 2016 and 2018 (O'Neill *et al*., in prep.).	
8.3 Additional information *Optional*	Pressures and threats were selected and ranked from field data recorded during the monitoring survey of 2016-2018. Abandonment was recorded as a negative impact at four sites affecting the entire population and with a medium or high intensity. Rank vegetation poses a threat to *Saxifraga hirculus* through competition and other negative physical effects. Drainage – for different purposes and therefore coded separately – mainly for agriculture, forestry and in preparation for peat harvesting, was recorded as a negative impact at four sites, mostly at a low intensity but affecting entire populations; additionally, the	

	hydrology criterion failed at a total of eight populations. Pressures on hydrology were therefore regarded as a negative impact of medium importance nationally. Other negative impacts of low importance not listed above include: cattle grazing, which is unsuitable for *Saxifraga hirculus* habitat as the animals are too heavy for the vulnerable habitat; and off-road motorised driving in the form of quad bikes through *S. hirculus* habitat. The negative impact of ecologists surveying the *Saxifraga hirculus* habitats was also noted but deemed to be low and was kept to a minimum. Wind farms were noted as an impact in the previous monitoring period, but the negative effects of wind farms appear to be less serious than previously thought as they are often situated in locations where drainage has previously been implemented for other purposes, e.g. peat extraction, as is the case in Bellacorick. The impact of climate change has not been specifically assessed but is likely to be negative. Higher temperatures expected due to climate change will impact the distribution of this species, particularly at its southern limits (including Ireland), pushing the species further northwards or to higher altitudes. Altered rain/groundwater levels or a change to the composition and diversity of the flush communities could also occur.

9 Conservation measures

To be reported only for Annex II species

9.1 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*
9.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, population and/or habitat for the species or* *b) Expand the current range of the species (related to 'Range') or* *c) Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population') or* *d) Restore the habitat of the species (related to 'Habitat for the species')*
9.3 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*

9.4 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 in field 9.2):* *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)*
9.5 List of main conservation measures	None taken
9.6 Additional information *Optional*	The following conservation measures are recommended to restore the habitat for the species within the Natura 2000 network but are not yet being taken: CA04: Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures – to counteract pressure A06 at Bellacorick, Largan More A and Sheskin A & B. Specifically this refers to optimising sheep grazing in undergrazed areas to discourage the establishment of negative species and to prevent vegetation from becoming too tall or rank for *Saxifraga hirculus*; and discontinuing cattle grazing in fragile *Saxifraga hirculus* habitat. CB14: Manage drainage and irrigation operations and infrastructures (in relation to forestry) – to counteract pressure B27 at Bellacorick and Ox Mountains A, B & C. Specifically this refers to managing drainage operations and infrastructures as well as managing or restoring the hydrological regime of drained forest areas. The management of drainage and irrigation can include the possible cessation of these activities. Measures proposed include blocking drains in exploited forestry and peat bog areas adjacent to *Saxifraga hirculus* to raise the water table. This measure also includes restoring freshwater habitats impacted by changes of hydrological functioning due to drainage for forestry. CC02: Adapt/manage exploitation of energy resources – to counteract pressure C05 in the vicinity of Ox Mountains A. Specifically this relates to adapting/managing (including stopping/avoiding) peat extraction. CC07: Habitat restoration/creation from resources, exploitation areas or areas damaged due to installation of renewable energy infrastructure – to counteract pressure C05 at Bellacorick. Specifically this refers to restoration of land previously used or drained for peat extraction to Annex I habitat or *Saxifraga hirculus* habitat. This includes both active and passive restoration. While all known *Saxifraga hirculus* populations are within the SAC network, pressures on the populations come from impacts both inside and outside of the immediate habitat of the species, as well as outside of the SAC network, e.g. in coniferous forestry or blanket bog adjacent to or surrounding the species' habitat, particularly where drainage is involved. The measures would be expected to improve the situation over the next one or two reporting periods. Many of the sites are relatively

	small, so changes would not necessarily be required on a large scale, although the measures designed to improve hydrology would need to be carefully assessed and overseen by a hydrogeologist to ensure that they would take effect in the correct area. Management practices that are currently taking place as part of normal farming practice, such as sheep grazing, have not been included as "Measures identified and taken" as they have not been actively introduced as a specific conservation action for *Saxifraga hirculus*.

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	Range is stable, equal to Favourable Reference Range, with no loss since the last monitoring period, and the Future prospects of Range are assessed as Good. Nationally, the population of *Saxifraga hirculus* is higher in this monitoring period than the previous, despite decreases at two sites since the last monitoring period. The Future prospects of Population are assessed as Good. However, it should be noted that, as the loss of one population would represent a loss of national genetic diversity, the situation at these two sites should be monitored closely and remedial action taken in the next monitoring period to secure their future. The area and quality of Habitat for the species on a national basis are both good. Some pressures and threats such as drainage and undergrazing / abandonment are causing deterioration in habitat quality for the species at some small sites but nationally these are relatively minor. Therefore the Future prospects of Habitat for the species have been assessed as Good. There is evidence of habitat decline at two small sites and this could impact on the long-term survival of the species at these locations. As noted in the previous paragraph, the situation at these sites should be monitored closely and any remedial action taken without delay. Taking the individual parameter assessments into account as well as the pressures and threats operating on the habitat for the species, the overall Future prospects for *Saxifraga hirculus* have been assessed as Good.	

11 Conclusions

Assessment of conservation status at end of reporting period	
11.1 Range	***Favourable*** *(FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.2 Population	***Favourable*** *(FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*

11.3 Habitat for the species	***Favourable*** *(FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	***Favourable*** *(FV) / Inadequate (U1)/ Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	***Favourable*** *(FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*

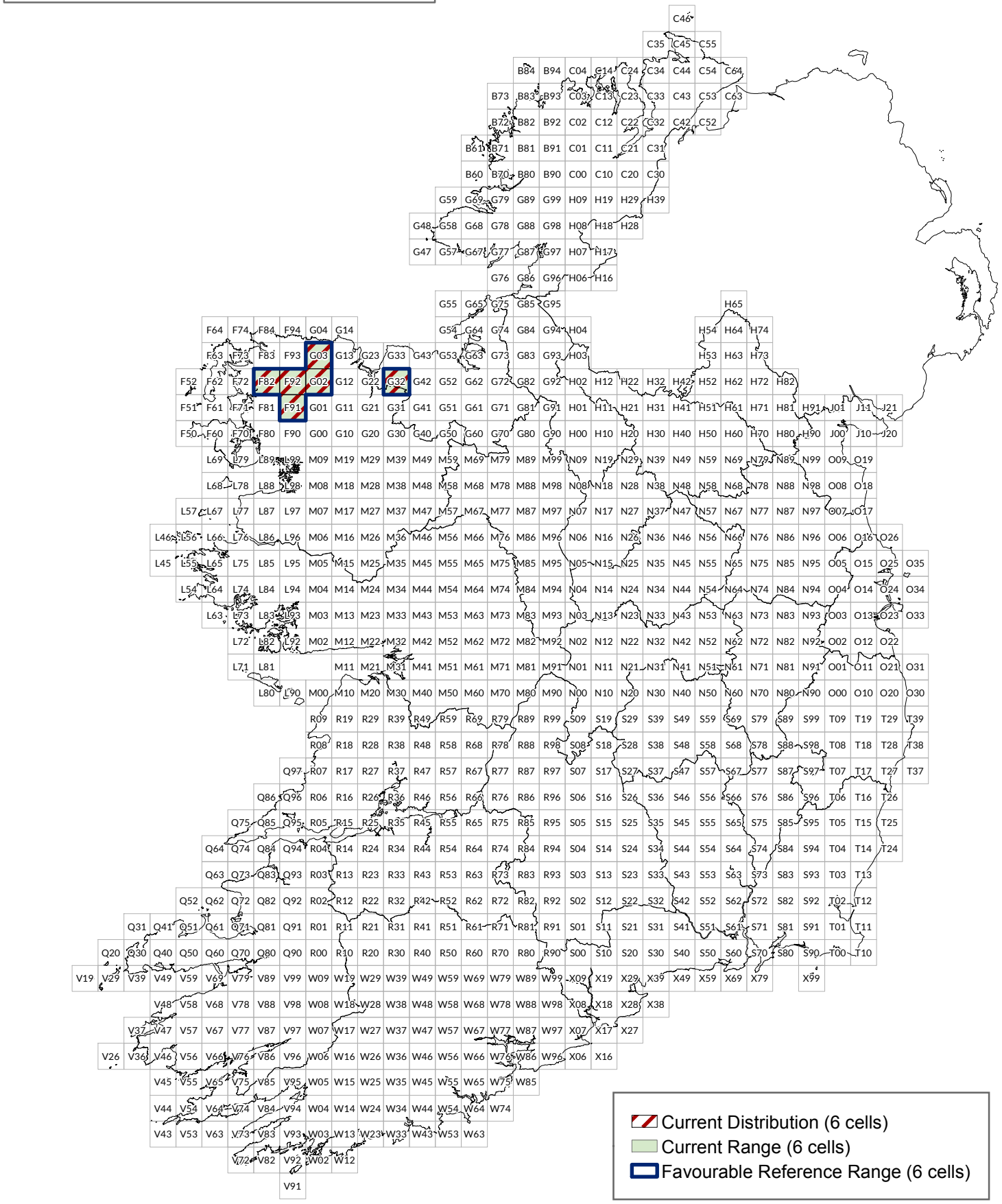
11.8 Additional information *Optional*	The survey for this monitoring period compared this period's data with the baseline survey to derive a trend. A *stable* trend was indicated rather than *improving* because, despite some population increases and habitat improvement, there were also instances of population and habitat decline. Both the populations and the habitat may currently be in a state of fluctuation due to changes in grazing levels that have occurred since the previous monitoring period. Deterioration in population numbers and habitat quality at two sites, Bellacorick and Sheskin A, has been significant. However, as population numbers have been generally stable at these sites since the 1980s, and because current numbers, though lower than historic levels, may be broadly in line with them, it is not considered enough to warrant the poorer assessment of Unfavourable-Inadequate for *Saxifraga hirculus* for this monitoring period.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

12.1 Population size inside the pSCIs, SCIs and SACs network *(on the biogeographical/marine level including all sites where the species is present)*	**a) Unit**	***Number of individuals***
	b) Minimum	
	c) Maximum	
	d) Best single value	***3,122,500***
12.2 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
12.3 Population size 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*	
12.4 Short-term trend of population size within the network **Direction**	*Short-term trend of population size within the network over the period indicated in field 6.5 :* ***stable*** */ increasing / decreasing / uncertain / unknown*	
12.5 Short-term trend of population size within 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*	
12.6 Additional information *Optional*	All known *Saxifraga hirculus* populations are located within the SAC network, therefore all values in this section are the same as in previous sections for the national population.	

13 Complementary information

Marsh saxifrage
Saxifraga hirculus (1528)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1833***
1.3 Species scientific name	*Najas flexilis*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Slender naiad
1.6i Species description	The slender naiad (*Najas flexilis*) is a fragile, annual plant that grows in clear-water, lowland lakes. It has an unusual global distribution, being widespread in North America but more restricted in Europe and Asia, and is rare and declining in many countries. The core of the species' European range is Ireland and Scotland. The species is considered to occur in 52 lakes in counties Clare, Donegal, Galway, Kerry and Mayo, with most sites found near the coast. It is a glacial relict species that is not colonising new sites, rather it has occupied the same lakes continuously for almost 10,000 years. It is considered to have gone extinct in six lakes. The slender naiad has exacting environmental requirements, most notably high water clarity/transparency and deep euphotic zones. It occurs in lakes with some base-rich influences in otherwise peatland-dominated catchments. In Ireland, the lakes typically overlie calcareous sand (often in machair, habitat code 21A0), marble or sometimes limestone. The plant grows permanently submerged, commonly in deep water, and can easily be overlooked. It reproduces only from seed with seedlings appearing around June. The plant dies in September/October, once it has set seed. Population size can vary over time, owing to fluctuations in seed production and germination. The species is threatened by enrichment (eutrophication), acidification and peatland damage.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***1986-2018***
2.3 Distribution map	Submitted

2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	The distribution was based on the 52 lakes considered to contain extant populations of the species. *Najas flexilis* records are held in the NPWS *Najas* database. Najas_flexilis_Records_V4.0_2018 was used to map the distribution. Records held date from 1850 to 2018. A large number of the records were made by expert aquatic botanists (frequently using snorkelling/diving methods and as part of NPWS-funded monitoring/other surveys). Two dedicated *Najas flexilis* surveys were conducted during the reporting period, between 2014 and 2018 (Roden and Murphy, 2014; Roden *et al*., 2016, 2017, 2018, in prep.). Based on the findings of these surveys, the records were reviewed and the species is now considered to occur in 52 lakes and to be extinct from six lakes, while records for eight lakes have been rejected. The most recent records for *Najas flexilis* in the 52 lakes mapped in the distribution ranged from 1986 (Lough Corrib, where the species has been recorded only once (Krause and King, 1994)) to 2018 (many). The species was recorded in 32 of the lakes during the current cycle (2013-2018). In the last Article 17 report, populations in three lakes (Loughs Nafeakle, Ibby and Namanawaun) were considered to have gone extinct before the Habitats Directive came into force (O Connor, 2013). These are still considered to be extinct and, in addition, the populations of three lakes (Keel, Glenade and Cloonee Middle) were declared extinct during the reporting period (Roden and Murphy, 2014; Roden *et al*., 2016, 2017, 2018, in prep.). The extinction of the population at Keel occurred since 1999 and, while the species has not been recorded at Glenade since 1978, this SAC population is also considered likely to have gone extinct since the Habitats Directive came into force, most likely as a result of eutrophication. *Najas flexilis* has only once been recorded at Cloonee (another SAC for the species): a drift specimen taken in 1957. Roden and Murphy (2014) expressed some doubt as to the likelihood of the species occurring in the Cloonee/Inchiquin catchment, but could not dismiss the record owing to the existence of a herbarium specimen. If *Najas flexilis* did occur in the system, it is likely to have gone extinct before the Directive came into force. Records for eight lakes have been rejected as erroneous (Roden and Murphy, 2014; Roden *et al*., 2016, 2017, 2018, in prep.). These were Lough Derg (Donegal); Lough Adoolig and Muckross Lake (Kerry); Truska Lough, Lough Illauntrasna, Lough Anillaunlughy and Lough Sruffauncam (Galway) and Fin Lough (Mayo). Populations were discovered during the reporting period in five

	additional lakes. These were Loch na Cúige Rua West, Loch Chluain Toipín, Lettershask Lough, Derryneen Lough, all in Connemara, and Knocka Lough in Clare.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
4.2 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. Lake Ecological Status 2007-2015 V1.2.xls Krause, W. and King, J.J. (1994) The ecological status of Lough Corrib, Ireland, as indicated by physiographic factors, water chemistry and macrophytic flora. *Vegetatio* 110: 149–161. 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. 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 (each with a separate site-specific supporting document): 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 (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: 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: 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. Najas_flexilis_conservation_status_assessment_Art17_2019_V1_Oct2018.xls
4.2i Additional information	Government of Ireland (2018) *River Basin Management Plan for Ireland 2018 – 2021*. Prepared by the Department of Housing, Planning and Local Government. 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. Wingfield, R.A., Murphy, K.J., Hollingsworth, P. and Gaywood, M.J. (2004) *The Ecology of* Najas flexilis. Scottish Natural Heritage Commissioned Report No. 017 (ROAME No. F98PA02).

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***5,900 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	

5.5 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*	
5.6 Long-term trend Period *Optional*	***1994–2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 6,100 km²***	
	b) Indicate if operators were used (use these 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 Favourable Reference Range (FRR) was generated, based on the distribution of 52 lakes, plus Keel and Glenade Loughs. The resultant FRR is considered to be the range when the Directive came into force and is considered to include 'all significant ecological variations of the species' for Ireland and be 'sufficiently large to allow the long-term survival of the species'. The FRR reported for the 2007-2012 period was 6,800 km^2. The difference between reporting periods is the result of the rejection of records from eight lakes and the discovery of the species in five additional lakes, as well as the removal of the extinct-pre-1994 population of Cloonee Middle.	
5.11 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*
5.12 Additional information *Optional*	The 52 lake polygons produced a 10 km grid distribution of 39 squares that was used to calculate the range of 5,900 km^2, using the range tool. The range has reduced by 800 km^2 since the last reporting cycle. The recorded extinctions at three additional lakes led to a 400 km^2 reduction in range (genuine change). The range decreased by 500 km^2 as a result of the rejection of records for Lough Derg, Lough Adoolig, Lough Illauntrasna, Lough Sruffauncam and Fin Lough (improved knowledge). The discovery of the species at Knocka Lough, Co. Clare increased the range by 100 km^2 (R16). The four other previously undocumented populations discovered were within the previous range. The short- and long-term trends were based on population extinctions. The species is considered to have gone extinct from a total of six lakes. Two (Keel and Glenade) of these six extinctions were considered to have occurred since the Directive came into force. In addition, the status of the species in at least two lakes (Corrib and Kylemore) is uncertain: the populations may be extinct, however further survey is required.

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***1986-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***97***
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval / **minimum***	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	a) Unit	***Localities/number of localities***
	b) Minimum	
	c) Maximum	
	d) Best single value	***52***
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / **minimum***	

6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	***a) 54 localities***	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) If favourable reference population is unknown indicate by using 'x'	

	d) Indicate method used to set reference value if other than operators The Favourable Reference Population (FRP) was based on the reported 'Additional population size', i.e. number of localities, where one locality equals one lake, plus two localities/lakes for Keel and Glenade Loughs. The resultant FRP is considered to be the population when the Directive came into force and the minimum necessary to ensure the long-term viability of the species.	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information *Optional*	The required population size reporting unit was calculated by selecting all 1 x 1 km grid squares containing point records for the 52 extant populations. The additional population unit was given as the number of localities, where one locality is one lake. The 1 x 1 km grid squares unit is not a reliable, repeatable measure as point records are observations in space and time and reflect the distribution of survey effort rather than the species itself. Furthermore, the seasonality of *Najas flexilis* means that failures to observe the species cannot be interpreted as an absence of the species, while the challenges of underwater survey mean that the full extent of a population can seldom be recorded (see O Connor, 2013). As a result, the 1 x 1 km grid squares estimate is considered to be a minimum population size. The new, required reporting unit 1 x 1 km grid squares is not comparable with previous reports (leading to a change between reporting periods owing to the use of a different method). Given the practical challenges and high uncertainty in estimating the size of Najas flexilis populations (see O Connor, 2013), it is not possible to report trend magnitudes. Trends were based on recorded decreases in population (number of locations in a lake, area of occupancy, depth range, numbers of plants, density of plants). Four of the six declared extinctions occurred outside of the trend periods (i.e. before 1994) and were not considered. Data were available for 32 populations 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.). 20 of the 32 populations were considered to be	

	'stable' between the periods, 11 were considered to be 'decreasing' and one was categorised as 'uncertain'. Uncertainty is high in assessing changes in population for this annual species, as illustrated by the lake categorised as 'uncertain', Loch an Chaolaigh, which was surveyed annually between 2016 and 2018. The species was recorded in 2017, but was absent in 2016 and 2018. No populations were assessed as 'increasing', although some recovery may have occurred at one lake, Tully Lough. Overall, 9 out of 30 populations, or 30%, were assessed as 'decreasing'. This is likely to be an underestimate as 'stable' was the default assessment. Changes between reporting periods resulted from the change in reporting unit (from numbers of mature individuals to 1 x 1 km grid squares), improved data from surveys during the reporting cycle and genuine, documented decreases in *Najas flexilis* populations.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? YES/**NO**/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/**NO**/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / **decreasing** / uncertain / unknown*

7.8 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*
7.9 Additional information *Optional*	The slender naiad grows permanently submerged, commonly at depth, in clear-water, lowland lakes. In Ireland, it is associated with the Habitats Directive Annex I habitat 3130 (Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea*). Information on the condition of the *Najas flexilis* habitat was available for 33 lakes (Roden and Murphy, 2014; Roden *et al.*, 2016, 2017, 2018, in prep.). 20 lakes were assessed as in Good habitat condition, ten as Poor/Unfavourable-Inadequate and three as Bad/Unfavourable-Bad. This equates to 61% of sites in Good condition, 30% Poor and 9% Bad. As for the 2000-2006 and 2007-2012 cycles, habitat area was based on the entire surface area of the lake. 1:5,000 OSi data were used. For Lough Corrib, only the north-western basin was included (4.96 km^2). The total area of the habitat for 2013-2018 was estimated as 48.25 km^2. In terms of habitat (lake) area, therefore, 10.47 km^2 (or 22%) was in Good condition, 28.7 km^2 (or 59%) was Poor, 5.65 km^2 (or 12%) Bad and 3.44 km^2 (or 7%) Unknown. In order for *Najas flexilis* to maintain itself on a long-term basis as a viable component of its natural habitats, each occupied lake must have habitat in Favourable condition. Owing to the small size of most *Najas flexilis* lakes, natural mixing and associated processes, for many sites, the entire lake must reach the required habitat targets. The condition of the habitat was compared to data from earlier surveys in order to assess trends. Data were available for 30 *Najas flexilis* 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.). 22 of the 30 lakes were considered likely to have 'stable' habitat condition between the periods and eight were considered to be 'decreasing'. Owing to the limited number of samples over time, short- and long-term trends were assumed to be the same. Where uncertainty was high, the default trend in habitat condition was assessed as 'stable'. Therefore a 'decreasing' assessment required strong evidence of decline in habitat quality. Impacts observed on the species' habitat were 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*. For the 2000-2006 cycle the habitat area was reported as 49.60 km^2 and in 2007-2012 it was 61.4 km^2. Changes between reporting cycles were largely the result of improved knowledge of the species' distribution (see above). The use of different mapping scales also

	resulted in small differences in the surface area of individual lakes. 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 *Najas flexilis* habitat condition assessments for the 2013-2018 cycle represents an improvement in knowledge. EPA WFD status data (Fanning *et al*., 2017) were available for 17 of the lakes surveyed 2014-2018 (Roden and Murphy, 2014; Roden *et al*., 2016, 2017, 2018, in prep.). Adopting the interpretation of O Connor (2013), WFD data would indicate better condition at three lakes, the same condition at eight and worse at six lakes.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in 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) **F33** Abstraction of ground and surface waters (including marine) for public water supply and recreational use (M)
8.2 Sources of information	Roden, C. and Murphy, P. (2014) Targeted survey of *Najas flexilis.*	

Optional	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.
8.3 Additional information *Optional*	Pressures and threats were recorded in the field, as well as through examination of aerial imagery for the catchments of *Najas flexilis* lakes as part of dedicated *Najas flexilis* surveys (Roden and Murphy, 2014; Roden *et al.*, 2016, 2017, 2018, in prep.). Data were available for 50 *Najas flexilis* lake catchments. K04 and K05 were used for the drainage pressure that lowered water levels at Kiltooris, leading to the conservation condition of the species declining to bad at one of the most important *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 *Najas flexilis* 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 *Najas flexilis* lake catchments examined. Turf cutting (C05) was noted as a pressure at 4 catchments (8%). Golf courses were present adjacent to at least two *Najas flexilis* 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 species. 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.

9 Conservation measures	
To be reported only for Annex II species	
9.1 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*
9.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, population and/or habitat for the species or* *b) Expand the current range of the species (related to 'Range') or* *c) Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population') or* *d) Restore the habitat of the species (related to 'Habitat for the species')*
9.3 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*
9.4 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 in field 9.2):* *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)*
9.5 List of main conservation measures	None taken
9.6 Additional information *Optional*	As the pressures impacting on the slender naiad, *Najas flexilis*, 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 *Najas flexilis* populations within SACs. As option (a) was used, fields 9.2 to 9.5 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 *Najas flexilis* to Favourable conservation status. While further work is needed to identify effective, practical and iterative solutions and to establish interim targets, this species is associated with high water quality, i.e. the absence of eutrophication impacts: naturally low dissolved nutrients, clear water and low algal growth; and is considered to require oligotrophic or WFD high status in Ireland (NPWS, 2013; O Connor, 2013, 2015). 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 would be 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 *Najas flexilis*, 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.).

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	*Good / **Poor** / Bad / Unknown*
	b) Population	*Good / **Poor** / Bad / Unknown*
	c) Habitat of the species	*Good / **Poor** / Bad / Unknown*
10.2 Additional information *Optional*	The Future prospects of the Range, Population and Habitat for the species 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 species-specific, concrete conservation measures are currently being undertaken to maintain, restore or enhance populations of *Najas flexilis*, either within SACs or the wider countryside. It will take time to identify conservation measures based on the ecological requirements of the species, 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 will not 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 decreasing. The current range is 3% less than the Favourable Reference Range. Therefore, the Conservation Status of the Range was assessed as Unfavourable-Inadequate. Given the negative influence of the identified pressures and threats on the species populations and their habitat, and the lack of conservation measures, the predicted future trend in Range is negative. As a result, the Future prospects of the Range were assessed as poor. **Population**: The short- and long-term trends of the Population were assessed as decreasing. The estimated minimum population is 3% smaller than the Favourable Reference Population. Therefore, the Conservation Status of the Population was assessed as Unfavourable-Inadequate. Given the negative influence of the identified pressures and threats on the species populations and their habitat, and the lack of conservation measures, the predicted future trend in Population is negative. As a result, the Future prospects of the Population were assessed as poor. **Habitat for the species**: The short- and long-term trends in Habitat for the species were assessed as decreasing. Structure and functions was assessed as decreasing owing to evidence of habitat deterioration at eight of 30 lakes with data from two points in time. Habitat quality was Good at 20 lakes, Poor/Unfavourable-Inadequate at ten and Bad/Unfavourable-Bad at three. Recovery of good habitat quality is considered to be possible at the 13 lakes assessed as Unfavourable. As a result, the Conservation Status of the Habitat for the species was assessed as Unfavourable-Inadequate. Given the negative influence of the identified pressures and threats on the	

	species populations and their habitat, and the lack of conservation measures, the predicted future trend in Habitat for the species is negative. As a result, the Future prospects of the Habitat for the species were assessed as poor. As Future prospects of the three parameters were assessed as poor, the Future prospects for *Najas flexilis* were assessed as Unfavourable-Inadequate.

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*		
11.2 Population	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*		
11.3 Habitat for the species	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / **deteriorating** / stable / unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	***YES**/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/**NO***
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	Range: Current range is 3% below the Favourable Reference Range; Loss of 200 km^2 since 1994 is <0.14% per year; As a result, the Conservation Status of Range was assessed as Inadequate (U1). Population: Current population is 3% below the Favourable Reference Population; 9 of 30 populations were assessed as declining, with high uncertainty; The size of population declines was unquantifiable; There was no evidence to indicate a population decline of more than 1% per year; As a result, the Conservation Status of Population was assessed as Inadequate (U1). Habitat for the species: Habitat quality was Good at 20 lakes, Poor/Unfavourable-Inadequate at ten and Bad/Unfavourable-Bad at three; Recovery of good habitat quality is considered to be possible at the 13 lakes assessed as Unfavourable; As a result, the Conservation Status of Habitat for the species was assessed as Inadequate (U1). Future prospects: In line with the other three parameters, the Conservation Status of Future prospects for *Najas flexilis* was assessed as Inadequate (U1). Overall conservation status: As all four parameters were assessed as Inadequate (U1), the Overall Conservation Status was assessed as Inadequate (U1). The overall trend (qualifier) in Conservation Status was assessed as deteriorating, because the short- and long-term trends of Range, Population and Habitat for the species were assessed as 'decreasing' (sections 5.3, 5.7, 6.8, 6.12, 7.4 and 7.7), owing to two population extinctions, population decreases at a further nine lakes and decreasing habitat quality at eight lakes. In 2013, trends were assessed as stable owing to a lack of evidence of population extinctions or declines in habitat. As a result of the dedicated surveys during the current reporting cycle (2013-2018) (Roden and Murphy, 2014; Roden *et al*., 2016, 2017, 2018, in prep.), there are improved data to inform the trend assessments. The recent data (2013-2018)		

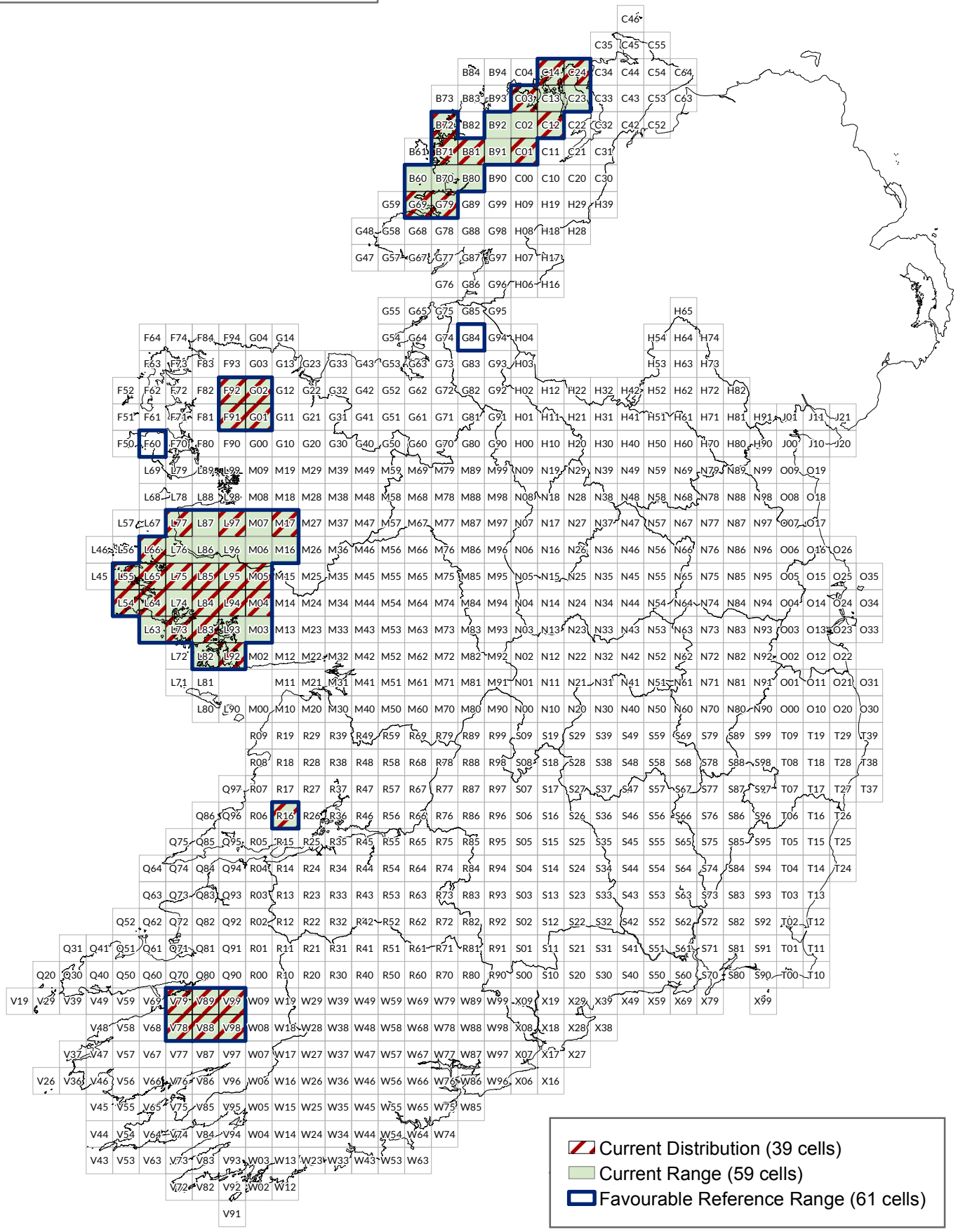
	were compared to previous data available for the same sites – typically 2000-2005 (Roden, 1999, 2002, 2003, 2004, 2005, 2007). As data were available for only two points in time for most sites, it was not possible to identify when deterioration began or to determine whether it was on-going throughout the reporting cycle.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species		
12.1 Population size inside the pSCIs, SCIs and SACs network *(on the biogeographical/marine level including all sites where the species is present)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***81***
12.2 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval /* ***minimum***	
12.3 Population size 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*	
12.4 Short-term trend of population size within the network Direction	*Short-term trend of population size within the network over the period indicated in field 6.5 :* *stable / increasing /* ***decreasing*** */ uncertain / unknown*	
12.5 Short-term trend of population size within 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*	

12.6 Additional information *Optional*	The required population size reporting unit was calculated by selecting all 1 x 1 km grid squares containing point records for the extant populations within the SAC network. A total of 36 the 52 extant populations are within the SAC network. All 36 are in SACs that have *Najas flexilis* as a qualifying interest. The six extinct populations occurred in lakes in SACs. Four of these lakes are in SACs where the species is a qualifying interest (Ibby, Cloonee Middle, Nafeakle and Glenade). Glenade and Cloonee Middle were the only known populations in the two SACs (Site codes 001919 and 001342). Trends were based on recorded decreases in population. Data were available for 22 populations in SACs: 14 of the 22 populations were considered to be 'stable' between the periods and eight were considered to be 'decreasing'.

13 Complementary information

Slender Najad
Najas flexilis (1833)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Species code	***6216***
1.3 Species scientific name	*Hamatocaulis vernicosus*
1.4 Alternative species scientific name *Optional*	*Drepanocladus vernicosus* (The species was known as *Drepanocladus vernicosus* (Mitt.) Warnst. before Hedenäs (1989) transferred it to *Hamatocaulis*, a new genus. In the last Article 17 assessment, *Drepanocladus vernicosus* had the species code 1393).
1.5 Common name *Optional*	Slender green feather-moss; Shining sickle moss
1.6i Species description	*Hamatocaulis vernicosus* Mitt. Hedenäs (Slender green feather-moss/Shining sickle moss) is a medium-sized perennial moss with distinctively hooked shoot tips with branches that are held at around 90º to the stem. The leaves are strongly curved, are often longitudinally pleated and are frequently tinged with red at the bases. Male and female reproductive organs are found on different plants. Sporophytes have never been recorded in Ireland and are very rare across its global distribution, maturing in summer where they do occur. No specialised asexual propagules are known, thus propagation must be through fragmentation of the parent plant. Slender green feather-moss is a circumboreal species ranging from the Arctic, south to western, central and eastern Europe, Turkey, Caucasus, central Asia and northern USA, with a disjunct occurrence in the Dominican Republic. It is currently known from 11 localities in Ireland, with large populations in the lowlands (at Lough Corrib, Lough Mask and Scragh Bog) and smaller more scattered populations in the uplands (in Cos. Donegal, Mayo, Waterford and Cavan). Slender green feather-moss is found in intermediate fens and flushes where there is an influence of mineral-rich, but not calcium-rich, groundwater. In Ireland, it is found in springs and flushes in upland districts, while in the lowlands it generally occurs in spring-influenced sites in mildly basic small-sedge fens.

2 Maps

Distribution of the species within the Member State concerned.

2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2015-2017***
2.3 Distribution map	Submitted
2.4 Distribution map 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*

2.5 Additional maps *Optional*	Range map was submitted
2.6i Additional information	The distribution map was compiled from *Hamatocaulis vernicosus* population envelope polygons digitised from the 2015-2018 Rare Plants Monitoring Survey (RPMS; Campbell *et al*., in prep.) during which all 11 known populations of *H. vernicosus* in the Republic of Ireland were surveyed (in 2015-2017).

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	***Atlantic***, *Marine Atlantic*
4.2 Sources of information	Campbell, C. (2013) Conservation of selected legally protected and Red Listed bryophytes in Ireland. Ph.D. Thesis, University of Dublin, Trinity College. Campbell, C., Hodgetts, N. & 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 the Arts, Heritage and the Gaeltacht, Ireland. Campbell, C., Hodd, R. & O'Neill, F. (in prep.) The monitoring and assessment of *Hamatocaulis vernicosus* (Slender Green feather-moss) in Ireland 2015-2018. Irish Wildlife Manuals, No. XXX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland. Hedenäs, L. (1989a) The genera *Scorpidium* and *Hamatocaulis*, gen. nov., in northern Europe. Lindbergia 15: 8-36. Hedenäs, L. (1989b) *Drepanocladus vernicosus* in the Dominican Republic. The Bryologist 92: 128-129. Lockhart, N., Holyoak, D. T. & Hodgetts, N.G. (2012a) Rare and Threatened Bryophytes of Ireland. National Museums, Northern Ireland. Lockhart, N., Hodgetts, N. & Holyoak, D. (2012b) Ireland Red List No. 8: Bryophytes. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. NPWS (2013) 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.

4.2i Additional information	Atherton, A., Bosanquet, S. & Lawley, M. (Eds.) (2010) Mosses and Liverworts of Britain and Ireland. British Bryological Society, Cardiff. Beltman, B., Dorland, E. & Van Vliet, B. (2002) The role of a buffer zone on species composition and nutrient status of fens in Ireland: a case study in Scragh Bog, Co. Westmeath. The Irish Naturalists' Journal 27: 19-31. Blockeel, T.L. (1997) A revision of British (and Irish) specimens of *Drepanocladus vernicosus.* Unpublished report to Joint Nature Conservation Committee, Peterborough. Blockeel, T.L. (2000) The identification of *Drepanocladus revolvens* and *D. cossonii*, and their distribution in Britain and Ireland. Bulletin of the British Bryological Society 75: 32-40. Blockeel, T.L., Bosanquet, S.D.S., Hill, M.O. & Preston, C.D. (2014) Atlas of British and Irish Bryophytes. Pisces Publications, Newbury. Bosanquet, S.D.S., Hale, A.D., Motley, G.S. & Woods, R.G. (2006) Recent work on *Hamatocaulis vernicosus* in mid and south Wales. Field Bryology 90: 2-8. Church, J.M., Hodgetts, N.G., Preston, C.D. & Stewart, N.F. (2001) British Red Data Books: mosses and liverworts. Joint Nature Conservation Committee, Peterborough. Doyle, G.J. & Ó Críodáin, C. (2003) Peatlands - fens and bogs. In: M.L. Otte (Ed.) Wetlands of Ireland: distribution, ecology, uses and economic value. University College Dublin Press. Hedenäs, L. (2003) The European species of the *Calliergon-Scorpidium-Drepanocladus* complex, including some related or similar species. Meylania 28: 1-116. Hedenäs, L. & Eldenäs, P. (2007) Cryptic speciation, habitat differentiation, and geography in *Hamatocaulis vernicosus* (Calliergonaceae, Bryophyta). Plant Systematics and Evolution 268: 131-145. Hodgetts, N.G. (2007a) Survey of Rare and Threatened Bryophytes in County Waterford. Unpublished report to National Parks and Wildlife Service, Dublin. Hodgetts, N.G. (2007b) *Hamatocaulis vernicosus* (Mitt.) Hedenäs (Slender Green feather-moss) in Ireland. Unpublished report to National Parks and Wildlife Service, Dublin. Hodgetts, N.G. (2015) Checklist and country status of European bryophytes – towards a new Red List for Europe. Irish Wildlife Manuals, No. 84. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. Manukjanová, A., Košnar, J. & Kučera, J. (2018) Microsatellite primers for the cryptic species of the moss *Hamatocaulis vernicosus* and methods for their quick barcoding, Journal of Bryology 40(3): 302-305. O'Connell, M. (1980) The developmental history of Scragh Bog, Co. Westmeath and the vegetational history of its hinterland. New Phytologist 85: 301-319. O'Connell, M. (1981) The phytosociology and ecology of Scragh Bog, Co. Westmeath. New Phytologist 87: 139-187. Perrin, P.M., Roche, J.R., Barron, S.J., Daly, O.H., Hodd, R.L., Muldoon,

	C.S. & Leyden, K.J. (2013). 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. Pépin, F., Hugonnot, V. & Celle, J. (2013) Sex ratio patterns and fertility of *Hamatocaulis vernicosus* (Mitt.) Hedenäs at different spatial scales. Journal of Bryology 35(1): 20-26. Sabovljević, M., Szurdozi, E., Sabovljević, A. & Papp, B. (2017) Back to Hungary: A story on reintroduction of a European Habitat Directive moss species, *Hamatocaulis vernicosus*. Acta Biologica Plantarum Agriensis 5(10): 60. Štechová, T. & Kučera, J. (2007) The requirements of the rare moss, *Hamatocaulis vernicosus* (Calliergonaceae, Musci), in the Czech Republic in relation to vegetation, water chemistry and management. Biological Conservation 135: 443-449. Štechová, T., Hájek, M., Hájková, P. & Navrátilová, J. (2008) Comparison of habitat requirements of the mosses *Hamatocaulis vernicosus*, *Scorpidium cossonii* and *Warnstorfia exannulata* in different parts of temperate Europe. Preslia 80: 399-410. Štechová, T., Štech, M. & Kučera, J. (2012) The distribution of *Hamatocaulis vernicosus* (Mitt.) Hedenäs (Calliergonaceae, Bryophyta) in the Czech Republic. Bryonora 49: 5-16.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***1,100 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 Short-term trend 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*	
5.6 Long-term trend Period *Optional*	***1994–2018***	
5.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	

5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 Long-term trend Method used *Optional*	*a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.10 Favourable reference range	***a) 1,100 km²*** or	
	b) Indicate if operators were used (use these 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 was deemed to be unchanged since the 2007-2012 monitoring period (NPWS, 2013), and is the same 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 of the current range is not large enough to allow the long-term survival of the species.	
5.11 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*	
5.12 Additional information *Optional*	Range was calculated using the range tool, based on the current known distribution of *Hamatocaulis vernicosus*. A maximum gap distance of two 10k grid cells was used when running the range tool. Population envelope polygons from the mapping of all 11 populations of *H. vernicosus* during the 2015-2017 survey (Campbell *et al*., in prep.) were intersected with the Irish National Grid 10km square grid. The range map consists of the 11 current range squares which correspond to the 11 current distribution cells representing the 11 populations field-verified and mapped during the 2015-2017 survey (Campbell *et al*., in prep.). Short-term trend was deemed stable as the number and location of the 10km squares comprising the range from the 2015-2017 survey (Campbell *et al*., in prep.) are the same as the range of the 2007-2012 reporting period (NPWS, 2013). No genuine losses of populations leading to range contraction were noted. The 11 10km range squares for *H. vernicosus* are scattered	

	throughout the Republic of Ireland, with populations occurring in the counties Cavan, Donegal, Galway, Mayo, Westmeath and Waterford. Formerly, populations occurred in Wicklow, Meath, Wexford and Mayo, but these were lost due to drainage and afforestation before the Directive came into force. The long-term trend is deemed to be stable as there is no evidence of a decline in range since the Directive came into force and the restoration of historic populations is not feasible due to irreversible habitat damage and loss.

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	***2015-2017***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***19***
6.3 Type of estimate	**Best estimate** */ multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	***Area covered by population in m^2***
	b) Minimum	
	c) Maximum	
	d) Best single value	***28,494 m^2***
6.5 Type of estimate *Optional*	***Best estimate** / multi-year mean / 95% confidence interval / minimum*	
6.6 Population size 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*	
6.7 Short-term trend Period	***2007-2018***	
6.8 Short-term trend Direction	***stable*** / increasing / decreasing / uncertain / unknown	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

6.10 Short-term trend 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	**stable** / increasing / decreasing / uncertain / unknown	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.14 Long-term trend Method used *Optional*	*a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	***a) 19 x 1 km grids***	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators Favourable Reference Population is deemed to be equal to the current population size unit figure, i.e. 19 x 1km grids. No losses have occurred since the Directive came into force and the current population size is considered to be large enough to allow the long-term survival of the species.	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information *Optional*	The number of 1 x 1 km grids (19) represents the 11 known populations in the Republic of Ireland, all of which were surveyed in the 2015-2017 survey (Campbell *et al*., in prep.). Population envelope polygons from the mapping of all 11 populations of *Hamatocaulis*	

	vernicosus during the 2015-2017 survey (Campbell *et al*., in prep.) were intersected with the Irish National Grid 1km square grid. The number of 1 x 1 km grid squares recorded in the 2013-2018 period (19) is larger than the number recorded in the 2007-2012 period (17), but this change is due to improved knowledge/more accurate data. The two extra 1 x 1 km grid squares reported are due to full recording of the population envelope at two sites where complete surveys had not previously been carried out (at Hv08c Coumtay, Co. Waterford and Hv09 Commas, Co. Cavan). Both sites were found to extend over two 1 x 1 km grid squares, not one, as previously reported. The 11 populations are contained within nine SACs in the Republic of Ireland occurring in the counties Cavan, Donegal, Galway, Mayo, Westmeath and Waterford. Genetic fingerprinting analysis of seven of the 11 populations showed that the majority of genetic variation is among the populations as opposed to within them and that gene flow among the geographically fragmented populations is minimal (Campbell, 2013). Therefore, conservation of all 11 populations within the 19 1 x 1 km grids is essential. The area covered by the population (m^2) estimate was calculated during the 2015-2017 survey (Campbell *et al*., in prep.). The extent of occurrence at all 11 known populations was mapped with the aid of GPS waypoints recorded in the field. The area covered by the population (m^2) within each extent of occurrence polygon was estimated from the mean percentage cover of *H. vernicosus* within sample 2 x 2m plots as not all microhabitats within the extent of occurrence polygons are suitable for *H. vernicosus*. The area covered by the population (m^2) at the 11 sites was summed to give a national total. Short-term trend is deemed to be stable as, although the number of 1 x 1 km grid squares recorded in the 2013-2018 period (19) is larger than the number recorded in the 2007-2012 period (17), the two extra 1 x 1 km grids reported are due to full recording of the population envelope at two sites where complete surveys had not previously been carried out (at Hv08c Coumtay, Co. Waterford and Hv09 Commas, Co. Cavan) and it is not thought that this is a genuine expansion of the population. The area covered by the population (m^2) recorded during the 2013-2018 period differs somewhat from the 2007-2012 period, but this is mostly due to differences in mapping and calculation. Two populations, Hv01 Meentygrannagh and Hv06 NW of Gortachalla Lough, had a decrease in mean cover of *H. vernicosus* in the monitoring plots sampled and did not meet population attribute targets set in the last round of reporting. This could be linked to drainage in parts of the sites. However, there are still large populations at these sites overall. Long-term trend is also deemed to be stable as the data available suggests that there have been no losses in population size since the Directive came into force. Four documented historical populations of *H. vernicosus* were lost due to drainage and afforestation before the Directive came into force, but these are unlikely to be restored due to irreversible habitat loss and issues surrounding the re-introduction of populations that have a different genetic provenance.

	Favourable Reference Population is deemed to be equal to the current population size unit figure, i.e. 19 1 x 1 km grids. No losses have occurred since the Directive came into force and the current population size is considered to be large enough to allow the long-term survival of the species.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied habitat 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable*** / increasing / decreasing / uncertain / unknown
7.5 Short-term trend 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	***stable** / increasing / decreasing / uncertain / unknown*
7.8 Long-term trend Method used *Optional*	*a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
7.9 Additional information *Optional*	*Hamatocaulis vernicosus* is found in intermediate fens and flushes where there is an influence of mineral-rich, but not calcium-rich, groundwater, such as in the lowland topogenous depression at Scragh Bog, Co. Westmeath and also in soligenous types that occur on valley slopes and hillsides, such as at Hv01 Meentygrannagh, Co. Donegal. At *H. vernicosus* sites in the Republic of Ireland, pH of surface water ranges from 5.11 to 7.5 (Campbell, 2013; Campbell *et al*., 2015; Campbell *et al*., in prep.). The species generally grows optimally in open, relatively short vegetation. Habitat quality indicators, including tree cover (%), shrub cover (%), grass cover (%), bryophyte cover (%), cover of *Calliergonella cuspidata* (%) and mean

	vegetation height (cm), were assessed at each known population site and overall Habitat for the species was deemed to be of good quality. The Habitat for the species assessment, based on the habitat quality indictors above, passed at each of the 11 *H. vernicosus* sites in the Republic of Ireland, apart from one site, Hv08c Coumtay, which did not meet targets for grass cover (marginal fail of 2.5%), bryophyte cover and cover of *C. cuspidata.* This site occurs in a flush in the uplands that did not appear to be overgrazed itself, although the flush is more heavily grazed by sheep than the other two sites in the Comeragh Mountains SAC, Hv08a Below Sgilloge Loughs and Hv08b Nier River Valley. However, the surrounding slopes are heavily overgrazed and the results of the assessment and water sample analysis suggest that the site is eutrophicated. This is a very small population with an area covered by the population estimate from the 2015–2017 survey of 2.6m^2. As this site had not been fully surveyed before, it is not known if the population size has contracted. It may always have been small as a result of the site containing only marginally suitable habitat for the species. The area of suitable habitat at this site (c. 2.6 m^2) is a small percentage (c. 0.0009%) of the national estimated area of suitable habitat (28,494 m^2). Therefore, Habitat for the species is deemed to be Favourable on a national scale. An estimate of area of suitable habitat was calculated during the 2015-2017 survey (Campbell *et al*., in prep.). The extent of occurrence at all 11 known populations was mapped with the aid of GPS waypoints recorded in the field. The area of suitable habitat within each extent of occurrence polygon was estimated from the mean percentage cover of *H. vernicosus* within sample 2 x 2 m plots as not all microhabitats within the extent of occurrence polygons are suitable for *H. vernicosus*. The area of suitable habitat at each site was summed to give a national total which was deemed to be of sufficient size and quality to allow the long-term survival of the species. The site Hv06 NW of Gortachalla Lough did not meet the target set for area of suitable habitat as the mean percentage cover of *H. vernicosus* in the monitoring plots failed the target. This is linked to drainage outside the extent of occurrence in the site but it is deemed on expert opinion that there is still sufficient area of suitable habitat present at this site for the survival of the species. As this is a local issue, the area of suitable habitat is deemed sufficient at a national scale. Short-term trend is deemed to be stable as area and quality of suitable habitat for *H. vernicosus* recorded during the 2013-2018 reporting period is considered not to have decreased overall since the 2007-2012 reporting period. Long-term trend is also deemed to be stable as the data available suggests that there have been no losses in area or quality of the habitat for the species since the Directive came into force. Four documented historical populations of *H. vernicosus* were lost due to drainage and afforestation before the Directive came into force, but these are unlikely to be restored due to irreversible habitat damage and loss.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**Xxp** No pressures	**Xxt** No threats

8.2 Sources of information *Optional*	Pressures and threats were recorded during 2015-2017 field surveys at all eleven known populations of *H. vernicosus* in the Republic of Ireland (Campbell *et al*., in prep.).
8.3 Additional information *Optional*	Pressures and threats were ranked from data gathered during the 2015-2017 monitoring programme at all eleven known *Hamatocaulis vernicosus* sites and further information on the occurrence of pressures can be found in Campbell *et al*. (in prep.). No pressures were identified as being of high or medium importance nationally. Any high or medium-impact negative pressures recorded during surveys usually affected only small areas of the habitat for the species, or occurred at a low frequency across the sites surveyed. A10 Extensive grazing or undergrazing by livestock was the most frequently recorded activity at the sites, usually affecting large areas where it occurred. In most cases where grazing (by sheep, cattle, deer or rabbits) was recorded, it was regarded as non-intensive and 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. keeping vegetation low and prevention of unwanted scrub encroachment which would outcompete and shade-out *H. vernicosus*) and the negative effects, such as poaching, erosion and eutrophication. For example, erosion was recorded at Hv04 Uggool and 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 the habitat for the species at this and any other sites. Poaching was also recorded as negatively affecting a small proportion of the Hv03 Largan More site. Overgrazing is a local negative impact at Hv08c Coumtay and is linked to eutrophication at the site, but this is not an issue on a national scale. Grazing is discussed in more detail in Campbell *et al*. (in prep.). Pressures that were high-impact but which affected only a small area of the habitat at a local level included A30 Active abstractions from groundwater, surface water or mixed water for agriculture at Hv01 Meentygrannagh and Hv06 NW of Gortachalla Lough, where drainage ditches had been freshly excavated since the last round of reporting (last site visits in 2011). This was deemed to be having a negative impact on 1-25% of the habitat for the species at each site. This,

	however, is a locally occurring issue and overall, while drainage is a potential threat for the habitat for the species, it is not currently impacting at the sites on a national level. Climate change has not been added as an impact but it is likely to affect the altitudinal and latitudinal range of *H. vernicosus* in Ireland in decades to come if average temperatures continue to rise. Any long-term changes to hydrology due to prolonged drought would be unfavourable for *H. vernicosus* habitat.

9 Conservation measures	
To be reported only for Annex II species	
9.1 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*
9.2 Main purpose of the measures taken	***a) Maintain the current range, population and/or habitat for the species*** *or* *b) Expand the current range of the species (related to 'Range') or* *c) Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population') or* *d) Restore the habitat of the species (related to 'Habitat for the species')*
9.3 Location of the measures taken	***a) Only inside Natura 2000*** *or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
9.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	***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)*
9.5 List of main conservation measures	**CA03** Maintain existing extensive agricultural practices and agricultural landscape features **CA01** Prevent conversion of natural and semi-natural habitats, and habitats of species into agricultural land
9.6 Additional information *Optional*	The maintenance of extensive cattle and sheep grazing (recorded under code CA03) at appropriate levels 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 in the SAC network.

	It should be recognised that the management regimes of most habitats in *H. vernicosus* sites 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, for e.g. mowing at Hv05 Owenbrin. At a local level, at Hv01 Meentygrannagh and at Hv06 NW of Gortachalla Lough, where it was found that drainage ditches had been recently excavated inside and just outside the habitat for the species respectively, the implementation of conservation measure CA15 Manage drainage and irrigation operations and infrastructures in agriculture would benefit *H. vernicosus* if the drains were refilled in a sensitive manner. However, it is not clear whether more damage could occur to *H. vernicosus* by mechanical infilling of drains rather than leaving them to refill naturally. Measure CA01 (Prevent conversion of natural and semi-natural habitats, and habitats of species into agricultural land) applies to all sites. All eleven *H. vernicosus* populations are listed as Qualifying Interests (QIs) for the nine SACs within which they occur and therefore are protected by the Birds and Natural Habitats Regulations (Statutory Instrument No. 477/2011) which regulates any plans or projects that may negatively impact on the habitat for the species. There is also a list of Activities Requiring Consent (ARCs) that are only granted if they do not negatively impact on the QIs within an SAC. Any damaging activity that impacts the conservation status of *H. vernicosus* populations is regulated under the Environment Liability Regulations 2008 (S.I. 547 of 2008). *H. vernicosus* is classified as *Near Threatened* in the Republic of Ireland (Lockhart *et al*., 2012) and all populations are protected under the Flora (Protection) Order, 2015 (Statutory Instrument No. 356 of 2015) and as such it is illegal to collect the species without a licence or damage/destroy the species or its habitat. Legislation, however, does not in itself constitute a management plan; rather it is a tool by which plans may be enacted. Failure to enforce legislation is as damaging as not having a plan in place or not implementing it. Therefore, it is important that any laws or regulations that safeguard *H. vernicosus* be implemented and enforced.

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	**Good** / *Poor / Bad / Unknown*
	b) Population	**Good** / *Poor / Bad / Unknown*
	c) Habitat of the species	**Good** / *Poor / Bad / Unknown*
10.2 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 Population is assessed as Stable. Current population is equal to the Favourable Reference Population. Conservation status of Population is therefore Favourable. Future trend of Population is assessed as Stable, as no change in population is expected based on the balancing of the threats and conservation measures that are currently in place. Future prospects of Population are therefore Good. Short-term trend direction of Habitat is assessed as Stable. Current Habitat for the Species is assessed as Favourable as the area and quality of the occupied habitat for the species is deemed to be sufficient for the species long-term survival. Conservation status of Habitat for the Species is therefore Favourable. Future prospects of Habitat for the Species are therefore Good.

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*

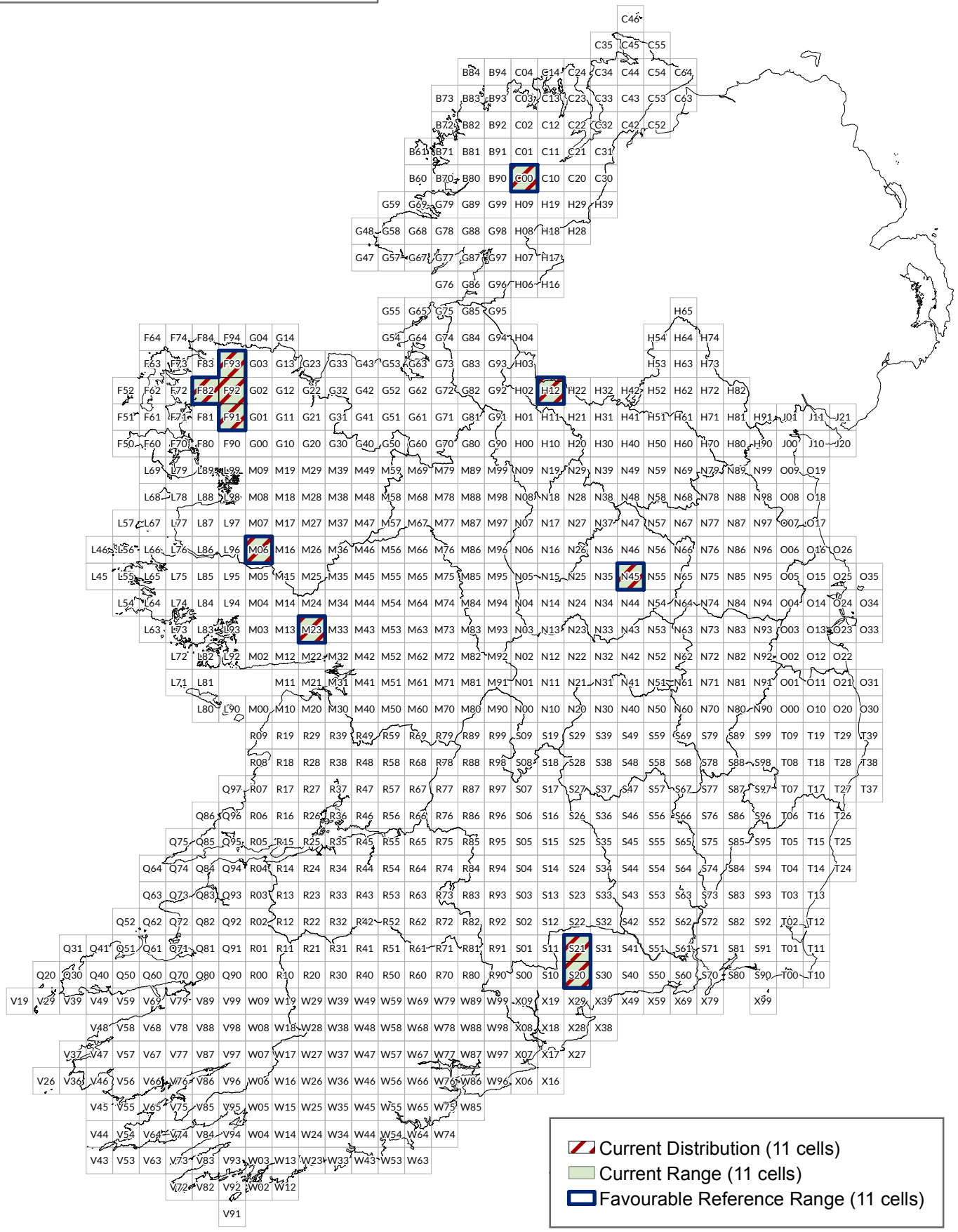
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the nature of change	*YES/NO*	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
11.8 Additional information *Optional*	Range was assessed as Favourable, as in the previous reporting period as it is equivalent to the Favourable Reference Range. The current population size is deemed to be equal to the Favourable Reference Population, i.e. 19 1x1 km grids. Therefore, Population is assessed as Favourable. A total of 10 of the 11 known sites (c. 90%) were assessed as Favourable for Habitat for the Species. The area of suitable habitat in Favourable condition is >99% of the national total. Habitat for the Species is therefore assessed as Favourable as the area and quality of the occupied habitat for the species is deemed to be sufficient for the species' long-term survival. Because Population and Habitat for the Species were both assessed as Favourable and no negative pressures were identified that seriously impacted on the habitat at a national level, Future prospects were also assessed as Favourable. Therefore, the overall Conservation Status is assessed as Favourable and the overall trend in Conservation Status is deemed to be stable.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species		
12.1 Population size inside the pSCIs, SCIs and SACs network *(on the biogeographical/marine level including all sites where the species is present)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***19***
12.2 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
12.3 Population size 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*	

12.4 Short-term trend of population size within the network **Direction**	*Short-term trend of population size within the network over the period indicated in field 6.5 :* ***stable*** */ increasing / decreasing / uncertain / unknown*
12.5 Short-term trend of population size within 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*
12.6 Additional information *Optional*	At the 11 known *Hamatocaulis vernicosus* sites, all population envelopes mapped during the 2015-2017 survey (Campbell *et al*., in prep.) lie within the SAC network. The 11 populations occur within nine SACs and *H. vernicosus* is listed as a Qualifying Interest in each.

13 Complementary information

Slender green Feather Moss
Hamatocaulis vernicosus (6216)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1395***
1.3 Species scientific name	*Petalophyllum ralfsii*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Petalwort
1.6i Species description	*Petalophyllum ralfsii* (Wils.) Nees & Gottsche (petalwort) is a pioneering thallose liverwort of bare, moist, stable sand or of short turf, mainly on mildly to strongly base-rich dune slacks and machair where the habitat can be subject to inundation in the winter. The species looks like a miniature lettuce and is often less than 1 cm diameter. It has erect, almost parallel, lamellae which are perpendicular to the flattened part of the thallus. The above-ground parts can die back during the summer when conditions are drier and the plants survive as underground tubers. Thalli can be solitary, in rosettes or in mats. Male and female parts are on separate plants. Sporophytes are produced regularly in spring and early summer. Spores may persist in the soil for long periods until environmental conditions become suitable for new plant production. No specialised asexual propagules are known, but the plant can reproduce clonally, whereby the thallus splits in two. Underground branches can also give rise to new thalli, which then become independent as the underground branches decay. Petalwort has an Atlantic-Mediterranean distribution and in Ireland is most common on the west coast. Some of the largest petalwort populations in the world are thought to occur in Ireland.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***1998-2018***
2.3 Distribution map	Submitted
2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted

2.6i Additional information	The distribution map was compiled from *Petalophyllum ralfsii* population envelope polygons digitised from the 2015-2018 Rare Plants Monitoring Survey (RPMS; Campbell *et al*., in prep.) and from 1998-2006 locations recorded during the NPWS Rare and Threatened Bryophyte Surveys (Hodgetts, 2002, 2003a, 2003b; Holyoak, 1999, 2002, 2003a, 2003b, 2004; NPWS Rare and Threatened Bryophyte database). Details of all populations recorded between 1998 and 2006 can also be found in Campbell *et al*. (2015). In total, 22 of the 30 known *P. ralfsii* sites in the Republic of Ireland were surveyed during the RPMS in 2016-2018 (Campbell *et al*., in prep.). Polygons recorded during the 2016-2018 survey are judged to be good quality data and represent the species occurrence within 19 of the 22 sites surveyed. At three 2016-2018 survey sites in Co. Kerry (Pr17a SW of Lough Naparka, Pr17c Kilshannig and Pr19 West of Inny Ferry) no thalli were recorded, but there is the potential for the species to return as suitable habitat still exists. Records from NPWS surveys (Hodgetts, 2003b; NPWS Rare and Threatened Bryophyte database) at these sites were used in the production of the distribution maps. The records at these three sites and those at the eight remaining sites (Hodgetts, 2002, 2003a; Holyoak, 1999, 2002, 2003a, 2003b, 2004; NPWS Rare and Threatened Bryophyte database) are also deemed to be of good quality.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	***Atlantic***, *Marine Atlantic*
4.2 Sources of information	Campbell, C. (2013) Conservation of selected legally protected and Red Listed bryophytes in Ireland. Ph.D. Thesis, University of Dublin, Trinity College. Campbell, C., Hodgetts, N. & Lockhart, N. (2015) Monitoring methods for *Petalophyllum ralfsii* (Wils.) Nees & Gottsche (Petalwort) in the Republic of Ireland. *Irish Wildlife Manuals*, No. 90. National Parks and Wildlife Service, Department of the Arts,

	Heritage and the Gaeltacht, Dublin. 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. XXX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Dublin. Hodgetts, N.G. (2003a) Survey of Rare and Threatened Bryophytes in County Sligo. Unpublished report to National Parks and Wildlife Service, Dublin. Hodgetts, N.G. (2003b) Survey of Rare and Threatened Bryophytes in Mid/East Cork and Dingle Peninsula. Unpublished report to National Parks and Wildlife Service, Dublin. Holyoak, D.T. (1999) Report on surveys of *Petalophyllum ralfsii* in Co. Mayo and Co. Galway, Western Ireland, 16-22 April 1999. Unpublished report to National Parks and Wildlife Service, Dublin. Holyoak, D.T. (2002) Survey of Rare and Threatened Bryophytes in North Donegal. Unpublished report to National Parks and Wildlife Service, Dublin. Holyoak, D.T. (2003a) Survey of Rare and Threatened Bryophytes in County Mayo. Unpublished report to National Parks and Wildlife Service, Dublin. Holyoak, D.T. (2003b) The distribution of bryophytes in Ireland. An annotated review of the occurrence of liverworts and mosses in the Irish vice-counties based mainly on the records of the British Bryological Society. Broadleaf Books, Dinas Powys, Vale of Glamorgan. Holyoak, D.T. (2004) Survey of Rare and Threatened Bryophytes in County Galway. Unpublished report to National Parks and Wildlife Service, Dublin. Lockhart, N., Holyoak, D. T. & Hodgetts, N.G. (2012a) *Rare and Threatened Bryophytes of Ireland*. National Museums, Northern Ireland. Lockhart, N., Hodgetts, N. & Holyoak, D. (2012b) Ireland Red List No. 8: Bryophytes. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. NPWS (2013) 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. NPWS Rare and Threatened Bryophytes database, National Parks and Wildlife Service, Dublin.
4.2i Additional information	Atherton, A., Bosanquet, S. & Lawley, M. (Eds) (2010) *Mosses and Liverworts of Britain and Ireland*. British Bryological Society, Cardiff. Blockeel, T.L., Bosanquet, S.D.S., Hill, M.O. & Preston, C.D. (2014) *Atlas of British and Irish Bryophytes.* Pisces Publications, Newbury. Crandall-Stotler, B.J., Stotler, R.E. & Ford, C.H. (2002) Contributions

	toward a Monograph of *Petalophyllum* (Marchantiophyta). *Novon* 12(3): 334-337. Curtis, T. (1991) The flora and vegetation of sand dunes in Ireland. In: M.B. Quigley (Ed.) *A Guide to the Sand Dunes of Ireland*. European Union for Dune Conservation and Coastal Management. Hodgetts, N.G. (2007) *Petalophyllum ralfsii* (Wils.) Nees & Gottsche (Petalwort) in Ireland. Unpublished report to National Parks and Wildlife Service, Dublin. Hodgetts, N.G. (2015) Checklist and country status of European bryophytes – towards a new Red List for Europe*. Irish Wildlife Manuals,* No. 84. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. Holyoak, D.T. (2000) Species dossier for *Petalophyllum ralfsii*. Plantlife International. Paton, J.A. (1999) *The Liverwort Flora of the British Isles*. Harley Books. Porley, R. & Hodgetts, N.G. (2005) *The New Naturalist Library: Mosses and Liverworts.* Harper Collins. Ratcliffe, D.A. (1968) An ecological account of Atlantic Bryophytes in the British Isles*. New Phytologist* 67: 365-439. Rumsey, F.J., Vogel, J.C. & Russell, S.J. (2001) A study of genetic variation in the threatened hepatic *Petalophyllum ralfsii* (Wils.) Nees and Gottsche (Fossombroniaceae). *Conservation Genetics* 2: 271-277. Scully, R.W. (1890) Hepaticae found in Kerry, 1889. The Journal of Botany, British and Foreign XXVIII: 200-203. Sim-Sim, M., Jones, M.P. & Sérgio, C. (2000) *Petalophyllum ralfsii* (Wils.) Nees & Gott., a threatened liverwort present in Portugal. Morphological and ecological data, directions for future conservation. *Lindbergia* 25: 101-105. Söderström, L., Urmi, E. & Váňa, J. (2002) Distribution of Hepaticae and Anthocerotae in Europe and Macaronesia. *Lindbergia* 27: 2-47. Stotler, R.E., Ford, C.H. & Crandall-Stotler, B.J. (2002). Typifications in the genus *Petalophyllum* (Marchantiophyta). *The Bryologist* 105(3): 400-406.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***3,200 km²***
5.2 Short-term trend Period	***2007–2018***
5.3 Short-term trend Direction	***stable*** / increasing / decreasing / uncertain / unknown

5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 Short-term trend 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	
5.6 Long-term trend Period *Optional*	***1994–2018***	
5.7 Long-term trend Direction *Optional*	***stable*** / increasing / decreasing / uncertain / unknown	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 Long-term trend Method used *Optional*	*a) Complete survey or a statistically robust estimate*	
	b) Based mainly on extrapolation from a limited amount of data	
	c) Based mainly on expert opinion with very limited data	
	d) Insufficient or no data available	
5.10 Favourable reference range	***a) 3,200 km²***	
	b) Indicate if operators were used (use these 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 was deemed to be the same as the 2007-2012 range (NPWS, 2013), which is the same as the current range, as there is no evidence of decline since the Directive came into force. The current range is considered to be large enough to encompass all of the ecological variation present and to allow the long-term survival of the species.	
5.11 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*
5.12 Additional information *Optional*	Range was determined using expert judgement based on the current known distribution of *Petalophyllum ralfsii*. The 2013-2018 Range is coincident with the 2007-2012 Range. Population envelope polygons from the mapping of populations of *P. ralfsii* during the 2016-2018 survey (Campbell *et al*., in prep.) and records from NPWS surveys (Hodgetts, 2002, 2003a, 2003b; Holyoak, 1999, 2002, 2003a, 2003b, 2004; NPWS Rare and Threatened Bryophyte database) were intersected with the Irish National Grid 10km square grid. The range map consists of the 32 current range squares which encompass the 26 current distribution cells representing the 30 populations field-verified and mapped during the 2016-2018 survey (Campbell *et al*., in prep.) and recorded during NPWS surveys (Hodgetts, 2002, 2003a, 2003b; Holyoak, 1999, 2002, 2003a, 2003b, 2004; NPWS Rare and Threatened Bryophyte database). Short-term trend was deemed stable as the number and location of the 10km squares comprising the range from the 2016-2018 survey (Campbell *et al*., in prep.) and NPWS surveys (Hodgetts, 2002, 2003a, 2003b; Holyoak, 1999, 2002, 2003a, 2003b, 2004; NPWS Rare and Threatened Bryophyte database) are the same as those comprising the range of the 2007-2012 reporting period (NPWS, 2013). No confirmed losses of populations leading to range contraction were noted. The long-term trend is deemed to be stable as there is no evidence of a decline in range since the Directive came into force. Four documented historical populations of *P. ralfsii* were lost due to coastal development, agricultural improvement and/or natural succession before the Directive came into force, but these are unlikely to be restored due to irreversible habitat damage and loss. Favourable Reference Range was deemed to be the same as the 2007-2012 range (which is the same as the current range) as there is no evidence of decline since the Directive came into force. It is thought that the current range is large enough to encompass all of the ecological variation present and to allow the long-term survival of the species.

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***1998–2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***49***

6.3 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	***Number of localities***
	b) Minimum	
	c) Maximum	
	d) Best single value	***30***
6.5 Type of estimate *Optional*	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.6 Population size 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*	
6.7 Short-term trend Period	***2007-2018***	
6.8 Short-term trend Direction	***stable*** / increasing / decreasing / uncertain / unknown	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 Short-term trend 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	***stable*** / increasing / decreasing / uncertain / unknown	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.14 Long-term trend Method used *Optional*	*a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.15 Favourable reference	***a) 49 x 1km grids***	

population *(using the unit in 6.2 or 6.4)*	*b) Indicate if operators were used (using symbols ≈, >, >>, <) or*	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators Favourable Reference Population is deemed to be equal to the current population size, i.e. 49 x 1km grids. No losses have occurred since the Directive came into force and the current population size is considered to be large enough to allow the long-term survival of the species.	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information *Optional*	The number of 1x1 km grids (49) represents the 30 known populations of *Petalophyllum ralfsii* in the Republic of Ireland which were surveyed during the 2016-2018 survey (Campbell *et al*., in prep.) and recorded during NPWS surveys (Hodgetts, 2002, 2003a, 2003b; Holyoak, 1999, 2002, 2003a, 2003b, 2004; NPWS Rare and Threatened Bryophyte database). Population envelope polygons from the mapping of *P. ralfsii* populations during the 2016-2018 survey (Campbell *et al*., in prep.) and records from NPWS surveys (Hodgetts, 2002, 2003a, 2003b; Holyoak, 1999, 2002, 2003a, 2003b, 2004; NPWS Rare and Threatened Bryophyte database) were intersected with the Irish National Grid 1km square grid. The 'number of localities' (a locality being defined as a 'discrete geographical area inhabited by a set of individuals which are able to reproduce or occur on a long-term basis and cover continuous space in a given period' where *P. ralfsii* has been recorded between 1998 and 2018) is given as the additional population size unit as it may be a better alternative to use than 'number of individuals' or 'area covered by the population (m^2)' as the number and area measured depends on the number of visible thalli present which can vary widely depending on conditions at time of measurement. The 30 localities, occurring in the counties Clare, Cork, Donegal, Dublin, Galway, Kerry, Mayo and Sligo, cover a wide geographical distribution and the number and locations are deemed adequate to ensure the species' survival in Ireland. Short-term trend is deemed to be stable as the number and location of 1x1 km grid squares recorded in the 2007-2012 reporting period is equal to that reported in the 2013-2018 period. The number and	

	location of localities reported in the 2007-2012 period is equal to that reported in the 2013-2018 period; however, thalli were not recorded at three localities, Pr17a SW of Lough Naparka, Pr17c Kilshannig and Pr19 West of Inny Ferry, during the 2016-2018 survey (Campbell *et al*., in prep.), but there is still the possibility that the species will return to these localities as suitable habitat still exists. *P. ralfsii* is an ephemeral pioneering species and may not always be recorded during a survey, even if habitat conditions are suitable. It has been decided that the species will be declared lost from a locality only after three successive cycles of 6-yearly monitoring surveys fail to record the species (Campbell *et al*., in prep.). As there are areas of potentially suitable habitat at these three sites, it is possible that, with some changes in management, *P. ralfsii* may be recorded at these localities in future monitoring surveys. For these reasons, these three localities are still retained in this round of reporting (see Campbell *et al*., in prep.). Long-term trend is also deemed to be stable as the data available suggest that there have been no losses in population size since the Directive came into force. Favourable Reference Population is deemed to be equal to the current population size, i.e. 49 1x1 km grids. No losses have occurred since the Directive came into force and the current population size is considered to be large enough to allow the long-term survival of the species.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied habitat 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable*** / increasing / decreasing / uncertain / unknown
7.5 Short-term trend 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*
7.6 Long-term trend Period *Optional*	***1994–2018***

7.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*
7.8 Long-term trend Method used *Optional*	*a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
7.9 Additional information *Optional*	In the Republic of Ireland, nearly all *Petalophyllum ralfsii* localities are found in coastal dune systems with damp calcareous dune slacks or machair. In Ireland and Great Britain, *P. ralfsii* is a lowland calcicole and a pioneering species of bare moist stable compact sand or of short turf, mainly on mildly to strongly base-rich dune slacks and machair that are subject to inundation in the winter. The largest populations in Ireland are found in the west of Ireland on Machair (EU Habitat code 21A0). *P. ralfsii* is found in dune slacks (Humid Dune Slacks; EU habitat code 2190) in the earlier stages of development and prefers soil that is compact and bare, for example at the sides of paths, and does not grow in slacks that are water-filled for long periods or that are heavily shaded. Some localities where *P. ralfsii* is found could not be described as typical machair or dune slack habitat. For example, there are localities in Donegal where *P. ralfsii* grows on a flushed slope (Pr01 Rosses Strand), on peaty sand above limestone (Pr05b Sheskinmore) and on thin humic sand over rock beside the shore (Pr04c Keadew Point). The locality at Pr16 Fanore, Co. Clare is also unusual as *P. ralfsii* grows there on damp soil *circa* 25 cm deep over limestone. Habitat quality indicators, including aspects of hydrology, shrub cover (%), grass cover (%), cover of bare ground (%) and mean vegetation height (cm) were assessed at 22 of the 30 known localities (Campbell *et al*., in prep.) and overall Habitat for the Species was deemed to be of good quality at a national level. The Habitat for the Species assessment, based on the above habitat quality indicators, passed at all localities to give a Favourable assessment at each, apart from at the three localities where *P. ralfsii* was not found. Areas of potentially suitable open habitat were searched at each site, but did not yield thalli. Assessment plots were placed at points where previous relevé plots had been recorded at Pr17a SW of Lough Naparka, Pr17c Kilshannig and Pr19 West of Inny Ferry during NPWS surveys (Hodgetts, 2003; NPWS Rare and Threatened Bryophyte database). The assessments failed on percentage bare ground at all three sites, percentage grass cover at Pr17c and Pr19 and mean vegetation height at Pr17c. The results indicate that the sites are not grazed appropriately. Despite being grazed by cattle, there is an issue of undergrazing (and some poaching and eutrophication). A change in management to sheep grazing at these sites should result in more tightly grazed open conditions across the sites. As the area of suitable habitat at each site never exceeded 10m^2 each, which is c. 0.00008% of the national total (c. 395,620m^2), it is deemed that Habitat for the Species should remain Favourable. An area of suitable habitat estimate was calculated during the 2016-

	2018 survey (Campbell *et al*., in prep.) at 22 of the 30 known localities. The extent of occurrence at these localities was mapped with the aid of GPS waypoints recorded in the field. The percentage area of suitable habitat within each extent of occurrence polygon was then estimated, as not all microhabitats within the extent of occurrence polygons are suitable for *P. ralfsii*. Estimates of area of suitable habitat were made for the remaining localities using expert judgement based on the records at those localities (Hodgetts, 2002, 2003a, 2003b; Holyoak, 1999, 2002, 2003a, 2003b, 2004; NPWS Rare and Threatened Bryophyte database). The area of suitable habitat at the localities was summed to give a national total which was deemed to be of sufficient size and quality to allow the long-term survival of the species. The area of suitable habitat estimate for the 2013-2018 period is slightly larger than that for the 2007-2012 period (NPWS, 2013), but this is due mostly to the fact that complete surveys were undertaken at more localities than during the last reporting period, and due to differences in mapping, and is not thought to be a genuine increase (see Campbell *et al*., in prep.). Short-term trend is deemed to be stable as area and quality of suitable habitat for *P. ralfsii* recorded during the 2013-2018 reporting period is considered not to have decreased overall since the 2007-2012 reporting period. Long-term trend is also deemed to be stable as the data available suggests that there have been no losses in area or quality of the habitat for the species since the Directive came into force. Four documented historical populations of *P. ralfsii* were lost due to coastal development, agricultural improvement and/or natural succession before the Directive came into force, but these are unlikely to be restored due to irreversible habitat damage and loss.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**Xxp** No pressures	**Xxt** No threats
8.2 Sources of information *Optional*	Pressures and threats were recorded during 2015-2018 field surveys at 22 of the known 30 localities of *P. ralfsii* in the Republic of Ireland (Campbell *et al*., in prep.). Details of pressures and threats were noted at the eight remaining localities during the NPWS Rare and Threatened Bryophyte surveys (see Campbell *et al.*, 2015).	

8.3 Additional information *Optional*	Pressures and threats were ranked from data gathered during the 2016-2018 survey at 22 of the known 30 localities of *P. ralfsii* and further information on the occurrence and frequency of pressures at these localities can be found in Campbell *et al*. (in prep.). Details of pressures and threats were noted at the eight remaining localities during the NPWS Rare and Threatened bryophyte surveys (see Campbell *et al.*, 2015). 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 for the species, or occurred at a low frequency across the localities surveyed. Pressures that affected relatively large areas of the localities where they occurred, but which occurred at a low frequency across the localities surveyed, include A09 Intensive grazing or overgrazing by livestock and A10 Extensive grazing or undergrazing by livestock. In most cases where intensive and non-intensive grazing (mainly by sheep, cattle and rabbits) was recorded, it was regarded as either beneficial or not damaging to the habitat for the species. The negative pressure of undergrazing is thought to be implicated in the reason for the absence of *P. ralfsii* at three localities in Co. Kerry, but there is the potential for the species to return to these localities and undergrazing is not a pressure at a national scale. These sites are grazed by cattle, but changing the management to sheep grazing would result in a shorter, more open sward and less poaching and eutrophication. The issue of grazing is complex and a balance needs to be maintained between the beneficial effects (e.g. creating bare patches for pioneering *P. ralfsii* to colonise and keeping vegetation generally low and open) and the negative effects, such as poaching, erosion and eutrophication. Grazing is discussed in more detail in Campbell *et al*. (in prep.). Sports, tourism and leisure activities (F07) such as walking, jogging, horseriding and non-motorised and motorised vehicle use was noted as an impact on the habitat for the species at many *P. ralfsii* localities, but this is beneficial, as trampling compresses the ground and keeps vegetation low, maintaining suitable conditions for *P. ralfsii* and also can create new niches for *P. ralfsii* by creating bare areas of substrate for subsequent colonisation. However, too much disturbance from these activities on a continuous basis can break up the substrate crust continually, making it harder for *P. ralfsii* to establish and maintain itself. This was noted as a high impact but only affecting a very small proportion of the habitat for the species at some localities and is not impacting at a national level. Coastal erosion (L01 Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization) was recorded as a negative pressure at a couple of localities but only affected small areas of the overall habitat for the species and was not listed as a pressure nationally. Other pressures that were high-impact but which affected only a small area of the habitat at a local level include 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, but it is likely to affect the distribution of *P. ralfsii* in Ireland in decades to come if

	average temperatures continue to rise.

9 Conservation measures

To be reported only for Annex II species

9.1 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*
9.2 Main purpose of the measures taken	***a) Maintain the current range, population and/or habitat for the species** or* *b) Expand the current range of the species (related to 'Range') or* *c) Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population') or* *d) Restore the habitat of the species (related to 'Habitat for the species')*
9.3 Location of the measures taken	*a) Only inside Natura 2000 or* ***b) Both inside and outside Natura 2000** or* *c) Only outside Natura 2000*
9.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	***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)*
9.5 List of main conservation measures	**CA03** Maintain existing extensive agricultural practices and agricultural landscape features **CF01** Manage conversion of land for construction and development of infrastructures.
9.6 Additional information *Optional*	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 in the SAC network. It should be recognised that the management regimes of most habitats in *P. ralfsii* localities are driven by the landowner(s) rather than by any formal management plan or policy; therefore, the continued operation of the management regimes currently in place is not guaranteed, for e.g. commonage grazing at a number of localities. Measure CF01 (Manage conversion of land for construction and development of infrastructures) refers to the correct implementation

	of planning policies, for example, carrying out appropriate assessments of Annex I habitats in SACs prior to undertaking construction projects for residential, commercial, industrial and recreational purposes, such as golf courses and club houses. All 30 *P. ralfsii* populations are listed as Qualifying Interests (QIs) for the 21 SACs within which they occur and therefore are protected by the Birds and Natural Habitats Regulations (Statutory Instrument No. 477/2011) which regulates any plans or projects that may negatively impact on the habitat for the species. There is also a list of Activities Requiring Consent (ARCs) that are only granted if they do not negatively impact on the QIs within an SAC. Any damaging activity that impacts the conservation status of *P. ralfsii* populations is regulated under the Environment Liability Regulations 2008 (S.I. 547 of 2008). While *P. ralfsii* is classified as *Least Concern* in the Republic of Ireland (Lockhart *et al*., 2012a, b), Ireland's international responsibility to conserve the species is recognised and *P. ralfsii* is protected under the Flora (Protection) Order, 2015 (Statutory Instrument No. 356 of 2015); as such, it is illegal to collect the species without a licence or damage/destroy the species or its habitat. Legislation, however, does not in itself constitute a management plan; rather it is a tool by which plans may be enacted. Failure to enforce legislation is as damaging as not having a plan in place or not implementing it. Therefore, it is important that any laws or regulations that safeguard *P. ralfsii* be implemented and enforced. At the three localities where *P. ralfsii* was not recorded during the 2016-2018 survey (Pr17a SW of Lough Naparka, Pr17c Kilshannig and Pr19 West of Inny Ferry), conservation measure CA05 Adapt mowing, grazing and other equivalent agricultural activities should be implemented to achieve a level of appropriate grazing that makes the habitat for the species more favourable for *P. ralfsii.*

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** / *Poor / Bad / Unknown*
	b) Population	***Good*** / *Poor / Bad / Unknown*
	c) Habitat of the species	***Good*** / *Poor / Bad / Unknown*
10.2 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 Population is assessed as Stable. Current population is equal to the Favourable Reference Population. Conservation status of Population is therefore Favourable. Future trend of Population is assessed as Stable, as no change in Population is expected based on the balancing of the threats and conservation measures that are currently in place.	

	Future prospects of Population are therefore Good. Short-term trend direction of Habitat is assessed as Stable Current Habitat for the Species is assessed as Favourable as the area and quality of the occupied habitat for the species is deemed to be sufficient for the species' long-term survival. Conservation status of Habitat for the Species is therefore Favourable. Future prospects of Habitat for the Species are therefore Good.

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	Range was assessed as Favourable, as in the previous reporting period, as it is equivalent to the Favourable Reference Range. Although the species was not recorded at 3 of the 22 surveyed sites, the 3 sites (at Pr17a SW of Lough Naparka, Pr17c Kilshannig and Pr19 West of Inny Ferry) are to be retained in this round of reporting, particularly as there is some potential for *P. ralfsii* to be recorded in the next reporting round. The current population size is deemed to be equal to the Favourable Reference Population, i.e. 49 1x1 km grids. Therefore, Population is assessed as Favourable. A total of 19 of the 22 surveyed sites (86%) were assessed as Favourable for Habitat for the Species. The area of suitable habitat in Favourable condition is >99% of the national total. Habitat for the Species is therefore assessed as Favourable as the area and quality of the occupied habitat for the species is deemed to be sufficient for the species long-term survival. Because Population and Habitat for the Species were both assessed as Favourable and no negative pressures were identified that seriously impacted on the habitat at a national level, Future prospects were also assessed as Favourable. Therefore, the overall Conservation Status is assessed as Favourable and the overall trend in Conservation Status is deemed to be stable.		

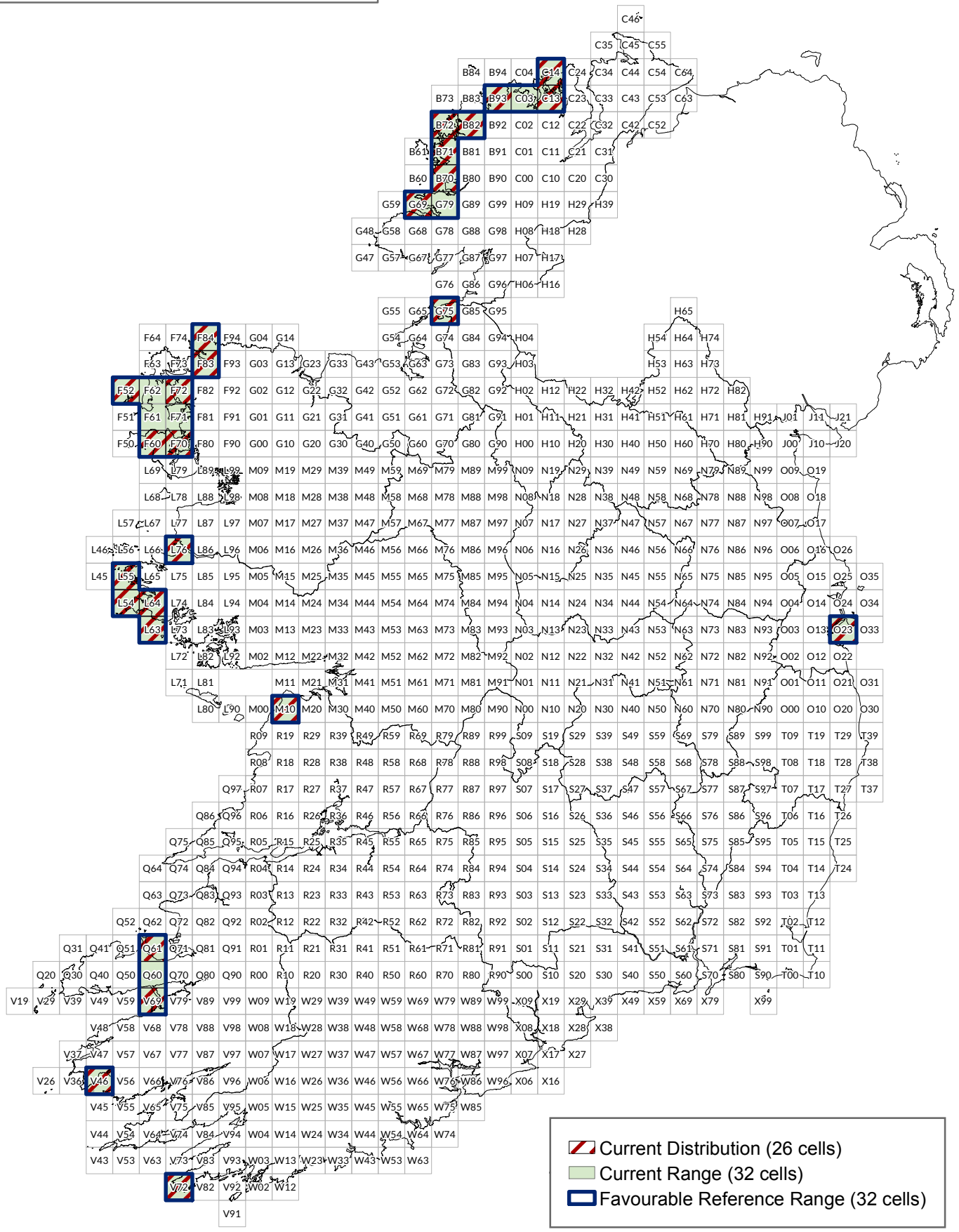
12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

12.1 Population size inside the pSCIs, SCIs and SACs network *(on the biogeographical/marine level including all sites where the species is present)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***49***
12.2 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
12.3 Population size 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*	
12.4 Short-term trend of population size within the network **Direction**	*Short-term trend of population size within the network over the period indicated in field 6.5 :* ***stable*** */ increasing / decreasing / uncertain / unknown*	

12.5 Short-term trend of population size within 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*
12.6 Additional information *Optional*	At the 30 known *Petalophyllum ralfsii* localities, all population envelopes in the 49 1x1 km grid squares mapped during the 2016-2018 survey (Campbell *et al*., in prep.) and NPWS surveys (Hodgetts, 2002, 2003a, 2003b; Holyoak, 1999, 2002, 2003a, 2003b, 2004; NPWS Rare and Threatened Bryophyte database) lie within the SAC network, apart from an area of c. 41 m^2 of the Pr05b Sheskinmore population, which lies just outside the boundary of West of Ardara/Maas Road SAC (000197). Also, an area of c. 3,533 m^2 of a population envelope containing records for *P. ralfsii* at Pr14c Doon Hill/West of Aillebrack lies just outside the boundary of Slyne Head Peninsula SAC (002074). The 2007-2012 assessment reported an area of c. 44 m^2 of habitat for the species mapped around a point at Pr02 Rosepenna by David Holyoak in 1999 that lies just outside the boundary of Sheephaven SAC (001190). The GPS point of this record was digitised from a sketch map. When the locality was visited during the 2016-2018 survey (Campbell *et al*., in prep.), this area was fenced and did not look suitable for *P. ralfsii*. The 30 populations occur within 21 SACs and *P. ralfsii* is listed as a Qualifying Interest in each.

13 Complementary information

Petalwort
Petalophyllum ralfsii (1395)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1376/1377***
1.3 Species scientific name	*Lithothamnion corallioides/ Phymatolithon calcareum*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Maërl
1.6i Species description	*Lithothamnion corallioides* and *Phymatolithon calcareum* are Annex V species of calcified red seaweed and two of a number of species that are collectively known as maërl (which also include *Lithophyllum dentatum* and *Lithophyllum fasciculatum*). These species live freely over mud, sand or gravel substrates. They are slow-growing species and morphology is variable but frequently presents as branched nodules. Differentiation in the field can be difficult but *Phymatolithon calcareum* may be slightly larger than *Lithothamnion corallioides* and may form a more pronounced stag-horn morphotype. Individuals may be 4-7 cm across and whilst alive are usually pink or brownish in colour but appear a blanched white when dead. Maërl species in Ireland are considered habitat-forming species and are often frequently incorrectly thought of as coral because of the calcareous bodies and broad similarity in shape. The distribution of maërl species are influenced by temperature, salinity and light penetration. Although they are slow growing, only growing when temperatures exceed 12-13^{o}C, where abundant they can form an extensive covering of the underlying substrate. Rhodolith algae require fully saline bottom conditions and are consequently frequently associated with the Annex I habitat *Large Shallow Inlets and Bays*. Both species are limited by the penetration of light to the substrate and are usually found within a depth of less than 20m, occasionally 30m, but always below the lowest astronomical tide. In Ireland more than 85% of maërl habitat is recorded within those bays sheltered to some extent from large swell waves on the Atlantic coast from Roaringwater Bay in Cork to Mulroy Bay in Donegal. There are no records for the Irish Sea or the majority of the Celtic Sea. Maërl beds are frequently considered a living mixed coarse substrate associated with clean water and strong bottom currents. Burial or disturbance to maërl or the surrounding area that increases sedimentation or turbidity over the thalli results in significant mortality. The accumulation of calcareous thalli over time can generate a three-dimensional habitat that is suitable for colonisation both superficially and in the associated interstices by a wide range of species. The structure of dead thalli, which cannot be closely packed together unless damaged, allows a significant exchange of water and nutrients with the surrounding waters. Surveys have

	shown about 138 distinct maërl beds, with the largest area within Galway Bay Complex SAC, mostly in Co Clare. In recent surveys of maërl communities, all were composed of *Lithothamnion corallioides* and 78% (or seven sites) of them also contained *Phymatolithon calcareum*. The rare species *Lithophyllum dentatum* and *Lithophyllum fasciculatum* are recorded in 56% (5 sites) and 44% (4 sites) of sites respectively. Maërl exists in a number of forms; it may be live maërl, dead maërl or a mixture of both and on occasion forms dunes. It also occurs as a combination of gravel, mud and maërl. The fauna within this community type is very diverse, with a large number of species being recorded in low abundance. However a number of species are commonly seen within the beds in most of the sites. These include the anthozoans *Anthopleura ballii*, *Anemonia viridis* and *Cereus pedunculatus*, the crustaceans *Phtisica marina*, *Pisidia longicornis* and *Caprella acanthifera* and the polychaetes *Chaetopterus variopedatus* and *Polyophthalmus pictus* and the free living calcareous algae *Corallina officinalis*. The holothurian *Neopentadactyla mixta* is recorded from a number of the maërl sites and in Kilkieran Bay it is estimated to occur in densities of several hundred per square metre in a duned maërl bed off Ardmore Point. In Valencia and Kilkieran the bivalve *Pecten maximus* has been recorded within the beds; *Ostrea edulis* occurs in the beds in Kilkieran. A number of rare species occur within maërl beds. In Roaringwater Bay, the rare filamentous red alga *Spyridia filamentosa* has been recorded. In Kilkieran Bay, a number of rare anemones, *Edwardsia claparedii*, *Scolanthus callimorphus*, *Mesacmaea mitchellii* and *Aureliana heterocera* occur within the beds. In Kingston Bay the possibly endemic epiphytic algae *Gelidiella calcicola* has also been recorded.

2 Maps

Distribution of the species within the Member State concerned.

2.1 Sensitive species	*The spatial information provided relates to a species (or subspecies) to be treated as 'sensitive' YES/**NO***
2.2 Year or period	***1998-2018***
2.3 Distribution map	Submitted
2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted

2.6i Additional information	These communities were extensively surveyed by a combination of diver transects and bottom viewers in Irish waters between 2006 and 2010. During the most recent survey programme (2017-2018), a significant proportion of the transects from previously mapped areas were resurveyed using a Cathx Ocean® 4K dropdown video camera combined with the spatial encoding RedHen Systems®. Video surveys were supplemented by diver surveys using SCUBA by a team of marine ecologists.

3 Information related to Annex V species (Art. 14)

3.1 Is the species taken in the wild/exploited?	*Is the species taken in the wild/exploited?* ***NO***

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Atlantic,* ***Marine Atlantic***
4.2 Sources of information	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. De Grave *et al.* (2000) A Study of Selected Maërl Beds in Irish Waters and their Potential for Sustainable Extraction. *Marine Resource Series 10*. Published by the Marine Institute. Hall-Spencer *et al.* (2007) Assessment of maërl beds in the OSPAR area and the development of a monitoring program. Prepared for the Department of the Environment, Heritage and Local Government (DEHLG), Ireland. McCormack, E. (2006) *Carraroenia ruthae gen. et sp. nov.* (Copepoda, Harpacticoida, Laophontidae) from maërl substrates of the Irish west coast. *Zootaxa* 1202: 39–52. 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 (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 code: 000101). Monitoring methodology 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 (Site code: 000101). Site monitoring report. Carried out by MERC on behalf of National Parks and Wildlife Service, Department of Environment, Heritage and Local Government. Scally, L., Pfeiffer, N.J. and Hewitt, E. (in prep.) Monitoring and assessment of six EU Habitats Directive Annex I marine habitats. Irish Wildlife Manuals, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.
4.2i Additional information	

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***3,200 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	

5.5 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*	
5.6 Long-term trend Period *Optional*	***1994–2018***	
5.7 Long-term trend Direction *Optional*	***stable*** */ increasing /* decreasing */ uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 3,200 km²***	
	b) Indicate if operators were used (use these 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 set as the current range as there is no evidence of loss since the Directive came into force and the range is likely to encompass all geographical, geological and ecological variation.	
5.11 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*	

5.12 Additional information *Optional*	Maërl beds within Irish coastal waters were surveyed in specific dive surveys carried out between 2005 and 2009. At that time the area of the beds was mapped by a combination of diver transects and bottom viewers and the condition was assessed using the percentage cover of maërl, the ratio of live to dead maërl and the conspicuous species were noted. During the most recent monitoring project, over 70% of the previously mapped polygons for this community were revisited and surveyed using dropdown video supported by diver ground truthing. The data derived from this analysis was compared to the attributes listed in the transect data for the maërl-dominated community polygons from previous surveys (MERC, 2006-2009).

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2007-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1x1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***312***
6.3 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	a) Unit	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	***stable*** */ increasing / decreasing /* uncertain */ unknown*	
6.9 Short-term trend	**a) Minimum**	

Magnitude *Optional*	**b) Maximum**	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	a) Minimum	*Percentage change over the period indicated in the field 6.11. 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 6.11. If a precise value is known provide the same value under both minimum and maximum*
	c) Confidence interval	*Indicate confidence interval if a statistically reliable sampling scheme is used*
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	***a) 312 1x1 km grids***	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators Favourable Reference Population has been set as the current population as there is no evidence of decline since the Directive came into force and the population estimate is considered sufficient for the long-term survival of the species.	
6.16 Change and reason for change in population size	*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***	
6.17 Additional information *Optional*	For the survey of the maërl community, dropdown video combined with diver ground truthing was employed. These communities were extensively surveyed by a combination of diver transects and bottom viewers in Irish SACs between 2006 and 2009. During 2016 and 2018 a significant proportion of previously mapped polygons for each of these communities was resurveyed. At each polygon surveyed a Cathx Ocean® 4K dropdown video camera combined with RedHen Systems® spatial encoding was used to resurvey the polygons. One or more video transects through the polygons were carried out. The number of transects conducted through each polygon varied depending on the size of the polygon. In small polygons, typically those less than 20ha, a single transect through the polygon was conducted. In larger polygons additional transects were carried out to ensure that the full extent of the community was surveyed. Video surveys were supplemented by diver surveys using SCUBA by a team of marine ecologists. Dive surveys were carried out within three of the relevant communities within each site surveyed. During dive surveys stills images of the surveyed area were recorded and species lists of the all epifauna and their relative abundance on a SACFOR (**S**uperabundant, **A**bundant, **C**ommon, **F**requent, **O**ccasional, **R**are) scale were prepared. Characterising epifauna (i.e. those species recorded at an abundance of Frequent to Superabundant) were identified. Observations were also made on any impacts or disturbing activities seen within the surveyed area. This information was used to assist in the analysis and interpretation of the video transects. There has been no change in area during the reporting period. The unit used in 2013 was m^2. This has been updated to number of 1x1 km grids. Short-term trend was assessed over the period 2005-2018; the stable trend is assumed to hold also over the default trend period of 2007-2018.	

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? YES/**NO*** *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/**Unknown***
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	While the area of the maërl beds across its range has remained the same, the quality of the beds has deteriorated over the last reporting period. In Blacksod Bay physical damage to maërl thalli was observed due to benthic bivalve dredging at this site. Significant negative impacts were recorded in the maërl community including the rare *Lithothamnion dentatum* within Roaringwater Bay. These impacts of pseudofaeces deposition, and/or extensive algal cover along with the high numbers of the opportunistic ascidian *Ascidiella aspersa* were associated with the mussel longlines which lay in the immediate vicinity of the beds.

	The establishment of the invasive alien species *Sargassum muticum* in maërl beds was a noted impact with the potential to lead to significant ecosystem change in the future. Short-term trend was assessed over the period 2005-2018; the decreasing trend is assumed to hold also over the default trend period of 2007-2018.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**G01** Marine fish and shellfish harvesting (professional, recreational) activities causing physical loss and disturbance of seafloor habitats (H) **G15** Modification of coastal conditions for marine aquaculture (H) **G16** Marine aquaculture generating marine pollution (H) **I02** Other invasive alien species (other than species of Union concern) (H)	**G01** Marine fish and shellfish harvesting (professional, recreational) activities causing physical loss and disturbance of seafloor habitats (H) **G15** Modification of coastal conditions for marine aquaculture (H) **G16** Marine aquaculture generating marine pollution (H) **I02** Other invasive alien species (other than species of Union concern) (H)
8.2 Sources of information *Optional*	Scally, L., Pfeiffer, N.J. and Hewitt, E. (in prep.) Monitoring and assessment of six EU Habitats Directive Annex I marine habitats. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.	
8.3 Additional information *Optional*	During the course of the most recent survey programme, a number of direct impacts due to pressures on maërl beds were recorded. In Blacksod Bay physical damage was observed to maërl thalli in the maërl beds adjacent to and co-incident with the *Serpula vermicularis*-dominated community complex, a community which has been lost as a result of benthic bivalve dredging. Significant negative impacts were recorded in the maërl community within Roaringwater Bay SAC (MERC, 2014). Here, pseudofaeces deposition and/or extensive algal cover over the maërl beds including the rare *Lithothamnion dentatum* was caused by the presence of mussel longlines. A proliferation of opportunistic ascidian species was also recorded during sampling by diving, with *Ascidiella aspersa* forming an extensive community on the seabed adjacent to mussel lines. This	

	ascidian was recorded as super abundant in the maërl bed which occurs in the inner reaches of Kenmare River SAC. The establishment of the invasive alien species *Sargassum muticum* maërl beds was a noted impact with the potential to lead to significant ecosystem change in the future.

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*
	c) Habitat of the species	*Good / Poor /* ***Bad*** */ Unknown*
10.2 Additional information *Optional*	The Maërl-dominated community complex is a marine community type of the Annex I habitat Large shallow inlets and bays in ten SACs. In the current reporting period nine of these SACs were assessed; all bar Galway Bay SAC were found to be in Unfavourable condition. Of the remainder, seven are assessed as Unfavourable-Bad and one as Unfavourable-Inadequate. Eutrophication is a major factor acting on most of the sites as indicated by the prevalence of the opportunistic ascidian *Ascidiella aspersa* at a number of sites. The establishment of the invasive alien species *Sargassum muticum* in maërl beds is a noted impact with the potential to lead to significant ecosystem change in the future. Dredging has caused damage to the maërl bed and the loss of another keystone community (*Serpula vermicularis*) in Blacksod Bay. Therefore the Future prospects for Habitat for the species are Bad.	

11 Conclusions

Assessment of conservation status at end of reporting period	
11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.3 Habitat for the species	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*
11.4 Future prospects	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*
11.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) /* ***Bad (U2)*** */ Unknown (XX)*
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving /* ***deteriorating*** */ stable / unknown*

<table>
<tr><td rowspan="8">11.7 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 (11.5)</td><td>Overall trend in conservation status (11.6)</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 data</td><td>YES/<u>NO</u></td><td>YES/<u>NO</u></td></tr>
<tr><td>d) yes, due to the use of different method (including taxonomical change or 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 the 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 colspan="3"></td></tr>
<tr><td>11.8 Additional information

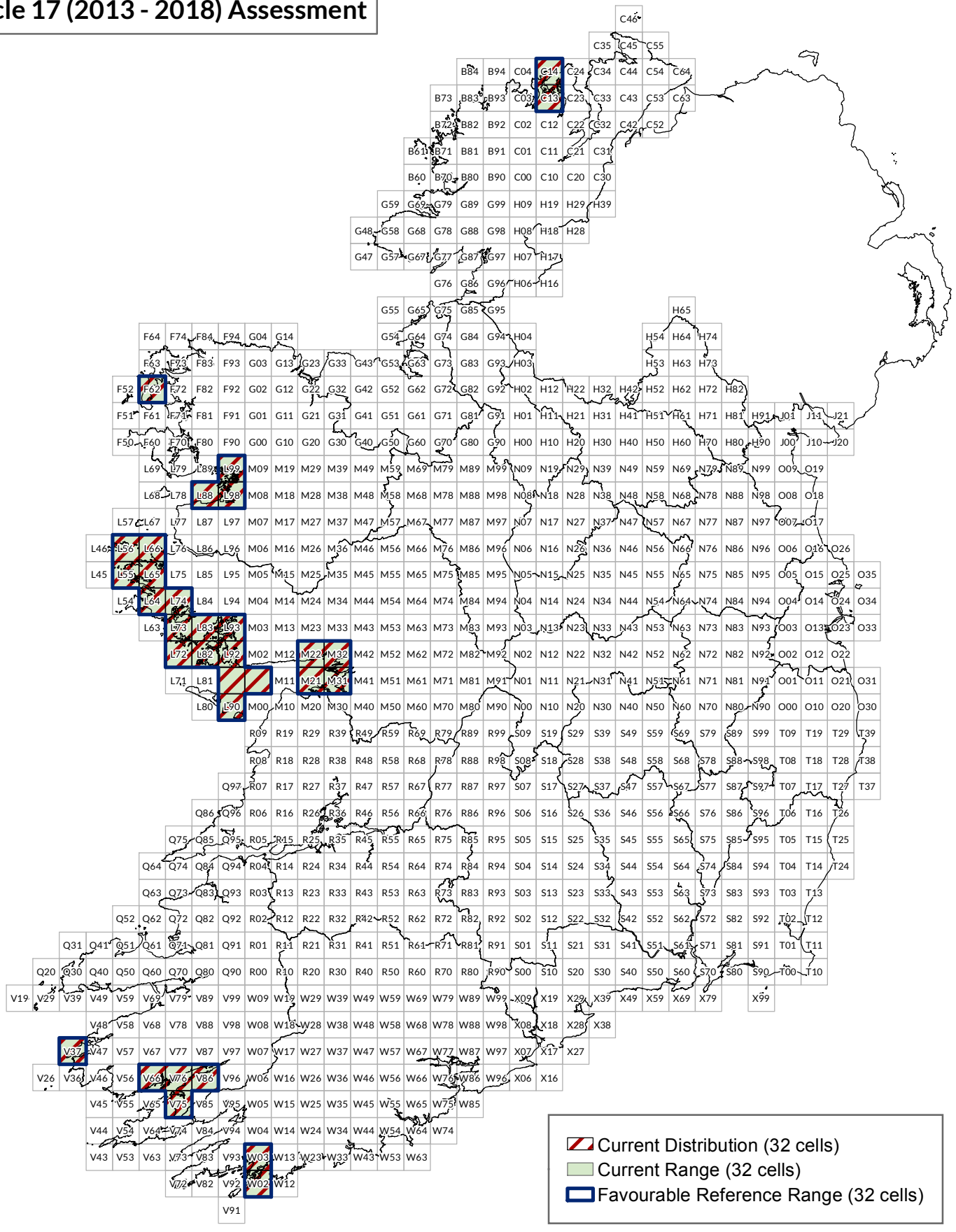
Optional</td><td colspan="2">The Overall assessment of Unfavourable-Bad/declining is due to the deterioration in the quality of the maërl beds caused by the deposition of pseudofaeces and/or extensive algal cover on the beds; the presence of negative indicator species such as the opportunistic ascidian Ascidiella aspersa; and the presence of the invasive alien species Sargassum muticum.</td></tr>
</table>

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Maërl
Lithothamnium coralloides (1376)
Phymatholithon calcareum (1377)
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

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Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Species code	***1400***
1.3 Species scientific name	*Leucobryum glaucum*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	White Cushion Moss
1.6i Species description	White Cushion Moss (*Leucobryum glaucum*) is a densely tufted moss, forming glaucous green cushions which can extend to one metre across and to 15 cm high. The plant can hold water like a sponge. Male and female parts are on separate plants and this species rarely produces sporophytes in Ireland. It grows in acidic woodland and mires, including wet heath, raised and blanket bog, and is widely distributed throughout Ireland.

2 Maps

Distribution of the species within the Member State concerned.

2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***1962-2018***
2.3 Distribution map	Submitted
2.4 Distribution map 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*
2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	Mapping of the species distribution was informed by two data sources: 1. Records compiled by the British Bryological Society (BBS) for their atlas mapping scheme (record dates: 1962 to 2012). 2. Records from various sources submitted to NPWS by the National Biodiversity Centre (NBDC) Waterford (record dates: 2001 to 2016). The Distribution for the species was generated by intersecting the standard 10km Terrestrial grid (Irish Grid coordinate system) with the records from these two data sources.

3 Information related to Annex V species (Art. 14)

3.1 Is the species taken in the wild/exploited?	*Is the species taken in the wild/exploited?* ***NO***

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic****, Marine Atlantic*
4.2 Sources of information	Blockeel, T.L., Bosanquet, S.D.S., Hill, M.O. and Preston, C.D. (2014) *Atlas of British and Irish Bryophytes*. Pisces Publications, Newbury. Ferriss, S.E., Inskipp, T.P., Kloda, J. and Sinovas, P. (2007) Wildlife trade in Ireland – a review. Confidential report to the National Parks and Wildlife Service, Ireland. UNEP World Conservation Monitoring Centre, Cambridge. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Overview Volume 1. Unpublished report, National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.
4.2i Additional information	

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***47,900 km²***	
5.2 Short-term trend Period	***2007-2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 Short-term trend 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*	
5.6 Long-term trend Period *Optional*		
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	

5.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
5.9 Long-term trend Method used *Optional*	*a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.10 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	
5.11 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*	
5.12 Additional information *Optional*	The range map consists of 479 current range cells, including the 262 current distribution cells and a further 217 cells, derived by running the EEA range tool (version 10), that could potentially support the species due to geological and edaphic reasons. As no targeted surveys of *Leucobryum glaucum* have taken place the range is considered a minimum estimate. As there is no evidence of a decline since the Directive came into force the current range is set as approximately equal to the Favourable Reference Range. A stable trend is set as there is no evidence to suggest a decline within the default trend period.	

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***1962-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	**1 x 1 km grids**
	b) Minimum	

	c) Maximum	
	d) Best single value	**502**
6.3 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.6 Population size 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*	
6.7 Short-term trend Period	***2007-2018***	
6.8 Short-term trend Direction	***stable*** / increasing / decreasing / uncertain / unknown	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 Short-term trend 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*	
6.11 Long-term trend Period *Optional*		
6.12 Long-term trend Direction *Optional*	stable / increasing / decreasing / uncertain / unknown	
6.13 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
6.14 Long-term trend Method used *Optional*	*a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	a) In km^2 or	
	b) Operator ≈ (approximately equal to) *or*	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information *Optional*	The number of 1km grid squares submitted as an estimate for the population size of the species was derived by intersecting the records used in mapping the distribution with the standard 1km Terrestrial grid (Irish Grid coordinate system). Any 10km square record was translated into one single 1km square. As no targeted surveys of *Leucobryum glaucum* have taken place the population size is considered a minimum estimate. The Favourable Reference Population is set as approximately equal to the current population as there is no evidence of a decline since the Directive came into force. A stable trend is set as there is no evidence to suggest a decline within the default trend period.	

7 Habitat for the species

7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)?* ***YES****/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied habitat 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*
7.3 Short-term trend Period	***2007-2018***
7.4 Short-term trend Direction	***stable*** / increasing / decreasing / uncertain / unknown

7.5 Short-term trend 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*
7.6 Long-term trend Period *Optional*	
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 Long-term trend Method used *Optional*	*a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
7.9 Additional information *Optional*	Based on expert opinion with no sampling. As no targeted surveys of *Leucobryum glaucum* have been carried out and because of the fact that the species is found across such a diversity of habitats, it would be difficult to report on the quality of all. Many peatland areas have suffered from declines in both area and quality as a result of over-grazing and drainage. However, it is considered that there is enough habitat of sufficient quality to ensure the long-term survival of the species.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**XXp** No pressures	**Xxt** No threats
8.2 Sources of information *Optional*		
8.3 Additional information *Optional*	A study was commissioned in 2006 by the National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Ireland to investigate wildlife trade in Ireland. There was no evidence of exploitation of this species presented in the report (Ferriss *et al*., 2007) and there is no evidence that the species is under any significant pressures or threats at present.	

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	As there is enough habitat of suitable quality to support this species and no current pressures of significant importance to threaten the species over the next 12 years, the Future prospects of all attributes are considered to be good.	

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*

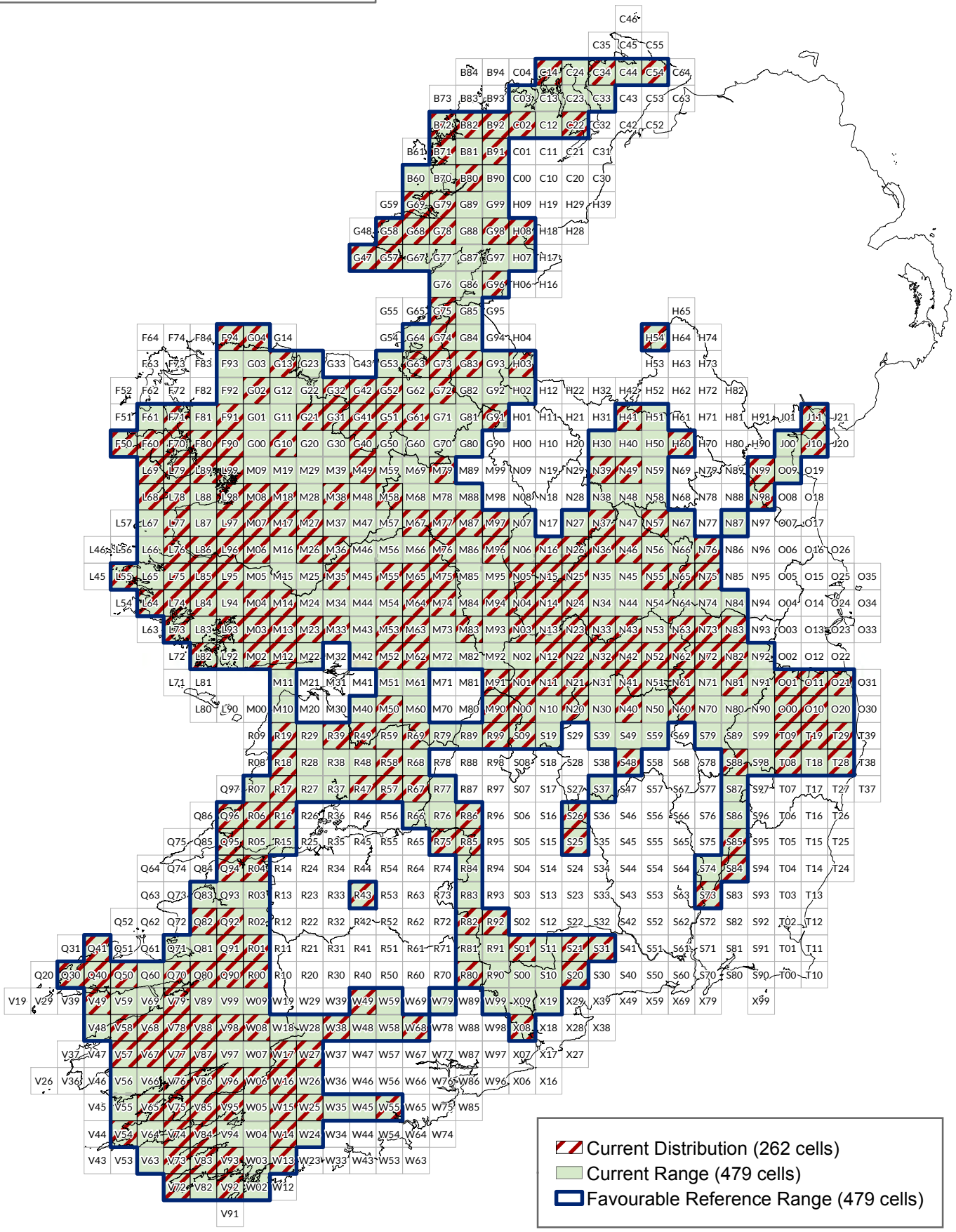
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the nature of change	*YES/NO*	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
11.8 Additional information *Optional*	The current range is large enough to allow the long-term survival of the species. The population is sufficient to ensure the long-term viability of the species. Although some of the habitats in which the species occurs are impacted by pressures, there is enough habitat of sufficient quality to support the species. There is no evidence that pressures are operating to compromise the status of this species. Therefore this species has been assessed as Favourable with a stable trend.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

White Cushion Moss
Leucobryum glaucum (1400)
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

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Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1409***
1.3 Species scientific name	*Sphagnum* spp.
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	
1.6i Species description	*Sphagnum* mosses are the key peat-forming species in most acid bogs, including raised bogs and blanket bogs, and can occur in a variety of other wetland habitats such as wet heaths, wet woodland, transition mires and alkaline fens. These mosses usually form carpets or hummocks made up of vertically growing shoots and can hold up to twenty times their own dry weight in water. Their morphology depends on the wetness and exposure of the habitat but all require high rainfall to survive. There are 32 *Sphagnum* species recorded from Ireland out of a total of 55 known species recorded in Europe.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	
2.3 Distribution map	Not submitted
2.4 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*
2.5 Additional maps *Optional*	Not submitted
2.6i Additional information	

3 Information related to Annex V species (Art. 14)	
3.1 Is the species taken in the wild/exploited?	*Is the species taken in the wild/exploited? YES/**NO***

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned.	
4 Biogeographical and marine regions	
4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
4.2 Sources of information	Ferriss, S.E., Inskipp, T.P., Kloda, J. and Sinovas, P. (2007) *Wildlife trade in Ireland – a review*. Confidential report to the National Parks and Wildlife Service, Ireland. UNEP World Conservation Monitoring Centre, Cambridge. Laine, J., Flatberg, K.I., Harju, P., Timonen, T., Minkkinen, K., Laine, A., Tuittila, E.-S. and Vasander, H. (2018) Sphagnum *Mosses: The Stars of European Mires*. University of Helsinki, Department of Forest Sciences, Sphagna Ky, Helsinki. 326 pp. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Overview Volume 1. Unpublished report, National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.
4.2i Additional information	

5 Range		
Range within the biogeographical/marine region concerned.		
5.1 Surface area	***N/A***	
5.2 Short-term trend Period		
5.3 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
5.5 Short-term trend 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*	
5.6 Long-term trend Period *Optional*		
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	

5.9 Long-term trend Method used *Optional*	*a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.10 Favourable reference range	*a) In km2 or*	
	b) Indicate if operators were used (use these 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	
5.11 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*	
5.12 Additional information *Optional*		

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***N/A***	
6.2 Population size (*in reporting unit)*	a) Unit	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	a) Unit	
	b) Minimum	
	c) Maximum	
	d) Best single value	

6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.6 Population size 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*	
6.7 Short-term trend Period		
6.8 Short-term trend Direction	stable / increasing / decreasing / uncertain / unknown	
6.9 Short-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
6.10 Short-term trend 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*	
6.11 Long-term trend Period *Optional*		
6.12 Long-term trend Direction *Optional*	stable / increasing / decreasing / uncertain / unknown	
6.13 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
6.14 Long-term trend Method used *Optional*	*a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) In km^2 or*	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information *Optional*		

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? YES/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied habitat 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*
7.3 Short-term trend Period	
7.4 Short-term trend Direction	stable / increasing / decreasing / uncertain / unknown
7.5 Short-term trend 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*
7.6 Long-term trend Period *Optional*	
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 Long-term trend Method used *Optional*	*a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
7.9 Additional information *Optional*	

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal		
8.2 Sources of information *Optional*		
8.3 Additional information *Optional*		

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	a) Range	*Good / Poor / Bad / Unknown*
	b) Population	*Good / Poor / Bad / Unknown*
	c) Habitat of the species	*Good / Poor / Bad / Unknown*
10.2 Additional information *Optional*		

11 Conclusions

Assessment of conservation status at end of reporting period	
11.1 Range	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.2 Population	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.3 Habitat for the species	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.4 Future prospects	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.5 Overall assessment of Conservation Status	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*

11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating / **stable** / unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*

11.8 Additional information *Optional*	There are 32 *Sphagnum* species in the Republic of Ireland. The overall conservation status of this genus as a group is Inadequate. Range and Population are deemed to be in Favourable status as the genus is widely distributed. However, although this genus occurs in many widespread habitats, the condition of these habitats is considered to be inadequate due to peat extraction, drainage and eutrophication, for example. The conservation assessments for blanket bog, raised bog and fen habitats were taken into consideration for this assessment and the habitat for this species group was assessed as Inadequate. A study commissioned in 2006 by the National Parks and Wildlife Service to investigate wildlife trade in Ireland noted some trade in moss species (Ferriss *et al*., 2007). However, it appeared to be low-level and, with one exception, did not involve plants collected in Ireland. *Sphagnum* was formerly collected for use in hanging baskets; however this has not been prevalent in the last 20 years or so. Collection of these species was not widespread and unlikely to pose a conservation problem. Therefore, as regards future prospects, collection is not a concern, but due to the poor conservation status of the peatland habitats within which the majority of *Sphagnum* species occur, the overall Future prospects are rated as Inadequate. The overall Conservation Status is thus Inadequate.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1409***
1.3 Species scientific name	*Sphagnum* spp.
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	
1.6i Species description	*Sphagnum* mosses are the key peat-forming species in most acid bogs, including raised bogs and blanket bogs, and can occur in a variety of other wetland habitats such as wet heaths, wet woodland, transition mires and alkaline fens. These mosses usually form carpets or hummocks made up of vertically growing shoots and can hold up to twenty times their own dry weight in water. Their morphology depends on the wetness and exposure of the habitat but all require high rainfall to survive. There are 32 *Sphagnum* species recorded from Ireland out of a total of 55 known species recorded in Europe.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	
2.3 Distribution map	Not submitted
2.4 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*
2.5 Additional maps *Optional*	Not submitted
2.6i Additional information	

3 Information related to Annex V species (Art. 14)	
3.1 Is the species taken in the wild/exploited?	*Is the species taken in the wild/exploited? YES/**NO***

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned.	
4 Biogeographical and marine regions	
4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
4.2 Sources of information	Ferriss, S.E., Inskipp, T.P., Kloda, J. and Sinovas, P. (2007) *Wildlife trade in Ireland – a review*. Confidential report to the National Parks and Wildlife Service, Ireland. UNEP World Conservation Monitoring Centre, Cambridge. Laine, J., Flatberg, K.I., Harju, P., Timonen, T., Minkkinen, K., Laine, A., Tuittila, E.-S. and Vasander, H. (2018) Sphagnum *Mosses: The Stars of European Mires*. University of Helsinki, Department of Forest Sciences, Sphagna Ky, Helsinki. 326 pp. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Overview Volume 1. Unpublished report, National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin.
4.2i Additional information	

5 Range		
Range within the biogeographical/marine region concerned.		
5.1 Surface area	***N/A***	
5.2 Short-term trend Period		
5.3 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
5.5 Short-term trend 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*	
5.6 Long-term trend Period *Optional*		
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	

5.9 Long-term trend Method used *Optional*	*a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
5.10 Favourable reference range	*a) In km2 or*	
	b) Indicate if operators were used (use these 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	
5.11 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*	
5.12 Additional information *Optional*		

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***N/A***	
6.2 Population size (*in reporting unit)*	a) Unit	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	a) Unit	
	b) Minimum	
	c) Maximum	
	d) Best single value	

6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.6 Population size 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*	
6.7 Short-term trend Period		
6.8 Short-term trend Direction	stable / increasing / decreasing / uncertain / unknown	
6.9 Short-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
6.10 Short-term trend 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*	
6.11 Long-term trend Period *Optional*		
6.12 Long-term trend Direction *Optional*	stable / increasing / decreasing / uncertain / unknown	
6.13 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
6.14 Long-term trend Method used *Optional*	*a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) In km^2 or*	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information *Optional*		

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? YES/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied habitat 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*
7.3 Short-term trend Period	
7.4 Short-term trend Direction	stable / increasing / decreasing / uncertain / unknown
7.5 Short-term trend 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*
7.6 Long-term trend Period *Optional*	
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 Long-term trend Method used *Optional*	*a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
7.9 Additional information *Optional*	

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal		
8.2 Sources of information *Optional*		
8.3 Additional information *Optional*		

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	a) Range	*Good / Poor / Bad / Unknown*
	b) Population	*Good / Poor / Bad / Unknown*
	c) Habitat of the species	*Good / Poor / Bad / Unknown*
10.2 Additional information *Optional*		

11 Conclusions

Assessment of conservation status at end of reporting period	
11.1 Range	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.2 Population	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.3 Habitat for the species	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.4 Future prospects	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.5 Overall assessment of Conservation Status	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*

<table>
<tr><td>11.6 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">11.7 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 (11.5)</td><td>Overall trend in conservation status (11.6)</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 data</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>d) yes, due to the use of different method (including taxonomical change or use of different thresholds)</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>e) yes, but there is no information on the 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>
</table>

11.8 Additional information *Optional*	There are 32 *Sphagnum* species in the Republic of Ireland. The overall conservation status of this genus as a group is Inadequate. Range and Population are deemed to be in Favourable status as the genus is widely distributed. However, although this genus occurs in many widespread habitats, the condition of these habitats is considered to be inadequate due to peat extraction, drainage and eutrophication, for example. The conservation assessments for blanket bog, raised bog and fen habitats were taken into consideration for this assessment and the habitat for this species group was assessed as Inadequate. A study commissioned in 2006 by the National Parks and Wildlife Service to investigate wildlife trade in Ireland noted some trade in moss species (Ferriss *et al*., 2007). However, it appeared to be low-level and, with one exception, did not involve plants collected in Ireland. *Sphagnum* was formerly collected for use in hanging baskets; however this has not been prevalent in the last 20 years or so. Collection of these species was not widespread and unlikely to pose a conservation problem. Therefore, as regards future prospects, collection is not a concern, but due to the poor conservation status of the peatland habitats within which the majority of *Sphagnum* species occur, the overall Future prospects are rated as Inadequate. The overall Conservation Status is thus Inadequate.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1413***
1.3 Species scientific name	*Lycopodium* spp.
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	
1.6i Species description	Clubmosses (family Lycopodiaceae) are an ancient group of vascular plants that, like ferns, produce spores rather than seeds. In Ireland four species of Clubmoss are included under the species code 1413 *Lycopodium* genus: *Diphasiastrum alpinum* (L.) Holub [= *Lycopodium alpinum* L.] (Alpine Clubmoss), *Huperzia selago* (L.) Bernh. ex Schrank & Mart. (Fir Clubmoss), *Lycopodium clavatum* L. (Stag's-horn Clubmoss) and *Lycopodiella inundata* (L.) Holub (Marsh Clubmoss). *Diphasiastrum alpinum* is an evergreen perennial herb that has an upland distribution, occurring in mossy heaths, acidic grasslands or bare peat on mountain ridges and summits (Parnell & Curtis, 2012). It has a preference for moist but well-drained, thin peaty soils, especially those overlying rocks (Preston *et al.,* 2002). Its main stem is prostrate (often buried), with widely spaced alternate leaves; from these, branches arise which themselves are repeatedly branched, to form distinctive fan-shaped structures with bluish-green, lanceolate, acutely pointed leaves that are arranged in four longitudinal rows. The cones are terminal (Parnell & Curtis, 2012). Vegetative propagation is more frequent than sexual reproduction (Preston *et al.,* 2002). It is considered a rare yet under-recorded species in the Irish context (Roche, 2011; Hodd & Roche, 2015). The All-Ireland population of the species was assessed as Near Threatened, based on a decline in its Area of Occupancy between the two assessment periods 1930-1969 and 1987-1999, in the recent Red List for vascular plants in Ireland (Wyse Jackson *et al*., 2016). *Huperzia selago* is an evergreen perennial herb that has a generally upland distribution, occurring on mountain cliffs and wet heaths, mostly above 300 m, but sometimes also on lowland bogs (Parnell & Curtis, 2012). It is generally found on acidic, nutrient-poor, sandy or peaty soils (Preston *et al.,* 2002). Its main stem is erect, between 5 and 12 cm high, usually forked once or twice, with sporangia in the leaf-axils rather than aggregated into distinct cones; sometimes, however, bud-like bulbils instead of sporangia occur in the leaf-axils and these detach and function in vegetative reproduction (Parnell & Curtis, 2012). The All-Ireland population of *H. selago* was assessed as Least Concern in Wyse Jackson *et al*. (2016). *Lycopodium clavatum* is a prostrate, evergreen perennial herb found on wet heaths and grassy mountain slopes and with a scattered

	distribution in Ireland. It is a pioneer species, often recorded in open habitats such as bare and rocky ground. While propagation is mostly by vegetative means, its spores can also colonise new sites, particularly where disturbed soil is present, e.g. roadside embankments and quarries. It is described in Parnell & Curtis (2012) as "rare and declining", largely due to pressures on its habitat such as overgrazing, burning and agricultural improvement. However, as it is a poor competitor, naturally eroded areas in mountains and a level of erosion due to trampling are likely to benefit the species, and small amounts of low-density mixed grazing have been found to reduce competition from other species, allowing open patches of bare ground to develop which it can colonise (Smyth *et al.,* 2015). The All-Ireland population of the species was assessed as Near Threatened, based on a decline in its Area of Occupancy and suspected future decline (Wyse Jackson *et al*., 2016). *Lycopodiella inundata* is found on lake margins and on open patches on peaty soil in heathland, flushes and bog. Its habitats are typically lowland, and moderate levels of disturbance such as periodic inundation, grazing and trampling are both beneficial and necessary to maintain an open habitat. The species is a poor competitor and is quickly lost where management or hydrological regime shifts result in vigorous growth of other vegetation. It can tolerate a wide range of soil pH. Many of its sites in Ireland are known to flood, in some years for considerable periods of time. *L. inundata* is the rarest of the four Annex V clubmosses and is listed on Ireland's Flora (Protection) Order 2015. The All-Ireland population of the species was assessed as Vulnerable, based on declines in Area of Occupancy, Extent of Occurrence and habitat quality (Wyse Jackson *et al*., 2016). There is no evidence of the exploitation/commercial collecting of any of these species in Ireland.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	
2.3 Distribution map	Not submitted
2.4 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*
2.5 Additional maps *Optional*	Not submitted
2.6i Additional information	

3 Information related to Annex V species (Art. 14)	
3.1 Is the species taken in the wild/exploited?	*Is the species taken in the wild/exploited? YES/**NO***

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned.	
4 Biogeographical and marine regions	
4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
4.2 Sources of information	BSBI (2015-2018) Surveys of sites for Lycopodiaceae species in the Republic of Ireland, 2015-2018. Unpublished recording cards of surveys undertaken by members of the Botanical Society of Britain and Ireland (BSBI) on behalf of the National Parks and Wildlife Service, Dublin. BSBI (2018) Plant records extracted from the BSBI's Distribution Database following data request. Accessed September 2018. Hodd, R.L. and Roche, J.R. (2015) *Diphasiastrum alpinum* (L.) Holub (Alpine Clubmoss) rediscovered in Co. Kerry (H1). *Irish Naturalists' Journal* 34 (2): 125-126. NBDC (2018) Information from the National Biodiversity Data Centre downloaded from https://maps.biodiversityireland.ie, September 2018. NPWS (2018) NPWS Irish Vascular Plants Database. Recorder 6 database of records from Ireland for protected, threatened, rare, scarce and other vascular plant species. National Parks and Wildlife Service, Dublin. O'Neill, F.H. *et al*. (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. Parnell, J. and Curtis, T. (2012) *Webb's An Irish Flora*. 8th edition. Cork University Press, Cork. Preston, C.D., Pearman, D.A. and Dines, T.D. (eds.) (2002) *New Atlas of the British and Irish Flora*. Oxford University Press, Oxford. Roche, J.R. (2011) New records for *Diphasiastrum alpinum* L. (Holub) and their implications for the species' conservation status in Ireland. *Irish Botanical News* 21: 16-20. Smyth, N., Nienhuis, C., Muldoon, C. and Lynn, D. (2015) Conservation assessment and monitoring methods for the Annex V Clubmoss group (*Lycopodium* spp.) in Ireland. *Irish Wildlife Manuals*, No. 86. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, 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.
4.2i Additional information	

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***N/A***	
5.2 Short-term trend Period		
5.3 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*		
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	*a) In km^2 or*	
	b) Indicate if operators were used (use these 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	
5.11 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*	
5.12 Additional information *Optional*		

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	***N/A***	
6.2 Population size (*in reporting unit)*	a) Unit	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	a) Unit	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate*	

	b) Based mainly on extrapolation from a limited amount of data *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period		
6.8 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*		
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a)*	
	b) ≈ approximately equal to current population	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information *Optional*		

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? YES/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	
7.4 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	

8 Main pressures and threats		
8.1 Characterisation of pressures/threats		
a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	Threat
8.2 Sources of information *Optional*		
8.3 Additional information *Optional*		

9 Conservation measures

To be reported only for Annex II species

10 Future prospects		
10.1 Future prospects of parameters	a) Range	*Good / Poor / Bad / Unknown*
	b) Population	*Good / Poor / Bad / Unknown*
	c) Habitat of the species	*Good / Poor / Bad / Unknown*
10.2 Additional information *Optional*		

11 Conclusions

Assessment of conservation status at end of reporting period	
11.1 Range	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.2 Population	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*

11.3 Habitat for the species	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	*Favourable (FV) / Inadequate (U1)/ Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating / **stable** / unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	The overall conservation status of *Lycopodium* spp. was assessed as Unfavourable-Inadequate. This was based on unfavourable assessments for the Habitat for the species and Future prospects parameters for *Huperzia selago* and *Lycopodium clavatum*. *Lycopodium clavatum* also received an unfavourable assessment for Population. The overall trend in conservation status was assessed as stable. This is based on nationally stable trends for Range, Population and Habitat for the species when the four species are assessed in combination. The individual assessment of *Lycopodium clavatum* identified a decreasing trend in Population for this species		

	(magnitude of the trend was more than 1% per year). However, when the Population trend was assessed nationally across all four *Lycopodium* species, the magnitude of the trend was less than 1% per year. As the two other parameters were stable, following EU guidelines on trend assessment, the overall trend was assessed as stable. During the current reporting period, these four clubmoss species were assessed as part of the Rare Plants Monitoring Survey (O'Neill *et al*., in prep.). Ten sites of *Huperzia selago* and five sites each of *Diphasiastrum alpinum, Lycopodium clavatum* and *Lycopodiella inundata* were surveyed, a total of 25 sites. Full relevés incorporating assessment data were recorded at each site; a total of 112 plots were recorded. The data were analysed to give an indication of the preferences for each of the species in terms of habitat type, altitude, cover of bare rock, bare soil and total vegetation, among others. Full details are in O'Neill *et al*. (in prep.) but the main points are summarised below. Additional sites for these four species were surveyed by members of the Botanical Society of Britain and Ireland (BSBI, 2015-2018) and these data were utilised in this assessment. There was a strong overlap between *Diphasiastrum alpinum* and *Lycopodium clavatum* in terms of their habitat preferences, with both found, as expected, to have a distribution strongly associated with higher altitude, being mostly found in alpine heaths. *Lycopodium clavatum* additionally was found in upland grassland. Both of these species had a weak negative association with taller vegetation and bare soil. *Huperzia selago* occurred in both upland and lowland areas and across a range of habitats including alpine heaths, wet and dry heaths, blanket bogs and exposed rock. There was thus some overlap between *D. alpinum, L. clavatum* and *H. selago* habitats, with the first two effectively being found within a subset of habitats supporting *H. selago*. However, *Lycopodiella inundata* was quite separate, being found on lake margins and on open patches on peaty soil, primarily in wet heath. Its habitats were typically lowland, generally in flushed or periodically inundated habitat, and no overlap occurred with the other three species, except on one occasion with *H. selago* (O'Neill *et al*., in prep.). *Huperzia selago* is the most widespread and frequent of the *Lycopodium* clubmosses, and *Lycopodiella inundata* is the least. Historical declines in the national range of clubmosses have occurred due to habitat loss from agricultural improvement, burning, overgrazing and drainage (Preston *et al*., 2002; Wyse Jackson *et al*., 2016). The indications are that their range has not declined since the Habitats Directive came into force in 1994, but definitive data of suitable resolution from across the entire range of the species are lacking. Historical declines in populations of the four species have also occurred, for the same reasons as range decline. Due to the difficulty of proving a negative result (for example, definitively confirming the local extinction of a species), records back to 1970 have been used to determine the current distribution of populations. Some older populations have been searched for but not refound (Smyth *et al*., 2015; O'Neill *et al*., in prep.), raising the possibility that they are no longer extant, although suitable habitat

	has been found at the searched sites. On the other hand, other well-established new populations have been discovered that were not in the historical lists, suggesting a degree of under-recording of some of the species as noted by some authors (e.g. Roche, 2011; Hodd & Roche, 2015; Smyth *et al*., 2015). A low level of disturbance or grazing can be regarded as beneficial to clubmosses to keep the habitat open. Excessive grazing, however, was identified as a negative pressure on habitats for the clubmosses nationally, particularly on lower-altitude sites of *Huperzia selago* (O'Neill *et al*., in prep.). There was no clear indication of overgrazing being a negative pressure on *Lycopodiella inundata* populations surveyed in this monitoring period, with the levels of grazing observed being appropriate in the sites surveyed (O'Neill *et al*., in prep.). Drainage is a potential problem for *Lycopodiella inundata* populations, but there was no clear indication that drainage is a current pressure on the species, with the surveys during the current monitoring period finding hydrology to be suitable across the five *L. inundata* sites surveyed (O'Neill *et al*., in prep.). However, this should continue to be assessed in the future. Climate change has not been included as a negative pressure or threat on clubmoss populations as its intensity is currently unknown. Its influence, however, is likely to be negative, particularly for upland species such as *Diphasiastrum alpinum* and *Lycopodium clavatum*.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1378***
1.3 Species scientific name	*Cladonia* (*Cladina*) spp.
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Reindeer Lichens; Reindeer Mosses
1.6i Species description	The former genus *Cladina* is no longer recognised as a taxonomically valid unit, even as a sub-genus, consisting as it does of at least two unrelated groups, with a similar morphology derived by convergent evolution (Sanderson, 2016), and it is more useful to refer to the group here as the Reindeer Lichens. Currently there are four species of Reindeer Lichen confirmed from Ireland: *Cladonia arbuscula* (Wallr.) Flot. (represented by subsp. *squarrosa* (Wallr.) Ruoss), *C. ciliata* Stirt. (represented by var. *ciliata* and var. *tenuis* (Flörke) Ahti), *C. portentosa* (Dufour) Coem. and *C. rangiferina* (L.) F.H. Wigg. A fifth species, *C. azorica* Ahti, also occurs but a recent study has questioned its taxonomic validity, in suggesting that Macaronesian material of the species forms part of the variation within *C. portentosa*. This study did not, however, include Irish or British material (which is known to be somewhat different from the Macaronesian taxa and ecologically very distinct from *C. portentosa*) and further research is required to clarify if Irish and British *C. azorica* comprises a new taxon (Sanderson, 2016). Old records of *C. mitis* Sandst. and *C. stellaris* (Opiz) Pouzar & Vězda are unsupported by voucher specimens and are rejected as errors (Sanderson, 2016; Seaward, 2010). The occurrence in Ireland of *C. mediterranea* P.A. Duvign. & Abbayes is considered possible, perhaps on the south coast, (Sanderson, 2016), but this species has not yet been recorded here. *C. portentosa* and *C. ciliata* are the commonest and most widespread of the five species in Ireland, followed by *C. arbuscula* and *C. rangiferina*, in that order. *C. azorica* is the rarest of the five, having been recorded from only two locations. Reindeer Lichens, collectively, are found on low-productivity acid soils, predominately on drier soils but extending on to drier bog peats. They are poor competitors with vascular plants and require habitats where vascular plant vegetation is naturally supressed and low, or set back by periodic fires or by grazing. They are particularly poor competitors with grasses and are mainly found in heath and bog with low grass productivity (Sanderson, 2016). In Ireland they occur in a wide range of habitats, including dry heaths, wet heaths, alpine and subalpine heaths, raised bogs, blanket bogs, siliceous screes, rocky slopes, fixed coastal dunes, dune heaths, mature vegetated shingle and on rocks, including in old Oak woodland.

	No evidence of the exploitation/commercial collecting in Ireland of any of the Reindeer Lichen species has been found.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	
2.3 Distribution map	Not submitted
2.4 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*
2.5 Additional maps *Optional*	Not submitted
2.6i Additional information	

3 Information related to Annex V species (Art. 14)	
3.1 Is the species taken in the wild/exploited?	*Is the species taken in the wild/exploited? YES/**NO***

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned.	
4 Biogeographical and marine regions	
4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
4.2 Sources of information	NPWS (2013) *The Status of EU Protected Habitats and Species in Ireland. Overview Volume 1*. Unpublished Report, National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. Sanderson, N.A. (2016) *A review of Reindeer Lichens in the Republic of Ireland*. Unpublished report to CEDaR, National Museums Northern Ireland, Holywood. Seaward, M.R.D. (2010) *Census Catalogue of Irish Lichens*. 3rd edition. National Museums Northern Ireland, Holywood.
4.2i Additional information	

5 Range		
Range within the biogeographical/marine region concerned.		
5.1 Surface area	***N/A***	
5.2 Short-term trend Period		
5.3 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*		
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	*a) In km^2 or*	
	b) Indicate if operators were used (use these 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	
5.11 Change and reason for change in surface area of	*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*	

range	*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*	
5.12 Additional information *Optional*		

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period		
6.2 Population size (*in reporting unit)*	a) Unit	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	a) Unit	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period		

6.8 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*		
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) In km^2 or*	
	b) Operator ≈ (approximately equal to current population)	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
6.16 Change and reason for change in population size	*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*
6.17 Additional information *Optional*	

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? YES/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	
7.4 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information	

Optional	

8 Main pressures and threats

8.1 Characterisation of pressures/threats		
a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	Threat
8.2 Sources of information *Optional*		
8.3 Additional information *Optional*		

9 Conservation measures

To be reported only for Annex II species

10 Future prospects		
10.1 Future prospects of parameters	a) Range	*Good / Poor / Bad / Unknown*
	b) Population	*Good / Poor / Bad / Unknown*
	c) Habitat of the species	*Good / Poor / Bad / Unknown*
10.2 Additional information *Optional*		

11 Conclusions

Assessment of conservation status at end of reporting period	
11.1 Range	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.2 Population	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.3 Habitat for the species	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.4 Future prospects	*Favourable (FV) / Inadequate (U1)/ Bad (U2) / Unknown (XX)*

11.5 Overall assessment of Conservation Status	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating / **stable** / unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	The habitats in which Reindeer Lichen species occur in Ireland are currently assessed as Unfavourable (Bad or Inadequate) and, due to ongoing pressures on these, the overall conservation status of the group is assessed as Inadequate (U1). The overall trend has been assessed as stable as there is still likely to be sufficient habitat to support populations of these species.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1013***
1.3 Species scientific name	*Vertigo geyeri*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Geyer's Whorl Snail
1.6i Species description	*Vertigo geyeri* is one of eight species of whorl snail (genus *Vertigo*) living in Ireland. The whorl snails are amongst the smallest of the Irish land molluscs ranging in size from 1.7 to 2.7mm in height and 1 to 1.5mm in width. *Vertigo geyeri* is small even amongst these small species, so finding it is a challenge and certain identification requires microscopic examination. All whorl snails favour damp or wet habitats, where they live mostly in moss, leaves and decaying vegetation. They feed on bacterial films and decaying vegetation. *Vertigo geyeri* is consistent in where it lives, within the saturated and decaying roots of small sedges (particularly *Carex viridula* ssp. *brachyrrhyncha*) and associated fen mosses (particularly *Drepanocladus revolvens* and *Campylium stellatum*). It is stringent in its requirement for saturated water conditions in calcareous, groundwater-fed flushes. This microhabitat is generally found in mosaics of suitable patches that are often limited in size to a few metres square within wider fen habitats, which in Ireland can themselves fall within wider site habitats as diverse as raised bog laggs, transition mires, lake shores, hill or mountain slopes, and wetlands associated with coastal dunes and machair. It requires an openness of habitat that prevents succession by shade-loving plants and more competitive shade-loving snails. There is a general requirement for stable conditions and *Vertigo geyeri* is particularly sensitive to changes in hydrology. Within its macro-habitat, *V. geyeri* needs constancy of hydrological conditions, but with enough variation to provide refugia for the meteorological extremes that the habitat must endure. This species is hermaphrodite but may often be self-fertilising with some cross fertilisation. One to ten uncalcified, separated eggs are produced which have a 14-day development period. The main reproductive period may vary considerably from site to site and depending upon meteorological conditions. At some sites the main period appears to be March/April and the species reaches sexual maturity in less than a year, with maximum numbers of adults observed in the autumn (September/October). However, at a site in Anglesey it was found that there was an extended and variable breeding season with no clear annual cycle. Individuals may live for somewhat more than a year, but less than two years. Population densities seem frequently to be low, but up to 200 individuals/m² have been recorded (Killeen, 2003).

	Dispersal mechanisms are uncertain, but hypotheses include transport by charadriiform birds and/or grazing animals, dependent upon circumstance. The ability of the species to self-fertilise makes it possible for a single coloniser to establish a new population. *Vertigo geyeri* is considered to be under threat in Ireland. It was assessed as Vulnerable on the Irish Red List (Byrne *et al*., 2009). However, in Europe the assessment in the latest Red List was Least Concern (Cuttelod *et al*., 2011). *Vertigo geyeri* is found locally in calcareous fens in central Ireland and more widely in western coastal counties from Galway to Donegal. For further information consult the references listed in section 4.2.

2 Maps

Distribution of the species within the Member State concerned.

2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***1994-2018***
2.3 Distribution map	Submitted
2.4 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*
2.5 Additional maps *Optional*	Range map was submitted
2.6i Additional information	The distribution and population data have been compiled from: a. published and unpublished reports containing records of the species such as Holyoak (2005) and Long & Brophy (2013); b. NPWS commissioned surveys of possible sites for the species conducted between 1995 and 2006 (Moorkens, 1995, 1997, 1998, 2006); c. national monitoring survey 2007-2001 (Moorkens & Killeen, 2011); d. national monitoring survey 2014-2017 (Long & Brophy, in prep.). All occupied hectads with records since 1994 are shown in the current distribution unless there is good evidence from surveys that the species is no longer present.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	***Atlantic**, Marine Atlantic*
4.2 Sources of information	Brophy, J.T. & 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 Culture, Heritage and the Gaeltacht, Ireland. Byrne, A., Moorkens, E.A., Anderson, R., Killeen, I.J. & Regan, E.C. (2009) *Ireland Red List No. 2 – Non-Marine Molluscs*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. Cuttelod, A., Seddon, M. & Neubert, E. (2011) *European Red List of Nonmarine Molluscs.* Luxembourg: Publications Office of the European Union. Holyoak, G.A., 2005. Widespread occurrence of *Vertigo geyeri* (Gastropoda: Vertiginidae) in north and west Ireland. *Irish Naturalists' Journal* 28: 141-150. Long, M.P. & Brophy, J.T. (2013) Survey, habitat and population assessments of *Vertigo geyeri*, *Vertigo moulinsiana*, *Oxyloma sarsi* and *Omphiscola glabra* at selected sites. Unpublished report to National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. Long, M.P. & Brophy, J.T. (in prep.) Monitoring of sites and habitat for three Annex II species of whorl snail (*Vertigo*) 2014-2017. *Irish Wildlife Manual*s, No. 1XX. Volume 1: Main report. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland. Moorkens, E.A. (1995) Mapping of proposed SAC sites for *Vertigo angustior*, *V. moulinsiana* and *V. geyeri*. Unpublished report to National Parks and Wildlife Service. Moorkens, E.A. (1997) An inventory of Mollusca in potential SAC sites with special reference to *Vertigo angustior*, *V. moulinsiana* and *V. geyeri*: 1997 survey. Unpublished report to National Parks and Wildlife Service. Moorkens, E.A. (1998) An inventory of Mollusca in potential SAC sites with special reference to *Vertigo angustior*, *V. moulinsiana* and *V. geyeri*: 1998 survey. Unpublished report to National Parks and Wildlife Service. Moorkens, E.A. (2006) Management prescriptions for *Vertigo geyeri* at cSAC sites for the species in the Republic of Ireland. Unpublished report to National Parks and Wildlife Service. Moorkens, E.A. (2012) Survey of two fen areas close to the N4 for molluscs particularly with reference to *Vertigo geyeri*. In: Sligo County Council (2013) N4 Collooney to Castlebaldwin proposed road development. EIS Volume 4, Appendix 12.7.

	Moorkens, E.A. & Killeen, I.J. (2011) Monitoring and condition assessment of populations of *Vertigo geyeri*, *Vertigo angustior* and *Vertigo moulinsiana* in Ireland. *Irish Wildlife Manuals*, No. 55. National Parks and Wildlife Service, Dublin, Ireland. NPWS National species database viewable on the National Biodiversity Data Centre https://maps.biodiversityireland.ie/Species/123613. 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, Dublin, Ireland.
4.2i Additional information	Cameron, R.A.D., Colville, B., Falkner, G., Holyoak, G. A., Hornung, E., Killeen, I.J., Moorkens, E.A., Pokryszko, B.M., Proschwitz, T. von, Tattersfield, P. & Valovirta, I. (2003) Species accounts for snails of the genus *Vertigo* listed in Annex II of the Habitats Directive: In Speight, M.C.D., Moorkens, E.A. & Falkner, G. (eds.) Proceedings of the Workshop on Conservation Biology of European *Vertigo* Species. Dublin, 2002. *Heldia* 5: 151-170. Speight, M.C.D., Moorkens, E.A. & Falkner, G. (eds.) (2003) Proceedings of the Workshop on Conservation Biology of European *Vertigo* species, April 2002. Verlag der Friedrich-Held-Ges.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***3,600 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994–2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing / **decreasing** / uncertain / unknown*	

5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 4,100 km²***	
	b) Indicate if operators were used (use these 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 includes all cells lost since the Directive came into force.	
5.11 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*	
5.12 Additional information *Optional*	The current distribution is 23 hectads which were occupied or likely to have been occupied since 2007. Losses were detected from two hectads in surveys since 2013 and there were losses detected from three hectads in the previous reporting period. The losses have been from hectads C03 (last seen 2009), N00 (2010), N21 (1998), G31 (2007) and L98 (2003). The current range calculated by the range tool is 36 hectads. The Favourable Reference Range is set as the current range plus the hectads from which the species is considered lost. No new populations have been found. The occurrence in L98 should have been included in the Favourable Reference Range in the last assessment as the occurrence is accepted. The occurrence in G71 is an overlooked record from 2012 (but not announced until 2013).	

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	***2007-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	***24***
	c) Maximum	***44***
	d) Best single value	
6.3 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	a) Unit	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	

6.12 Long-term trend Direction *Optional*	*stable / increasing / **decreasing** / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	***a) 48 1 x 1 km grids***	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable Reference Population is set at the number of 1km x 1km grid squares that have been occupied since 1994. This includes 'new' squares found post-1994 as the species is not considered actively spreading and has low natural dispersal and these 'new' sites were undetected rather than newly colonised. This value is considered the minimum necessary to ensure the long-term viability of the species.	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information *Optional*	The species has been recorded from 48 x 1km squares in Ireland since 1994. Since 2007 there have been certain records from 31 x 1km squares. Losses from three 1km squares occurred before 2007 and the species has not been re-found in these grid squares (N2712, G3915 and C0039). Losses from the first two amount to site losses. There is no recent information on the status of *V. geyeri* in 14 x 1km squares. These occurrences are either small sites where the area of habitat present is small and significant populations are not thought to exist, e.g. Lough Nablasbarnagh (M9082), or 1km squares adjacent to,	

	but marginal to, known sites. The core areas of all surveyed sites will have been revisited but a sample may not have been taken from these marginal areas for a variety of reasons. In total the species was recorded from 29 x 1km squares in the last reporting period and 23 x 1km squares in this. Losses from seven 1km squares were recorded between the two recording periods – the species was present in the last reporting period, but not found in samples taken in this reporting period (C0038, G4025, M8983, M9083, N0800, N7715, N7716). Just one of these amounts to a loss from a site (N0800). Positive samples were obtained from two 1km squares (N2306 and G7849) which as far as it can be determined had not been sampled before but are adjacent to known sites. Population assessments using the methodology in Moorkens & Killeen (2011) were repeated during 2014-2017 (Long & Brophy, in prep.). The assessments indicated stable populations on eight sites, decreases (green to amber) on four and major decreases (green to red) on six sites. In the previous reporting period, the population proxy metric was area of habitat. In this reporting period, population is equated to the number of occupied 1km squares which has necessitated recalculation to calculate the population in the previous reporting period. Whilst survey efforts were made to look for the species in each 1km square that contained potential habitat during this monitoring period, this was not the case in the last cycle. The reinterpretation of the data to this new measure was not always possible, which will have had some effect on calculating changes. The number of occupied 1km squares in Ireland with records since 1994 is 48. There were confirmed occurrences from 23 x 1km squares in this reporting period which is taken as the minimum figure for population. There are 14 x 1km squares with no information on status since 2012 so the maximum population figure is 37.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? YES/**NO**/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/**Unknown***
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*

7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / **decreasing** / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	Optimal habitat is broadly defined in section 1.6i. Optimal habitat for most sites is more precisely defined in the site reports compiled by Brophy & Long (in prep.). These are based on the parameters and habitat features described by Moorkens & Killeen (2011) with any subsequent refinements. There is no methodology to calculate the amount of optimal habitat to answer this question. Occupied habitat continues to be found so the entire resource for the species is not known. However, given that habitat quality of known sites is known to be declining it is a reasonable assumption that the entire area of possible habitat is declining. The evidence of decline in habitat comes from Long & Brophy (in prep.) who assessed habitat quality on 17 sites that had been covered in the previous assessment by Moorkens & Killeen (2011). Habitat quality was stable (seven green, two amber) on nine sites, but declining moderately (all green to amber) on six and severely (green to red) on two sites.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**A06** Abandonment of grassland management (H) **A09** Intensive grazing or overgrazing by livestock (H) **A10** Extensive grazing or undergrazing by livestock (H) **K04** Modification of hydrological flow (H)	**A06** Abandonment of grassland management (H) **A09** Intensive grazing or overgrazing by livestock (H) **A10** Extensive grazing or undergrazing by livestock (H) **K04** Modification of hydrological flow (H)
8.2 Sources of information *Optional*	Long & Brophy (in prep.)	
8.3 Additional information *Optional*	This data comes from Long & Brophy (in prep.) with a reinterpretation by NPWS. Long & Brophy listed the following five activities that are having the most important negative impacts on *Vertigo* sites during 2013-2018: Abandonment of pastoral systems, lack of grazing; Non-intensive horse grazing; Species composition change (succession); Non-intensive sheep grazing; Non-intensive cattle grazing. Only these are listed in 8.1 as they cover a large proportion of the known habitat and each were impacting the habitat on more than one or two sites. Long & Brophy (in prep.) and Moorkens & Killeen (2011) listed numerous other negative impacts but most only impacted single sites or small areas of habitat on large sites. Grazing levels are considered critical at many sites, the species requiring areas of short vegetation within larger areas of wetland habitat. These areas of habitat are easily modified by under- and overgrazing and changes in stocking type. Given the small size of most sites, damage can happen very quickly so the pressure and threats of these activities are considered high. Note that changes in hydrological flows were not listed by Long & Brophy (in prep.). However the species is considered very sensitive to changes in hydrology and this has been implicated in causing some of the losses from sites during the current and earlier reporting periods. Changes in hydrology and their potential to impact the small areas of habitat for this species are very difficult to determine when sites are visited on only one or two occasions and several years apart. They are, therefore, coded as K04 as the causes are hard to determine.	

9 Conservation measures

To be reported only for Annex II species

9.1 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*
9.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, population and/or habitat for the species or* *b) Expand the current range of the species (related to 'Range') or* *c) Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population') or* *d) Restore the habitat of the species (related to 'Habitat for the species')*
9.3 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*
9.4 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 in field 9.2):* *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)*
9.5 List of main conservation measures	None taken
9.6 Additional information *Optional*	

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	*Good / Poor / **Bad** / Unknown*
	b) Population	*Good / **Poor** / Bad / Unknown*
	c) Habitat of the species	*Good / **Poor** / Bad / Unknown*

10.2 Additional information *Optional*	*Vertigo geyeri* occurs in small areas of habitat widely across the north and west of Ireland. It has generally been in decline and the Future prospects for Range suggest that this will continue. The assessment of Population and Habitat were both Unfavourable-Inadequate. The balance between the Pressures/Threats and Conservation Measures leads to the assessment of Poor for these two parameters.

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
11.2 Population	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*		
11.3 Habitat for the species	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / **deteriorating** / stable / unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/**NO***	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/**NO***	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	Range is assessed as Unfavourable-Bad (U2) as the current range is more than 10% below the Favourable Reference Range. Population is declining and has been assessed as Unfavourable-Inadequate (U1) as, although the decline appears to exceed the 1% per annum target, this may be somewhat exaggerated because of over-stringent methodology. It is also known that some very large populations are not showing a decline. The maximum current population is less than 25% below the Favourable Reference Population. Habitat is assessed as Unfavourable-Inadequate (U1) as there is sufficient habitat for long-term survival but there has been deterioration in area and quality. The Overall assessment of Conservation Status is Unfavourable-Bad (U2) and the trend is deteriorating. This is a change from the previous assessment.		

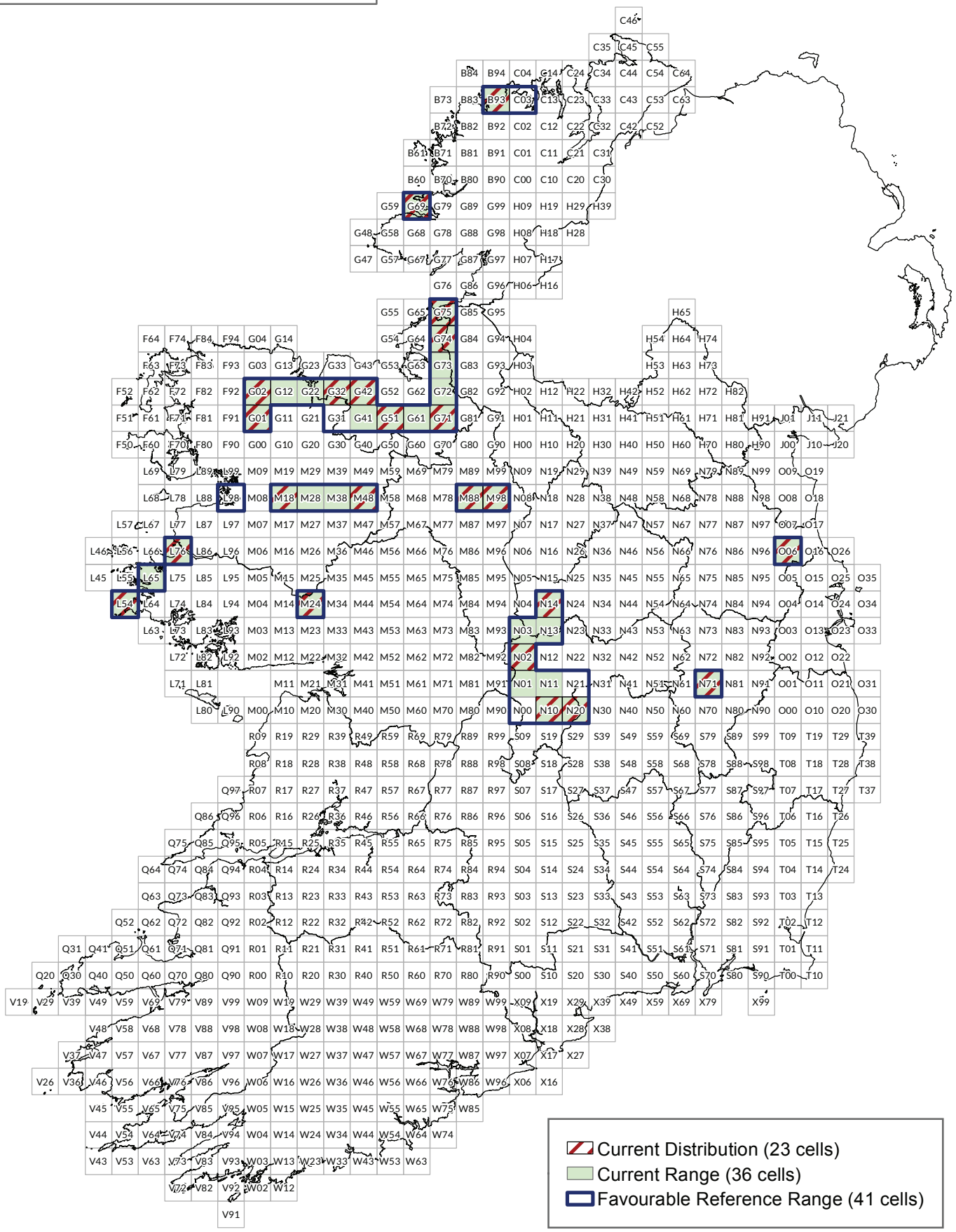
12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

12.1 Population size inside the pSCIs, SCIs and SACs network *(on the biogeographical/marine level including all sites where the species is present)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***27***
12.2 Type of estimate	***Best estimate** / multi-year mean / 95% confidence interval / minimum*	
12.3 Population size 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*	
12.4 Short-term trend of population size within the network **Direction**	*Short-term trend of population size within the network over the period indicated in field 6.5 :* *stable / increasing / **decreasing** / uncertain / unknown*	

12.5 Short-term trend of population size within 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*
12.6 Additional information *Optional*	Each of the 48 x 1km cells in the file was manually inspected to check for intersections with the SAC network. A total of 27 x 1km cells intersect with the SAC network; of these, 24 cells occur in SACs where *Vertigo geyeri* is a Qualifying Interest for the SAC. The trend was assessed from the site surveys in Long & Brophy (in prep.). *V. geyeri* does not occur in 4 of the 14 sites where it is a QI: Lough Hoe Bog SAC (000633), Clonaslee Eskers and Derry Bog SAC (000859), Clew Bay Complex SAC (001482) and Lisduff Fen SAC (002147).

13 Complementary information

Geyer's whorl snail
Vertigo geyeri (1013)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map - rscáil
V 2.0
Date áta
June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1014***
1.3 Species scientific name	*Vertigo angustior*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Narrow-mouthed Whorl Snail
1.6i Species description	*Vertigo angustior* is one of eight species of whorl snail (genus *Vertigo*) living in Ireland. The whorl snails are amongst the smallest of the Irish land molluscs with a size ranging from 1.7 to 2.7mm in height and 1 to 1.5mm in width. The shells of *Vertigo angustior* are reddish-coloured with fine vertical raised lines (striations). The mouth of the shell is on the left when viewed from the front as the shell is sinistrally coiled. This is unusual in Irish molluscs and in most the mouth is on the right side and amongst the Irish *Vertigo* only one other species, *V. pusilla*, is similarly coiled. All whorl snails favour damp or wet habitats, where they live mostly in moss, leaves and decaying vegetation. They feed on bacterial films and decaying vegetation. Many of the species are very sensitive to changes in hydrology and the dampness of the habitat. Habitats occupied by *Vertigo angustior* include dunes, damp grassland, fen and marsh, salt marsh and flood plain. Occupied habitats may be elongate narrow zones in wetlands or extensive dune and other coastal grassland sites. *Vertigo angustior* is mainly a European species but extends through Turkey and into Iran. It ranges from southern Scandinavia to the Mediterranean and from Ireland to the Caspian Sea. At a broad level, *Vertigo angustior* appears to be present in a very wide range of habitat categories but the ecotone within which it is restricted means that the exact conditions which its presence demands are rare, and a lot of habitat that is "almost correct" is devoid of the snail, and other sites have an appropriate ecotone restricted to a narrow band only a few metres wide (but of variable length). Sites where the species is widespread, especially those where a variety of suitable habitats and wetness conditions occur within the one general site, are of high importance. This species is hermaphrodite and often self-fertilising. The main reproductive period may vary considerably from site to site and depending upon meteorological conditions. At some sites the main period appears to be March/April and the species reaches sexual maturity in less than a year, with maximal numbers of adults observed in the autumn (September/October). Individuals may live for somewhat more than a year, but less than two years. Population densities are often very high in some maritime situations and densities in excess of 1,000 individuals/m² have been recorded. Available information suggests that this species can be dispersed by

	various mechanisms over distances of up to 100m within a twelve-month period. It has been recorded as transported by slugs and small mammals, and wind-blown litter is also likely to play a significant role. It is considered to be under threat in Ireland and Europe and was assessed as Vulnerable on the Irish Red List (Byrne *et al.*, 2009) and Vulnerable in Europe and the EU on the European Red List (Cuttelod *et al.*, 2011). For more information see Cameron *et al*. (2003), Falkner *et al*. (2001), Killeen (2003), Moorkens & Gaynor (2003), Pokryszkom (1987) and Sharland (2000).

2 Maps

Distribution of the species within the Member State concerned.

2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***1994-2018***
2.3 Distribution map	Submitted
2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	The distribution and population data have been compiled from: a. published and unpublished reports containing records of the species such as the Doonbeg monitoring reports (CHE, 2017); b. NPWS commissioned surveys of possible sites for the species conducted between 1995 and 2007 (Moorkens 1995, 1997, 1998 and 2007); c. national monitoring surveys 2007-2011 (Moorkens & Killeen, 2011); d. national monitoring surveys 2014-2017 (Long & Brophy, in prep.). All occupied hectads with records since 1994 are shown in the current distribution unless there is good evidence from surveys that the species is no longer present.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned.	
4 Biogeographical and marine regions	
4.1 Biogeographical or marine region where the species occurs	***Atlantic**, Marine Atlantic*
4.2 Sources of information	Brophy, J.T. & Long, M.P. (in prep.) Monitoring of sites and habitat for three Annex II species of whorl snail (Vertigo). Volume 2: *Vertigo angustior* site reports. Irish Wildlife Manuals, No. 1XX, National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland. Byrne, A., Moorkens, E.A., Anderson, R., Killeen, I.J. & Regan, E.C. (2009) *Ireland Red List No. 2 – Non-Marine Molluscs*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. Cameron, R.A.D., Colville, B., Falkner, G., Holyoak, G. A., Hornung, E., Killeen, I.J., Moorkens, E.A., Pokryszko, B.M., Proschwitz, T. von, Tattersfield, P. & Valovirta, I. (2003) Species accounts for snails of the genus *Vertigo* listed in Annex II of the Habitats Directive: In Speight, M.C.D., Moorkens, E.A. & Falkner, G. (eds.) Proceedings of the Workshop on Conservation Biology of European *Vertigo* Species. Dublin, 2002. *Heldia* 5: 151-170. Creagh House Environmental Ltd (2017) Doonbeg Golf Links, Doonbeg, Co. Clare Annual Conservation Report 2017. Unpublished report to National Parks and Wildlife Service. Cuttelod, A., Seddon, M. & Neubert, E. (2011) *European Red List of Non-marine Molluscs.* Luxembourg: Publications Office of the European Union. Long, M.P. & Brophy, J.T. (in prep.) Monitoring of sites and habitat for three Annex II species of whorl snail (*Vertigo*) 2014-2017. Volume 1: Main report. *Irish Wildlife Manual*s, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland. Moorkens, E.A. (1995) Mapping of proposed SAC sites for *Vertigo angustior*, *V. moulinsiana* and *V. geyeri*. Unpublished report to National Parks and Wildlife Service. Moorkens, E.A. (1997) An inventory of Mollusca in potential SAC sites with special reference to *Vertigo angustior*, *V. moulinsiana* and *V. geyeri*: 1997 survey. Unpublished report to National Parks and Wildlife Service. Moorkens, E.A. (1998) An inventory of Mollusca in potential SAC sites with special reference to *Vertigo* angustior, *V. moulinsiana* and *V. geyeri*: 1998 survey. Unpublished report to National Parks and Wildlife Service. Moorkens, E.A. (2007) Management prescriptions for *Vertigo angustior* at cSAC sites for the species in the Republic of Ireland. Unpublished report to National Parks and Wildlife Service. Moorkens, E.A. & Killeen, I.J. (2011) Monitoring and Condition Assessment of Populations of *Vertigo geyeri, Vertigo angustior* and *Vertigo moulinsiana* in Ireland. *Irish Wildlife Manuals*, No. 55.

	National Parks and Wildlife Service, Dublin, Ireland. NPWS National species database viewable on the National Biodiversity Data Centre https://maps.biodiversityireland.ie/Species/123620. 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, Dublin, Ireland.
4.2i Additional information	Speight, M.C.D., Moorkens, E.A. & Falkner, G. (eds.) (2003) Proceedings of the Workshop on Conservation Biology of European *Vertigo* species, April 2002. Verlag der Friedrich-Held-Ges.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***5,200 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994-2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing / **decreasing** / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	

5.10 Favourable reference range	***a) 5,600 km²***	
	b) Indicate if operators were used (use these 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 plus losses reported by Moorkens & Killeen (2011) and Long & Brophy (in prep.). The range prior to these losses is considered sufficient to encompass geographical and ecological variation and large enough to ensure the long-term survival of the species.	
5.11 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***	
5.12 Additional information *Optional*	The current distribution is 32 hectads which were occupied or likely to have been occupied since 2007. The loss of the species from R44 (last seen 2010) and L80 (last seen 2006) was determined during the current period. The current range calculated by the range tool is 52 hectads. Favourable Reference Range includes the current range plus the proven losses since 1994. These losses were from hectads G58 (last seen 2006), L80 (2006), N93 (1997) and R44 (2010).	

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2013-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***56***
6.3 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other*	a) Unit	
	b) Minimum	

than reporting unit) *Optional*	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	***a) 71 1 x 1 km grids***	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) If favourable reference population 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 Population is set at the number of 1km grid squares that have been occupied since 1994. This includes ‘new’ squares found post-1994 as the species is not considered actively spreading and has low natural dispersal and these ‘new’ sites were undetected rather than newly colonised. This value is considered the minimum necessary to ensure the long-term viability of the species.</td></tr>
<tr><td rowspan="6">6.16 Change and reason for change in population size</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><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):
<u>genuine change</u> / improved knowledge or more accurate data / the use of a different method</td></tr>
<tr><td>6.17 Additional information

Optional</td><td colspan="2">The species has been recorded from 71 x 1km squares in Ireland since 1994. Since 2007 there have been certain records from 66 x 1km squares. Losses from five 1km squares occurred before 2007 and the species has not been re-found in these grid squares (G5285, G6037, L8907, M1308 and N9936). Losses from L8907 and N9936 amount to site losses; the other sites were adjacent to other occupied squares. There is no new information on the status of V. angustior since 2012 from 21 x 1km squares and since 2007 from a further four 1km squares. Lastly there was a new record from grid square G6652 in the latest assessment period. There is no reason to believe that this population was not an established one as it is part of an extensive population on the sand dunes at Streedagh, Co. Sligo.
Population assessments using the methodology in Moorkens & Killeen (2011) were repeated during 2014-2017 (Long & Brophy in prep.). The assessments indicated stable populations on eight sites, decreases (green to amber) on four and major decreases (green to red) on six sites.
Population assessments using the methodology in Moorkens & Killeen (2011) were repeated during 2014-2017 on 19 sites by Long & Brophy (in prep.). The assessments indicated stable populations on eleven sites, decreases (green to amber) on two and major decreases (green to red) on six sites. The population on the Carrowmore Dunes (Doonbeg Golf Course) is at least stable.
In the previous reporting period, the population unit was area of habitat. This has changed for this reporting period to the number of occupied 1km squares, which has necessitated recalculation to determine the population in the last recording period. Whilst efforts were made to look for the species in each 1km square that contained potential habitat during this monitoring period, this was not always</td></tr>
</table>

	possible and the same applies to the last cycle. The number of occupied 1km squares in Ireland with records since 1994 is 71. There were confirmed occurrences in 33 x 1km squares in this reporting period and there are 23 x 1km squares with no information on status since 2012. This total of 56 is given as the best estimate.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? YES/**NO**/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/**Unknown***
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / **decreasing** / uncertain / unknown*
7.8 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*

7.9 Additional information *Optional*	Optimal habitat is broadly defined in section 1.6i. Optimal habitat for most sites is more precisely defined in the site reports compiled by Brophy & Long (in prep.). These are based on the parameters and habitat features described by Moorkens & Killeen (2011) with any subsequent refinements. There is no methodology to calculate the amount of optimal habitat to answer this question. Occupied habitat continues to be found so the entire resource for the species is not known. However, given that habitat quality of known sites is known to be declining it is a reasonable assumption that the entire area of possible habitat is declining. The evidence of decline in habitat comes from Long & Brophy (in prep.) who assessed habitat quality on 19 sites that had been covered in the previous assessment by Moorkens & Killeen (2011). Habitat quality was stable (give green, three amber, two red) on nine sites, but declining moderately (green to amber on three sites and amber to red on three sites) on six and severely (green to red) on four sites.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**A06** Abandonment of grassland management (e.g. cessation of grazing or of mowing) (H) **A10** Extensive grazing or undergrazing by livestock (H) **F07** Sports, tourism and leisure activities (M) **F05** Creation or development of sports, tourism and leisure infrastructure (outside the urban or recreational areas) (M)	**A06** Abandonment of grassland management (e.g. cessation of grazing or of mowing) (H) **A10** Extensive grazing or undergrazing by livestock (H) **F07** Sports, tourism and leisure activities (M) **F05** Creation or development of sports, tourism and leisure infrastructure (outside the urban or recreational areas) (M)
8.2 Sources of information *Optional*	Long & Brophy (in prep.)	

8.3 Additional information *Optional*	These data come from Long & Brophy (in prep.) with a reinterpretation by NPWS. Long & Brophy (in prep.) listed activities that have negative impacts on *Vertigo angustior* sites during 2013-2018. The most significant threats and pressures from this list are those which cover many sites, impact the habitat requirements of the species and cover a significant proportion of the national habitat resource. Grazing is critical for the maintenance of the habitat of *Vertigo angustior*, especially on the extensive sand dune populations. These areas of habitat are easily modified by under- or overgrazing, changes in stocking type and the impact of wild herbivores, especially rabbits. Issues around under- and overgrazing by domestic stock should be eminently fixable in the short and medium term. Sand dune systems have been impacted by leisure activities (caravan sites and golf courses mainly) and these cover significant areas of habitat. Expansion of these is a significant pressure on some large sites.

9 Conservation measures

To be reported only for Annex II species

9.1 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*
9.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, population and/or habitat for the species or* *b) Expand the current range of the species (related to 'Range') or* *c) Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population') or* *d) Restore the habitat of the species (related to 'Habitat for the species')*
9.3 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*

9.4 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 in field 9.2):* *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)*
9.5 List of main conservation measures	None taken
9.6 Additional information *Optional*	

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	*Good / **Poor** / Bad / Unknown*
	b) Population	*Good / **Poor** / Bad / Unknown*
	c) Habitat of the species	*Good / **Poor** / Bad / Unknown*
10.2 Additional information *Optional*	The pressures and threats that are having the most significant impact are related to management, especially grazing levels. These will impact habitat and population particularly. However, habitat quality can be improved with implementation of correct grazing regimes, so this is deemed eminently fixable in the next 12 years. Population can respond quickly when habitat conditions are correct. Maintaining range is a more intractable problem, especially in inland sites, and range will continue to decline if suitable and stable conditions cannot be maintained on the sites. All three parameters are assessed as Unfavourable-Inadequate and the expected future trends are declining so the Future prospects for each are poor.	

11 Conclusions

Assessment of conservation status at end of reporting period	
11.1 Range	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*
11.2 Population	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*
11.3 Habitat for the species	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*
11.4 Future prospects	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*
11.5 Overall assessment of Conservation Status	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / **deteriorating** / stable / unknown*
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	Range is assessed as Unfavourable-Inadequate (U1) as the current range is less than 10% below the Favourable Reference Range and although there is a declining trend it is at a rate of less than 1 % per year. Population is declining and is assessed as Unfavourable-Inadequate (U1) as, although the decline appears to exceed the 1% per annum target, this may be somewhat exaggerated because of over-stringent methodology. It is also known that some very large populations are not showing a decline. The current population is less than 25% below the Favourable Reference Population. Habitat is assessed as Unfavourable-Inadequate (U1) as there is sufficient habitat for long-term survival but there has been deterioration in area and quality.		

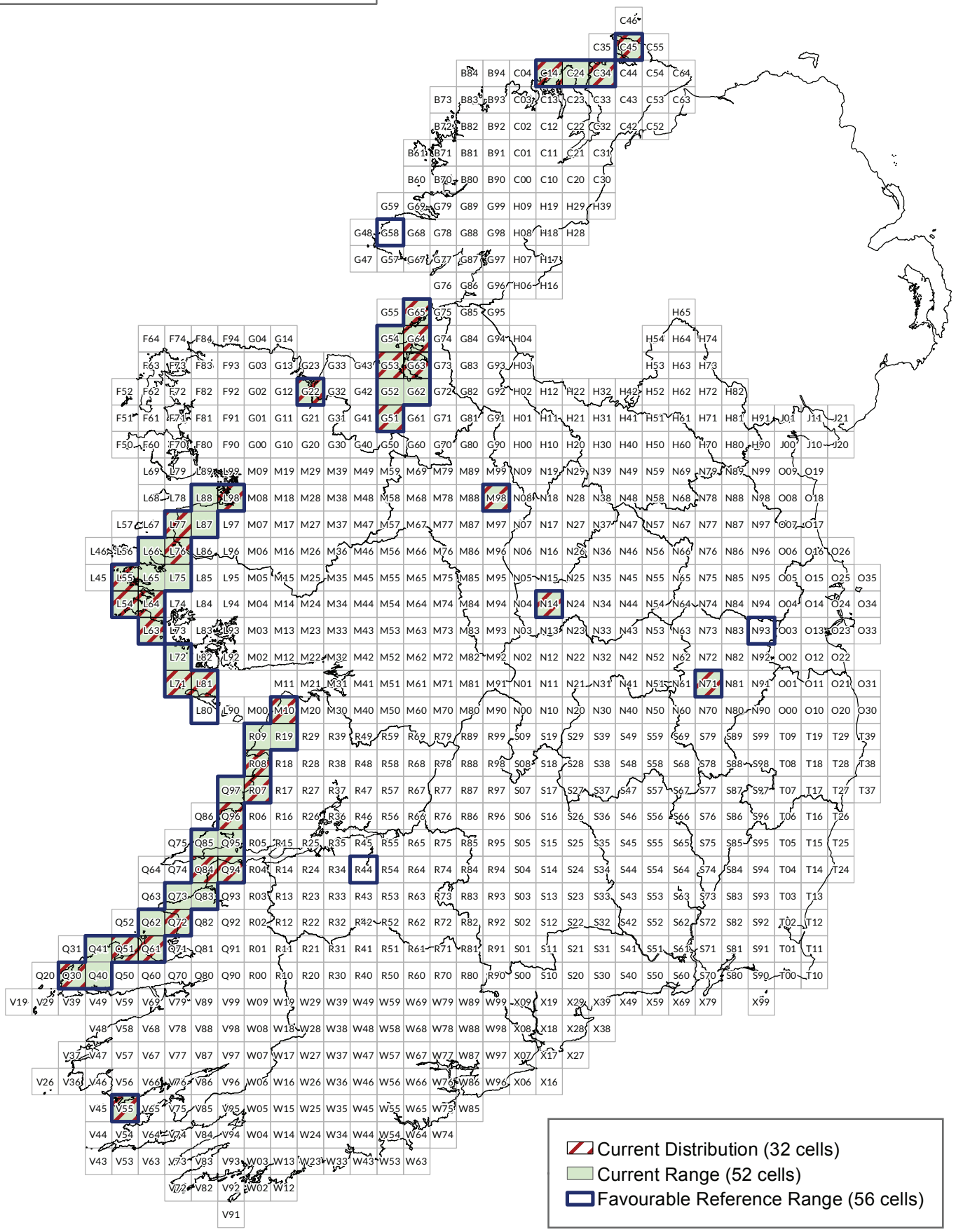
12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

12.1 Population size inside the pSCIs, SCIs and SACs network *(on the biogeographical/marine level including all sites where the species is present)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	
	c) Maximum	

	d) Best single value	***50***
12.2 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
12.3 Population size 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*	
12.4 Short-term trend of population size within the network **Direction**	*Short-term trend of population size within the network over the period indicated in field 6.5 :* *stable / increasing /* ***decreasing*** */ uncertain / unknown*	
12.5 Short-term trend of population size within 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*	
12.6 Additional information *Optional*	Each of the 56 x 1km cells in the file was manually inspected to check for intersections with the SAC network. The trend was assessed from the site surveys in Long & Brophy (in prep.).	

13 Complementary information

Narrow-mouthed whorl snail
Vertigo angustior (1014)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map - rscáil
V 2.0
Date áta
June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1016***
1.3 Species scientific name	*Vertigo moulinsiana*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Desmoulin's Whorl Snail
1.6i Species description	*Vertigo moulinsiana* is one of 8 species of whorl snail (genus *Vertigo*) living in Ireland. The whorl snails are amongst the smallest of the Irish land molluscs with a size ranging from 1.7 to 2.7mm in height and 1 to 1.5mm in width. *Vertigo moulinsiana* is the largest of all the *Vertigo* species, growing to between 2.2 and 2.7mm in height. All whorl snails favour damp or wet habitats, where they live mostly in moss, leaves and decaying vegetation. They feed on bacterial films and decaying vegetation. *Vertigo moulinsiana* lives on living and dead stems and leaves of tall wetland plants. It has a requirement for tall structured vegetation containing tall riparian grasses and sedges, particularly *Glyceria maxima, Phragmites australis, Carex riparia* and *Cladium mariscus*. Sites are usually at the end of hydroseral succession and unmanaged, allowing the build-up of litter. As well as the tall vegetation structure of the habitats, *V. moulinsiana* requires a stable hydrology with the water table at, or slightly above, the ground surface for much of the year and very low amplitude seasonal flooding. It climbs tall vegetation in the summer and autumn, but in severe conditions aestivates on the lower leaves of plants. In winter it descends to the litter level and becomes less active. *Vertigo moulinsiana* is hermaphrodite but may often self-fertilise. The eggs develop in less than two weeks, and the main reproductive period is in the summer, peak numbers of adults being recorded then, with large numbers of juveniles being recorded in the autumn. Population densities of more than 1000 individuals/m² have been recorded for this species at sites in England, but are subject to considerable annual fluctuation, the same sampling stations recording densities varying from 200 to 600 individuals/m² in successive years (Killeen 2003a, b). Water-borne transportation is believed to be the principal dispersal mechanism for *V. moulinsiana*. By the nature of its wetland habitat, the snails are likely to be able to float on the water surface or attached to floating vegetation and can therefore disperse during periods of flooding. Dispersal is also believed to be mediated by mammals, the snail being brushed from vegetation as the animals pass, and then adhering to their body hair. A similar dispersal is inferred by attachment to the feet and feathers of birds. The ability of the species to self-fertilise makes it possible for a single coloniser to establish a new population.

	Vertigo moulinsiana is considered to be an Atlantic-Mediterranean species with a range extending from Ireland to Russia and south to North Africa, but the main populations are in western and Central Europe. It is considered to be under threat in Ireland and Europe and was assessed as Endangered on the Irish Red List (Byrne *et al.*, 2009) and Vulnerable on the European Red List (Cuttelod *et al.*, 2011). Populations of *V. moulinsiana* are found widely in central and southern Ireland. It is found mainly in calcareous, lowland wetlands, especially swamps, fens and marshes bordering rivers, canals, lakes and ponds. For further information consult the references listed in section 4.2.

2 Maps

Distribution of the species within the Member State concerned.

2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***1994-2018***
2.3 Distribution map	Submitted
2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	The distribution and population data have been compiled from: a. published and unpublished reports containing records of the species such as Moorkens (2012); b. NPWS commissioned surveys of possible sites for the species conducted between 1995 and 2018 (Long & Brophy, 2013; Moorkens 1995, 1997, 1998 and 2007); c. national monitoring surveys 2007-2011 (Moorkens & Killeen, 2011) d. national monitoring surveys 2014-2017 (Long & Brophy, in prep.). All occupied hectads with records since 1994 are shown as in the current distribution unless there is good evidence from surveys that the species is no longer present.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned.	
4 Biogeographical and marine regions	
4.1 Biogeographical or marine region where the species occurs	***Atlantic**, Marine Atlantic*
4.2 Sources of information	Brophy, J.T. & Long, M.P. (in prep.) 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. Byrne, A., Moorkens, E.A., Anderson, R., Killeen, I.J. & Regan, E.C. (2009) Ireland Red List No. 2 – Non-Marine Molluscs. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. Cuttelod, A., Seddon, M. and Neubert, E. (2011). *European Red List of Non-marine Molluscs.* Luxembourg: Publications Office of the European Union. Killeen, I.J. (2003a) A review of EUHSD *Vertigo* species in England and Scotland. In: Speight, M.C.D., Moorkens, E.A. & Falkner, G. (Eds) Proceedings of the Workshop on Conservation Biology of European Vertigo Species. Dublin, 2002. *Heldia* 5: 151-170. Killeen, I.J. (2003b) Ecology of Desmoulin's Whorl Snail - *Vertigo moulinsiana*. Conserving Natura 2000 Rivers Ecology Series No. 6. English Nature, Peterborough. Long, M.P. & Brophy, J.T. (2013) Survey, habitat and population assessments of *Vertigo geyeri*, *Vertigo moulinsiana*, *Oxyloma sarsi* and *Omphiscola glabra* at selected sites. Unpublished report to National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. Long, M.P. & Brophy, J.T. (in prep.) Monitoring of sites and habitat for three Annex II species of whorl snail (*Vertigo*) 2014-2017. Volume 1: Main report. *Irish Wildlife Manuals*, No. 1XX. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland. Moorkens, E.A. (1995) Mapping of proposed SAC sites for *Vertigo angustior*, *V. moulinsiana* and *V. geyeri*. Unpublished report to National Parks and Wildlife Service. Moorkens, E.A. (1997) An inventory of Mollusca in potential SAC sites with special reference to *Vertigo angustior*, *V. moulinsiana* and *V. geyeri*: 1997 survey. Unpublished report to National Parks and Wildlife Service. Moorkens, E.A. (1998) An inventory of Mollusca in potential SAC sites with special reference to *Vertigo* angustior, *V. moulinsiana* and *V. geyeri*: 1998 survey. Unpublished report to National Parks and Wildlife Service. Moorkens, E.A. (2007) Management prescriptions for *Vertigo moulinsiana* at cSAC sites for the species in the Republic of Ireland. Unpublished report to National Parks and Wildlife Service. Moorkens, E.A. (2012) Management recommendations for populations

	of the whorl snail *Vertigo moulinsiana* and its habitat in County Longford. Unpublished report prepared for Waterways Ireland. Moorkens, E.A. & Killeen, I.J. (2011) Monitoring and condition assessment of populations of *Vertigo geyeri*, *Vertigo angustior* and *Vertigo moulinsiana* in Ireland. *Irish Wildlife Manuals*, No. 55. National Parks and Wildlife Service, Dublin, Ireland. NPWS National species database viewable on the National Biodiversity Data Centre https://maps.biodiversityireland.ie/Species/123616. 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, Dublin, Ireland.
4.2i Additional information	Cameron, R.A.D., Colville, B., Falkner, G., Holyoak, G. A., Hornung, E., Killeen, I.J., Moorkens, E.A., Pokryszko, B.M., Proschwitz, T. von, Tattersfield, P. & Valovirta, I. (2003) Species accounts for snails of the genus *Vertigo* listed in Annex II of the Habitats Directive: In Speight, M.C.D., Moorkens, E.A. & Falkner, G. (eds) Proceedings of the Workshop on Conservation Biology of European *Vertigo* Species. Dublin, 2002. *Heldia* 5: 151-170. Speight, M.C.D., Moorkens, E.A. & Falkner, G. (eds.) (2003) Proceedings of the Workshop on Conservation Biology of European *Vertigo* species, April 2002. Verlag der Friedrich-Held-Ges.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***5,400 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994–2018***	

5.7 Long-term trend Direction *Optional*	*stable / increasing / **decreasing** / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 5,600 km²***	
	b) Indicate if operators were used (use these 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 plus two grids which have been lost from the range since the Directive came into force.	
5.11 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*	
5.12 Additional information *Optional*	The current distribution is 29 hectads which were occupied or likely to have been occupied since 2007. Losses were detected from 2 hectads in surveys since 2013 and there were losses detected from two hectads in the previous reporting period. The losses have been from hectads N72 (last seen 2010), S47 (1998), S75 (2008) and R99 (1995). In 2018 a previously unknown population was found in S55. There is no reason to consider that this was not an established population. For squares M70, M84, M94, N16, N74, R89, S37 and X09 there has been no new information on the species since 2012 and, in the absence of this, these are assumed to be still extant. The current range calculated by the range tool is 54 hectads. The Favourable Reference Range is set at 56 hectads, which is the current range plus two additional hectads lost from the range.	

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	***2007-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	***37***
	c) Maximum	***64***
	d) Best single value	
6.3 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	a) Unit	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	

6.12 Long-term trend Direction *Optional*	*stable / increasing / **decreasing** / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	***a) 66 1x 1 km grids***	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable Reference Population is set at the number of 1km x 1km grid squares that have been occupied since 1994. This includes 'new' squares found post-1994 as these 'new' sites were in natural fen sites not directly connected to known populations and therefore considered to have been overlooked populations rather than newly colonised ones. This value is considered the minimum necessary to ensure the long-term viability of the species.	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information *Optional*	The species has been recorded from 66 x 1km squares in Ireland since 1994. Since 2007 there have been certain records from 54 x 1km squares. Recorded losses from two 1km squares occurred before 2007 (R9598 and S4679). Both of these amounted to site losses. Since 2013 there have been losses from a further nine 1km squares (M8704, N3455, N7615, N7927, N8027, N8128, N8129, R4148 and S7150). Apart from S7150 the losses are all from squares contiguous with still extant populations in extensive sites. The population at S7150 was all contained within that grid square and is now	

	considered lost. There is no new information on the status of *V. moulinsiana* since 2012 from 10 x 1km squares and since 2007 from a further eight 1km squares. Lastly there were new records from two 1km squares (M8503, S5059) in the latest assessment period which are new records for their respective squares. There is no reason to believe that these populations were not established ones. The occurrence in S5059 is a new population; that in M8503 is part of an extensive population that exists on northern Lough Derg. Population assessments using the methodology in Moorkens & Killeen (2011) were repeated during 2014-2017 on 18 sites by Long & Brophy (in prep.). The assessments indicated stable populations on four sites, decreases (green to amber) on seven and major decreases (green to red) on six sites. One site, Curragh Chase SAC, showed an increase in population. In the previous reporting period, the population unit was area of habitat. This has changed for this reporting period to the number of occupied 1km squares, which has necessitated recalculation to determine the population in the last recording period. Whilst efforts were made to look for the species in each 1km that contained potential habitat during this monitoring period, this was not always possible and the same applies to the last cycle. The number of occupied 1km squares in Ireland with records since 1994 is 66. There were confirmed occurrences from 37 x 1km squares in this reporting period which is taken as the minimum figure for population. There are 18 x 1km squares with no information on status since 2007 so the maximum population figure is 55. The corresponding figures for 2007-2013 are 56 (min) and 64 (maximum). Long & Brophy (in prep.) comment that the assessment of population at some sites is too stringent and sites were failing for this parameter although other features of the site including habitat were not deteriorating. However, the overall picture is a decline in population, although not as severe as the measured indicators suggest.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*

7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / **decreasing** / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	Optimal habitat is broadly defined in section 1.6i. Optimal habitat for most sites is more precisely defined in the site reports compiled by Brophy & Long (in prep.). These are based on the parameters and habitat features described by Moorkens & Killeen (2011) with any subsequent refinements. There is no methodology to calculate the amount of optimal habitat to answer this question. Occupied habitat continues to be found so the entire resource for the species is not known. Indeed, the area of habitat for the species mapped by Long & Brophy (in prep.) was 72% greater than in the previous assessment. Most of this increase in area of habitat was on sites which were not recognised in previous assessment as containing suitable habitat. They do not represent new habitat. However, it does make the conservation status of the species more robust than previously considered. Nevertheless, despite this newly documented area of habitat, there has been a measurable decline in area on other sites. The evidence of decline in habitat quality comes from Long & Brophy (in prep.) who assessed habitat quality on 18 sites that had been covered in the previous assessment by Moorkens & Killeen (2011). Habitat quality was stable on eleven sites (ten green, one red), but had declined moderately (all green to amber) on four and severely (green to red) on three sites. Habitat quality is therefore assessed as showing an overall decline.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**L02** Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices) (H) **L01** Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization) (H) **A07** Abandonment of management/use of other agricultural and agroforestry systems (all except grassland) (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) (H) **L01** Abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization) (H) **A07** Abandonment of management/use of other agricultural and agroforestry systems (all except grassland) (M) **A10** Extensive grazing or undergrazing by livestock (M)

8.2 Sources of information *Optional*	Long & Brophy (in prep.)
8.3 Additional information *Optional*	These data come from Long & Brophy (in prep.) with a reinterpretation by NPWS. Long & Brophy (in prep.) listed the following four activities that are having the most important negative impacts on *Vertigo moulinsiana* sites during 2013-2018: - Species composition change (succession); - Drying out; - Abandonment of pastoral systems, lack of grazing; - Non-intensive mowing. Only these are listed in 8.1 as they cover a large proportion of the known habitat and each was impacting the habitat on more than one or two sites. Long & Brophy (in prep.) and Moorkens & Killeen (2011) listed numerous other negative impacts but most only impacted single sites or small areas of habitat on large sites. The first two pressures and threats are assigned a high category as these are the most significant drivers of loss of this species. The sites are mainly unmanaged because of their natural wetness, so grazing and mowing are less significant on a national scale and equally should be easily rectified in the short and medium term.

9 Conservation measures	
To be reported only for Annex II species	
9.1 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*
9.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, population and/or habitat for the species or* *b) Expand the current range of the species (related to 'Range') or* *c) Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population') or* *d) Restore the habitat of the species (related to 'Habitat for the species')*
9.3 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*
9.4 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 in field 9.2):* *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)*
9.5 List of main conservation measures	None taken
9.6 Additional information *Optional*	

10 Future prospects		
10.1 Future prospects of parameters	**a) Range**	***Good** / Poor / Bad / Unknown*
	b) Population	*Good / **Poor** / Bad / Unknown*
	c) Habitat of the species	*Good / **Poor** / Bad / Unknown*

10.2 Additional information *Optional*	Due to the restrictive Range envelope for this species and the fact that additional large populations are being found it is likely that the current noted losses are likely to be subsumed into larger Range envelopes in the future. Therefore, Future prospects of Range are considered Good. The pressures and threats that are identified as having high impact are related to broad habitat conditions. Habitat stability is important for the species but lack of management is considered to be a significant factor and this needs to be implemented to reduce the decline in population and habitat. Habitat quality at *Vertigo moulinsiana* sites is driven by large-scale landscape issues such as management of the riparian zones of watercourses and through the artificial controlling of water levels. The species occurs at the end of the hydroseral succession and requires stable habitat in terms of water levels and build-up of decaying vegetation. The natural process of succession should create new habitat conditions for the species, but equally there will be natural losses as succession proceeds. Where the species has shown significant declines, this has been attributed to general drying out of the sites. The driver of this on the individual sites is uncertain. The assessment of Future prospects of Population and Habitat of the species is Poor.

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*
11.2 Population	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*
11.3 Habitat for the species	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*
11.4 Future prospects	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*
11.5 Overall assessment of Conservation Status	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / **deteriorating** / stable / unknown*
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	Range is assessed as Unfavourable-Inadequate (U1) as the current range is less than 10% below the Favourable Reference Range, and although there has been a decline it is less than the 1% per annum threshold. Population is assessed as Unfavourable-Inadequate (U1) as, though there have been significant losses, these have mainly been in areas peripheral to large populations. The maximum current population is less than 25% below the Favourable Population Value. Both Habitat area and Habitat quality have shown a decline on the monitored sites. However, large areas of habitat are known which are not covered by monitoring and the trends in these recently discovered sites are uncertain. The assessment of Habitat for the species is Unfavourable-Inadequate (U1). The Overall Conservation Status is Unfavourable-Inadequate (U1) and the trend is deteriorating. This is the same assessment as in the previous reporting period.		

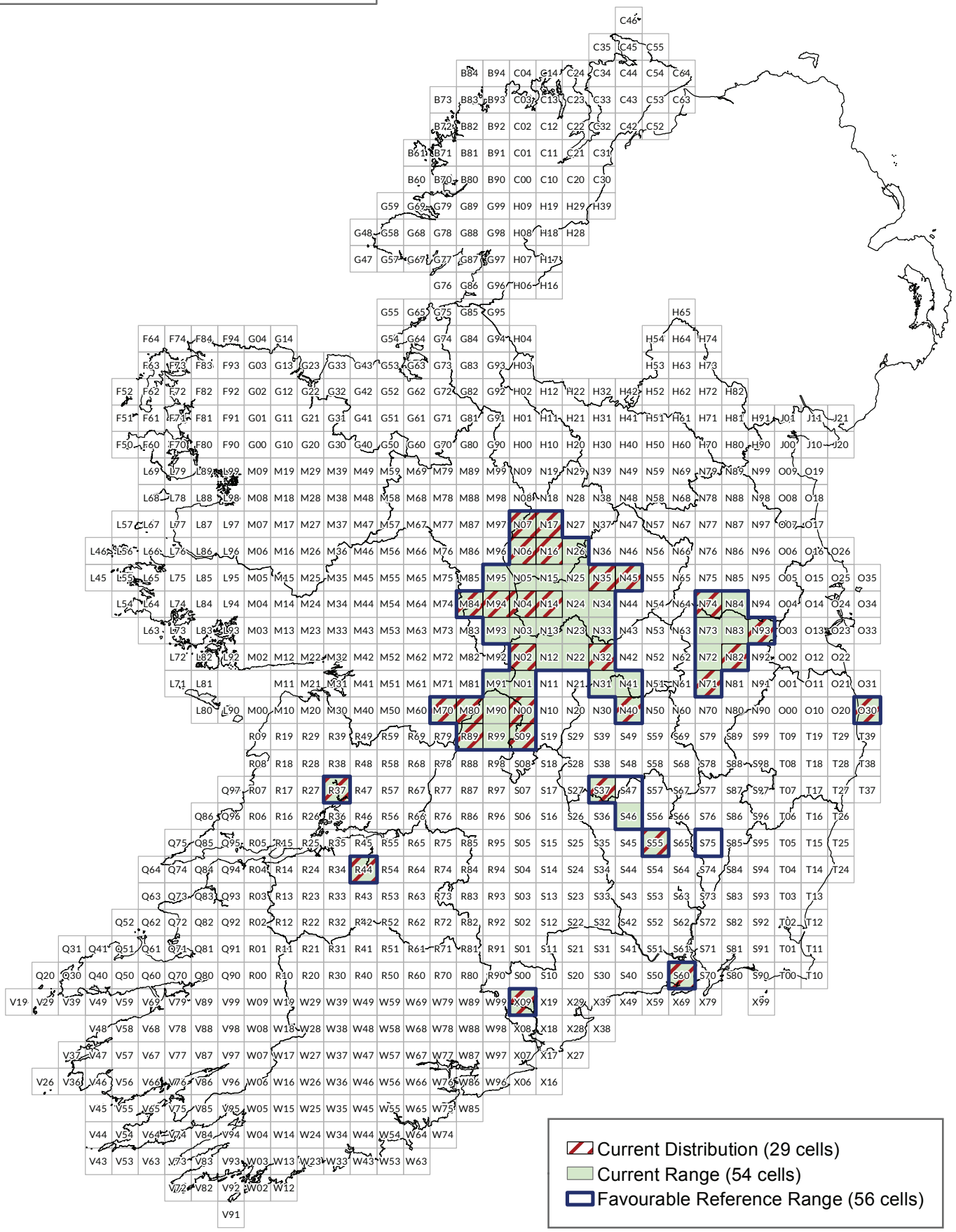
12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

12.1 Population size inside the pSCIs, SCIs and SACs network *(on the biogeographical/marine level including all sites where the species is present)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***29***
12.2 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	

12.3 Population size 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*
12.4 Short-term trend of population size within the network **Direction**	*Short-term trend of population size within the network over the period indicated in field 6.5 :* *stable / increasing / **decreasing** / uncertain / unknown*
12.5 Short-term trend of population size within 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*
12.6 Additional information *Optional*	Each of the 54 x 1km cells in the file was manually inspected to check for intersections with the SAC network. The trend was assessed from the site surveys in Long & Brophy (in prep.).

13 Complementary information

Desmoulin's whorl snail
Vertigo moulinsiana (1016)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map - rscáil V 2.0
Date áta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1024***
1.3 Species scientific name	*Geomalacus maculosus*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Kerry slug
1.6i Species description	The slug genus *Geomalacus* contains four recognised species which are characterised by their spotted appearance and woodland habitat. The genus has a very limited global range with all species found on the Iberian peninsula. This species, which was the first member of the genus to be formally described, is, uniquely amongst the genus, found in Ireland as well as Spain and Portugal. As it was first described from specimens found in 1842 at Caragh Lake, Co. Kerry, the vernacular name given to it in Britain and Ireland is the Kerry slug. The species was first found in northern Spain in 1868 and in northern Portugal in 1873. The distribution of *G. maculosus* is often given as the classic example of a Lusitanian species, i.e. a species with a disjunct, Atlantic distribution in Iberia and Ireland. However, DNA analysis of specimens across its range show that the Irish population is the product of an introduction many hundreds, perhaps thousands of years ago (Reich *et al.*, 2015). Irish populations are considered most like those in the north-east of its Iberian range. The Kerry slug adults vary in colour from black with white spots to brown with cream spots. The black form is found in open habitat and the brown form in woodland. It is now known this colour variation is related to the amount of dark pigment in their bodies and animals produce more dark pigment in more open habitat in response to increased insolation. This explains how dark individuals can quickly appear in areas that have recently been clear-felled. The slug emerges to feed in very damp and humid conditions, on very cloudy warm damp days either during or after rain, or at dawn, dusk and during the night if it is not too cold or dry. In Iberia it is considered to be nocturnal in habits, and during sunny periods in Ireland it also rests in refugia during daylight hours. In Ireland, Kerry slugs can remain active throughout the year if conditions are suitable. In a recent study (McDonnell & Gormally, 2011) the number of slugs seen in open habitats was correlated to the amount of previous rainfall, with fewest seen when conditions were dry (in that study during the spring months). Peak numbers of slugs were detected during autumn in the open habitats. However even in the middle of summer, wet periods would allow slugs to become active. In woodland habitat, slugs could be seen throughout the year but highest numbers were recorded in spring. No correlation between temperature and the numbers of slugs

	detected was found. The Kerry slug occurs in two main habitats: woodland, and blanket bog and wet heathland. It only occurs on acidic geology, mainly on Devonian Old Red Sandstone and in Spain on granite. Occurrence on granite in Ireland has recently been observed at a locality in Connemara where the species is considered introduced. The slugs are found on trees in woodland and on boulders in the open habitats. Feeding experiments have revealed the food preferences of the species. Research in captivity has revealed preferences for certain species of mosses, lichens and liverworts (Reich *et al.*, 2012). Kearney (2010) found the slugs in conifer woodland in Connemara and this is also the case in the south-west. McDonnell & Gormally (2011) found the species was present on rock outcrops in clear-fell and low-density conifer woodland but absent from rocks in high-density plantation. These results indicate a negative effect of conifer plantation on the occurrence of Kerry slug on outcrops but the study did not look at the occurrence on the trees themselves. The studies by Reich *et al.* (2012) and especially Johnson *et al.* (2018) have shown that Kerry slug can be abundant on conifer trees. The species will also recolonise boulder habitat when the wood is clear-felled (McDonnell & Gormally, 2011; Reich *et al.*, 2012).

2 Maps

Distribution of the species within the Member State concerned.

2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***1980-2018***
2.3 Distribution map	Submitted
2.4 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*
2.5 Additional maps *Optional*	Range map was submitted
2.6i Additional information	The distribution data come from specific surveys for the species including a national assessment survey 2008-2010 for NPWS (McDonnell & Gormally, 2011; McDonnell *et al.*, 2013), environmental impact assessments and other surveys carried out under licence to NPWS, research projects (e.g. Reich *et al.*, 2017), casual, opportunistic recording of the species by NPWS staff, naturalists and others, and published accounts (e.g. Platts & Speight, 1988). Populations that are considered due to introductions are not included (Kearney, 2010; Reich *et al.*, 2017). The range is assessed since 1980. The range tool has not been used.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	***Atlantic***, *Marine Atlantic*
4.2 Sources of information	Byrne, A., Moorkens, E.A., Anderson, R., Killeen, I.J. & Regan, E.C. (2009) *Ireland Red List No. 2 – Non-Marine Molluscs*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. Carnaghi, M., Rae, R., De Ley, I.T., Johnston, E., Kindermann, G., McDonnell, R., O'Hanlon, A., Reich, I., Sheahan, J., Williams, C.D. & Gormally, M.J. (2017) Nematode associates and susceptibility of a protected slug (*Geomalacus maculosus*) to four biocontrol nematodes. *Biocontrol Science and Technology* 27(2): 294-299. Johnston, E., Kindermann, G., O'Callaghan, J., Burke, D., McLaughlin, C., Horgan, S., McDonnell, R., Williams, C. & Gormally, M. (2017) Monitoring the EU protected *Geomalacus maculosus* (Kerry Slug): what are the factors affecting catch returns in open and forested habitats? *Ecological research* 32(1): 95-104. Johnston, E., Kindermann, G., O'Callaghan, J., Burke, D., McLoughlin, C., Horgan, S., Reich, I., Mc Donnell, R., Williams, C.D. & Gormally, M. (2018) Mature exotic conifer stands have greater catches of the EU-protected *Geomalacus maculosus* than adjacent peatland or clear-felled stands—implications for forestry. *Annals of Forest Science* 75(1): 4. Kearney, J. 2010 Kerry slug (*Geomalacus maculosus* Allman 1843) recorded at Lettercraffroe, Co. Galway. *Irish Naturalists' Journal* 31: 68–69. McDonnell, R.J. & Gormally, M.J. (2011) Distribution and population dynamics of the Kerry Slug, *Geomalacus maculosus* (Arionidae). *Irish Wildlife Manuals,* No 54. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. McDonnell, R., O'Meara, K., Nelson, B., Marnell, F. & Gormally, M. (2013) Revised distribution and habitat associations for the protected slug *Geomalacus maculosus* (Gastropoda, Arionidae) in Ireland. *Basteria* 77: 33-37. NPWS National species database viewable on the National Biodiversity Data Centre https://maps.biodiversityireland.ie/Species/123864. NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Species Assessments Volume 3. Version 1.0. Unpublished report, National Parks and Wildlife Service. Department of Arts,

	Heritage and the Gaeltacht, Dublin. O'Hanlon, A., Feeney, K., Dockery, P. & Gormally, M. J. (2017) Quantifying phenotype-environment matching in the protected Kerry spotted slug (Mollusca: Gastropoda) using digital photography: exposure to UV radiation determines cryptic colour morphs. *Frontiers in Zoology* 14(1): 35. O'Hanlon, A. & Gormally, M.J. (2018) Juvenile Kerry Slugs (*Geomalacus maculosus*) observed living inside fungal fruiting bodies for the first time. *Journal of Conchology* 43: 109-110. Platts, E.A. & Speight, M.C.D. (1988) The taxonomy and distribution of the Kerry slug, *Geomalacus maculosus* Allman, 1843 (Mollusca: Arionidae) with a discussion of its status as a threatened species. *Irish Naturalists' Journal* 22: 417-30. Reich, I. (2016) The EU-protected slug *Geomalacus maculosus*: an investigation into its phylogenetics, population densities in conifer plantations and its gut microbial community. PhD Thesis, National University of Ireland, Galway. Reich, I., O'Meara, K., McDonnell, R.J. & Gormally, M.J. (2012) An assessment of the use of conifer plantations by the Kerry Slug (*Geomalacus maculosus*) with reference to the impact of forestry operations. *Irish Wildlife Manuals*, No. 64. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland. Reich, I., Gormally, M., Allcock, A.L., McDonnell, R., Castillejo, J., Iglesias, J, Quinteiro, J. & Smith; C.J. (2015) Genetic study reveals close link between Irish and Northern Spanish specimens of the protected Lusitanian slug *Geomalacus maculosus*. *Biological Journal of the Linnean Society* 116: 156–168. https://doi.org/10.1111/bij.12568 Reich, I., McDonnell, R., Mc Inerney, C., Callanan, S. & Gormally, M. (2017) EU-protected slug *Geomalacus maculosus* and sympatric *Lehmannia marginata* in conifer plantations: what does mark-recapture method reveal about population densities? *Journal of Molluscan Studies* 83: 27-35. Reich, I., O'Meara, K., Nelson, B., McDonnell, R.J. & Gormally, M.J. (2017) Absence of *Geomalacus maculosus* (Kerry slug) from parts of Western Ireland suggests human mediated transposal of species to its most northerly location. *Biology and Environment: Proceedings of the Royal Irish Academy* 2017. DOI: 10.3318/ BIOE.2017.14.
4.2i Additional information	

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***5,600 km²***
5.2 Short-term trend Period	***2007–2018***

5.3 Short-term trend Direction	*stable / **increasing** / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994–2018***	
5.7 Long-term trend Direction *Optional*	*stable / **increasing** / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 5,400 km²***	
	b) Indicate if operators were used (use these 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 has been an expansion of the current range in recent years; however, the Favourable Reference Range is set as the figure in the previous assessment as this is considered to encompass all the habitat and ecological requirements needed for long-term survival.	
5.11 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*
5.12 Additional information *Optional*	There is good evidence of range expansion on the eastern edge of the previously assessed range in north Kerry and west Cork. It is perhaps also spreading on the Dingle Peninsula and in north Kerry. It is assumed that spread into squares contiguous with the previous range has been natural but this cannot be proven. Large populations are known to have developed in conifer plantations (Reich *et al*., 2012; Johnson *et al*., 2017) and these may be driving expansion. Where the species has appeared in squares that are not connected to the existing range, introduction is considered the most likely cause. The species has certainly been introduced to Co. Galway (Kearney, 2010; Reich *et al*., 2017) and the occupied hectads in this area are excluded from the range. However, in reality it is impossible to determine the main driver of each range expansion. The species is adapting to and colonising commercial conifer plantations and it is known that forestry operations have created new populations for it in Co. Galway. This may also be occurring in areas adjacent to its core range which gives the impression of natural spread. During this assessment period *Geomalacus maculosus* was recorded for the first time in hectads Q51, W04, W24 and W38. There are some hectads within the previous range for which there have been no records for at least 24 years but there is no reason to assume that the species is still not present.

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2007-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***151***
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval /* ***minimum***	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	a) Unit	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / minimum*	

6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / **increasing** / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / **increasing** / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	***a) 151 x 1 km grids***	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) If favourable reference population 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
No national population estimate exists for this species, nor is it likely that one could ever be produced. Density figures have been calculated for a few sites (mainly conifer plantations) in south-west Ireland (Johnson et al., 2017) and also for introduced populations in Galway (Reich et al., 2017) but extrapolation to a national population should not be attempted from these. These figures only come from a few sites and there is no information on how the numbers of the species vary with key environmental, habitat and climatic conditions. Nor is it practical to assign estimates of numbers to rapidly reproducing, cryptic species of invertebrates. What the figures indicate is that populations in conifer populations are much higher than in both the natural habitat it has replaced and the area that is recreated after clear-felling.</td></tr>
<tr><td rowspan="6">6.16 Change and reason for change in population size</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>YES/<u>NO</u></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):
<u>genuine change</u> / improved knowledge or more accurate data / the use of a different method</td></tr>
<tr><td>6.17 Additional information

Optional</td><td colspan="2">The level of recording of the species is not at fine enough resolution to provide any meaningful population statistic. However, with the increase in range (and lack of evidence of any losses) the population is assumed to be increasing. It is not possible to put a figure on this increase.</td></tr>
</table>

<table>
<tr><th colspan="2">7 Habitat for the species</th></tr>
<tr><td>7.1 Sufficiency of area and quality of occupied habitat</td><td>a) Are area and quality of <u>occupied</u> habitat sufficient (for long-term survival)? <u>YES</u>/NO/Unknown
b) If NO, is there a sufficiently large area of <u>unoccupied</u> habitat of suitable quality (for long-term survival)? YES/NO/Unknown</td></tr>
<tr><td>7.2 Sufficiency of area and quality of occupied habitat Method used</td><td>Select 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>
</table>

7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	Optimal habitat for the species is woodland and blanket bog and wet heath with outcropping boulders. The habitat must provide suitable food resources of lichens and mosses. There is sufficient habitat of adequate quality to maintain sufficient population.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**I02** Other invasive alien species (other than species of Union concern) (M)	**H04** Vandalism or arson (M) **I02** Other invasive alien species (other than species of Union concern) (M)
8.2 Sources of information *Optional*		

8.3 Additional information *Optional*	In the last assessment the pressures and threats were: agricultural intensification; forest planting on open ground (native trees); artificial planting on open ground (non-native trees); forest replanting (native trees); forest replanting (non-native trees); forestry clearance and invasive non-native species. Understanding of the species in conifer plantations have shown that the species can occur in high population densities (in excess of what is in unplanted areas) and so afforestation is not considered a pressure or threat (see Reich *et al*., 2012, 2017; Johnson *et al*., 2017). The issues of agricultural intensification where it removes or alters the outcropping rocks in heaths and invasive non-native species (Rhododendron in woodland) do remain but are considered no more than medium importance. Burning has been an issue in areas where the species has been introduced in conifer forests and this is included as it poses a threat to all conifer plantation populations.

9 Conservation measures	
To be reported only for Annex II species	
9.1 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*
9.2 Main purpose of the measures taken	*a) Maintain the current range, population and/or habitat for the species or* *b) Expand the current range of the species (related to 'Range') or* *c) Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population') or* *d) Restore the habitat of the species (related to 'Habitat for the species')*
9.3 Location of the measures taken	*a) Only inside Natura 2000 or* *b) Both inside and outside Natura 2000 or* *c) Only outside Natura 2000*
9.4 Response to the measures *(when the measures starts to neutralize the pressure(s) and produce positive effects)*	*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)*
9.5 List of main conservation measures	None needed
9.6 Additional information *Optional*	

10 Future prospects		
10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	All three attributes are Favourable and the threats to the species are not severe. Future prospects are therefore good for all parameters.	

11 Conclusions			
Assessment of conservation status at end of reporting period			
11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.6 Overall trend in Conservation Status	***improving*** */ deteriorating / stable / unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the nature of change	*YES/NO*	*YES/NO*

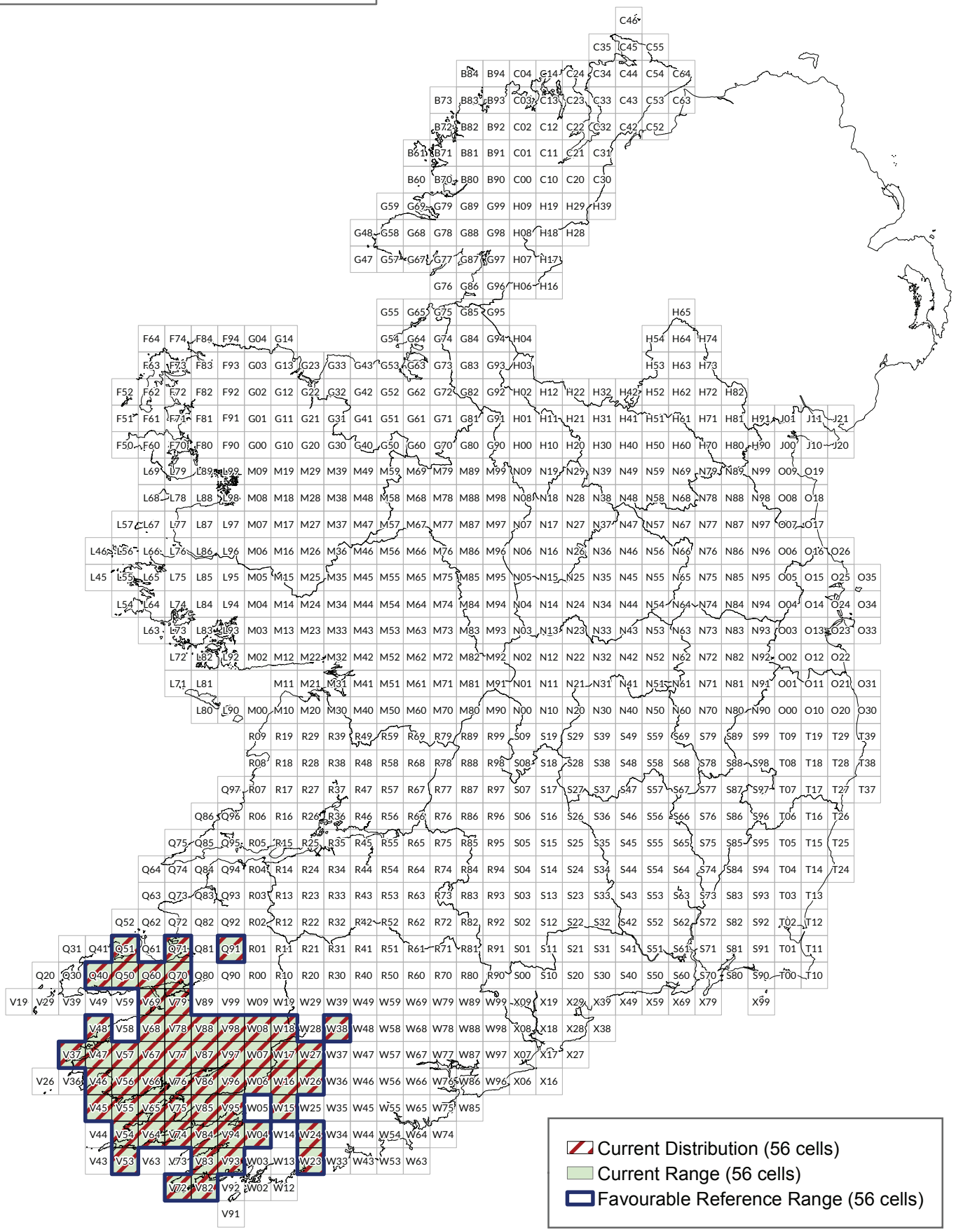
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
11.8 Additional information *Optional*	The species is in Favourable Conservation Status. Its range is increasing and it is highly likely also that the population is increasing. This is being driven in part by the large populations in conifer plantations. Habitat is sufficient for long-term survival and there are no significant threats and pressures. Improving trend for Favourable assessments was not an option in the previous monitoring round.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

12.1 Population size inside the pSCIs, SCIs and SACs network *(on the biogeographical/marine level including all sites where the species is present)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***108***
12.2 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval /* ***minimum***	
12.3 Population size 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*	
12.4 Short-term trend of population size within the network **Direction**	*Short-term trend of population size within the network over the period indicated in field 6.5 :* *stable / increasing / decreasing / uncertain /* ***unknown***	
12.5 Short-term trend of population size within 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*	
12.6 Additional information *Optional*		

13 Complementary information

Kerry slug
Geomalacus maculosus (1024)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map - rscáil
V 2.0
Date áta
June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1029***
1.3 Species scientific name	*Margaritifera margaritifera*
1.4 Alternative species scientific name *Optional*	*Margaritifera margaritifera* (incorporating *Margaritifera margaritifera durrovensis/ Margaritifera durrovensis* (species code 1990))
1.5 Common name *Optional*	Freshwater pearl mussel (incorporating Nore pearl mussel)
1.6i Species description	The freshwater pearl mussel is a large, long-lived, bivalve mollusc found in clean, fast-flowing rivers. The species has a discontinuous holarctic distribution, being found in North America, north-western Europe and parts of central Europe. Individuals can grow to very large sizes relative to other freshwater molluscs, slowly building up thick calcareous shells in rivers with relatively soft water and low levels of calcium. In natural conditions, individual mussels can live to over a hundred years of age in Ireland. Like other members of its family, Margaritiferidae, the freshwater pearl mussel has a complex life cycle. Mussels mature between seven and 15 years of age, and have a prolonged fertile period lasting into old age. The species produces glochidial larvae that use a temporary salmonid host, typically Atlantic salmon and sea trout in Ireland, but also brown trout. Juvenile mussels occupy interstitial habitats in the river bed for five years or more. The freshwater pearl mussel is highly threatened: critically endangered in Ireland and across Europe. The species' poor conservation status and severe declines have not resulted from exploitation but rather from habitat deterioration: a combination of hydrological and morphological changes, sedimentation and enrichment. Riverbeds have become so clogged with silt, algae and rooted plants that young mussels can no longer survive. In many rivers, adult mussels have become stressed and are prematurely dying owing to habitat deterioration. The pressures impacting on the species come from a combination and wide variety of sources (e.g. pollution from urban wastewater, development activities, farming and forestry), often quite removed from the habitat of the species. The species also suffers direct impacts from in-stream works such as channelisation, bridge repairs/ construction and recreational fishery structures. Flow changes, caused by activities such as land drainage, have been highlighted as an important contributor to the species' demise. Ensuring the long-term future of the freshwater pearl mussel requires significant, integrated catchment management to prevent direct impacts, to restore the natural hydrological regime and to reduce losses of sediment and nutrients from all indirect sources. In previous cycles, the River Nore pearl mussel population was

	reported separately as taxon 1990 (*Margaritifera durrovensis*), however genetic research has since placed the Nore population within the *Margaritifera margaritifera* taxon (Habitats Directive species code 1029) (Feind *et al*., 2016; Geist *et al*., 2018) and, in line with reporting guidance, the Nore population has been included within this report.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***1987-2018***
2.3 Distribution map	Submitted
2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	The distribution was based on *Margaritifera margaritifera* and *Margaritifera durrovensis* records held in the NPWS Margaritifera_Geodatabase. The majority of these records were made by *Margaritifera* specialists or by other expert freshwater ecologists as part of an NPWS monitoring survey or survey to inform environmental assessments. Positive records of living mussels are held in the Margaritifera_Records feature class. The distribution of freshwater pearl mussel habitat in Special Areas of Conservation is mapped as a polyline feature (FPM_Habitat_Classification). Both of these feature classes were intersected with the Irish National 10 km Grid, producing a distribution of 151 x 10 km grid squares. Reporting of the Nore population with the other populations of *Margaritifera margaritifera* (species code 1029) added three 10 km x 10 km squares to the distribution. Four new 10 km x 10 km squares were added based on improved knowledge. In addition, seven 10 km x 10 km squares were removed from the 2007-2012 distribution as they had been included in error (no records of living mussels). The oldest record in the database dates from *circa* 1850, although the majority of records date from the mid-1980s onwards, and most rivers have positive records since 2000. However, neither point records nor habitat lines are reliable, repeatable measures of the species' current distribution. They are observations in space and time that reflect the distribution of survey effort, rather than the species itself. Despite this caveat, the quality of the data was considered to be good to excellent for the 27 SAC populations and for *circa* 15 other populations. The species is found in more than 150 rivers, in approximately 100 catchments/sub-catchments across 16 counties (Carlow, Cavan, Clare,

	Cork, Donegal, Galway, Kerry, Kilkenny, Laois, Limerick, Mayo, Sligo, Tipperary, Waterford, Wexford and Wicklow).

3 Information related to Annex V species (Art. 14)

3.1 Is the species taken in the wild/exploited?	*Is the species taken in the wild/exploited? YES/**NO***

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
4.2 Sources of information	EPA (2018) *Urban Waste Water Treatment in 2017*. Environmental Protection Agency, Wexford. Feind, S, Kuehn, R., Geist, J, Moorkens, E.A. and Killeen, I.J. (2016) Population genetic analyses of the endangered freshwater pearl mussel (*Margaritifera margaritifera*) in Ireland. Unpublished report for the National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. Geist, J., Moorkens, E., Killeen, I., Feind, S., Stoeckle, B.C., O Connor, Á. and Kuehn, R. (2018) Genetic structure of Irish freshwater pearl mussels (*Margaritifera margaritifera and Margaritifera durrovensis*): validity of subspecies, roles of host fish, and conservation implications. *Aquatic Conservation: Marine and Freshwater Ecosystems* 28:923–933. DOI: 10.1002/aqc.2913 Johnston, P.M. and Moorkens, E.A. (2018) Electrofishing survey to identify fish hosts for the freshwater pearl mussel *Margaritifera margaritifera* in 12 populations in the Republic of Ireland. 2017 Survey. Unpublished report to the National Parks and Wildlife Service, DCHG, Dublin. Moorkens, E.A. (2010) Addressing the conservation and rehabilitation of *Margaritifera margaritifera* populations in the Republic of Ireland within the framework of the Habitats and Species Directive. *Journal of Conchology* 40: 339-350. Moorkens, E.A. (2014) *Report on assisted breeding of the Nore pearl mussel*. Unpublished report, National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Moorkens, E. (2015) Monitoring Populations of the Freshwater Pearl Mussel *Margaritifera margaritifera*. 2014 Monitoring Survey of the River Clady, County Donegal. Unpublished report to the National Parks and Wildlife Service, DAHG, Dublin. Moorkens, E. (2015) Monitoring Populations of the Freshwater Pearl Mussel *Margaritifera margaritifera* 2015 Monitoring Survey of the Larah River, County Cavan. Unpublished report to the National Parks and Wildlife Service, DAHRRGA, Dublin.

	Moorkens, E. (2015) Monitoring Populations of the Freshwater Pearl Mussel *Margaritifera margaritifera.* 2015 Monitoring Survey of the Leannan River, County Donegal. Unpublished report to the National Parks and Wildlife Service, DAHG, Dublin. Moorkens, E. (2015) Monitoring Populations of the Freshwater Pearl Mussel *Margaritifera margaritifera*. 2014 Monitoring Survey of the Owenriff River, County Galway. Unpublished report to the National Parks and Wildlife Service, DAHRRGA, Dublin. Moorkens, E. (2015) Monitoring Populations of the Freshwater Pearl Mussel *Margaritifera margaritifera*. 2015 Monitoring Survey of the Owenriff River, County Galway. Unpublished report to the National Parks and Wildlife Service, DAHRRGA, Dublin. Moorkens, E. (2015) Monitoring Populations of the Freshwater Pearl Mussel *Margaritifera margaritifera*. 2015 Monitoring Survey of the Recess River system, County Galway. Unpublished report to the National Parks and Wildlife Service, DAHG, Dublin. Moorkens, E.A. (2015) Monitoring Populations of the Freshwater Pearl Mussel *Margaritifera margaritifera*, 2015 Monitoring Survey of the Swanlinbar River, County Cavan. Unpublished report to the National Parks and Wildlife Service, DAHRRGA, Dublin. Moorkens, E. (2015) KerryLIFE Project. 2014 Surveys of the Kerry Blackwater and Caragh Rivers. March 2015 Unpublished report to the National Parks and Wildlife Service, Dublin. Moorkens, E. (2015) Provision of freshwater pearl mussel monitoring, training and expert review for the KerryLIFE project in the Caragh and Blackwater (Kerry) catchments 2014 to 2019. Summary report of work carried out in 2015. Unpublished, interim report to the National Parks and Wildlife Service, Dublin. Moorkens, E.A. (2016) Monitoring Populations of the Freshwater Pearl Mussel, *Margaritifera margaritifera*. Monitoring Methods Used. Unpublished report to the National Parks and Wildlife Service, Department of the Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Dublin. Moorkens, E. (2016) Survey and Condition Assessment of the population of the freshwater mussel *Margaritifera margaritifera* in the Davros River, County Galway. Unpublished report to the National Parks and Wildlife Service, DAHRRGA, Dublin. Moorkens, E. (2016) Monitoring Populations of the Freshwater Pearl Mussel *Margaritifera margaritifera*. 2014/2015 Monitoring Survey of the River Derreen, County Carlow/Wicklow. Unpublished report to the National Parks and Wildlife Service, DAHRRGA, Dublin. Moorkens, E. (2016) KerryLIFE PROJECT Summary of mussel surveys of the Blackwater and Caragh rivers carried out in 2016. 27 July 2016. Unpublished, interim report to the National Parks and Wildlife Service, Dublin. Moorkens, E. (2016) KerryLIFE Project Condition assessment of freshwater pearl mussel populations in the Kerry Blackwater and Caragh rivers in 2016. Unpublished, interim report to the National Parks and Wildlife Service, Dublin. Moorkens, E.A. (2017) Short-term breeding: releasing post-parasitic juvenile *Margaritifera* into ideal small-scale receptor sites: a new technique for the augmentation of declining populations. *Hydrobiologia* 810(1): 145-155.

	Moorkens, E. (2017) Survey and Condition Assessment of the population of the freshwater mussel *Margaritifera margaritifera* in the River Allow, County Cork. Unpublished report to the National Parks and Wildlife Service, DAHRRGA, Dublin. Moorkens, E. (2017) Survey and Condition Assessment of the population of the freshwater mussel *Margaritifera margaritifera* in the Bundorragha River, County Mayo. Unpublished report to the National Parks and Wildlife Service, DAHRRGA, Dublin. Moorkens, E. (2017) Survey and Condition Assessment of the population of the freshwater mussel *Margaritifera margaritifera* in the Cloon River, County Clare. Unpublished report to the National Parks and Wildlife Service, DAHRRGA, Dublin. Moorkens, E. (2017) Survey and Condition Assessment of the population of the freshwater mussel *Margaritifera margaritifera* in the River Deel, County Mayo. Unpublished report to the National Parks and Wildlife Service, DAHRRGA, Dublin. Moorkens, E. (2017) Survey and Condition Assessment of the population of the freshwater mussel *Margaritifera margaritifera* in the River Eske, County Donegal. 2014-2016. Unpublished report to the National Parks and Wildlife Service, DAHRRGA, Dublin. Moorkens, E. (2017) Survey and Condition Assessment of the population of the freshwater mussel *Margaritifera margaritifera* in the Glaskeelan River, County Donegal. Unpublished report to the National Parks and Wildlife Service, DAHRRGA, Dublin. Moorkens, E. (2017) Survey and Condition Assessment of the population of the freshwater mussel *Margaritifera margaritifera* in the Mountain River, County Carlow. Unpublished report to the National Parks and Wildlife Service, DAHRRGA, Dublin. Moorkens, E. (2017) Survey and Condition Assessment of the population of the freshwater mussel *Margaritifera margaritifera* in the River Nore, County Laois. Unpublished report to the National Parks and Wildlife Service, DAHRRGA, Dublin. Moorkens, E. (2017) Survey and Condition Assessment of the population of the freshwater mussel *Margaritifera margaritifera* in the Owenea River, County Donegal. Unpublished report to the National Parks and Wildlife Service, DAHRRGA, Dublin. Moorkens, E. (2017) 2016 Survey and Condition Assessment of the population of the freshwater mussel *Margaritifera margaritifera* in the Owenriff River, County Galway. Unpublished report to the National Parks and Wildlife Service, DAHRRGA, Dublin. Moorkens, E. (2017) Survey and Condition Assessment of the population of the freshwater mussel *Margaritifera margaritifera* in the Sullane River, County Cork. Unpublished report to the National Parks and Wildlife Service, DAHRRGA, Dublin. Moorkens, E. (2017) KerryLIFE Project (LIFE13 NAT/IE/000144), 2016 and 2017 surveys of the Kerry Blackwater and Caragh Rivers. Unpublished report to the National Parks and Wildlife Service, DCHG, Dublin. Moorkens, E. (2018) Survey and Condition Assessment of the population of the freshwater mussel *Margaritifera margaritifera* in the Doonbeg River, County Clare. Unpublished report to the National Parks and Wildlife Service, DCHG, Dublin. Moorkens, E.A. (2018) Monitoring Populations of the Freshwater Pearl

Mussel *Margaritifera margaritifera* 2014 - 2016 Monitoring Survey of flow velocities in *Margaritifera* habitats. Unpublished report to the National Parks and Wildlife Service, DCHG, Dublin.

Moorkens, E. (2018) Survey and Condition Assessment of the population of the freshwater mussel *Margaritifera margaritifera* in the Bundorragha River, County Mayo. Unpublished report to the National Parks and Wildlife Service, DCHG, Dublin.

Moorkens, E.A. (2018) Survey and Condition Assessment of the population of the freshwater mussel *Margaritifera margaritifera* in the Owenriff River, County Galway. Unpublished report to the National Parks and Wildlife Service, DCHG, Dublin.

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5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***15,100 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	

5.5 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*	
5.6 Long-term trend Period *Optional*	***1994–2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 15,200 km²***	
	b) Indicate if operators were used (use these 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 As for the 2000-2006 and 2007-2012 cycles, the Favourable Reference Range (FRR) was based on the reported current range. A new FRR was generated based on the distribution, which now incorporates the Nore population, plus an additional 10 km x 10 km square for the Nore population (S35). A FRR of 400 km² was set for the Nore population in 2007 (Moorkens *et al*., 2007). This was to provide for a second population of Nore pearl mussels in captivity and/or a second hard-water river. Geist *et al*. (2018) concluded that, although part of the *Margaritifera margaritifera* taxon, the Nore mussel had 'the highest genetic divergence from all the populations studied' and recommended 'its recognition as a separate conservation unit', recommending 'urgent action' 'to prevent any further erosion of their genetic variability'. The additional square in the FRR is therefore retained. The resultant FRR is considered likely to be the range when the Directive came into force and includes all significant ecological variations of the species for Ireland. The FRRs reported for the 2007-2012 period were 15,200 km² (species 1029) and 400 km² (species 1990). The changes between reporting periods result from the incorporation of the Nore population report into the 1029 report, as well as records for the species from an additional four 10 km x 10 km squares and the	

<table>
<tr><td></td><td colspan="2">removal of seven 10 km x 10 km squares from the distribution, which were previously included in error (no records of living mussels).</td></tr>
<tr><td rowspan="6">5.11 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>5.12 Additional information

Optional</td><td colspan="2">The range was based on the distribution, i.e. the Range Tool was not used, as the current distribution is considered to be accurate and the species is unlikely to occur outside the mapped 10 km grid squares. For a lotic species or habitat, occupying linear features in the landscape, the Range Tool is likely to include 10 km squares without rivers or with unsuitable river types.
Trends were estimated based on monitoring survey results; specifically evidence of population extinctions or contractions of the species' distribution within a river system:
- A single extinction was documented during the reporting cycle, leading to the loss of one 10 km grid square from the distribution. The only record of a live specimen in the Larah River was made in 1988 and it is likely that the population extinction occurred before the short-term trend period and, possibly, before the Directive came into force;
- Monitoring surveys found no evidence of contractions of the species' range within individual rivers, despite significant decreases in population size, mussel density, habitat occupancy and recruitment. This demonstrates that range is slow to change and is, therefore, not a sensitive measure of changes in the size or viability of freshwater pearl mussel populations, at either population or national scales;
- As a result, the short-term trend was assessed as stable, and the long-term trend was assessed as decreasing, based on the evidence of the extinction of the Larah population.
No values were provided for long- or short-term trend magnitude in the range of freshwater pearl mussels as, based on the available data, these would be speculative.
The reasons for the changes in the range were:
- improved knowledge/more accurate data:
Records of living mussels were made in an additional four 10 km grid squares;
Documentation of the extinction in the Larah, leading to</td></tr>
</table>

	the loss of one 10 km grid square; A review of the 2007-2012 distribution led to the removal of seven 10 km grid squares owing to the absence of records for live mussels; Genetic research concluded that the Nore population lies within the *Margaritifera margaritifera* taxon (Feind *et al*., 2016; Geist *et al*., 2018); - different methods: The inclusion of the Nore population led to an increase of 300 km^2 in the area of the range and a 400 km^2 increase in the FRR. In line with the guidance, and as for previous reporting cycles, the 'Favourable Reference Range' (FRR) was based on the reported current range. This approach does not consider the following challenges: - For widespread, cryptic or otherwise difficult to survey species, the reported current range will inevitably be based on a sub-sample and/or historical data and, therefore, may not accurately represent the actual range; - In addition, for species, such as *Margaritifera margaritifera*, with documented declines in population and habitat condition, the range will inevitably decline in the future, unless the species' habitat and populations are restored throughout the reported range. Maintenance/restoration of a freshwater pearl mussel range that is smaller than the FRR would be sufficient to allow the long-term survival of the species in Ireland. Establishing such a (smaller) national target for Range is advisable and achieving it would be highly ambitious, but would not allow, under the current Article 17 reporting format, the national conservation status of the Range to return to Favourable. In 2007, the Favourable Reference Population was set as 13 viable populations of *Margaritifera margaritifera* (including two viable, self-sustaining populations of the Nore mussels). A Range target of *circa* 20 x 10 km grid squares (2,000 km^2) would support this Population target. The National Conservation Strategy for the species (NPWS, 2011) prioritised eight populations for restoration. The distribution of these eight priority populations occupies 15 x 10 km grid squares (1,500 km^2). The reported FRR (152 x 10 km grid squares, or 15,200 km^2) is therefore considered unrealistic and unnecessary to secure the future of the species in Ireland.

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	***1987-2018***	
6.2 Population size	**a) Unit**	***1 x 1 km grids***

(*in reporting unit)*	**b) Minimum**	
	c) Maximum	
	d) Best single value	***713***
6.3 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	***Number of mature individuals***
	b) Minimum	***7,394,834***
	c) Maximum	***9,607,907***
	d) Best single value	
6.5 Type of estimate *Optional*	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

<table>
<tr><td>6.14 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">6.15 Favourable reference population
(using the unit in 6.2 or 6.4)</td><td colspan="2">a) 12,000,000 mature individuals</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 population 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 Population (FRP) is that reported for the 2000-2006 and 2007-2012 periods for species 1029 and based on the national population estimate from 2007 (Moorkens et al., 2007). This estimate is assumed to be close to the number of mature individuals present when the Directive came into force (1994). The FRP for the Nore population (10,000) is considered to be included within this figure of 12 million.
In 2007, the FRP was set as 11 viable populations of species 1029 and at least two viable, self-sustaining populations of species 1990. The number of viable populations (13) is still considered to be a more appropriate FRP target.
There should be less emphasis on population size and greater weighting given to the viability of the individual populations and the resilience of the national population (considering factors such as number of sites occupied, geographical distribution, pressures, etc.) in reporting the conservation status and setting targets to ensure the long-term survival of a species within a member state.</td></tr>
<tr><td rowspan="6">6.16 Change and reason for change in population size</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>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):

<u>genuine change</u> / improved knowledge or more accurate data / the use of a different method</td></tr>
<tr><td>6.17 Additional information

Optional</td><td colspan="2">The population was based on the distribution. All 1 x 1 km squares intersected by positive records of living mussels (Margaritifera_Records feature class) and/or a freshwater pearl mussel habitat line (FPM_Habitat_Classification) were selected. The result is that both Range and Population report the distribution of the species, Range using a 10 x 10 km scale grid and Population a 1 x 1 km scale grid. The 1 x 1 km unit is not a reliable measure of either the</td></tr>
</table>

	species' distribution or its population size: - Point records are observations in space and time that reflect the distribution of survey effort, rather than the species itself and, therefore, are not a reliable, repeatable measure of the species' current distribution or population. - The distribution is based on all available records. It is not practically possible to survey every occupied 1 x 1 km square in a reporting cycle and, in the absence of evidence to the contrary, it must be assumed that this long-lived species continues to occupy each 1 x 1 km square in its distribution. Therefore, the distribution, and hence the population, will not change between reporting cycles, other than where a population has been declared to be extinct through a comprehensive, repeat survey. As a result, the population based on the 1 x 1 km unit will not illustrate the documented decline in population size and/or viability. - The 1 x 1 km grid unit is not a measure of the size or viability of the freshwater pearl mussel population. The 1 x 1 km unit masks variation in the abundance and density of mussels, and in the carrying capacity of habitat, among squares. To illustrate, one 1 x 1 km square in the Bundorragha is estimated to contain more than 1 million adult mussels. By contrast, five transects counted in a 1 x 1 km square (X2186) in the Licky had only 11 mussels in 2016, and the entire stretch within that square is unlikely to contain more than 200 mussels. The new, required reporting unit 1 x 1 km grid squares is not comparable with previous reports (leading to a change between reporting periods owing to the use of a different method). For the 2000-2006 and 2007-2012 reporting cycles, the recommended unit was number of mature individuals, which itself had significant limitations, not least that the challenges of underwater survey mean the full extent and abundance of a population can seldom be recorded (NPWS, 2013). Despite this, the number of mature individuals is reported again for the 2013-2018 cycle in order to illustrate the decline in freshwater pearl mussel Population size over time. The size of adult populations of *Margaritifera margaritifera* can be estimated based on sub-samples and length or area of available habitat. All available population estimates, plus expert opinion, were used in 2007 to provide a national population estimate for Ireland of 12 million adult mussels (Moorkens *et al*., 2007). For the 2007-2012 cycle, it was estimated that the population had declined from 12 million to 10,990,320 (a decline of 8% over the reporting period) (NPWS, 2013). During the 2013-2018 cycle, 27 freshwater pearl mussel populations were monitored. 21 of these are SAC populations listed on S.I. 296 of 2009 as amended by S.I. 355 of 2018. For one population, the Allow, more extensive baseline survey by the IRD Duhallow project led to the upwards revision of the population estimate. The Bundorragha population has been in Favourable condition in most years and its population was assumed to be stable overall. The remaining 25 populations all demonstrated significant population declines and monitoring data were used to produce

	population-specific revised estimates (e.g. the 2013-2018 estimates were 1.5-2.1 million adult mussels for the Caragh population and 145-1,064 for the Clodiagh population). The individual estimates for the 27 monitored populations summed to 6,416,958-8,625,931 adult mussels. Revised estimates were produced for the six unmonitored SAC populations. Five were assumed to have declined by 18% over the reporting cycle, while the Bandon was assumed to have declined by between 18% and 28% owing to damage to the river bank. 18%, or 3% per year, was the estimated decline used for the 2007-2012 cycle and was based on a combination of survey data and expert opinion (NPWS, 2013). The individual estimates for the six unmonitored populations summed to 45,253-49,353. An estimate of 932,623 was used for the remaining unmonitored populations, based on an assumed 18% decline over the reporting cycle (as per NPWS, 2013). The figures summed to the Minimum and Maximum population size estimates of 7,394,834-9,607,907. The estimated population is significantly (20-38%) below the Favourable Reference Population of 12 million assumed to be close to the number of mature individuals present when the Directive came into force (Moorkens *et al*., 2007). The estimated decline between the 2007-2012 and 2013-2018 cycles was 12.6-32.7%. In Ireland, routine surveillance of the freshwater pearl mussel evaluates changes in adult mussel numbers using three main measures: numbers of dead shells; changes in adult numbers in permanent count areas; and, in particular, population age profiles (Moorkens, 2016; Moorkens and Killeen, in prep.). Data are assessed against targets established in S.I. 296 of 2009, site-specific conservation objectives (NPWS, 2011, 2012, 2015, 2016, 2017) and NSAI (2017). These detailed demographic data were used to assess the conservation status and trends in the population of *Margaritifera margaritifera*. Population viability is the key measure of the conservation status of *Margaritifera* populations. The percentage of the population of approximately five years of age and under (≤30mm in shell length), and the percentage of the population of approximately 10-15 years of age and under (≤65mm in shell length) demonstrate whether the population is reproducing and recruiting young mussels, and are particularly important to the assessment of population viability. Based on the data from the 27 monitored populations, there has been a significant, genuine decline in the species' population during the reporting cycle, both in terms of a decline in the number of individuals and decreased population viability. Only one population, the Budorragha, was in Favourable condition. This is significantly below the recommended Favourable Reference Population target of 13 viable populations. One population, the Larah River in the Upper Erne catchment, was declared to be extinct. The conservation condition of the other 25 populations was assessed as Unfavourable, and an attempt was made to further categorise Unfavourable condition as Inadequate, Bad and extinction imminent: 1. No populations were assessed as 'Inadequate' (i.e. inadequate recruitment - both juvenile (≤30 mm) and young mussels (≤65 mm) present but below targets. AND At least some areas of

	habitat are in favourable condition (i.e. passed all habitat attributes). No kills or other evidence of accelerated mortalities.) 2. Four populations were assessed as Inadequate/Bad (i.e. either: (a) juvenile and young mussels present, but habitat in Poor to Bad condition, or (b) no juvenile and young mussels, but substantial areas (>40% of quadrats on habitat transects) of habitat in Favourable condition AND population large (hundreds of thousands or more). There may be evidence of accelerated mortalities in some stretches. 3. 14 were in Bad conservation condition (i.e. no juvenile mussels present (small numbers of young mussels may occur) and most/all of habitat is in Unfavourable (Poor to Bad) condition). 4. Eight populations were considered to be in imminent danger of extinction (i.e. the population is predicted to go extinct over the short-to-medium term, based on small population size, absence of recruitment, rapid decline in adult numbers and Bad habitat condition). Only four of the monitored populations had juvenile mussels (≤30 mm) (Bundorragha, Caragh, Kerry Blackwater and Currane). Eleven populations had one or more young mussels of ≤65 mm, two of these (Recess and Deel) were not within SACs for the species. In populations with no recruitment and few extant individuals, declines were severe and consistent across permanent monitoring stations, e.g. in the Clodiagh only 67 mature individuals were counted at five stations, declines ranged from 55.9% to 93.8%, or an average decline of 67.3% between 2006 and 2016. Similarly, in the Licky seven permanent monitoring stations showed declines of 66.7%, 37.1%, 65.2%, 92.3%, 80%, 100% and 100% between 2005 and 2016. Kills (recently dead and moribund adult mussels) were recorded in 12 of the 27 monitored populations during the reporting cycle (2013-2018), including the Bundorragha, Kerry Blackwater (Kealduff) and Owenriff. Large declines in adult numbers over the short-term trend period (2007-2018) indicated possible kills in another six populations, including the Glaskeelan and Caragh. In addition, kills were reported from unmonitored rivers, including the Bandon. As 96% of the monitored extant populations were in Unfavourable condition, the conservation status of the Population was assessed as Unfavourable-Bad. As 96% of the monitored extant populations showed strong evidence of decline in the number of individuals and decreased population viability, the short- and long-term trends in Population were assessed as decreasing. Trend magnitudes cannot be provided owing to the high uncertainties, both in estimating overall population size and the changes in numbers of mussels at individual sites (see NPWS, 2013). As an example, while the Caragh population showed an average loss of 24% across seven stations between 2004 and 2014, six showed declines in numbers (-13% to -92.7%) and one showed an increase (+51.5%). Mussels do not move when conditions are favourable and, based on the evidence of insufficient recruitment and habitat

	deterioration, this increase in numbers is considered likely to indicate stress and disturbance. The observed acceleration of population decline and further decreases in recruitment rates are alarming and raise questions as to the restorability not only of the small populations on the verge of extinction, but also of some priority populations with hundreds of thousands or millions of mussels.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? YES/**NO**/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/**NO**/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / **decreasing** / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	The freshwater pearl mussel is found in the oligotrophic, soft to neutral waters of fast-flowing rivers and, occasionally, in lakes. It is a benthic, largely sedentary species, living partially buried in gravels

	stabilised with larger clast-sizes such as cobbles and boulders. Juvenile mussels live fully buried between gravel particles, where oxygen is freely exchanged. The species is highly sensitive to alterations to the hydrology, morphology and benthic communities of its river habitat. The standard methods employed for monitoring the conservation condition of the freshwater pearl mussel require detailed monitoring of the species' habitat (Moorkens, 2016; Moorkens and Killeen, in prep.). Measurements for assessing habitat condition are typically taken in 1 m x 1 m quadrats, and largely relate to the river substratum: physical substrate parameters (composition and redox), plant colonisation (algae and macrophytes) and decomposing organic matter. Habitat condition is assessed using the attributes ('elements') and targets ('objectives') on the Fourth Schedule to the Freshwater Pearl Mussel Regulations (S.I. 296 of 2009), site-specific conservation objectives (NPWS, 2011, 2012, 2015, 2016, 2017) and NSAI (2017). Monitoring data demonstrated that habitat condition was Favourable in only one of the 26 monitored extant populations. Siltation was the most common impact observed on mussel habitat, with 19 of the 26 failing the silt target ("No artificially elevated levels of siltation") and 20 failing the redox target ("Average redox potential loss at 5cm <20%"). 17 and 14 rivers, respectively, failed the macroalgae and macrophyte targets ("Absent or Trace (<5%)"). As 96% of the monitored extant populations had Unfavourable habitat condition, the conservation status of the Habitat for the species was assessed as Unfavourable-Bad. The short- and long-term trends in freshwater pearl mussel habitat quality were assessed as declining for the 2007-2012 cycle (NPWS, 2013). This assessment was based on repeat monitoring of the species' habitat from 2004, which showed continuous Bad condition and/or further deterioration in the habitat condition. Survey and monitoring during the 2013-2018 cycle confirmed these general trends and also documented episodes of severe impact, in some cases associated with specific, identifiable incidents of anthropogenic pressure, e.g.: 1. heavy sedimentation (including with organic matter) in the Currane (agricultural drainage and 're-contouring'), Ownagappul (agricultural practices including cattle entering the river), Bandon (woodland clearance), Licky (clear-felling), Glaskeelan (forest thinning), Clodiagh (multiple sources: even fast riffles had extremely heavy silt plumes); 2. low flow velocity in the Ownagappul (drinking water abstraction from up-stream lake combined with altered river morphology owing to agricultural activities), Clady (hydroelectric impoundment), Cloon (catchment drainage), Kerry Blackwater (catchment drainage), Owenriff (angling weirs and catchment drainage); 3. heavy macroalgal growth in the Licky (agriculture and forestry, including removal of tree shade), Dawros (nutrient sources uncertain, but a tourist attraction with over half a million

	visitors in 2017 is one potentially significant source), Kerry Blackwater (agriculture and forestry), Owenriff (urban wastewater and agriculture are likely nutrient sources, algal biomass acts in combination with low flows and on-going abundant macrophytes); 4. heavy macrophyte growth in the Bandon (removal of tree shade), Currane, Owenriff. The decline in the habitat condition in priority catchments (Ownagappul, Currane, Glaskeelan, Owenriff, Kerry Blackwater and Caragh) is particularly concerning. The development of more detailed habitat mapping methods (Moorkens, 2016; Moorkens and Killeen, in prep.) is providing additional data on the area of available habitat, including its potential to support juvenile mussels, as well as its conservation condition (Good, Moderate and Poor) (populations where these methods have been used include the Caragh, Kerry Blackwater, Owenriff, Bundorragha, Allow, Dawros, Deel). These data will inform future national assessments of the area of the habitat in Favourable, Inadequate and Bad condition.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**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) **F31** Other modification of hydrological conditions for residential or recreational development (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)	**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) **F31** Other modification of hydrological conditions for residential or recreational development (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 (M) **C05** Peat extraction (M) **F28** Modification of flooding regimes, flood protection for residential or recreational development (M) **D02** Hydropower (dams, weirs, run-off-the-river), including infrastructure (M) **F33** Abstraction of ground and surface waters (including marine) for public water supply and recreational use (M)	generating pollution to surface or ground water (M) **C05** Peat extraction (M) **F28** Modification of flooding regimes, flood protection for residential or recreational development (M) **D02** Hydropower (dams, weirs, run-off-the-river), including infrastructure (M) **F33** Abstraction of ground and surface waters (including marine) for public water supply and recreational use (M)
8.2 Sources of information *Optional*		
8.3 Additional information *Optional*	Pressures and threats were documented as part of routine surveillance. Data were also available from the 2010 draft Sub-basin Plans for 27 catchments. Additional information came from reported incidents (including through site-inspection), monitoring of authorised activities (following AA/EIA) and KerryLIFE (LIFE13 NAT/IE/000144), as well as other NPWS projects and WFD and EPA reports. Pressures were ranked according to their importance in the eight priority pearl mussel catchments. A large number of pressures were identified and are itemised below. Only ten could be listed on the form, only five of which could be listed as of high importance. Knowledge of the species' ecological flow requirements has improved in recent years (e.g. Moorkens and Killeen, 2014; Moorkens *et al*., 2015). Changes in hydrological regime, particularly reduced base flow, but also increased scour at high flows, have been demonstrated to impact significantly on populations in Ireland, alone and in combination with pollution. Hydrological change in pearl mussel catchments is largely a result of land drainage (for agriculture (A31), forestry (B27) and peat extraction (C05)), but also results from abstraction for drinking water (F33) and, in at least one catchment (Clady), impoundment for electricity generation (D02). F31 – Other modification of hydrological conditions for residential or recreational development – was used to cover the construction of fishery weirs in freshwater pearl mussel habitat in the Owenriff, which led to morphological changes in the habitat and severe impacts on flow. Owing to the international importance of this population, this pressure was assessed as of High importance. Pollution with fine sediment and nutrients continues to impact on the species. Agriculture is a primary source, notably land reclamation and intensification (A01, A02, A04, A05, A13, A20, A31), increased stocking densities and housing of stock, leading to the generation of slurry (A19), and over-grazing (A09). Code A26 for diffuse pollution was used to cover all of these agricultural sources, although with drainage of peatland and wet soils, agricultural pollution can effectively be point source. Physical alteration of river banks,	

	including bank reinforcement (A33) continues to be a significant pressure in pearl mussel rivers and is linked to intensification of agricultural use. A30, abstractions for agriculture, is also a concern, but it has not yet been demonstrated to be more than of low importance. As with other abstraction pressures, A30 may become a more significant threat, in combination with predicted droughts owing to climate change. Direct impacts have been recorded owing to livestock (cattle) in rivers, in at least six catchments, including three priority catchments. Some of the incidents have already been addressed through KerryLIFE (LIFE13 NAT/IE/000144) and it is hoped others in the eight priority catchments will be addressed through the Pearl Mussel Project European Innovation Partnership. Cattle in rivers have caused direct disturbance and death of mussels and habitat damage, as well as being a point-source of pollution. This pressure could have, therefore, been reported under a number of different pressure codes, e.g. A14 – Livestock farming (without grazing), K05 - Physical alteration of water bodies, but is considered to be covered, along with most other agricultural pressures, by A26. As well as causing hydrological impacts, drainage (C05, B27, A31) and other disturbance of peatland (e.g. over-grazing by sheep (A09) or wind farm development (D01, D08)) leads to pollution, through mineralization of peat and increased losses of ammonia, dissolved and particulate organic fractions and mineral sub-soil. Furthermore, damage to wetland areas reduces the detrital food supply for adult and juvenile mussels. Organic pollutants, as well as increasing water colour and turbidity, cause enrichment through increased biomass of the bacteria and fungi. The loss of organic acids from drained and degraded peatland has also been demonstrated to result in acid episodes in Irish streams. Conifer forest on peatland releases high pollutant loads (B23). Significant losses of pollutants occur following tree-felling (B09, B12), where slow decomposition of conifer needles, branches and roots is a significant source of organic matter and, ultimately, nutrients. Ground disturbance by machinery can also contribute to losses of inorganic sediment and particulate organic matter. Direct loss of dissolved nutrients can occur during application of synthetic fertilisers (B19), which is required to establish, and bring to maturity, conifer crops on peatland. Pollution with human waste-water (F12) is also an on-going concern, particularly from on-site systems at tourist attractions (e.g. in the Dawros and Bundorragha), but also from urban agglomerations (e.g. possible leakages from sewerage network in Owenriff). EPA (2018) highlighted that urban waste-water treatment needs to improve at 13 urban areas to protect the freshwater pearl mussel. Maintenance of flood-relief/arterial drainage schemes is an on-going pressure, including in at least two SAC populations (F28). A number of pearl mussel populations are also threatened by new flood-relief schemes. Operation and maintenance of bridges, roads and other transport infrastructure (E01 Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels)) continues to be a pressure in pearl mussel catchments. New and upgraded transport infrastructure is

	still a threat. Although KerryLIFE (LIFE13 NAT/IE/000144) and the Pearl Mussel Project European Innovation Partnership are addressing agricultural pressures, these are voluntary schemes limited to priority catchments. As a result, all pressures are likely to continue and have also been listed as threats. Other than the construction of fishery weirs in the Owenriff, there has been no genuine change in pressures or threats for this reporting cycle. Both the reporting form and Article 17 pressures and threats list have changed since Article 17 2013.

9 Conservation measures	
To be reported only for Annex II species	
9.1 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*
9.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, population and/or habitat for the species or* *b) Expand the current range of the species (related to 'Range') or* *c) Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population') or* ***d) Restore the habitat of the species (related to 'Habitat for the species')***
9.3 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*
9.4 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 in field 9.2):* *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)*

9.5 List of main conservation measures	**CA15** Manage drainage and irrigation operations and infrastructures in agriculture **CA11** Reduce diffuse pollution to surface or ground waters from agricultural activities **CA05** Adapt mowing, grazing and other equivalent agricultural activities **CA09** Manage the use of natural fertilisers and chemicals in agricultural (plant and animal) production **CB04** Adapt/manage reforestation and forest regeneration **CB06** Stop forest management and exploitation practices **CB05** Adapt/change forest management and exploitation practices **CB14** Manage drainage and irrigation operations and infrastructures
9.6 Additional information *Optional*	Measures are needed to restore the habitat for the freshwater pearl mussel in order to improve adult survival and to allow successful recruitment, with the aim of restoring the viability and sustainability of the populations. Specifically, measures are needed within the wider catchments of the eight priority populations to restore or rehabilitate the hydrological regimes of pearl mussel rivers, to reduce sources of fine sediment, nutrient and other pollutants, to restore wetland habitats to provide food to adult and, particularly, juvenile mussels, and to restore the natural morphology of mussel rivers (e.g. eliminate unnatural levels of bank erosion and slumping). The national conservation strategy for the freshwater pearl mussel (NPWS, 2011) focused on the development of measures for agriculture and forestry in eight priority catchments. These measures are required to be implemented both inside and outside of the associated SACs, in order to restore the SAC populations. The KerryLIFE project (LIFE13 NAT/IE/000144) is demonstrating effective conservation measures on farms and in forests to restore the freshwater pearl mussel to Favourable conservation condition. KerryLIFE is working on parts of the farmed and commercially forested land within two SACs in the catchments of the priority Caragh and Kerry Blackwater freshwater pearl mussel populations. 48 farms, or more than 5,700 ha, have been surveyed by KerryLIFE and 39 farm plans (covering 5,081 ha) are being implemented. Measures undertaken include management of drains at over 860 locations, management of grazing and supplementary feeding across 437 ha, and 262 alternative water drinking water sources for livestock. The project has prepared nine forest management plans covering 495 ha. Four forest trials have been completed over 43 ha and additional forest measures are planned for another 62 ha. The project also hopes to establish almost 50 ha of native woodland, through afforestation and conversion of conifer forest. The Department of Agriculture, Food and the Marine (DAFM) appointed a contract team to manage the Pearl Mussel Project European Innovation Partnership in 2018. This six-year, results-based agri-environmental programme, with a total budget of €10 million, will address agricultural pressures in the eight priority catchments. The team has been consulting with farmers and conducting baseline

	surveys. Farms plans will be prepared and implemented from 2019 onwards. The DAFM (Forest Service) also published a draft Plan for Forests & Freshwater Pearl Mussel in Ireland for consultation in July 2018. In response to damage to the Bandon SAC, the Office of Public Works (OPW) has updated its environmental assessment and management procedures, which should reduce pressures arising from maintenance of OPW-managed flood-relief and arterial drainage schemes. Through on-going investment in and regulation of urban waste-waters, there have been some water quality improvements in other SAC rivers (i.e. outside of the eight priority populations); however 13 urban areas have been identified as needing improvements for freshwater pearl mussel (EPA, 2018). 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. Predicting the species' response to conservation measures is difficult and has a high degree of uncertainty. Uncertainty can be considered under the headings 'ability to measure' and 'confounding or inhibiting factors'. 1. In terms of ability to measure/demonstrate improvements, time lags are expected between: a) Implementation of measures and improvement in river habitat; and b) Improvement in river habitat and improved mussel recruitment. While some improvements in river habitat and mussel recruitment may be detected in the short-to-medium term, it is likely to take long-term high-frequency data to demonstrate statistically robust improving trends. 2. In terms of confounding or inhibiting factors, conservation measures may not have the expected positive response in river habitat or mussel recruitment, if other activities in the catchments sustain or increase pressures, or factors such as climate change have unpredicted consequences (e.g. cause a shift in natural dynamics). Despite the positive progress towards implementation of conservation measures for the freshwater pearl mussel, the future of the species remains uncertain. Reasons for this include the following: - Participation in KerryLIFE is voluntary, the project area does not cover the entirety of either catchment and resources are not sufficient to allow all pressures within the project area to be addressed. As a result, agricultural, forest and turf cutting activities, including activities such as land reclamation, unsustainable levels of grazing on peatland and clear-felling, are continuing to impact on the target populations; - Participation in the Pearl Mussel Project European Innovation Partnership is also voluntary and the available budget will not be sufficient to address all agricultural pressures in the eight

	priority catchments; - There are few mechanisms for addressing agricultural pressures outside of the eight priority catchments; - The Plan for Forests & Freshwater Pearl Mussel has yet to be implemented and the consultation draft was not based on the species' ecological requirements or its site-specific conservation objectives. Neither did the plans consider the specific pressures and threats from forestry in the SAC catchments, particularly those pressures and threats from existing conifer plantations. Pro-active mechanisms for implementing the necessary conservation measures also appeared to be lacking; - There is currently no mechanism to address turf-cutting pressures in pearl mussel catchments; - Proposed flood-relief schemes pose a threat to non-SAC populations of pearl mussel; and - In the absence of catchment (Sub-basin) management plans, as required under S.I. 296 of 2009, there is no framework/plan for co-ordination of: conservation measures; the steps to avoid disturbance of the species and deterioration of its habitat; or appropriate assessment procedures. In conclusion, many measures have been identified as necessary for the species, but relatively few have been taken and only in a restricted area, and the likely response in the species' habitat and population remains uncertain.

10 Future prospects		
10.1 Future prospects of parameters	**a) Range**	*Good / **Poor** / Bad / Unknown*
	b) Population	*Good / Poor / **Bad** / Unknown*
	c) Habitat of the species	*Good / Poor / **Bad** / Unknown*
10.2 Additional information *Optional*	The Future prospects of the Range, Population and Habitat for the species 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 listed as pressures and threats. Many sectors give rise to impacts on the freshwater pearl mussel and longer lists of pressures and threats could have been provided. These pressures and threats impact on the species habitat through changes in hydrological regime, river substratum and plant biomass. They also impact more directly on the species leading to stress, loss of condition and, ultimately, premature death. **Conservation measures**: Species-specific, concrete conservation measures are currently being implemented in parts of two SAC catchments (Caragh and Kerry Blackwater) through the KerryLIFE project. Work has also commenced on the implementation of a European Innovation Partnership in all eight priority SAC catchments.	

	These conservation measures are voluntary and focused on agriculture and so do not address all of the pressures and threats impacting on the target populations. Identification and implementation of field and farm-specific measures takes time and there will be a significant time-lag before they take effect. The extent of restoration of terrestrial habitats required in order to restore the species' habitat to Favourable condition is not yet known. Such catchment restoration must provide sufficient resilience to maintain the species and its habitat at Favourable condition long-term in order to fulfil the conservation objectives. Given the lack of measures for other pressures, particularly the lack of mechanisms to deal with existing conifer plantations on peat soils, as well as the number of incidents of damage recorded in the reporting cycle, it can be concluded that the conservation measures will not 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 and the long-term trend as decreasing. The current range is 3% less than the Favourable Reference Range. Therefore, the Conservation Status of the Range was assessed as Unfavourable-Inadequate. Given the negative influence of the identified pressures and threats, the Bad condition of the Population and the Habitat for the species, and the insufficient conservation measures, the predicted future trend in Range is negative. As a result, the Future prospects of the Range were assessed as Poor. **Population**: The short- and long-term trends of the Population were assessed as decreasing. The estimated minimum population is 38% smaller than the Favourable Reference Population. Only one individual population is considered to be viable. Therefore, the Conservation Status of the Population was assessed as Unfavourable-Bad. Given the negative influence of the identified pressures and threats on the species' populations and their habitat, and the insufficient conservation measures, the predicted future trend in Population is negative. As a result, the Future prospects of the Population were assessed as Bad. **Habitat for the species**: The short- and long-term trends in Habitat for the species were assessed as decreasing, owing to evidence of on-going and accelerated habitat decline, as well as documented episodes of severe impact. The decline in the condition of the habitat within six of the priority catchments was particularly concerning. 96% of the monitored extant populations had Unfavourable habitat condition. As a result, the Conservation Status of the Habitat for the species was assessed as Unfavourable-Bad. Given the negative influence of the identified pressures and threats on the species' habitat, and the insufficient conservation measures, the predicted future trend in Habitat for the species is negative. As a result, the Future prospects of the 'Habitat of the species' were assessed as Bad. As the Future prospects of the Range were assessed as Poor and the Future prospects of the Population and Habitat for the species as Bad, the overall Future prospects for *Margaritifera margaritifera* were assessed as Unfavourable-Bad.

11 Conclusions			
Assessment of conservation status at end of reporting period			
11.1 Range	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*		
11.2 Population	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
11.3 Habitat for the species	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
11.4 Future prospects	*Favourable (FV) / Inadequate (U1)/ **Bad (U2)** / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / **deteriorating** / stable / unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/**NO***	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	***YES**/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	**Range**: The current range is 3% smaller than the Favourable Reference Range. As a result, the Range has been assessed as Unfavourable-Inadequate. This change from the 2007-2012 report is because the Nore pearl mussel population is now reported with other *Margaritifera margaritifera* populations. As no changes in the		

	species' range were recorded during the reporting cycle, the short-term trend was assessed as stable. The long-term trend was assessed as decreasing, owing to the extinction of the Larah population, however this extinction may have occurred before the Directive came into force. Given the recorded declines in Population, the Bad status of the Habitat for the species and the pressures and threats recorded, the Range of the species is predicted to decline significantly in the future. Securing the long-term viability of the species in Ireland does not require restoration of the full, reported species' range, and it is highly unlikely that the habitat of many populations is restorable. **Population**: The estimated population (number of mature individuals) is 20-38% smaller than the Favourable Reference Population of 12 million. Only one individual population is considered to be viable (in Favourable condition). The target is for 13 viable populations. Of the 27 populations monitored, one was declared extinct and 25 were found to be in Unfavourable condition: eight were considered in imminent danger of extinction, 14 were considered to be in Bad condition and four were Inadequate/Bad. Mussel kills were reported in 12 of the 27 populations monitored. Therefore, the Conservation Status of the Population was assessed as Unfavourable-Bad. The short- and long-term trends of the Population were assessed as decreasing, owing to failure to recruit young mussels, recorded kills and documented declines in numbers of adult mussels. **Habitat for the species**: 96% of the monitored extant populations had Unfavourable habitat condition. 77% failed the redox target, 73% failed the silt target, 65% failed the macroalgae target and 54% failed the macrophyte target. Flow impacts were also recorded in many of the rivers. Episodes of severe impacts were documented in at least 12 populations. As a result, the Conservation Status of the Habitat for the species was assessed as Unfavourable-Bad. The short-term trend in Habitat for the species was assessed as decreasing owing to evidence of on-going and accelerated habitat decline, as well as documented episodes of severe impact. The decline in the condition of the habitat within six of the priority catchments was particularly concerning. **Future prospects**: The Conservation Status of the Range was assessed as Unfavourable-Inadequate, but its predicted future trend was negative, owing to the Bad condition of the Population and the Habitat for the species, the negative influence of the identified pressures and threats, and the insufficient conservation measures. As a result, the Future prospects for the Range were assessed as Poor. Population and Habitat for the species were assessed as Unfavourable-Bad and decreasing and, therefore, their Future prospects are Bad. As Population, Habitat for the species and Future prospects were assessed as Unfavourable-Bad, the Overall Conservation Status of the freshwater pearl mussel was assessed as Unfavourable-Bad. As for the 2007-2012 cycle, the overall trend was assessed as deteriorating, based on the overall Bad Conservation Status and the decreasing trends in Population and Habitat for the species. Despite

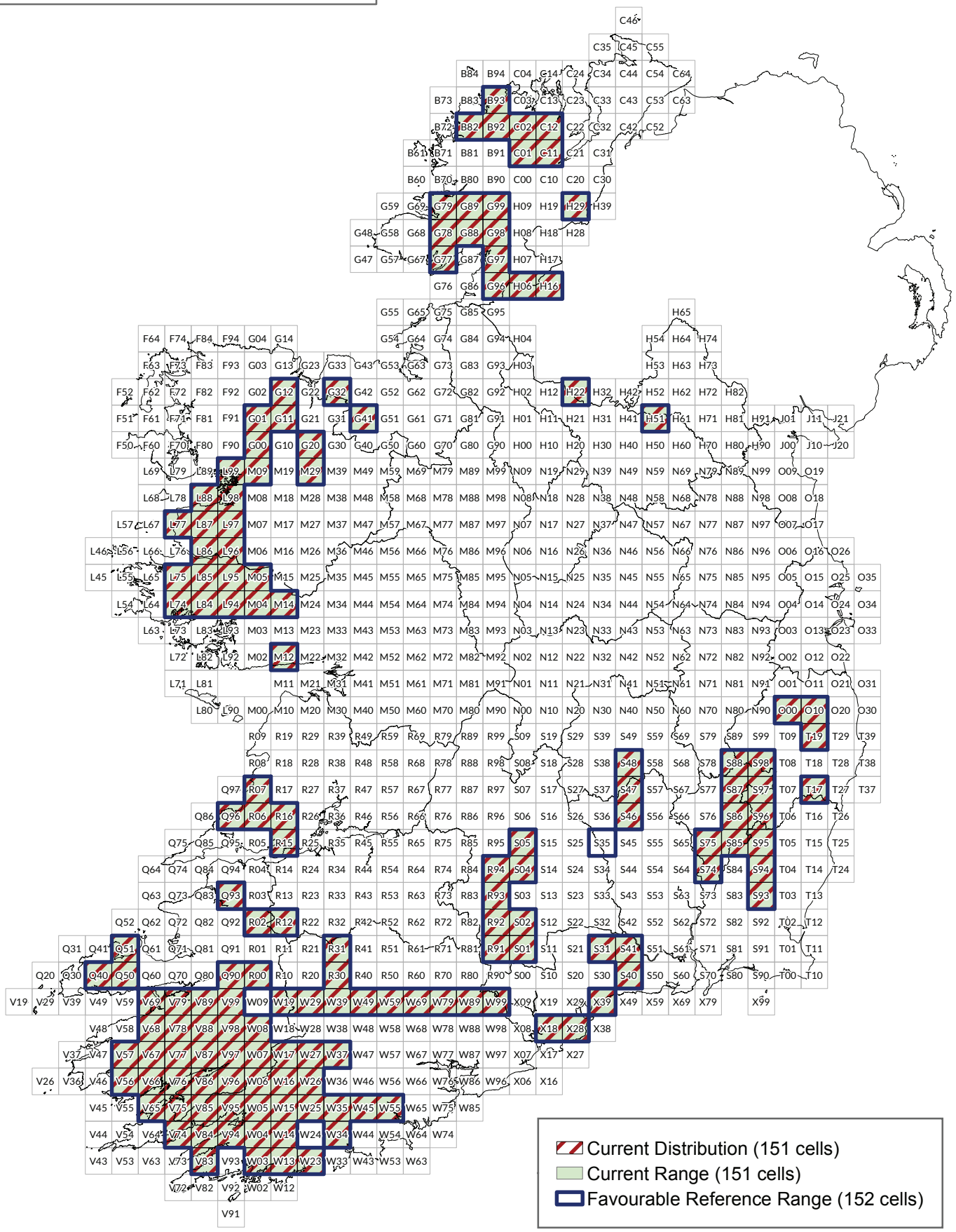
	the significant progress in identifying and implementing the necessary conservation measures for the species, particularly by the KerryLIFE project, relatively few practical conservation measures have yet been taken and only in a restricted area. Populations have continued to decline, many at alarmingly high and previously unpredicted rates, the condition of the habitat for the species has continued to deteriorate, new pressures have emerged and incidents of direct and indirect damage have occurred. There were delays with the implementation of relevant plans/programmes (e.g. FPM EIP, forestry and FMP, WFD RBMP), and there has been some poor policy integration, as well as insufficient consideration of the science, particularly in relation to the species' ecological requirements. It is hoped that with the demonstration of conservation measures through the KerryLIFE project and the Pearl Mussel Project European Innovation Partnership, that the Future prospects of the species will improve in the next reporting cycle and that evidence of improvements in the Habitat for the species and in Population viability will be detected.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species		
12.1 Population size inside the pSCIs, SCIs and SACs network *(on the biogeographical/marine level including all sites where the species is present)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***495***
12.2 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
12.3 Population size 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*	
12.4 Short-term trend of population size within the network Direction	*Short-term trend of population size within the network over the period indicated in field 6.5 :* *stable / increasing /* ***decreasing*** */ uncertain / unknown*	
12.5 Short-term trend of population size within 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*	
12.6 Additional information	The population size inside the network was based on the distribution. All 1 km x 1 km squares with positive records of living	

Optional	mussels (Margaritifera_Records feature class) and/or a freshwater pearl mussel habitat line (FPM_Habitat_Classification) that intersected the SAC network were selected. 347 1 km x 1 km squares intersected SACs designated for the protection of the species. These squares represent the 26 populations listed on S.I. 355 of 2018. 148 1 km x 1 km squares intersected SACs where the species is not a Qualifying Interest. For the 2007-2012 cycle, the total size of the 27 populations listed on S.I. 296 of 2009 was estimated as 10,500,799 (NPWS, 2013). When the estimated population of the Munster Blackwater is removed, the 2007-2012 estimate for the 26 SAC populations listed on the amendment Regulations (S.I. 355 of 2018) is 10,492,599. During the 2013-2018 cycle, 21 of the SAC populations were monitored. The Allow population estimate was revised upwards based on a more extensive baseline survey by the IRD Duhallow project. The Bundorragha population has been in Favourable condition in most years and its population was assumed to be stable overall. The remaining 19 populations all demonstrated significant population declines and monitoring data were used to produce population-specific revised estimates. Five of the six unmonitored SAC populations were assumed to have declined by 18% over the reporting cycle, while the Bandon was assumed to have declined by between 18% and 28% owing to damage to the river bank. The individual 2013-2018 estimates for the 26 SAC populations summed to minimum and maximum population size estimates of 6,370,820-8,577,805 adult mussels. The estimated decline in the 26 SAC populations between the 2007-2012 and 2013-2018 cycles was, therefore, 18-39%. Only one population, the Bundorragha, was in Favourable condition. The remaining 20 monitored SAC populations were Unfavourable. Six SAC populations were considered to be in imminent danger of extinction, eleven were assessed as Bad and three were assessed as Inadequate/Bad. Only the Bundorragha, Caragh, Kerry Blackwater and Currane had juvenile mussels (≤30 mm), the Favourable Bundorragha having 23% ≤30 mm in 2016. In total, only nine SAC populations had one or more young mussels of ≤65 mm. Severe declines in adult mussels were recorded in some small SAC populations, notably the Clodiagh, where only 67 mature individuals were counted at five stations, and the Licky. Kills (recently dead and moribund adult mussels) were recorded in at least eleven of the SAC populations during the reporting cycle. The observed acceleration of population decline and further decreases in recruitment rates are alarming and raise questions as to the restorability not only of the small SAC populations on the verge of extinction, but also of some priority populations with hundreds of thousands or millions of mussels.

13 Complementary information

Freshwater Pearl Mussel
Margaritifera margaritifera (1029)
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

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Scale - Scála
0 12.5 25 50 km

N

Map - rscáil V 2.0
Date áta June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1092***
1.3 Species scientific name	*Austropotamobius pallipes*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	White-clawed crayfish
1.6i Species description	The white-clawed crayfish, *Austropotamobius pallipes*, is the largest freshwater arthropod found in Ireland. It is part of a species complex which is found in south-western Europe in Spain, Italy, Croatia, Switzerland, Austria, western Germany, France, U.K. and Ireland (Souty-Grosset *et al*., 2006). Populations from northern Italy northwards are treated as nominate *pallipes*. The populations in southern Italy and Spain are considered distinct and treated as either a subspecies or separate species, *italicus*. There is good evidence that the Irish population is an introduced one from a French population dating from around 1680 (Lucey, 1999) and, in support of this, the white-clawed crayfish of France, UK and Ireland have been found to be genetically rather uniform. In most of its range, white-clawed crayfish is found principally in first-order streams, but in Ireland it utilises a much broader spectrum of habitats extending from the smallest streams and drains to large rivers and medium-sized lakes wherever there is sufficient lime. The distribution in Ireland reflects this need for lime as it is widespread in central Ireland but absent from areas with acidic geology such as Kerry and west Cork, the west of Galway and Mayo, and Donegal. White-clawed crayfish faces an existential threat from twin impacts of non-indigenous crayfish species (NICS) and Crayfish Plague which is a water-borne disease specific to freshwater crayfish caused by the oomycete *Aphanomyces astaci*. NICS impact the white-clawed crayfish through direct predation and competition but also act as carriers of Crayfish Plague. *Aphanomyces astaci* originated in North America and it arrived in Europe in the 19th century. The organism grows on the cuticle of crayfish but for a variety of reasons, when it infects European crayfish species, the infected animals die within a few days. American species can resist the disease as they have co-evolved with it. European crayfish species have been lost from much of their range due in part to Crayfish Plague and lost species have been replaced by one or more NICS. Ireland had remained free of Crayfish Plague until 2015 when the disease was confirmed (earlier outbreaks were before 1994). By 2018 Crayfish Plague outbreaks had been confirmed in six river systems (another outbreak was detected in Northern Ireland, making seven in total on the whole island). However no populations of any NICS have been confirmed on the island.

	The white-clawed crayfish is generally associated with good quality waters (e.g. Grandjean *et al.*, 2003) but this is not necessarily the case in Ireland where it can occur in water of lower quality, down to a Q value of around 3 or an ASPT of 4 (Demers & Reynolds, 2002, 2003; Gallagher *et al*., 2006). It is now generally considered as a keystone or heritage species rather than as a bioindicator (Reynolds & Souty-Grosset, 2003), because of its traditional importance and its large size, longevity and dominant position in the ecosystem (Matthews & Reynolds, 1992). The species prefers relatively cool temperatures and adequate dissolved oxygen and lime, although tolerating significant fluctuations in these parameters (Lyons & Kelly-Quinn, 2003; Demers *et al*., 2006; Reynolds *et al*., 2002; Souty-Grosset *et al*., 2006). Habitat heterogeneity is important (Smith *et al*., 1996); juveniles live among submerged tree roots, gravel or macrophytes, while larger crayfish must have stones to hide under, or an earthen bank in which to burrow (Holdich & Rogers, 2000; Demers *et al*., 2003; Gallagher *et al*., 2006). Brooding females in particular require undisturbed shelter over a prolonged winter-spring period. The species is omnivorous, with juveniles more reliant than adults on animal foods (Reynolds & O'Keeffe, 2005). Indicating its keystone status, *A. pallipes* had a marked impact on stands of charophytes and on most macroinvertebrates in caged experiments in an Irish lake (Matthews *et al*., 1993).

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2007-2018***
2.3 Distribution map	Submitted
2.4 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*
2.5 Additional maps *Optional*	Range map was submitted. An additional map is provided showing the distribution of Crayfish Plague-causing organism *Aphanomyces astaci*.
2.6i Additional information	White-clawed crayfish distribution records come from four main sources: a. River quality monitoring. This provides the most extensive data on its occurrence throughout Ireland. The species is not routinely included in the protocol but it is noted whenever seen. The sites sampled are the same in each three-year period; b. NPWS species-specific surveys in certain habitats and designated sites. NPWS have funded specific surveys of the species in the

	plague-affected rivers and lakes and in SACs; c. Licence returns. These provide records often from sites which are not covered by the broader network of river monitoring surveys; and d. Crayfish records from Inland Fisheries Ireland fish surveys. The distribution of *Aphanomyces astaci* is derived either from DNA tests on tissue samples taken from crayfish or from tests on water samples (environmental-DNA testing) taken from sites with confirmed or suspected Crayfish Plague outbreaks.

3 Information related to Annex V species (Art. 14)

3.1 Is the species taken in the wild/exploited?	*Is the species taken in the wild/exploited? YES/**NO*** *If the reply is NO, or if the reply is YES and the conservation status of the species is Favourable (FV) in all biogeographical or marine regions where the species occurs, then do not fill in the remaining fields of this section* *If the reply is YES and the conservation status of the species is Unfavourable (U1 or U2) in one or more biogeographical/marine regions where the species occurs, complete the remaining relevant fields of this section*						
3.2 Which of the measures in Art. 14 have been taken?	*a) regulations regarding access to property*						*YES/NO*
	b) temporary or local prohibition of the taking of specimens in the wild and exploitation						*YES/NO*
	c) regulation of the periods and/or methods of taking specimens						*YES/NO*
	d) application of hunting and fishing rules which take account of the conservation of such populations						*YES/NO*
	e) establishment of a system of licences for taking specimens or of quotas						*YES/NO*
	f) regulation of the purchase, sale, offering for sale, keeping for sale or transport for sale of specimens						*YES/NO*
	g) breeding in captivity of animal species as well as artificial propagation of plant species						*YES/NO*
	h) other measures, if yes, describe						*YES/NO*
	If 'yes, other measures' have been taken, describe those measures *Free text*						
3.3 Hunting bag or quantity taken in the wild for Mammals and *Acipenseridae* (Fish)	a) Unit	*Use reporting unit as in field 6.2 a)*					
	b) Statistics/ quantity taken	*Provide statistics/quantity taken per hunting season or per year (where season is not used) over the reporting period*					
		Season/ year 1	*Season/ year 2*	*Season/ year 3*	*Season/ year 4*	*Season/ year 5*	*Season/ year 6*

	Min. *(raw, i.e. not rounded)*						
	Max. *(raw, i.e. not rounded)*						
	Unknown						
3.4 Hunting bag or quantity taken in the wild Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*						
3.5 Additional information *Optional*	Taking the species in the wild is prohibited in Ireland by the Wildlife Acts (1976, 2000). There is some (anecdotal) evidence of fishing for crayfish but firm evidence of incidents is often lacking. There is no evidence that illegal fishing is having an impact on the conservation status of the species.						

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	***Atlantic,*** *Marine Atlantic*
4.2 Sources of information	Demers, A. & Reynolds, J.D. (2002) A survey of the white-clawed crayfish, *Austropotamobius pallipes* (Lereboullet) and of water quality in two catchments of Eastern Ireland. *Bulletin Français de la Pêche et de la Pisciculture* 367: 729-740. Demers, A. & Reynolds, J. D. (2003) The distribution of the white-clawed crayfish, *Austropotamobius pallipes*, in eight catchments in Ireland in relation to water quality. In Holdich, D. M. & Sibley, P. J. (eds), *Management & Conservation of Crayfish*. Environment Agency, Bristol. pp 94-103. Demers, A., Reynolds, J. D. & Cioni, A. (2003) Habitat preferences of different size classes of *Austropotamobius pallipes* in an Irish river. *Bulletin Français de la Pêche et de la Pisciculture* 370-371: 127-137. Demers, A., Souty-Grosset, C., Trouilhe, M-C., Fureder, L., Renai, B. & Gherardi, F. (2006) Tolerance of three European native species of crayfish to hypoxia. *Hydrobiologia* 560: 425-432. Gallagher, M.B., Dick, J.T.A. & Elwood, R.W. (2006) Riverine habitat requirements of the white-clawed crayfish, *Austropotamobius pallipes*. *Biology & Environment* 106B: 1-8.

Gammell, M., McFarlane, A., Brady, D., O'Brien, J. Mirimin, L., Graham, C., Lally, H., Minto, C. & O'Connor, I. (2018) Survey of the status of white-clawed crayfish, *Austropotamobius pallipes*, in designated SACs in 2017. Unpublished report to National Parks and Wildlife Service.

Grandjean, F., Momot, J. & Bramard, M. (2003) Biological water quality assessment of the White-clawed Crayfish habitat based on macroinvertebrate communities: usefulness for its conservation. *Bulletin Français de la Pêche et de la Pisciculture* 370-371: 115-125.

Holdich, D.M. & Rogers, W.D. (2000) Habitat requirements of the white-clawed crayfish, *Austropotamobius pallipes*. In: D. Rogers & J. Brickland (eds) Crayfish Conference Leeds pp. 109-121. Environment Agency Leeds.

Lucey, J. (1999) A chronological account of the crayfish in Ireland. *Bulletin Irish Biogeographical Society* 23: 143-161.

Lyons, R. & Kelly-Quinn, M.J. (2003) An investigation into the disappearance of *Austropotamobius pallipes* (Lereboullet) populations in the headwaters of the Nore River, Ireland, and the correlation to water quality. *Bulletin Français de la Pêche et de la Pisciculture* 370-371: 139-150.

Matthews, M.A. & Reynolds, J.D. (1992) Ecological impact of crayfish plague in Ireland. *Hydrobiologia* 234:1-6.

Matthews, M.A., Reynolds, J.D & Keatinge, M. (1993) Macrophyte reduction and benthic community alteration by the crayfish *Austropotamobius pallipes* (Lereboullet). *Freshwater Crayfish* 9: 289-299.

Mirimin, L. (2017) Detection and monitoring of crayfish and crayfish plague in the Erne catchment using environmental DNA. Unpublished report to National Parks and Wildlife Service.

NPWS National species database viewable on the National Biodiversity Data Centre https://maps.biodiversityireland.ie/Species/17487.

NPWS (2013) 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.

Reynolds, J.D. & O'Keeffe, C. (2005) Dietary patterns in stream- and lake-dwelling populations of *Austropotamobius pallipes*. *Bulletin Français de la Pêche et de la Pisciculture* 376-377: 715-730.

Reynolds, J., Gouin, N., Pain, S., Grandjean, F., Demers, A. & Souty-Grosset, C. (2002) Irish crayfish populations: ecological survey and preliminary genetic findings. *Freshwater Crayfish* 13: 584-594.

Smiddy, P (2016) Recent records of the White-clawed Crayfish (*Austropotamobius pallipes*) in Co. Cork. *Irish Naturalists' Journal* 35: 61-63.

Smiddy, P. & Saich, C. (2015) Using Otter (*Lutra lutra*) diet to indicate presence of White-clawed Crayfish (*Austropotamobius pallipes*) populations. *Irish Naturalists' Journal* 34: 45-50.

Souty-Grosset, C., Holdich, D., Noel, P., Reynolds, J. & Haffner, P. (2006) *Atlas of crayfish in Europe*. Muséum national d'Histoire naturelle, Paris. 187 pp. (Patrimoines naturels, 64).Sweeney, N. &

	Sweeney, P. (2017) Expansion of the White-clawed Crayfish (*Austropotamobius pallipes* (Lereboullet)) population in the Munster Blackwater. *Irish Naturalists' Journal* 35: 94-98. Williams, L. (2017) NPWS Surveys of Crayfish Plague-Infected Rivers; River Deel, Co. Limerick. Unpublished report to National Parks and Wildlife Service.
4.2i Additional information	Gouin, N., Grandjean, F., Pain, S., Souty-Grosset, C. & Reynolds, J. (2003) Origin and colonization history of the white-clawed crayfish, *Austropotamobius pallipes*, in Ireland. *Heredity* 9: 70-77. Holdich, D.M., Reynolds, J.D., Souty-Grosset, C. & Sibley, P.J. (2009) A review of the ever increasing threat to European crayfish from non-indigenous crayfish species. *Knowledge and Management of Aquatic Ecosystems* 394-395: 46 pp. DOI: 10.1051/kmae/2009025. Lucey, J (2010) Recent extension in range of the white-clawed crayfish (*Austropotamobius pallipes* (Lereboullet)) in Co. Cork. *Irish Naturalists' Journal* 31(1): 62-63. O'Connor, W., Hayes G., O'Keeffe, C. & Lynn, D. (2009) Monitoring of white-clawed crayfish *Austropotamobius pallipes* in Irish lakes in 2007. *Irish Wildlife Manuals*, No 37. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***40,200 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994-2018***	
5.7 Long-term trend Direction *Optional*	*stable / **increasing** / decreasing / uncertain / unknown*	

5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 35,700km²***	
	b) Indicate if operators were used (use these 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 has been an expansion of the current range in recent years, however the Favourable Reference range is kept at the same level as in the previous assessment as it was considered sufficient for the long-term survival of the species.	
5.11 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/ No information on the nature of change*	
5.12 Additional information *Optional*	The species was present in this assessment period in all the catchments and sub-catchments for which there are historic records. The number of occupied hectads (283) is greater than in either of the two previous assessments (223 and 207, respectively) and the current range is the most extensive recorded since 1994. Some of the increase in occupied hectads is due to improved coverage but genuine spread has also occurred along the River Blackwater in Co. Cork. This was first noticed during the last assessment period but has continued. The long-term Range trend is therefore assessed as increasing. However, the short-term Range trend is assessed as declining due to the appearance in Ireland of Crayfish Plague. There are six active outbreaks in Ireland on the Erne/Bruskey (since 2015), the Suir (2017), Barrow (2017), Deel (2017), Lorrha (2017) and Al (2018) rivers currently affecting a minimum of 17 hectads. The evidence from other parts of the European range is that Crayfish Plague causes 100% mortality of the species in affected areas. Work	

	on the Erne/Bruskey has indicated the total loss of the species along the entire river system, but the progression of the disease in other rivers has still to be determined. As some of these outbreaks are on large river systems, and there is no known means of preventing infection spread within an affected river, it is considered that there has been a net decline in range. The decreases caused by Crayfish Plague mortality have been greater than the range expansion in the Blackwater catchment and elsewhere. In the absence of Crayfish Plague, a Favourable assessment would have been justified for Range, but as the range changes have been caused by human-induced pressures (i.e. the introduction of a novel, non-native disease) but are affecting less than 10% of the range, the Range assessment meets the criteria for Unfavourable-Inadequate (U1).

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	***2007-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	***860***
	c) Maximum	***920***
	d) Best single value	
6.3 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	a) Unit	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
6.9 Short-term trend	**a) Minimum**	

Magnitude *Optional*	**b) Maximum**	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain /* ***unknown***	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.14 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***	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	***a) 957 x 1km squares***	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable Reference Population is set as the current population. This includes 1km grids which are within known Crayfish Plague outbreaks.	
6.16 Change and reason for change in population size	*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** / No information on the nature of change*
6.17 Additional information *Optional*	No national population estimate exists for this species nor is it likely that one could ever be produced. Population and density estimates have been produced for a few sites using mark-recapture of catch per unit effort methodologies. As these are few in number and the estimates have a high degree of uncertainty it is inappropriate to extrapolate from these to the national level. The number of 1km grids is used as a surrogate measure of population. There are confirmed records of this species from 957 x 1km squares in 2007-2018. This figure is taken as the Favourable Reference Population (FRP). Population size was expressed in a different way in the previous assessment period and the two periods cannot be compared. However, since 2015, Crayfish Plague has been confirmed in Ireland and has been detected in six widely spread river catchments. The presence of the disease organism has been confirmed by direct testing of affected animals or has been strongly indicated by environmental-DNA tests of water samples in a minimum of 37 x 1km squares. Not all of these grid squares will have had confirmed Crayfish populations but estimating the number of affected populations is difficult due to the extent of the possible infected areas. For example, on the River Barrow, Crayfish Plague has been confirmed at Monasterevin on the upper reaches of the river and also downstream of a point just south of Carlow but not as yet in between. Between these two points the river intersects at least 60 x 1km squares, of which 17 have confirmed populations. The current population therefore has a maximum value of 920 (FRP minus 37 known affected squares) but it could be as low as 860 (FRP minus 37 minus 60). The trends in the population over the long term are unknown but there is clear evidence of a decline in the short term as a result of the impact of plague. The assessment for Population is therefore Unfavourable-Inadequate (U1) but there are insufficient data to measure the rate and extent of the population decline.

7 Habitat for the species

7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*

7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	White-clawed crayfish in most of its global range is a species of small-order streams. In Ireland it occupies a greater range of habitats and is common in large rivers and in some small and medium-sized lakes. Optimal habitat for the species encompasses streams, small rivers and lakes with adequate refuges. These refuge areas can be the banks of streams into which animals can burrow, around structures such as bridges, in stable beds of cobbles and stones and amongst tree roots and beds of aquatic vegetation, particularly *Fontinalis antipyretica*, *Rorippa nasturtium-aquaticum*, *Apium nodiflorum* and charophytes. It is tolerant of a wide range of water quality conditions but calcium is essential for the species to create its exoskeleton and so it is rarely found in water below a pH of 7. It is not tolerant of high water temperatures above 20^{o}C. There is some differentiation in the use of the habitat by adults and juveniles so ideal habitat will provide adequate conditions for all life stages. The species is omnivorous. Suitable habitat for the species is common in Ireland and is not considered an issue for the survival of the species. This is supported by the widespread distribution of the species. There is little data on habitat quality but it is not considered that it is impacting on the

	national population. However there are undoubted impacts on the species during watercourse management and which removes refuges for the species and may restrict occupancy of the species. The overall decline in water quality may also impact the species but needs more investigation. This may be causing localised issues in some lakes which have experienced unexplained mortalities. One in 2018 on Lough Owel was investigated and the mortality was found not to be caused by Crayfish Plague. An alternative explanation is that it was caused by some sort of physiological stress on the animals linked to conditions in the lake and possibly oxygen levels. This needs further investigation.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**I05** Plant and animal diseases, pathogens and pests (M)	**I05** Plant and animal diseases, pathogens and pests (H) **I01** Invasive alien species of Union concern (H)

8.2 Sources of information *Optional*	
8.3 Additional information *Optional*	Crayfish Plague was confirmed in Ireland in 2015 by DNA testing which is the first case since the 1980s. This disease poses the most significant threat to the species as the evidence from elsewhere in Europe is that it causes 100% mortality of stocks of the species. As the disease was limited in occurrence to six well-separated locations, the pressure has been classified as medium importance. However the threat is to the entire national stock so is of high importance. Most of the disease outbreaks have been independent of each other (involving different strains of *Aphanomyces astaci*) but it cannot be ascertained how they arrived at the outbreak sites. Human-mediated transmission appears the most likely means of spread but there is no conclusive evidence. The threat from invasive non-indigenous crayfish species (NICS) remains high. At present there is no evidence that any NICS are present in Ireland. However, should they become established it would make control of the disease extremely difficult if not impossible. The importation to Ireland of the five crayfish species on the EU list of invasive alien species of Union concern has been prohibited by SI 354/2018, the European Union (Invasive Alien Species) (Freshwater Crayfish) Regulations 2018. Whilst habitat is considered sufficient for the species, allowing it to

	occupy its expected range, there are some indications of impacts of watercourse management that need investigation. The unexplained die-offs such as that on Lough Owel in 2018 also need investigation.

9 Conservation measures

To be reported only for Annex II species

9.1 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*
9.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, population and/or habitat for the species or*** *b) Expand the current range of the species (related to 'Range') or* *c) Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population') or* *d) Restore the habitat of the species (related to 'Habitat for the species')*
9.3 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*
9.4 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 in field 9.2):* ***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)*
9.5 List of main conservation measures	**CI01** Early detection and rapid eradication of invasive alien species of Union concern **CI07** Controlling and eradicating plant and animal diseases, pathogens and pests
9.6 Additional information *Optional*	CI01 – The importation to Ireland of the five crayfish species on the EU list of invasive alien species of Union concern has been prohibited by SI 354/2018, the European Union (Invasive Alien Species) (Freshwater Crayfish) Regulations 2018. CI07 – voluntary ban was in place after the outbreak of Crayfish Plague on the River Suir in 2017. It was lifted subsequently as disease spread continued.

10 Future prospects		
10.1 Future prospects of parameters	**a) Range**	*Good / Poor / **Bad** / Unknown*
	b) Population	*Good / Poor / **Bad** / Unknown*
	c) Habitat of the species	***Good** / Poor / Bad / Unknown*
10.2 Additional information *Optional*	The most severe current threat to the species is the presence of the Crayfish Plague organism which has caused outbreaks of the disease in six catchments. The spread of this is unpredictable and how many populations and how much of the range will be impacted is unknowable. How the disease arrived in Ireland is unknown but the evidence from DNA analysis is that most of the outbreaks involve different strains and therefore appear not to be due to spread from affected sites. The arrival of disease into Ireland and the method of transmission of the disease to new locations is not fully understood. Given that most of the known outbreaks have been of different strains, this means the inoculation events have been independent and not the result of spread from one infected river to another. However it is unlikely the origin and transmission of each outbreak will be determined. Given the experience elsewhere the mortality of the outbreaks is likely to be severe and probably total but the timescale for when a river will become disease-free is unknown. Restocking will not be possible if any disease remains in the affected catchments. NICS remain a threat to the species. Legislation has been enacted to prevent import of the EU-listed species but this will require vigilance. The absence of NICS does provide an opportunity to restock and restore lost populations based on current understanding of the transmission of the disease. NICS are carriers, and unless there are other carrier species, it is expected that the disease cycle would be broken when the population is removed.	

11 Conclusions	
Assessment of conservation status at end of reporting period	
11.1 Range	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*
11.2 Population	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*
11.3 Habitat for the species	***Favourable (FV)** / Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.4 Future prospects	*Favourable (FV) / Inadequate (U1)/ **Bad (U2)** / Unknown (XX)*
11.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / **deteriorating** / stable / unknown*

<table>
<tr><td rowspan="8">11.7 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 (11.5)</td><td>Overall trend in conservation status (11.6)</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 data</td><td>YES/<u>NO</u></td><td>YES/<u>NO</u></td></tr>
<tr><td>d) yes, due to the use of different method (including taxonomical change or 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 the 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 colspan="3"></td></tr>
<tr><td>11.8 Additional information

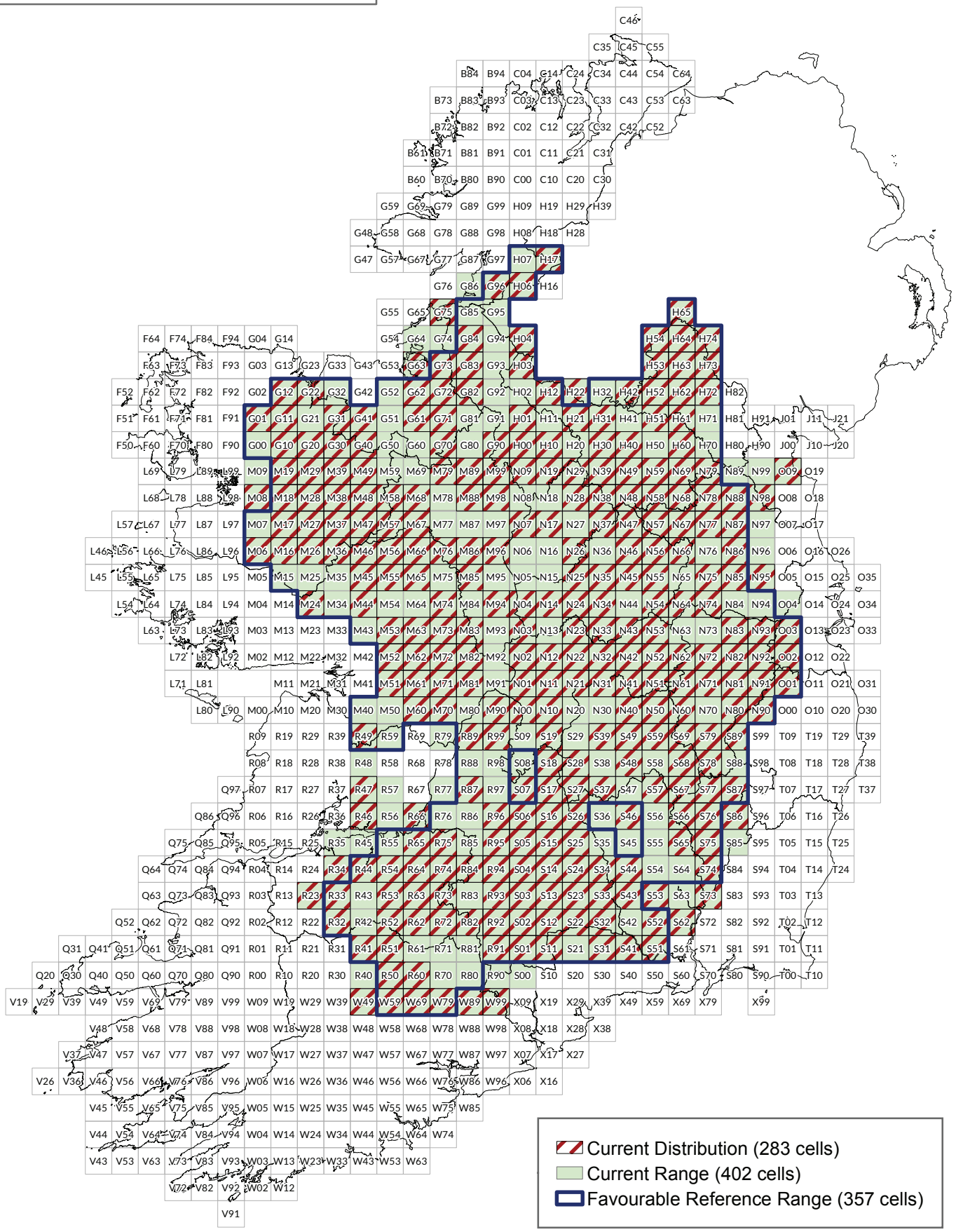
Optional</td><td colspan="3">Prior to 2015, the Range of the species was increasing but this has been reversed as the impact of Crayfish Plague has become apparent. Overall the Range has declined but by less than 10%, so the assessment is Unfavourable-Inadequate and declining.
Similarly Population has been impacted by the Crayfish Plague outbreaks and the assessment is Unfavourable-Inadequate and declining.
Habitat extent and quality is not impacted by the Crayfish Plague and is assessed as Favourable and stable.
The assessment of Future prospects for Range and Population are both strongly negative and so Future prospects has an Unfavourable-Bad and declining assessment.
This produces an Unfavourable-Bad assessment for the Overall Conservation Status.</td></tr>
</table>

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

12.1 Population size inside the pSCIs, SCIs and SACs network *(on the biogeographical/marine level including all sites where the species is present)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***319***
12.2 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval /* ***minimum***	
12.3 Population size 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*	
12.4 Short-term trend of population size within the network Direction	*Short-term trend of population size within the network over the period indicated in field 6.5 :* *stable / increasing /* ***decreasing*** */ uncertain / unknown*	
12.5 Short-term trend of population size within 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*	
12.6 Additional information *Optional*	Population was taken as the number of 1km grid squares intersecting the SAC network boundaries. Of the 957 occupied 1km grid squares, 638 were outside the SAC network and 319 inside.	

13 Complementary information

White -clawed Crayfish
Austropotamobius pallipes (1092)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map - rscáil
V 2.0
Date áta
June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1065***
1.3 Species scientific name	*Euphydryas aurinia*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Marsh Fritillary
1.6i Species description	The Marsh Fritillary is an attractive butterfly with chequered wings marked in brown, orange, black and white. The adults have a short flight period of 4-6 weeks in May and June. Males emerge first, a few days before the females. Females emerge with completely developed eggs and they mate soon after emergence. Within a few hours the female will have laid a first batch of several hundred eggs on the underside of a leaf of the food plant, which in Ireland is exclusively *Succisa pratensis* (Devil's-bit Scabious). Females may lay a second or possibly third batch of eggs on subsequent days. Females are incapable of flight until they have laid the first egg batch but they become more mobile and capable of short-distance dispersal as they age. This is the only period of the life cycle when long distance dispersal can occur. However, the evidence indicates that most Marsh Fritillary are sedentary, rarely dispersing beyond 750m, although long-range dispersal over longer distances of 5-20 km can occur allowing colonisation and functioning of metapopulations (Warren, 1994; Zimmermann *et al*., 2011). The larval stage is the longest part of the annual life cycle, lasting nine months. From August until October the brown-black spiny caterpillars feed together on *Succisa* leaves, protected inside a silken web. During the winter they hibernate together in a small web hidden within the vegetation. The caterpillars emerge on sunny days in February or early March to feed, basking on exposed dead grass or leaf litter. As their feeding requirements increase they separate into smaller and smaller groups, eventually becoming solitary feeders. The larvae pupate in late April with adults emerging two to three weeks later. Caterpillars suffer from both parasitism and predation. Some studies have considered parasitism to be a driver of the population but the impact of parasitism in Ireland is not known. The specific habitat conditions the Marsh Fritillary requires is a low (ideally 25cm or less), open sward with abundant *Succisa pratensis*. Colonies in Ireland can be found in a wide variety of situations often in complex mosaics of vegetation communities that are difficult to define and categorise. Colonies have been recorded on sand dunes, fens, cutover raised bogs, blanket bogs, wet heaths, unimproved wet, neutral or calcareous grasslands, calcareous and coastal heaths. These sites are maintained by a variety of management, accidental or deliberate, including grazing and burning. Most sites are in lowland

	situations below 200m but it has been recorded up to 350m and perhaps higher in recent years. Colonies also exist on exposed coastal headlands and small offshore islands, which indicates a tolerance of exposed conditions. The species is associated with the following Annex I habitats (Regan *et al*., 2010): 2130 Fixed dunes (grey dunes), 2190 Humid dune slacks, 21A0 Machair, 4010 Wet heath, 6210 Orchid rich/calcareous grassland, 6410 *Molinia* meadows, 7120 Degraded raised bogs, 7140 Transition mires and 7230 Alkaline fens. In the latest Red List assessment of Irish butterflies (Regan *et al*., 2010) the Marsh Fritillary was assessed as Vulnerable. It was assessed as Least Concern on the European Red List (Van Swaay *et al.*, 2010).

2 Maps

Distribution of the species within the Member State concerned.

2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2007-2018***
2.3 Distribution map	Submitted
2.4 Distribution map 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*
2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	The distribution data comes from the following main sources: - Opportunistic records from atlas and other recording projects; - NPWS funded surveys; - Environmental Impact surveys. Opportunistic records from atlas and other recording project provide the majority of records of the species, which will be biased towards adult records. There have been several butterfly atlases produced which show the distribution in Ireland in different time periods since the 1970s (Ní Lamhna, 1980; Heath *et al*., 1984). The early maps produced for the species are undoubtedly based on poor coverage and many of the individual records lack good quality supporting data. The intensity, geographical spread and precision of recording of the species have all been improving but much historical information is only available at a coarse resolution (1km or hectad resolution). This hinders interpretation of published distribution maps and makes it especially difficult to assess changes in distribution. Knowledge of the distribution of the Marsh Fritillary in Ireland therefore remains incomplete. The National Biodiversity Data Centre (NBDC) are organising a butterfly atlas project (Butterfly Atlas 2021) and all records that have been submitted to this will have full geospatial data at site level and be fully accessible. Distribution maps have been produced for the species since 1984.

	There were approximately 30 occupied hectads shown in Heath (1984) but these were widespread across Ireland from the south coast to northern Donegal. The review paper by Lavery (1993) showed 109 occupied hectads in the period 1980-1990. More organised mapping of the butterflies in Ireland has been taking place under the Butterflies for the New Millennium project. This has produced three series of maps (1995-1999: Asher *et al*., 2000; 2000-2004: Fox *et al*., 2006; and 2005-2009: Nash *et al*., 2012) covering successive five-year periods from 1995 which have allowed some assessment of change in range and distribution. Asher *et al*. (2000) used the 1970-1982 period as a baseline to assess change. However the baseline data for Ireland appears to be an amalgamation of the data in Heath *et al*. (1982) and Lavery (1993), i.e. extends over a different time period. The Red List showed the distribution in two time periods, pre-1995 and 1995-2009, based on the published maps. The number of post-1995 records (155) is just over twice the number of pre-1995 records (74). This increase in hectads was considered to be due to improved coverage rather than a genuine increase. NPWS have funded detailed surveys of the Marsh Fritillary and its habitat across Ireland including the north-west in 2011 (Woodrow & Allen, 2012) with a repeat on many of the same sites in 2012 (Woodrow, 2013), the south and east (Wilson *et al*., 2013) and the Burren (Ravenscroft *et al.*, 2013). Recent surveys covered Clare and Kerry (BEC, 2015a); Galway and Mayo (BEC, 2015b); and Roscommon and Longford (BEC, 2016). Environmental Impact studies have produced some data on the species, most recently and notably along the route of the proposed Galway bypass. All distribution data between 2007 and 2018 were mapped to derive the current distribution.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
4.2 Sources of information	Asher, J., Warren, M., Fox, R., Harding, P., Jeffcoate, G. & Jeffcoate, S. (2001) *The millennium atlas of butterflies in Britain and Ireland*. Oxford University Press. BEC (2016) Surveys of possible Marsh Fritillary sites and habitat in the

mid-west (Roscommon and Longford). Unpublished report to National Parks and Wildlife Service.

BEC (2015a) Surveys of possible Marsh Fritillary sites and habitat in Counties Clare (outside the Burren) and Kerry. Unpublished report to National Parks and Wildlife Service.

BEC (2015b) Surveys of possible Marsh Fritillary sites and habitat sites and habitats in Galway and Mayo. Unpublished report to National Parks and Wildlife Service.

Bulman, C.R., Wilson, R.J., Holt, A., Galvez Bravo, L., Early, R., Warren, M. & Thomas, C.D. (2007) Minimum viable metapopulation size, extinction debt, and the conservation of a declining species. *Ecological Applications* 17: 1460–1473.

Fox, R., Asher, J., Brereton, T., Roy, D. & Warren, M. (2006) *The state of butterflies in Britain and Ireland*. Pisces Publications, Newbury.

Maes, D., Verovnik, R., Wiemers, M. *et al.* (2019) Integrating national Red Lists for prioritising conservation actions for European butterflies. *Journal of Insect Conservation* https://doi.org/10.1007/s10841-019-00127-z.

Heath, J., Pollard, E. & Thomas, J. (1984) *Atlas of butterflies in Great Britain and Ireland.* Viking, Harmondsworth.

Lavery, T. (1993) A review of the distribution, ecology and status of the Marsh Fritillary *Euphydryas aurinia* Rottemburg, 1775 (Lepidoptera: Nymphalidae) in Ireland. *Irish Naturalists' Journal* 24: 192-199.

Nash, D., Boyd, T. & Hardiman, D. (2012) *Ireland's Butterflies*. The Dublin Naturalists' Field Club, Dublin.

Ní Lamhna, E. (1980) *Distribution atlas of butterflies in Ireland*. Irish Biological Records Centre, Dublin.

NPWS National species database viewable on the National Biodiversity Data Centre https://maps.biodiversityireland.ie/Species/77487 .

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

Ravenscroft, N., Bourn, N. & O'Hanrahan, B. (2013) Baseline web surveys and habitat assessments for the Marsh Fritillary *Euphydryas aurinia* in Moneen Mountain SAC and East Burren Complex SAC. Unpublished Report to National Parks and Wildlife Service, Dublin.

Regan, E.C., Nelson, B., Aldwell, B., Bertrand, C., Bond, K., Harding, J., Nash, D., Nixon, D., & Wilson, C.J. (2010) *Ireland Red List No. 4 – Butterflies*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Ireland.

Van Swaay, C., Cuttelod, A., Collins, S., Maes, D., Lopez Munguira, M., Šašić, M., Settele, J., Verovnik, R., Verstrael, T., Warren, M., Wiemers, M. & Wynhof, I. (2010) *European Red List of Butterflies*. Luxembourg: Publications Office of the European Union.

Warren, M.S. (1994) The UK Status and suspected metapopulation structure of a threatened European butterfly, the Marsh Fritillary,

	Eurodryas aurinia. Biological Conservation 67:239-249. Wilson, F., Bond, K., Crushell, P., Foss, P.J. & Osthoff, C. (2013) Survey of Marsh Fritillary Colonies – South and East Ireland 2012. Unpublished report to National Parks and Wildlife Service, Dublin. Woodrow, W. (2013) Survey of Marsh Fritillary Colonies North and West Ireland 2012 Report. Unpublished report to National Parks and Wildlife Service, Dublin. Woodrow, W. & Allen, D. (2012) Survey of Marsh Fritillary Colonies North and West Ireland 2011 Report. Unpublished report to National Parks and Wildlife Service, Dublin. Zimmermann, K., Fric, Z., Jiskra, P., Kopeckova, M., Vlasanek, P., Zapletal, M. & Konvicka, M. (2011). Mark-recapture on large spatial scale reveals long distance dispersal in the Marsh Fritillary, *Euphydryas aurinia*. *Ecological Entomology* 36(4): 499-510.
4.2i Additional information	

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***51,400 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	*stable / **increasing** / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994–2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / **uncertain** / unknown*	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	

5.9 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***	
5.10 Favourable reference range	***a) 51,400 km²***	
	b) Indicate if operators were used (use these 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 given as the current range and this is considered to encompass all the habitat and ecological requirements needed for long-term survival of the species.	
5.11 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*	
5.12 Additional information *Optional*	The Marsh Fritillary can potentially occur throughout Ireland as its food plant (*Succisa pratensis*) is recorded from virtually every hectad and the habitats occupied by the species are not limited by climate or geology. There are, however, areas where the species has always been scarce or absent including the north-east (covering counties Meath, Louth, southern Monaghan and eastern Cavan), the south (Waterford, south Wexford, south Kilkenny and the coastal regions of Cork), much of Co. Kerry, western Mayo and northern and eastern parts of Donegal (compare maps in Ní Lamhna, 1980; Heath *et al.*, 1984; Lavery, 1993; Asher *et al*., 2001; Fox *et al*., 2006; Nash *et al*., 2012). The map for the previous assessment covering the period 1995-2012 showed 239 occupied hectads. The map for this assessment for 2007-2018 has 314 occupied hectads, a net increase of 75 hectads. Given the scale of the change in occupied hectads over the short term, the trend is assessed as increasing. Genuine increase appears to be occurring in the western counties, with colonies being discovered in areas where the species has never been recorded before. In other areas, especially in the eastern and midland counties, there has been an increase in the number of occupied hectads and this is considered to be a combination of genuine increase, natural shifts in the	

	occupied sites in response to the availability of habitat, and improved knowledge through survey effort. There is too much uncertainty and lack of precision in the data to estimate the magnitude of the trend. This uncertainty also applies to long-term trend, which is assessed as uncertain.

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	***2007-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***705***
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval /* ***minimum***	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	a) Unit	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable /* ***increasing*** */ decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.14 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***	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) Population size (with unit) or*	
	b) Indicate if operators were used (use these symbols ≈, >, >>) or	
	c) Favourable reference population is unknown	
	d) Indicate method used to set reference value if other than operators	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information *Optional*	There has never been a population estimate for the Marsh Fritillary and one is unlikely to ever be produced. The biology of the species is such that there is no stage in the life cycle stage that can meaningfully be used to produce a population estimate. Counts of adult butterflies along monitoring transects is an accepted and reliable method for determining population trends but perform poorly for this species	

	due to its short flight period and metapopulation colony structure. As transect counts use fixed routes they are inefficient when breeding areas move around an area of habitat. The Irish Butterfly monitoring scheme has been running for over 10 seasons but as there are fewer than 10 transects with Marsh Fritillary an index cannot be calculated. Counting Marsh Fritillary webs in autumn provides an effective method of monitoring breeding performance and an assessment of habitat quality on each site, and in the long term it is hoped that a reliable trend in population will be produced from these counts. A dedicated Marsh Fritillary web count project run by the NBDC commenced in Ireland in 2015. This has not been running long enough to produce a reliable trend. However, with four years of data, the trend, although highly uncertain, suggests a stable population trend. However, because of the short time series and the high level of uncertainty, it is unwise to extrapolate from this to a national level. Given that the range has increased over the 2007-2018 assessment period, population measured by 1km occupancy has also increased. The short-term trend is therefore assessed as increasing. The trend for the long term is assessed as uncertain. The short-term trend in the last assessment was uncertain. Expert opinion in the Red List assessment was that the species was declining but there is too much uncertainty and lack of precision in the long-term data to determine a long-term trend.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*
7.5 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*

7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain /* ***unknown***
7.8 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***
7.9 Additional information *Optional*	Marsh Fritillary colonies can be found on many types of site and the habitat it occupies can be difficult to define. The presence of *Succisa pratensis* is an essential factor. This plant species is very widespread, occurring in virtually every hectad in Ireland. Theoretically the Marsh Fritillary could also occupy this range. What prevents occupancy of apparently suitable habitat is not known, but a key aspect may be connectivity of sites: sites may be too isolated from the nearest colonies for them to be occupied within a viable metapopulation. As the Marsh Fritillary occupies the landscape in a metapopulation structure there is a need for a network of sites within a region to allow the species to survive in the long term. In England the figure of 50ha of suitable habitat within an area of 16km^2 is indicated by Bulman *et al*. (2007). The modelling suggests that the species may persist in areas with less than the minimum amount of habitat for decades but will eventually go extinct if there is no additional habitat provided. More information is needed on this aspect in Ireland. Marsh Fritillary colonies occur in many habitats that have short to medium height vegetation (10-25cm is optimal) with abundant *Succisa pratensis*. Sites typically have a hummocky topography. Colonies are found in the following Annex I habitats: 2130 Fixed dunes (grey dunes), 2190 Humid dune slacks, 21A0 Machair, 4010 Wet heath, 6210 Orchid rich/calcareous grassland, 6410 *Molinia* meadows, 7120 Degraded raised bogs, 7140 Transition mires and 7230 Alkaline fens; and in the following Fossitt habitats: GS4 Wet grassland, PB4 Cutover bog, HH3 Wet heath, PF1 Rich fen and flush, GS1 Dry calcareous and neutral grassland, HH2 Dry calcareous heath, PF2 Poor fen and flush, GS2 Dry meadows and grassy verges, PF3 Transition mire and quaking bog, GS3 Dry-humid acid grassland, CD3 Fixed dunes, CD6 Machair, PB2 Upland blanket bog, CD5 Dune slacks, ER2 Exposed calcareous rock, and HH4 Montane heath. However many colonies exist in sites that do not fit in these categories or are examples that are not considered of high quality. Most Marsh Fritillary sites in Ireland are therefore undesignated. Information on management of sites is limited. Grazing is a common practice on many sites but a significant proportion appears unmanaged or only subject to occasional management. Many different types of management create and maintain sites in suitable condition for the Marsh Fritillary, from natural exposure on western

	islands and headlands, to wet and low-nutrient conditions creating the low-growing vegetational structure, extensive grazing, responses to disturbance (for example burning or peat extraction) and land abandonment. Sites therefore often come into suitable condition after cessation of a management practice. The Marsh Fritillary Monitoring Scheme gathers data on habitat quality. This has not been running long enough to produce a reliable trend but the four-year trend is stable. Given the evidence that the Range is increasing in the short term and short-term trend in Population is increasing, the trend in Habitat for the species is also assessed as stable. There is insufficient information to determine a long-term trend.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**A01** Conversion into agricultural land (excluding drainage and burning) (H) **A07** Abandonment of management/use of other agricultural and agroforestry systems (all except grassland) (M) **A10** Extensive grazing or undergrazing by livestock (M) **B01** Conversion to forest from other land uses, or afforestation (excluding drainage) (H)	**A01** Conversion into agricultural land (excluding drainage and burning) (H) **A07** Abandonment of management/use of other agricultural and agroforestry systems (all except grassland) (M) **A10** Extensive grazing or undergrazing by livestock (M) **B01** Conversion to forest from other land uses, or afforestation (excluding drainage) (H)
8.2 Sources of information *Optional*		
8.3 Additional information *Optional*	Information on management history of sites is limited. Sites may be grazed but many appear unmanaged or only subject to occasional management. Many management practices create and maintain the short, generally tussocky vegetation that the species requires, including grazing, natural exposure on western islands and coastal headlands, wet and low-nutrient ground conditions, and disturbance in the recent past (for example burning or peat extraction). The reduction of grazing which allows the vegetation to become suitable can also create suitable habitat. Sites therefore often come into suitable condition after cessation of a management practice.	

	Marsh Fritillary sites would mostly be in marginal areas of land and not covered by any designations. These would include marginal land in upland areas and the edges of wetlands and peatlands. The land is subject to pressures from agricultural conversion and afforestation. These threats and pressures can occur anywhere in the range so are ranked as High. However there are also issues in wetland sites, particularly where management ceases and vegetation becomes unsuitable through natural succession.

9 Conservation measures

To be reported only for Annex II species

9.1 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*
9.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, population and/or habitat for the species or* *b) Expand the current range of the species (related to 'Range') or* *c) Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population') or* *d) Restore the habitat of the species (related to 'Habitat for the species')*
9.3 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*
9.4 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 in field 9.2):* *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)*
9.5 List of main conservation measures	None taken

9.6 Additional information *Optional*	The Marsh Fritillary requires a network of sites that are close together to support its long-term survival in an area. The management of these networks requires a landscape approach as sites require light, extensive management. Management is most effective by grazing as it creates the correct sward structure that the species needs. Mowing, for example, creates a uniform structure in the vegetation such that colonies do not persist. Management of individual sites is best achieved through some sort of results-based payment system based on simple, easily measurable parameters. The Co-operation Across Borders for Biodiversity (CABB) project, supported by the European Union's INTERREG VA Programme, will deliver measures to improve habitat quality for this species.

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	*Good / **Poor** / Bad / Unknown*
	b) Population	*Good / **Poor** / Bad / Unknown*
	c) Habitat of the species	*Good / **Poor** / Bad / Unknown*
10.2 Additional information *Optional*	The Range and Population of the Marsh Fritillary in Ireland are assessed to have increased over the short term. However robust data on these trends, especially Population, are lacking. The key to maintaining the species across the range is the sufficiency of habitat patches to maintain the colony structure. The implication from the increase in range is that currently there is a sufficient habitat resource and it is not a limiting factor. The significant pressures affecting Marsh Fritillary in Ireland are related to habitat quality and its extent and there is no reason to consider that they will reduce in the foreseeable future. As the impact on the species is not direct and immediate it may be some time before there is an observable reduction in range. The majority of the habitats that the Marsh Fritillary is associated with are declining and in poor conservation status. The majority of the range and occupied sites are also found in undesignated sites and receive no protection. It is expected that the area of habitat will decline and that this will have an impact on range and population over the next 12 years. The impact of the pressures may increase as habitat patches become more fragmented and isolated and metapopulations cease to function. The pressures could be mitigated by implementation of appropriate policies at the landscape level to address the needs of the species. At the site level, conservation measures are well understood, especially to improve and maintain the quality of habitat. However there is a lack of management action specifically for the species currently in Ireland.	

11 Conclusions			
Assessment of conservation status at end of reporting period			
11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	*Favourable (FV) /* ***Inadequate (U1)****/ Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* ***improving*** */ deteriorating / stable / unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/****NO***
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/****NO***
	e) yes, but there is no information on the 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*

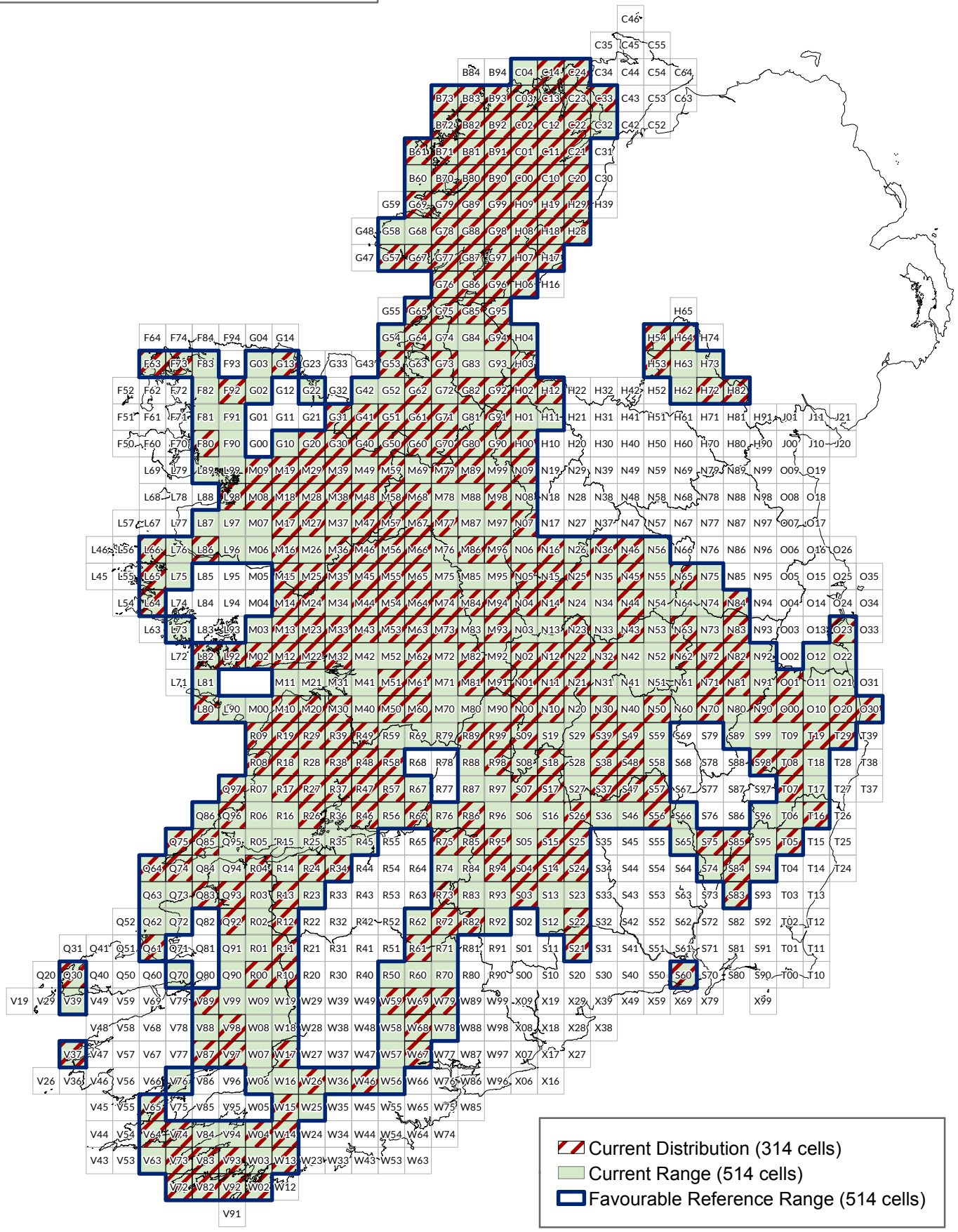
11.8 Additional information *Optional*	Range is Favourable and has shown an increasing trend in the short term. The species is present in all the areas it has been present in since 1994 but there has also been genuine spread into areas where there have not been previous records. Population is also assessed as Favourable reflecting the increase in Range. Habitat for the species is also assessed as Favourable as the species has been able to spread and the range is being maintained. Future prospects have been assessed as Unfavourable as there are no effective landscape-scale management measures in place to prevent loss of metapopulations and maintain the availability of suitable habitats. Range and Population have both increasing trends and Habitat is stable, so leading to an Improving Overall trend in Conservation Status.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

12.1 Population size inside the pSCIs, SCIs and SACs network *(on the biogeographical/marine level including all sites where the species is present)*	**a) Unit**	***1 x 1km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***248***
12.2 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval /* ***minimum***	
12.3 Population size 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*	
12.4 Short-term trend of population size within the network **Direction**	*Short-term trend of population size within the network over the period indicated in field 6.5 :* *stable / increasing / decreasing / uncertain /* ***unknown***	
12.5 Short-term trend of population size within 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***	
12.6 Additional information *Optional*	Each of the 705 x 1km cells in the file was manually inspected to check for intersections with the SAC network.	

13 Complementary information

Marsh Fritillary
Euphydryas aurinia (1065)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1095***
1.3 Species scientific name	*Petromyzon marinus*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Sea Lamprey (Loimpre mhara; Easpaig Mhuir)
1.6i Species description	The life cycle of the sea lamprey *(Petromyzon marinus)* contains both a marine phase and a freshwater phase. Adult sea lamprey at sea as external parasites on host fish or marine mammals grow in length from 60 to 100 cm before migrating in spring into freshwater to excavate redds or spawning nests in gravelled areas of large rivers. Upriver migration occurs at a time of, generally, falling water levels and substantial spawning activity has been recorded in gravelled areas downstream of large weirs in the major Irish SAC rivers. Sea lamprey spawning has been recorded in the upper reaches of the River Laune, where there are no barriers to upstream migration. Substantial areas of gravel suitable for spawning have been recorded in SAC main stem rivers but low utilisation of these areas by spawning sea lamprey has been recorded, both up- and downstream of barriers to migration. Male fish generally commence redd excavation and are joined by females when excavation is well advanced. The males release a pheromone that attracts the female fish to the redd site. Data on spawning effort, collected on 3-6 occasions over the period 2000-2018, point to a highly variable run size of spawning fish in different years. Spawning effort in major tributary channels has not been investigated to date. Egg laying follows nest excavation and the resulting larvae, called ammocoetes, hatch out within days. These swim or drift downstream to areas of fine sediment into which they can burrow. The ammocoete is a filter feeder and retains its burrowing habit in fine-grained sediment over a period of years. Transformation to the young adult stage occurs in late summer and the juvenile sea lamprey can be found migrating downriver to estuarine waters and the open sea in late autumn – winter. Extended residency and commencement of parasitic feeding has been recorded in several Irish lakes including Lough Derg, on the Shannon, L. Conn, L. Corrib, L. Gill and the Killarney lakes. The sea lamprey is listed in the most recent Irish Red Data Book (King *et al.*, 2011 as Near Threatened (A2c, B1ab(iii)). This assessment was primarily based on (a) the limited access to freshwater due to impassable anthropogenic barriers in the lower reaches of numerous large rivers and (b) the very limited degree to which juvenile sea

	lamprey were occurring in catchment-wide surveys in systems where spawning was known to occur. The low level of occurrence may be due to profligacy in spawning, with reports indicating up to 75% of gametes lost or washed out of the spawning nest, or due to competition for occupancy of sedimented areas by already-resident brook and/or river lamprey. This low level of occurrence of larvae requires investigation. Barriers to upstream migration (e.g. weirs), which limit access to spawning beds and juvenile habitat, are considered the major impediment to good conservation status for sea lamprey.

2 Maps

Distribution of the species within the Member State concerned.

2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2009-2018***
2.3 Distribution map	Submitted
2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	The majority of data for the distribution map are comprised of adult sea lamprey records. Catchment-wide electric fishing surveys for larval lamprey during the period 2009-2018 returned few *P. marinus* larvae. This may indicate low numbers of sea lamprey or may reflect an inadequate sampling methodology for this species. Records for adults were obtained from annual redd count surveys carried out at known spawning locations on SAC designated rivers. Data have also been obtained from float-over and walk-over surveys of the main channels of SAC rivers. Lake feeding juvenile sea lamprey were recorded from Lough Corrib, L. Gill, L. Leane, L. Conn and L. Derg. These sea lamprey were recorded attached to fish species (salmonids and pike) or their presence was noted from attachment wounds on captured fish from these lakes.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned.	
4 Biogeographical and marine regions	
4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
4.2 Sources of information	Barry, J., Coghlan, B., Cullagh, A., Kerr, J.R. & King, J.J. (2018) Comparison of coarse-resolution rapid methods for assessing fish passage at riverine barriers: ICE and SNIFFER protocols. *River Res Applic*. 2018:1–11. https://doi.org/10.1002/rra.3358 Bunn, S.E. & Arthington, A.H. (2002) Basic principles and ecological consequences of altered flow regimes for aquatic biodiversity. *Environmental Management* 30: 492–507. EPA (2018) Water quality in 2017: An indicators report. http://www.epa.ie/pubs/reports/water/waterqua/waterqualityin2017anindicatorsreport.html. Fealy, R., Bruyère, C. & Duffy, C. (2018) Regional Climate Model Simulations for Ireland for the 21st Century. EPA Research Report, Environmental Protection Agency, Johnstown Castle, Wexford, Ireland. 137 pages. Gardiner, R. (2003) Identifying lamprey: A field key for sea, river and brook lamprey. Conserving Natura 2000 Rivers Conservation Techniques Series No. 4, English Nature, Peterborough. 27pp. Graham, C.T. & Harrod, C. (2009) Implications of climate change for the fishes of the British Isles. *Journal of Fish Biology* 74: 1143–205. Gustavson, M.S., Collins, P.C., Finarelli, J.A., Egan, D, Ó Conchuir, R., Wightman, G.D., King, J.J., Gauthier, D.T., Whelan, K., Carlsson, J.E.L. and Carlsson, J. (2015) An eDNA assay for Irish *Petromyzon marinus* and *Salmo trutta* and field validation in running water. *Journal of Fish Biology* 87: 1254-1262. Habitats Directive and Red Data Book Species, Executive Report 2009, IFI/2010/1-0480. Inland Fisheries Ireland. Http://www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.html Habitats Directive and Red Data Book Species, Executive Report 2010, IFI/2011/1-0499. Inland Fisheries Ireland. Http://www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.html Habitats Directive and Red Data Book Species, Executive Report 2011, IFI/2012/1-4103. Inland Fisheries Ireland. Http://www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.html Habitats Directive and Red Data Book Species, Executive Report 2012, IFI/2013/1-4157. Inland Fisheries Ireland. Http://www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.html

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4.2i Additional information	Fanning, A., Craig, M., Webster, P., Bradley, C., Tierney, D., Wilkes, R., Mannix, A., Treacy, P., Kelly, F., Geoghegan, R., Kent, T. & Mageean, M. (2017) Water Quality in Ireland 2010 –2015. EPA Research Report, Environmental Protection Agency, Johnstown Castle, Wexford, Ireland. 68 pages. Genner, M.J., Hillman, R., McHugh, M., Hawkins, S.J. & Lucas, M.C. (2012) Contrasting demographic histories of European and North American sea lamprey (*Petromyzon marinus*) populations inferred from mitochondrial DNA sequence variation. *Marine and Freshwater Research* 63: 827-833. Hansen, M.J., Madenjian, C.P., Slade, J.W., Steeves, T.B.,Almeida, P.R. & Quintella, B.R. (2016) Population ecology of the sea lamprey (*Petromyzon marinus*) as an invasive species in the Laurentian Great Lakes and an imperiled species in Europe. *Reviews in Fish Biology and Fisheries* 26: 509–535 DOI 10.1007/s11160-016-9440-3. King, J.J., Lehane, B.M., Wightman, G.D., Dooley, R. & Gilligan, N. (2011) Development and implementation of environmental protocols in river maintenance in Ireland. *Water and Environment Journal* 25: 422 - 428. Mateus, C.S., Rodríguez-Muñoz, R., Quintella, B.R., Judite Alves, M. & Almeida, P.R. (2012) Lampreys of the Iberian Peninsula: distribution, population status and conservation. *Endangered Species Research* 16: 183–198. Nunn, A.D., Harvey, J.P., Noble, R.A.A. & Cowx, I.G. (2008) Condition assessment of lamprey populations in the Yorkshire Ouse catchment, north-east England, and the potential influence of physical migration barriers. *Aquatic Conservation: marine and freshwater ecosystems* 18: 175–189. Tierney, D. & O'Boyle, S. (2018) Water Quality in 2016: An Indicators Report. Environmental Protection Agency, Johnstown Castle, Wexford, Ireland. 48 pages.

5 Range		
Range within the biogeographical/marine region concerned.		
5.1 Surface area	***9,500 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	a) Minimum	*Percentage change over the period indicated in the field 5.6. 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 5.6. If a precise value is known provide the same value under both minimum and maximum*
5.9 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*	
5.10 Favourable reference range	*a) In km² or*	
	b) Operator >> (much greater than) *or*	
	c) If favourable reference range is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	

5.11 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*	
5.12 Additional information *Optional*	The range was calculated by creating envelopes around the distribution grids for rivers where sea lamprey occurred. As sea lamprey migrate from the sea to spawning grounds in freshwater, the envelopes extend from the mouths of rivers to the most upstream locations where they were recorded. With the exception of a small number of additional records for *P. marinus* in the current reporting period, the short-term trend for range was assessed as stable. Although the trend is determined from data between 2009 and 2018 the trend is assumed to hold for the default trend period. There was an increase in the estimated surface area for sea lamprey range in the current reporting period. This is the result of a more intensive sampling programme in the current monitoring cycle and does not represent a range expansion for this species. In several sea lamprey rivers (e.g. the Mulkear, Feale, Fergus and Barrow) major barriers to migration occur at the upstream end of the tidal freshwater. The FRR was estimated to be much greater than the current range to include up to 75% of the main stem channel in occupied rivers where barriers occur. While this is an arbitrary value, it is consistent with findings from the Moy and Laune (Killarney National Park) SACs where no barriers to passage occur and where sea lamprey adults have been recorded a long distance upstream of the tidal limit. Such a length of channel would give adequate access to spawning and nursery habitat in addition to enabling access to major tributaries.	

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2009-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1x1 km grids***
	b) Minimum	

	c) Maximum	
	d) Best single value	***115***
6.3 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	***Number of adults***
	b) Minimum	***632***
	c) Maximum	***948***
	d) Best single value	
6.5 Type of estimate *Optional*	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude	a) Minimum	*Percentage change over the period indicated in the field 6.11. If a precise value is known provide the same value under both minimum and maximum*

Optional	b) Maximum	*Percentage change over the period indicated in the field 6.11. If a precise value is known provide the same value under both minimum and maximum*
	c) Confidence interval	*Indicate confidence interval if a statistically reliable sampling scheme is used*
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) Population size (with unit) or*	
	b) Operator >> (much greater than) *or*	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
6.16 Change and reason for change in population size	*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***	
6.17 Additional information *Optional*	As few records were available for larval *P. marinus*, the population size estimate (Field 6.2) was based on data for adult sea lamprey (redd counts and direct observations of adults). Data were obtained from float-over and walk-over surveys of the main channels of 11 rivers (including 10 SAC rivers). Data were also provided from annual redd counts at known spawning locations on the main channels of 9 rivers. Ancillary information was available from sightings of adult sea lamprey from a range of different sources. The population estimate represents the number of 1 km grids where *P. marinus* occurred and was extrapolated to include entire lakes where there were records of lake feeding juvenile sea lamprey. The min and max population size estimates for the number of adults (Field 6.4) were based on an extrapolation from available annual redd count data for individual SAC rivers compiled by IFI covering the period 2000-2018. It consists of counts over extended lengths of	

	channel (float-over surveys) in the majority of cases. This is complemented by count data from specific locations – 'hot spot' surveys from, for example, the Fergus at Ennis. The data were tabulated and a mean value extracted for each SAC river. A sum of the means gave a working total of 316 redds. Factoring for one male plus one female per redd gave a figure of 632 fish as a minimum. Given the observations of Kelly & King (2001) from the Mulkear, where a degree of 'snooper male' activity was observed, the basic redd figure of 316 was multiplied by three, giving a working maximum of 948 adult sea lamprey. This is clearly an underestimate for the national picture. It does not include any data for the Mulkear (an important river for sea lamprey) collected as hot-spot and extended walk-over figures. It does not include other rivers into which sea lamprey might migrate and spawn. It was not possible to make a direct comparison of population size between the two reporting periods. The unit used to assess population size has changed from 'length of inhabited feature in km' in the previous reporting period to the 'number of occupied 1x1 km grids'. More data were available to assess population size for *P. marinus* in the current reporting cycle. While fluctuations occurred in the extent of spawning activity in certain rivers there was no indication of an overall increase or decrease in this parameter and the short-term trend was assessed as stable. Although the trend is determined from data between 2009 and 2018 the trend is assumed to hold for the default trend period. The change in population size between the two reporting periods was due to a change in the reporting unit and does not represent a genuine change. The FRP was determined to be much greater (>>) than the estimated population size based on expert opinion. IFI fish counter data (IFI 2013-2017) have shown that in excess of 300 sea lampreys have been recorded in certain years migrating upstream on the R. Mulkear (Lower River Shannon SAC 002165). Surveys of main stem channels indicate that the number of redds is extremely low in some catchments, e.g. the R. Laune and R. Barrow. Pheromone cues play an important role in attracting migrating sea lamprey into rivers to spawn but this mechanism is not fully understood. As sea lamprey do not exhibit natal fidelity to their rivers of origin, fluctuations in numbers of *P. marinus* will occur in individual rivers. However, the extremely low numbers of redds encountered in targeted surveys lead to recruitment concerns for this species.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)?* YES*/**NO**/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/**NO**/Unknown*

7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994-2018***
7.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	There are two optimal habitat requirements for sea lamprey including adult spawning and larval nursery habitat. Spawning activity is found in gravelled areas of main-stem SAC rivers with a moderate gradient and water velocity. Larval habitat consists of fine-grained areas of sediment in areas of deposition and of reduced velocity. The widespread occurrence of larval *Lampetra* sp. in main stem SAC channels (based on electric fishing surveys carried out in 2009-2018) indicate an adequacy of habitat for larval lamprey. Numbers of *P. marinus* larvae were exceedingly low in any main stem sites surveyed. This is not considered to be due to inadequate habitat and the reason for such low numbers requires significant investigation in Ireland. The main issue for sea lamprey is that the area of spawning habitat is not sufficient at a national level and particularly in SAC rivers in the southeast of Ireland. It is estimated that sea lamprey require access to 75% of main stem channel in SAC rivers to maximise spawning potential and increase the availability of suitable nursery habitat. The extent of available spawning habitat and the

	extent of use of this habitat was assessed in float-over surveys on main stem rivers, repeated at least three times in the period 2000-2018. Redd construction commonly occurred downstream of barriers. Barrier mitigation would allow a wider dispersal to upstream catchment areas and this may facilitate recruitment. Data from float-over surveys in the period 2000-2018 indicate that the short-term and long-term trends for habitat are stable. The short-term trend is determined from data between 2009 and 2018 and the long-term trend is determined from data between 2000 and 2018. However, both trends are assumed to be valid also for the default trend periods specified.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**D02** Hydropower (dams, weirs, run-off-the-river), including infrastructure (H) **N03** Increases or changes in precipitation due to climate change (H) **A19** Application of natural fertilisers on agricultural land (M) **A20** Application of synthetic (mineral) fertilisers on agricultural land (M) **A31** Drainage for use as agricultural land (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations (M) **Xo** Threats and pressures from outside the Member State (M)	**D02** Hydropower (dams, weirs, run-off-the-river), including infrastructure (H) **N03** Increases or changes in precipitation due to climate change (H) **A19** Application of natural fertilisers on agricultural land (M) **A20** Application of synthetic (mineral) fertilisers on agricultural land (M) **A31** Drainage for use as agricultural land (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations (M) **Xo** Threats and pressures from outside the Member State (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)

8.2 Sources of information *Optional*	Gargan, P. G., Roche, W. K., Keane, S., King, J. J., Cullagh, A., Mills, P. & O'Keeffe, J. (2011) Comparison of field- and GIS-based assessments of barriers to Atlantic salmon migration: a case study in the Nore Catchment, Republic of Ireland. *J. Appl. Ichthyol*. 27 (Suppl. 3) (2011): 66–72. Rooney, S.M.,Wightman,G.D., O Conchuir, R. & King, J.J. (2015) Behaviour of sea lamprey (*Petromyzon marinus* L.) at man-made obstacles during upriver spawning migration: use of telemetry to access efficacy of weir modifications for improved passage. *Biology and Environment: Proceedings of the Royal Irish Academy* 115B: 1-12.
8.3 Additional information *Optional*	The presence of obstacles to sea lamprey upstream migration (D02) will reduce access to spawning and juvenile habitats, regardless of the prevailing extent and distribution of both throughout catchments. Barriers will often result in a highly localised distribution of spawning in the lower sections of rivers, rather than a diffuse dispersion throughout the system (Gargan *et al*., 2011; Rooney *et al*., 2015). Barrier removal or mitigation measures to facilitate passage are considered essential in the context of conservation status of sea lamprey, especially in Irish SACs where the availability of main stem channel often falls well below the 75% criterion identified for this species. Enrichment and nutrient pollution due to agricultural (A19, A20) and other anthropogenic activities can result in profusions of macrophytes and filamentous algae, obscuring both juvenile and spawning habitats. This phenomenon has been observed during survey work for sea lamprey redds in the current reporting cycle and during previous SAC surveys (O'Connor, 2006a,b; 2007). There has been a 3% reduction in river water quality since 2015 (EPA, 2018) and the main sources of nutrient inputs are agriculture (slurry and chemical fertilisers) and sewage (waste water treatment plants). It is acknowledged that more effort will need to be made in tackling diffuse pollution in Irish rivers. Increases in river discharge can exacerbate the already high rate of natural egg wash-out, both from within nests and from surrounding spawning gravels (Smith & Marsden, 2009). When aspects of life history such as spawning, egg survival and early larval maturation are dependent on specific flow patterns, any pronounced increase in discharge (N03) could result in decreased or complete failure of recruitment for that year (Humphries & Lake, 2000; Bunn & Arthington, 2002; Maitland, 2003). For spawning sea lamprey in Irish catchments, the timing and scale of summer flood events (Lennon & Walsh, 2008; Walsh, 2016) are of concern, particularly given the increased likelihood of such incidents in the future (Sweeney *et al.*, 2008; Graham & Harrod, 2009; Fealy *et al*., 2018). While many pressures may be impacting on the freshwater phase of the life-cycle, the sea lamprey population in Ireland may be constrained by impacts at sea. *P. marinus* is marketed as a food item in a number of European countries (Xo). Sea lampreys do not home to their natal river to spawn. In effect all of western Europe

	contributes to a general marine adult population, from which individuals are free to return to rivers at random across their entire range. This is probably over-simplistic – adults may have a more regionalised marine location directly related to their original natal river, i.e. Irish sea lamprey may for the most part not stray beyond Irish coastal waters and will as a consequence return to Irish rivers due to proximity and convenience. Nevertheless some mixing and long-distance dispersion of adults will occur and Ireland will receive a complement of non-nationals in our overall spawning population from year to year. The size of this complement will be influenced by conditions, pressures and threats in other countries. During the marine phase in their life-cycle, sea lamprey are parasitic on a number of host fish species ranging from small teleost hosts to basking sharks and marine mammals. Marine fish harvesting (G01) could be having a negative impact on host distribution and abundance. Although not listed, another potential threat includes the harvesting of freshwater fish (G06). Angling magazines and fishing shops advertise frozen tissue of lamprey as among the prime baits for pike angling. There is a clear potential conflict between the status of conservation species and their identified use as angling bait. In the case of lamprey, it is often stated that the baits are imported as frozen fillets or nuggets, etc. There is clearly potential for major export of frozen sea lamprey from North America, given the intensive removal operations being undertaken there for many years. It is not considered that Irish populations of sea lamprey can sustain any exploitation.

9 Conservation measures	
To be reported only for Annex II species	
9.1 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*
9.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, population and/or habitat for the species or* ***b) Expand the current range of the species (related to 'Range')** or* *c) Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population') or* *d) Restore the habitat of the species (related to 'Habitat for the species')*

9.3 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*
9.4 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 in field 9.2):* *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)*
9.5 List of main conservation measures	**CC04** Reduce impact of hydropower operations and infrastructure **CF10** Manage changes in hydrological and coastal systems and regimes for construction and development
9.6 Additional information *Optional*	Measures relating to reducing the impact of river infrastructures (CC04), particularly weirs and dams, that may prevent natural upstream migration and access to spawning and nursery habitat, are particularly important for *P. marinus*. Detailed assessment of fish passability at all major barriers on the Irish SAC channels is underway and will be completed in 2019. To date these assessments have identified significant issues with many of these structures in regard to their capacity to permit upstream passage of adult sea lamprey (Barry *et al.*, 2018). Where opportunities have arisen, fish passage has been improved at a small number of locations on SAC rivers by installation of easements (including rock ramp structures), by breaching or structural failure: *Easement:* Lower River Shannon SAC: River Fergus in Ennis; *Rock ramp easements:* Slaney SAC: Tuckmills tributary; Barrow SAC: Hanover weir on River Burren tributary in Carlow town; Nore SAC: Castletown weir on main stem R. Nore; *Breaching:* Lower River Shannon SAC: Ballyclogh weir on River Mulkear; *Structural failure:* Nore SAC: Thomastown weir. Management of professional/commercial fishing (CG01) would be expected to help alleviate pressures on sea lamprey host fish in the marine environment. Any measure to reduce diffuse pollution to surface or ground waters from agricultural activities (CA11) would benefit water quality in rivers. This would have a knock-on beneficial effect on sea lamprey during the freshwater spawning phase, when spawning grounds can experience substantial filamentous algal growth.

10 Future prospects		
10.1 Future prospects of parameters	**a) Range**	*Good / Poor / **Bad** / Unknown*
	b) Population	*Good / Poor / **Bad** / Unknown*
	c) Habitat of the species	*Good / **Poor** / Bad / Unknown*
10.2 Additional information *Optional*	There is no evidence to suggest that, in the next 12 years, fish barriers will be removed to expand the range to <10% below the FRR. Therefore the Future prospects of Range are bad. There is no evidence to suggest that, in the next 12 years, pressures such as barriers to migration will be removed to expand the population to <25% below the FRP. Therefore the Future prospects of Population are bad. There is no evidence to suggest that, in the next 12 years, pressures such as pollution or climate-related impacts will be removed to improve the area and quality of the habitat. Therefore the Future prospects of the Habitat are poor.	

11 Conclusions			
Assessment of conservation status at end of reporting period			
11.1 Range	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
11.2 Population	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
11.3 Habitat for the species	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	*Favourable (FV) / Inadequate (U1)/ **Bad (U2)** / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating / **stable** / unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	The Range is assessed as Bad as it is more than 10% below the Favourable Reference Range. The Population is assessed as Bad as it is estimated to be more than 25% below the Favourable Reference Population. The Habitat is assessed as Inadequate as the area is not considered large enough to ensure the future long-term viability of sea lamprey. This assessment has changed since the previous reporting period and is based on new data and best expert judgement. The Overall Conservation Status of *P. marinus* has remained unchanged since the previous reporting period and is assessed as Bad.		

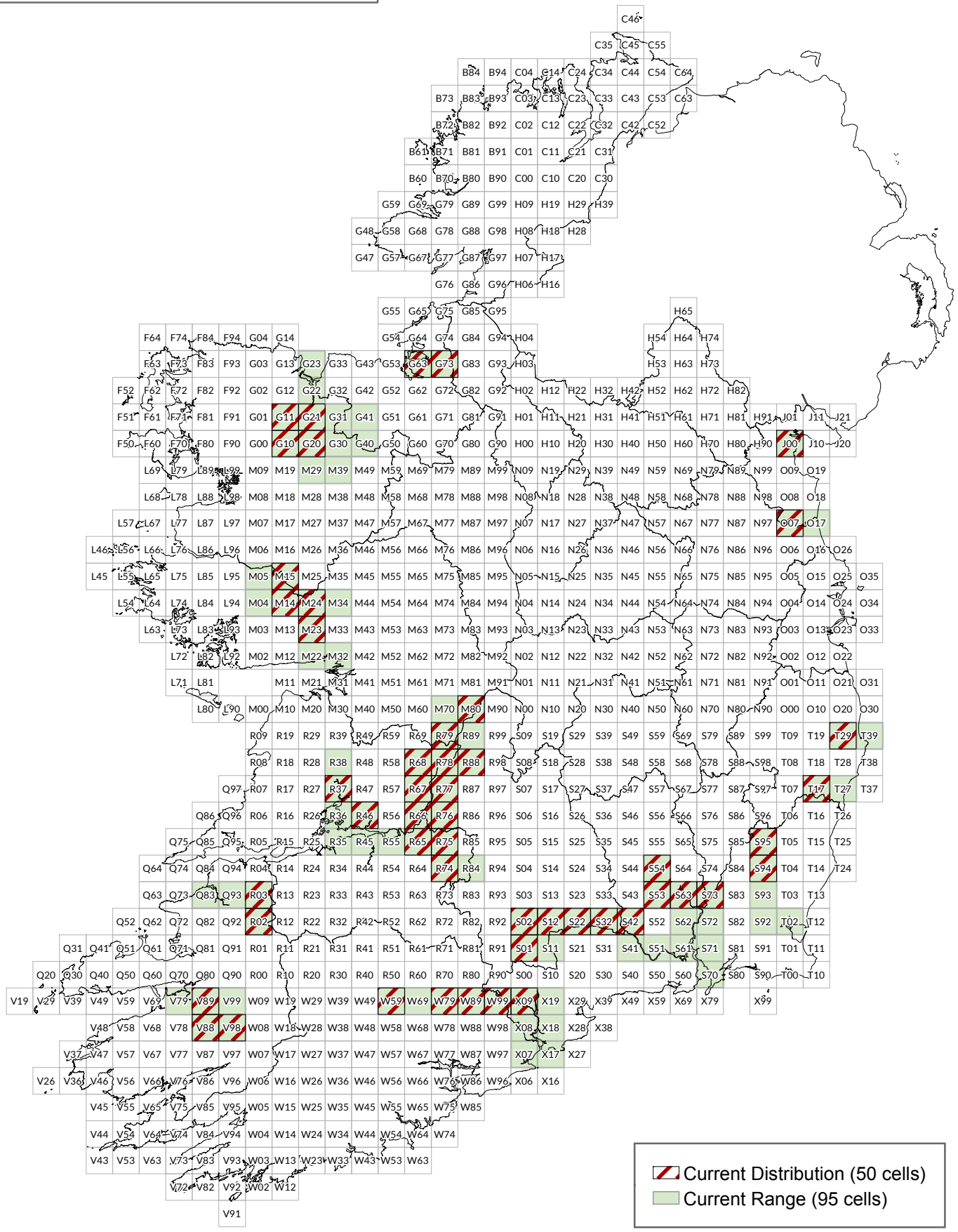
12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

12.1 Population size inside the pSCIs, SCIs and SACs network *(on the biogeographical/marine level including all sites where the species is present)*	**a) Unit**	***1x1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***103***
12.2 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
12.3 Population size 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*	

12.4 Short-term trend of population size within the network Direction	*Short-term trend of population size within the network over the period indicated in field 6.5 :* ***stable*** */ increasing / decreasing / uncertain / unknown*
12.5 Short-term trend of population size within 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*
12.6 Additional information *Optional*	Population size was estimated by counting the number of 1 km grids where sea lamprey were recorded within the SAC network. The unit used to estimate population size (number of occupied 1x1 km grids) has changed since the previous reporting period (length of inhabited feature in km). While fluctuations occurred in the extent of spawning activity in certain SAC rivers there was no indication of an overall increase or decrease in this parameter and the short-term trend was assessed as stable.

13 Complementary information

Sea lamprey
Petromyzon marinus (1095)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1096***
1.3 Species scientific name	*Lampetra planeri*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Brook Lamprey (Lampaire Brook)
1.6i Species description	The brook lamprey (*Lampetra planeri*) is the smallest of the three lampreys recorded in Ireland, typically reaching no more than 15-18cm in length. Unlike the sea lamprey (*Petromyzon marinus*) and the river lamprey (*Lampetra fluviatilis*), the brook lamprey is non-parasitic and non-migratory as an adult, living its entire life in freshwater. Adults spawn in spring, excavating shallow nests in relatively small-sized gravels in areas of reduced flow. After hatching, the larvae ('ammocoetes') drift or swim downstream to areas of river bed or margins with fine silt deposits. They burrow into this substrate and live as filter feeders over a period of years before transforming into young adult fish. The young adults overwinter before migrating short distances upstream to gravelled areas where they spawn. The adult fish die after spawning. River and brook lamprey are indistinguishable as larvae, living as filter feeders in sediment. Mature adult forms are, however, clearly distinguishable based on body size. Brook lamprey and river lamprey are considered by many in the same context as the brown trout / sea trout pairing, with a similar absence of genetic discriminators. Lamprey surveys in Ireland have necessarily focused on ammocoete abundances and to a lesser extent upon observations of adult spawning events. Consequently, most available data relate to '*Lampetra* sp.' and cannot be assigned to one species or the other. Information can only be definitively assigned to one species or the other where adult records exist. For brook lamprey in Ireland there are extensive areas of suitable habitat and no significant pressures impacting this species.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2009-2018***
2.3 Distribution map	Submitted

2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	The majority of records for *L. planeri* represent the larval life stage of *Lampetra* sp. with only a few adult records available for inclusion. Data for the distribution map were obtained from targeted electric fishing surveys for larvae from 30 SAC and non-SAC catchments carried out over the reporting periods (https://www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.html). These data were supplemented by incidental captures of larvae from non-target electric fishing surveys as part of general fish stock assessment monitoring carried out by the R&D division of Inland Fisheries Ireland (https://www.fisheriesireland.ie/Research-and-Development/fisheries-research.html). While the sampling methodology for larval lamprey (Harvey & Cowx, 2003) is robust, the reliability of the data is not guaranteed. It is not possible to distinguish between the larvae of *Lampetra planeri* and *L. fluviatilis* and it is therefore likely that a proportion of records in the distribution map are of *L. fluviatilis*. Larval records upstream of substantial barriers on many river systems are more likely to be *L. planeri* than *L. fluviatilis*, as the latter is a migratory species and its upstream passage can be impeded or prevented by major barriers.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
4.2 Sources of information	Gardiner, R. (2003) Identifying lamprey: A field key for sea, river and brook lamprey. Conserving Natura 2000 Rivers Conservation Techniques Series No. 4, English Nature, Peterborough. 27pp. Habitats Directive and Red Data Book Species, Executive Report 2009,

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185.

King, J.J. & Linnane, S.M. (2004) The status and distribution of lamprey and shad in the Slaney and Munster Blackwater SACs. *Irish Wildlife Manuals* No 14. National Parks and Wildlife Service, Dept. of Environment, Heritage and Local Government, Dublin Ireland.

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	physical migration barriers. *Aquatic Conservation: marine and freshwater ecosystems* 18: 175–189. O'Connor, W. (2004) A survey of juvenile lamprey populations in the Moy catchment. *Irish Wildlife Manuals* No. 15. National Parks and Wildlife Service, Dept. of Environment, Heritage and Local Government, Dublin, Ireland. O'Connor, W. (2006a) A baseline survey of juvenile lamprey populations in the River Feale catchment. *Irish Wildlife Manuals* No. 22. National Parks and Wildlife Service, Dept. of Environment, Heritage and Local Government, Dublin, Ireland. O'Connor, W. (2006b) A baseline survey of juvenile lamprey populations in the River Boyne catchment. *Irish Wildlife Manuals* No. 24. National Parks and Wildlife Service, Dept. of Environment, Heritage and Local Government, Dublin, Ireland. O'Connor, W. (2007) A baseline survey of juvenile lamprey populations in the Corrib and Suir catchments. *Irish Wildlife Manuals* No 26. National Parks and Wildlife Service, Dept. of Environment, Heritage and local Government, Dublin, Ireland. Rooney, S.M., O' Gorman, N.M., Greene, F. and King, J.J. (2013) Aspects of brook lamprey (*Lampetra planeri* Bloch) spawning in Irish waters. *Biology and Environment: Proceedings of the Royal Irish Academy* 113B: 13-25. Shephard, S., Gallagher, T., Rooney, S.M., O'Gorman, N., Coghlan, B. & King, J.J. (in press) Length-based assessment of larval lamprey population structure at differing spatial scales. *Aquatic Conservation: marine and freshwater ecosystems* 2018:1–8. DOI: 10.1002/aqc.3009. Torgersen, C.E. & Close, D.A. (2004) Influence of habitat heterogeneity on the distribution of larval Pacific lamprey (*Lampetra tridentata*) at two spatial scales. *Freshwater Biology* 49: 614–630.
4.2i Additional information	

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***52,000 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	

5.5 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*	
5.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	a) Minimum	*Percentage change over the period indicated in the field 5.6. 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 5.6. If a precise value is known provide the same value under both minimum and maximum*
5.9 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*	
5.10 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	
5.11 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***	

5.12 Additional information *Optional*	Range was calculated using the range tool provided in the reference portal (http://cdr.eionet.europa.eu/help/habitats_art17) and using a gap distance of 20km. Repeat surveys of the catchments sampled in 2009-2012 were not carried out in the current reporting period. Instead, additional catchments were sampled to provide further baseline data on the distribution and population size of *Lampetra* sp. at a national level. Based on expert opinion, and taking account of the combined surveys for both reporting periods, the short-term trend is assessed as stable. While the short-term trend was assessed over the period 2009-2018, this is assumed to hold also for the default trend period of 2007-2018. There was a decrease in the range between reporting periods. This does not represent an actual decline. In 2013 the Range encompassed the surface area of the state, minus a small number of coastal squares without freshwater, due to the fact that the species was recorded in all channels, from 1st-order streams to large 6th-order rivers. The current Range envelope has been drawn more conservatively around the current distribution. Targeted electric-fishing surveys for larvae over the period 2009-2018 have demonstrated the widespread availability of suitable habitat (in terms of nursery and spawning habitat requirements) for brook lamprey. Based on these data, in addition to expert opinion, the FRR was estimated as being approximately equal to the current range.

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2009-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1x1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***1,221***
6.3 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*		

6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	a) Minimum	*Percentage change over the period indicated in the field 6.11. 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 6.11. If a precise value is known provide the same value under both minimum and maximum*
	c) Confidence interval	*Indicate confidence interval if a statistically reliable sampling scheme is used*
6.14 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*	
6.15 Favourable reference	*a) Population size (with unit) or*	

population *(using the unit in 6.2 or 6.4)*	***b) Operator ≈ (approximately equal to)*** *or*	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
6.16 Change and reason for change in population size	*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***	
6.17 Additional information *Optional*	The estimated population size (Field 6.2) was calculated from results of surveys for larval *Lampetra* sp. for the combined reporting periods (2009-2018). It represents the total number of 1 km grids where *Lampetra* sp. was recorded. Two alternative population units (% occurrence and mean density/m^2 of larval *Lampetra* sp. at sites with suitable nursery habitat) were used as part of the monitoring programme for larval lamprey. Based on the Common Standards Monitoring (CSM) guidance for freshwater fauna (JNCC, 2015) a mean density >5/m^2 of larval *Lampetra* sp. in suitable habitat is one of the attribute targets used to assign favourable condition in SACs. Mean density was calculated from targeted electric fishing surveys of 1204 sites (1158 sites with suitable habitat) within 30 SAC and non-SAC catchments over the period 2009-2018 (https://www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.html). A mean density of 8/m^2 larvae was obtained suggesting a favourable condition within the biogeographic area. Another target from the CSM guidance is that, as a minimum, *Lampetra* should be present in not less than 50% of all sampling sites surveyed with suitable habitat present within the natural range. Of the 1158 sites with suitable nursery habitat, *Lampetra* sp. occurred at 813 (70%) sites, again, suggesting a favourable condition. The unit used to calculate population size has changed from 'number of 10x10 km grids' in the previous cycle to 'number of occupied 1x1 km grids'. A repeat survey of the catchments between the previous and current reporting periods was not carried out. Instead, additional catchments were sampled to provide further baseline data on the distribution and population size of *L. planeri* at a national level. The short-term trend direction was based on expert opinion. While trend was assessed over the period 2009-2018, it is assumed to hold also for the default trend period of 2007-2018.	

	The change in the reported population size was due to the change in unit. Based on data from an extensive targeted sampling programme for larval *Lampetra* sp. over the period 2009-2018, and best expert judgement, the FRP for brook lamprey is estimated at approximately equal to the current population (Field 6.2).

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information	Adult brook lamprey require well-oxygenated gravelled areas for spawning in the main channels and tributaries of rivers. Nursery habitat in the form of fine sands/silts in depositional areas is

Optional	required for the larval life stage. Habitat was assessed as part of the electric fishing surveys for larval lamprey in 2009-2018. Of the 1204 sites sampled, a high proportion (96%, n=1158) had suitable nursery habitat for brook lamprey. A smaller proportion (56%, n=678) of these sites were visually assessed for adjacent spawning habitat and, of these, 60% (n=406) had suitable habitat. Sites typically ranged in length from 20-50 m and it follows that only a localised assessment was possible for a given length of channel. Results give an adequate indication, however, of the availability of habitat types for these two major life stages of *L. planeri*. While repeat surveys were not carried out in this reporting cycle, additional sites were sampled within SAC and non-SAC catchments. In combining these surveys, expert opinion assesses the short-term trend in area and quality of habitat as stable. While the trend was assessed over the period 2009-2018, it is assumed to hold also for the default trend period of 2007-2018.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**A19** Application of natural fertilisers on agricultural land (M) **A20** Application of synthetic (mineral) fertilisers on agricultural land (M) **A31** Drainage for use as agricultural land (M) **B09** Clear-cutting, removal of all trees (M) **D02** Hydropower (dams, weirs, run-off-the-river), including infrastructure (M) **F11** Pollution to surface or ground water due to urban run-offs (M) **F12** Discharge of urban waste water (excluding storm overflows and/or urban run-offs) generating pollution to surface or	**A19** Application of natural fertilisers on agricultural land (M) **A20** Application of synthetic (mineral) fertilisers on agricultural land (M) **A31** Drainage for use as agricultural land (M) **B09** Clear-cutting, removal of all trees (M) **D02** Hydropower (dams, weirs, run-off-the-river), including infrastructure (M) **F11** Pollution to surface or ground water due to urban run-offs (M) **F12** Discharge of urban waste water (excluding storm overflows and/or urban run-offs) generating pollution to surface or

	ground water (M)	ground water (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)
8.2 Sources of information *Optional*	EPA (2018) Water Quality in 2017: an indicators report. http://www.epa.ie/pubs/reports/water/waterqua/waterqualityin2017anindicatorsreport.html	
8.3 Additional information *Optional*	Diffuse and point source pollution (A19, A20, F11, F12) may be having localised impacts on populations of *L. planeri*. There has been a 3% reduction in river water quality in the national territory since 2015 (EPA, 2018) and the main sources of nutrient inputs are agriculture (slurry and chemical fertilisers) and sewage (waste water treatment plants). It is acknowledged that more effort will need to be made in tackling diffuse pollution in Irish rivers. Activities that lead to hydrological changes and canalisation of river channels (A31) will impact on habitat availability for *L. planeri* in certain locations. Mean density of larval *Lampetra* was <5/m^2 in a number of catchments and, in certain cases, this is likely to be attributable to historical and on-going hydrological modifications in water bodies in the form of arterial drainage. All pressures and threats included here are ranked as having medium-level impacts on the long-term viability of *L. planeri* as impacts are generally localised.	

9 Conservation measures

To be reported only for Annex II species

9.1 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*
9.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, population and/or habitat for the species or* *b) Expand the current range of the species (related to 'Range') or* *c) Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population') or* *d) Restore the habitat of the species (related to 'Habitat for the species')*

9.3 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*
9.4 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 in field 9.2):* *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)*
9.5 List of main conservation measures	None taken
9.6 Additional information *Optional*	

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	The sampling programme for brook lamprey indicates that it has a widespread distribution with sufficiency of area and quality of habitat. While not reported here, data on population dynamics indicates a self-sustaining population with no recruitment issues. Depending on the catchment, the pressures and threats will have variable localised effects and have been assessed as having medium-level impacts.	

11 Conclusions

Assessment of conservation status at end of reporting period	
11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1)/ Bad (U2) / Unknown (XX)*
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*

11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating / **stable** / unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	Target and non-target surveys for brook lamprey over the current reporting period indicate favourable status for each of the parameters of Range, Population and Habitat and, based on available evidence, *L. planeri* is predicted to maintain itself at favourable conservation status for the foreseeable future.		

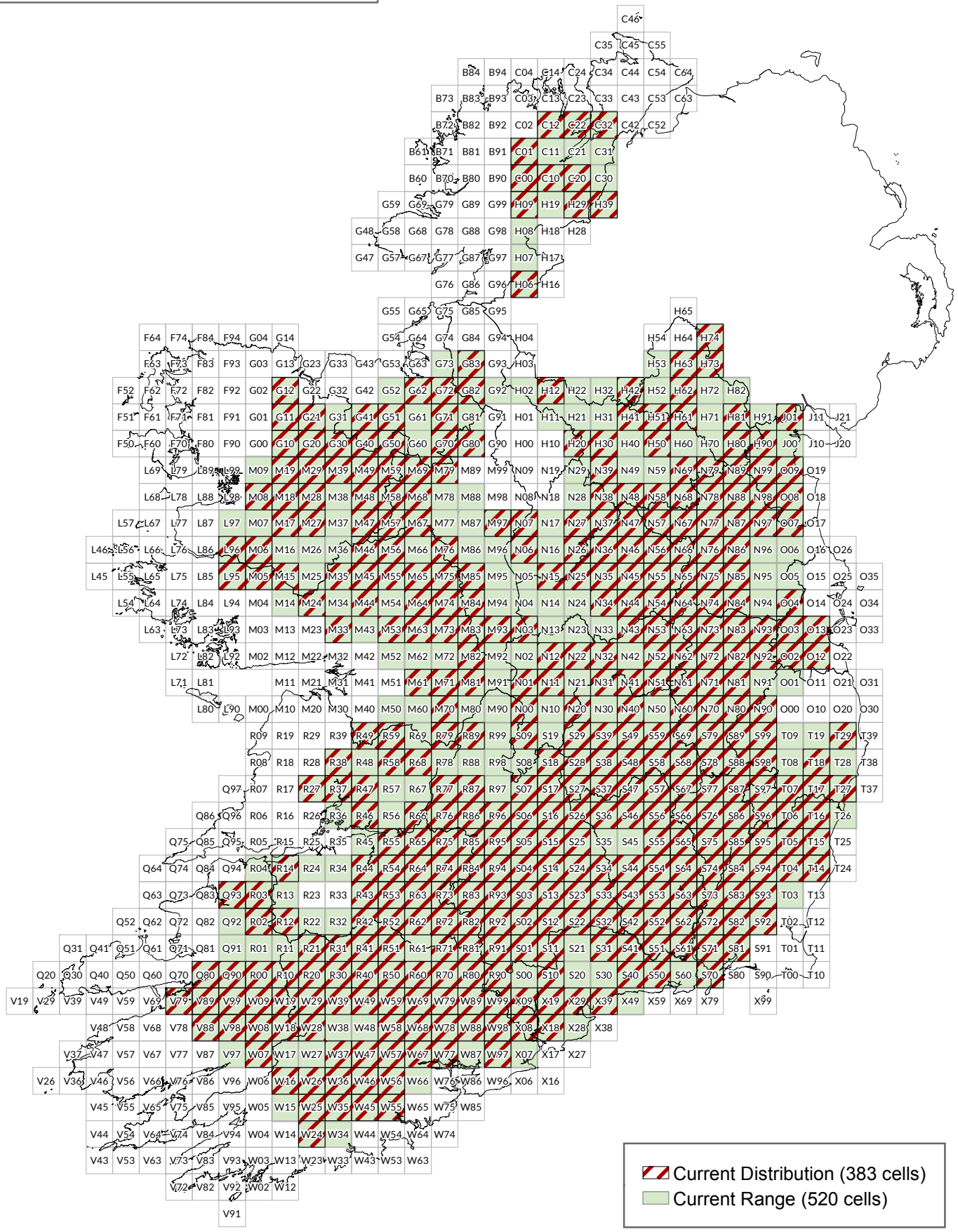
12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

12.1 Population size inside the pSCIs, SCIs and SACs network *(on the biogeographical/marine level including all sites where the species is present)*	**a) Unit**	***1x1 km grids***
	b) Minimum	
	c) Maximum	

	d) Best single value	***439***
12.2 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
12.3 Population size 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*	
12.4 Short-term trend of population size within the network **Direction**	*Short-term trend of population size within the network over the period indicated in field 6.5 :* ***stable*** */ increasing / decreasing / uncertain / unknown*	
12.5 Short-term trend of population size within 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*	
12.6 Additional information *Optional*	Population size was estimated by counting the number of 1 km grids occupied by *Lampetra* sp. larvae within the SAC network. The unit used to estimate population size has changed from the 'number of occupied 10x10 km grids' to the 'number of occupied 1x1 km grids'. Although not directly comparable, additional SAC catchments were surveyed in the current cycle and the short-term trend is assessed as stable based on expert opinion.	

13 Complementary information

Brook lamprey
Lampetra planeri (1096)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1099***
1.3 Species scientific name	*Lampetra fluviatilis*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	River Lamprey (Easpaigín na hAbhainn)
1.6i Species description	The river lamprey (*Lampetra fluviatilis*) breeds in freshwater rivers and streams. Adults spawn in spring, excavating shallow nests in riverine sections comprising fine gravels and small stones. After hatching, the larvae or 'ammocoetes' drift or swim downstream to areas of river bed or margins with fine silt deposits. They burrow into this bed material where they live as filter feeders over a period of years before transforming into young adult fish and migrating downriver to estuarine and marine habitats. As adults they are parasitic, attaching to and feeding on larger fish in coastal waters. They can grow up to 25-30cm at maturity at which stage they return to freshwater habitats to spawn, attracted by pheromones exuded by their larvae within the system. The adult fish die after spawning. River and brook lamprey are indistinguishable as larvae. The mature adult forms are, however, clearly distinguishable based on body size. The two types of lamprey are considered by many in the same context as the brown trout / sea trout pairing, with a similar absence of genetic discriminators. Lamprey surveys in Ireland have primarily focused on juvenile lamprey distributions and to a lesser degree upon adult spawning events. As a result, most available data relate to '*Lampetra* sp.' in general and can only be definitively assigned to one species or the other where adult records exist. This is an unsatisfactory yet unavoidable situation, given the paucity of adult records and the inability to differentiate juveniles, either morphometrically or genetically, in the field survey scenario. Migrating adults are extremely cryptic and spawning largely goes unnoticed. Evidence of nest-building for this species is particularly ephemeral. Several rivers along the east coast and within the Lower Shannon experience annual migrations accompanied by evidence of spawning. Conjecture aside, it is impossible to comment on their possible migration and spawning in other river systems nationwide without a directed and extensive survey effort. For adults and juveniles there are extensive areas of suitable habitat; however the presence of barriers to migration within river systems can, depending on timing of arrival and flow conditions, undoubtedly influence their distribution. The inability to distinguish between *L. fluviatilis* and *L. planeri* larvae, and the challenges associated with sampling for adult river lamprey,

	means that an evaluation of their actual range and population size cannot be undertaken and status is assessed as *unknown* for the current reporting period. This represents a change from the previous reporting period (where a favourable status was assigned) but does not represent a downgrade in status. Data on larval *Lampetra* sp. were used to assign status in the previous reporting period. Records for adult river lamprey, although difficult to obtain, are considered more appropriate for making a true assessment of this species. A targeted sampling programme for adult river lamprey will be required for assessing conservation status in the next reporting cycle.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2009-2018***
2.3 Distribution map	Submitted
2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	Accurate reporting for this species is problematic given the inability to distinguish between *L. fluviatilis* and *L. planeri* (brook lamprey) larvae and the difficulties in sampling for adult river lamprey. Data for adult river lamprey provide an unequivocal assessment of distribution and the current assessment is based on the limited number of adult records (39) available for the current reporting period. These data were obtained from both riverine and estuarine habitats in a number of catchments and the majority originated from redd count surveys, direct observations of spawning lamprey and fish counter data from Ardnacrusha on the River Shannon. Data were also provided from targeted trapping of migrating lamprey on the Avoca catchment (Aughrim river), non-target incidental records from various fyke netting surveys, and live captures of river lamprey in elver and smolt traps monitored by Inland Fisheries Ireland.

3 Information related to Annex V species (Art. 14)	
3.1 Is the species taken in the wild/exploited?	*Is the species taken in the wild/exploited? YES/**NO***

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned.	
4 Biogeographical and marine regions	
4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
4.2 Sources of information	Bracken, F.S.A., Rus Hoelzel, A., Hume, J.B. & Lucas, M.B. (2015) Contrasting population genetic structure among freshwater-resident and anadromous lampreys: the role of demographic history, differential dispersal and anthropogenic barriers to movement. *Molecular Ecology* 24: 1188-1204. Bunn, S.E. and Arthington, A.H. (2002) Basic principles and ecological consequences of altered flow regimes for aquatic biodiversity. *Environmental Management* 30: 492–507. EPA (2018) Water Quality in 2017: an indicators report. http://www.epa.ie/pubs/reports/water/waterqua/waterqualityin2017anindicatorsreport.html Fealy, R., Bruyère, C. & Duffy, C. (2018) Regional Climate Model Simulations for Ireland for the 21st Century. EPA Research Report, Environmental Protection Agency, Johnstown Castle, Wexford, Ireland. 137 pages. Gardiner, R. (2003) Identifying lamprey: A field key for sea, river and brook lamprey. Conserving Natura 2000 Rivers Conservation Techniques Series No. 4, English Nature, Peterborough. 27pp. Graham, C.T. & Harrod, C. (2009) Implications of climate change for the fishes of the British Isles. *Journal of Fish Biology* 74: 1143–205. Habitats Directive and Red Data Book Species, Executive Report 2009, IFI/2010/1-0480. Inland Fisheries Ireland. http://www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.html Habitats Directive and Red Data Book Species, Executive Report 2010, IFI/2011/1-0499. Inland Fisheries Ireland. http://www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.html Habitats Directive and Red Data Book Species, Executive Report 2011, IFI/2012/1-4103. Inland Fisheries Ireland. http://www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.htm Habitats Directive and Red Data Book Species, Executive Report 2012, IFI/2013/1-4157. Inland Fisheries Ireland.

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4.2i Additional information	

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***4,600 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	*stable / increasing / decreasing / **uncertain** / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	a) Minimum	*Percentage change over the period indicated in the field 5.6. 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 5.6. If a precise value is known provide the same value under both minimum and maximum*

5.9 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*	
5.10 Favourable reference range	*a) In km² or*	
	b) Indicate if operators were used (use these symbols ≈, >, >>) or	
	c) Favourable reference range is unknown *or*	
	d) Indicate method used to set reference value if other than operators	
5.11 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*** */ no information on nature of change*	
5.12 Additional information *Optional*	The range was calculated by creating envelopes around the distribution grids, extending from estuaries to the most upstream locations where adult river lampreys were recorded in individual rivers. The surface area reported in Field 5.1 is considered an extremely conservative estimate of the true range of *L. fluviatilis,* at a national level, but is constrained by the limited availability of data. Having an anadromous lifecycle, river lampreys are expected to have a reduced range compared to brook lampreys. They must negotiate barriers to reach spawning grounds and it is uncertain, if unlimited access were available, how far upstream they would ascend. There is evidence to suggest that, where flow conditions are suitable, river lamprey have the ability to surmount substantial weirs. On the River Slaney, *L. fluviatilis* has been recorded 70 km from the mouth of the river having overcome a major weir at Clohamon. Short-term trend was assessed over the period 2009-2018 but is assumed to hold also for the default trend period of 2007-2018.	

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	***2009-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1x1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***15***
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval /* ***minimum***	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*		
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing / decreasing /* ***uncertain*** */ unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	

6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	a) Minimum	*Percentage change over the period indicated in the field 6.11. 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 6.11. If a precise value is known provide the same value under both minimum and maximum*
	c) Confidence interval	*Indicate confidence interval if a statistically reliable sampling scheme is used*
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) Population size (with unit) or*	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) Favourable reference population is unknown *or*	
	d) Indicate method used to set reference value if other than operators	
6.16 Change and reason for change in population size	*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*** */ no information on nature of change*	
6.17 Additional information *Optional*	Only 23 records were available for adult river lamprey. The population estimate was calculated by counting the number of occupied 1 km grids. This is an extreme under-estimation of the actual population size and is reported as a minimum value. It was not possible to estimate the short-term trend as limited data for adult river lamprey were available for the two reporting periods. Short-term trend was assessed over the period 2009-2018 but is	

	unknown also for the default trend period of 2007-2018. The 10km distribution grid of Brook and River Lamprey records was used as a surrogate for the Population estimate in 2013. Therefore the "use of a different method" is the main reason for a change in the population estimate between reporting periods.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	Adult river lamprey migrate upstream from estuaries during the winter months to spawn in the spring. They require access to spawning grounds in the main channels and tributaries of rivers. Clean gravels and adequate flow conditions are a requirement for

	spawning. Upon hatching, larvae migrate to more still-water sections of river where they burrow into fine sediment deposits. Habitat was assessed as part of targeted electric fishing surveys for larval *Lampetra* sp. Of the 1204 sites sampled, a high proportion (96%, *n*=1158) had suitable nursery habitat for river lamprey. A smaller portion (56%, *n*=678) of these sites were visually assessed for adjacent spawning habitat and, of these, approximately 35% (*n*=238) were considered to be appropriate for river lamprey. Sampling sites typically ranged in length from 20-50 m and it follows that only a localised assessment was possible for a given length of channel. As the true range and population size of river lamprey is unknown, results are indicative only. Many of the channels sampled may be too small for river lamprey to ascend or may be inaccessible due to barriers to upstream migration. Short-term trend in Habitat was assessed as stable over the period 2009-2018 but this is assumed to apply also to the default trend period of 2007-2018.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**D02** Hydropower (dams, weirs, run-off-the-river), including infrastructure (H) **N03** Increases or changes in precipitation due to climate change (H) **A19** Application of natural fertilisers on agricultural land (M) **A20** Application of synthetic (mineral) fertilisers on agricultural land (M) **A31** Drainage for use as agricultural land (M) **E03** Shipping lanes, ferry lanes and anchorage infrastructure (e.g. canalisation, dredging) (M)	**D02** Hydropower (dams, weirs, run-off-the-river), including infrastructure (H) **N03** Increases or changes in precipitation due to climate change (H) **A19** Application of natural fertilisers on agricultural land (M) **A20** Application of synthetic (mineral) fertilisers on agricultural land (M) **A31** Drainage for use as agricultural land (M) **E03** Shipping lanes, ferry lanes and anchorage infrastructure (e.g. canalisation, dredging) (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)
8.2 Sources of information *Optional*		
8.3 Additional information *Optional*	Barriers to migration, such as dams and weirs, can impede or prevent upstream passage to spawning and nursery habitat. As river lamprey migrate during winter months, when precipitation is expected to be higher, it is possible that they are able to surmount some of the larger weirs. Pressures and threats that are likely to have high- or medium-level impacts on river lamprey migration include A31 and D02. Activities that lead to hydrological changes and canalisation of river channels (A31) will impact on spawning and nursery habitat availability for river lamprey in certain locations. Diffuse source pollution (A19, A20) may be having localised impacts on populations of *L. fluviatilis.* There has been a 3% reduction in river water quality since 2015 (EPA, 2018) and the main sources of nutrient inputs are agriculture (slurry and chemical fertilisers) and sewage (waste water treatment plants). It is acknowledged that more effort will need to be made in tackling diffuse pollution in Irish rivers. Increases in river discharge (N03) can exacerbate the already high rate of natural egg wash-out, both from within lamprey nests and from surrounding spawning gravels (Smith & Marsden 2009). When aspects of life history such as spawning, egg survival and early larval maturation are dependent on specific flow patterns, any pronounced increase in discharge could result in decreased or complete failure of recruitment for that year (Humphries & Lake, 2000; Bunn & Arthington, 2002; Maitland, 2003). For spawning river lamprey in Irish catchments, the timing and scale of late-spring and summer flood events (Lennon & Walsh, 2008, Walsh, 2016) are of concern, particularly given the increased likelihood of such incidents in the future (Sweeney *et al*., 2008; Graham & Harrod, 2009; Fealy *et al*., 2018). Although not listed, another potential threat includes the harvesting of freshwater fish (G06). Angling magazines and fishing shops advertise frozen tissue of lamprey as among the prime baits for pike angling. There is a clear potential conflict between the status of conservation species and their identified use as angling bait. In the case of lamprey, it is often stated that the baits are imported as frozen fillets or nuggets, etc. While it is unlikely they are being harvested for this purpose in Ireland, river lampreys (sourced from other European countries) are being used as bait for pike angling in this country.	

9 Conservation measures	
To be reported only for Annex II species	
9.1 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*
9.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, population and/or habitat for the species or* ***b) Expand the current range of the species (related to 'Range')** or* *c) Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population') or* *d) Restore the habitat of the species (related to 'Habitat for the species')*
9.3 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*
9.4 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 in field 9.2):* *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)*
9.5 List of main conservation measures	**CC04** Reduce impact of hydropower operations and infrastructure **CF10** Manage changes in hydrological and coastal systems and regimes for construction and development
9.6 Additional information *Optional*	Measures relating to reducing the impact of river infrastructures, particularly weirs and dams, that may prevent access to spawning and nursery habitat are particularly important for *L. fluviatilis*. Detailed assessment of fish passability at all major barriers on the Irish SAC channels is underway and will be completed in 2019. To date these assessments have identified significant issues with many of these structures in regard to their capacity to permit upstream passage of adult Atlantic salmon and of sea lamprey (Barry *et al.* 2018). Barriers impacting on these larger fish would also be likely to impede river lamprey upstream migration. Where opportunities have arisen, fish passage has been improved at a small number of locations on SAC rivers by installation of easements (including rock

	ramp structures), by breaching, or by structural failure. These measures are also of value to river lamprey. *Easement:* Lower River Shannon SAC: River Fergus in Ennis; *Rock ramp easements:* Slaney SAC: Tuckmills tributary; Barrow SAC: Hanover weir on River Burren tributary in Carlow town; Nore SAC: Castletown weir on main stem R. Nore; *Breaching:* Lower River Shannon SAC: Ballyclogh weir on River Mulkear; *Structural failure:* Nore SAC: Thomastown weir.

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	*Good / Poor / Bad /* ***Unknown***
	b) Population	*Good / Poor / Bad /* ***Unknown***
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	Few records for adult *L. fluviatilis* were available. Due to the limited data, therefore, the true range and population size could not be estimated and Future prospects for these parameters are unknown.	

11 Conclusions

Assessment of conservation status at end of reporting period			
11.1 Range	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***		
11.2 Population	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***		
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	*Favourable (FV) / Inadequate (U1)/ Bad (U2) /* ***Unknown (XX)***		
11.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating / stable / unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	***YES**/NO*	***YES**/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	***YES**/NO*	***YES**/NO*
	e) yes, but there is no information on the 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***
11.8 Additional information *Optional*	Given the large area of habitat availability and the likelihood that, in certain flow conditions, river lamprey are able to ascend many of the significant weirs on Irish rivers, it is possible that, in reality, they have a favourable conservation status. The inability to distinguish between *L. fluviatilis* and *L. planeri* larvae, however, and the challenges associated with sampling for adult river lamprey, means that an evaluation of their actual range and population size cannot be undertaken and status is assessed as *unknown* for the current reporting period. This represents a change from the previous reporting period (where a favourable status was assigned) but does not represent a downgrade in status. Data on larval *Lampetra* sp. were used to assign status in the previous reporting period. Records for adult river lamprey, although difficult to obtain, are considered more appropriate for making a true assessment of this species. A targeted sampling programme for river lamprey will be required for assessing conservation status in the next reporting cycle.		

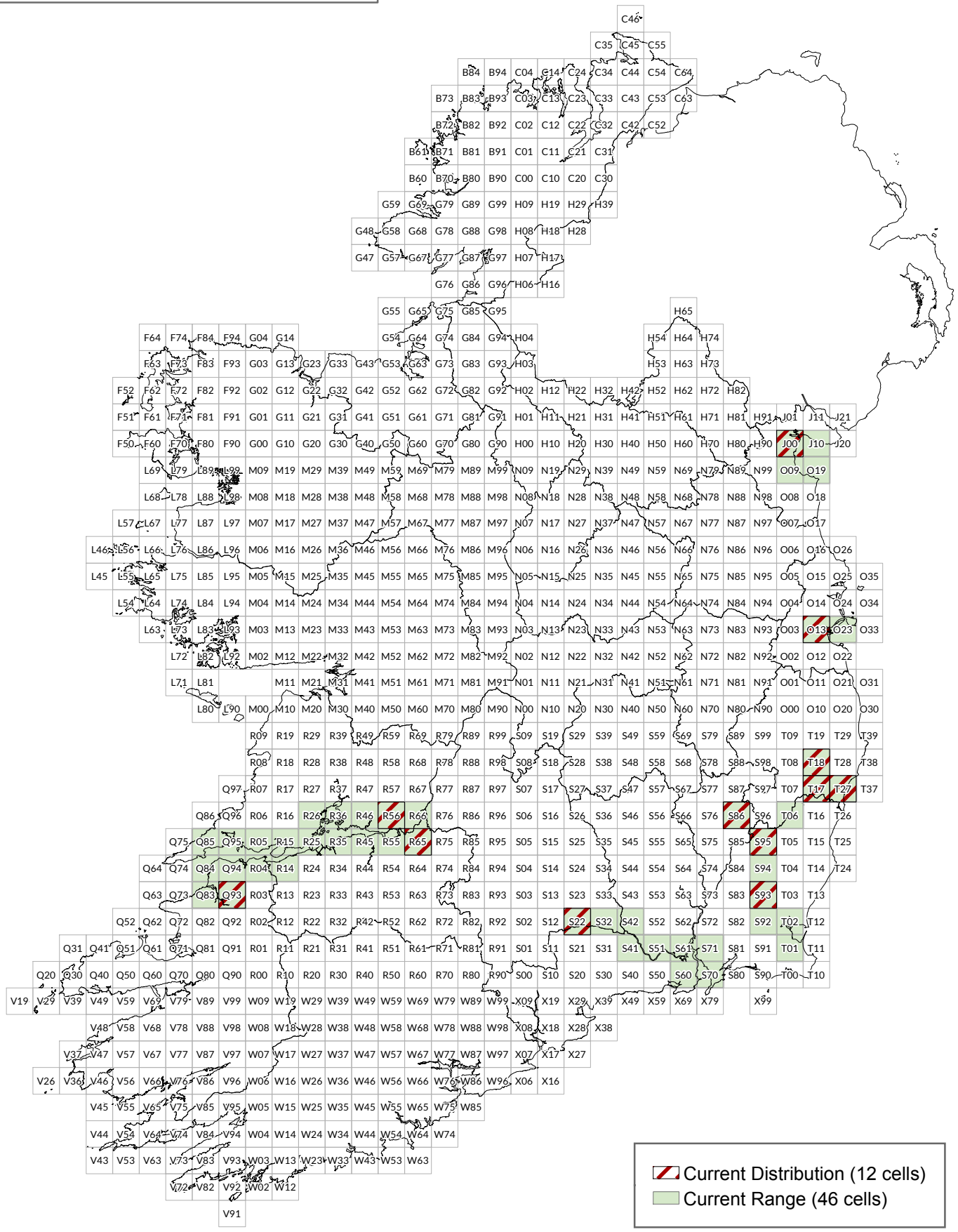
12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

12.1 Population size inside the pSCIs, SCIs and SACs network *(on the biogeographical/marine level including all sites where the species is present)*	**a) Unit**	***1x1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***7***

12.2 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*
12.3 Population size 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*
12.4 Short-term trend of population size within the network **Direction**	*Short-term trend of population size within the network over the period indicated in field 6.5 :* *stable / increasing / decreasing /* ***uncertain*** */ unknown*
12.5 Short-term trend of population size within 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*
12.6 Additional information *Optional*	The population size was estimated by counting the number of 1 km grids where adult *L. fluviatilis* were recorded within the SAC network. Data were not available to estimate the population size of adult *L. fluviatilis* within SACs during the last reporting period and the short-term trend is uncertain. The species is not found in seven of the ten SACs where it is listed as a qualifying interest.

13 Complementary information

River lamprey
Lampetra fluviatilis (1099)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***5046***
1.3 Species scientific name	*Alosa killarnensis*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Killarney shad (Sead fhallacsach Chill Áirne; Gabhairín Chill Áirne)
1.6i Species description	The Killarney shad (*Alosa fallax killarnensis* Regan) is unique to Ireland and is only recorded in Lough Leane in the Killarney National Park SAC. It is listed in the Irish Red Data Book (King *et al*., 2011) as 'Vulnerable D2', indicating a species with restricted occupancy or number of locations. The Killarney shad is a member of the Alosid group of fish, members of the herring family, and it is closely related to the twaite and allis shads. It is non-anadromous, unlike the twaite and allis shads. Anecdotal reports and observations indicate that the species spawns within Lough Leane along shallow gravelled shores and on gravel shoals adjoining the various islands. The adult fish live in shoals in the lake, feeding on zooplankton. Thus the full life cycle is undertaken within the lake. The species is considered to derive from ancestral post-glacial populations that became isolated in the lake. Lough Leane has unimpeded connectivity to the transitional waters of Castlemaine Harbour via the R. Laune. There are no records of anadromous shads being taken in either the transitional or riverine waters. The species has been the subject of investigations since the late 1980s and whole-lake surveys in the last three decades have confirmed the continued presence of the species. The species is found in L. Leane only and has never been found outside it. An increase in range would require colonisation of another water body, from the resident population. Neither adjoining waters – Muckross Lake or Upper Lake – is considered suitable for the species. The range is judged to have remained stable. The quality of the habitat is considered 'good' on the basis of water quality and physical habitat requirements of the species. Well-gravelled areas of lake bed in well-mixed areas of the waterbody are available as spawning habitat. These are adjoined by large areas of shallow littoral habitat that may be used by juvenile shad. There is extensive adult habitat in the open-water areas of the lake, including areas of considerable depth that can be used in situations of summer warming or thermocline development. The continual presence of adult fish in successive fish surveys indicates an on-going successful spawning effort. L. Leane has been subject to considerable pressure, primarily due to nutrient enrichment. Lough Leane is at the centre of a major tourism

	industry at Killarney. Tourist traffic leads to a very substantial, transient increase in human population over several months each year with a consequent pressure on water supply and an increased production of waste to be treated at the local waste water treatment works. The Killarney shad population appears to have survived impacts of eutrophication in the 1970s and early 1980s. However, the potential for adverse impact on L. Leane from anthropogenic eutrophication, particularly in combination with reduced summer water levels, remains. L. Leane is unique among Irish lakes in its fish community in containing a predominance of native species – Atlantic salmon, brown trout, eel, Killarney shad, arctic char – and an absence of the pike, a significant predator, and of widespread introductions – the roach or dace. The arrival of pike would introduce a top predator into a habitat that currently lacks such functional groups among the fish community. Introduction of roach or dace would lead to significant competition with Killarney shad for zooplankton food. There would also be a likelihood of competition for spawning habitats. Other potentially significant aquatic invasives would include the molluscs *Dreissena polymorpha* (Zebra mussel) and *Corbicula fluminea* (Asian clam) and a variety of crustacean species. The entire range of the Killarney shad is protected within Killarney National Park. The Overall Status is assessed as Favourable.

2 Maps

Distribution of the species within the Member State concerned.

2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2008-2018***
2.3 Distribution map	Submitted
2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	Records of Killarney shad for the distribution map were obtained from netting surveys of L. Leane carried out in 2008, 2011, 2014 and 2017 (http://wfdfish.ie/). A parallel hydroacoustic and pelagic gill netting survey was also carried out on L. Leane in 2017 (Connor *et al*., 2018).

3 Information related to Annex V species (Art. 14)	
3.1 Is the species taken in the wild/exploited?	*Is the species taken in the wild/exploited? YES/**NO***

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned.	
4 Biogeographical and marine regions	
4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
4.2 Sources of information	Bobori, D.C., Koutrakis, E.T. & Economidis, P.S. (2001) Shad species in Greek waters – a historical overview and present status. *Bulletin Francais de la peche et de la pisciculture* 362-363: 1101-1108. Connor, L., Coyne, J., Corcoran, W., Cierpial, D., Ní Dhonnaibhain, L., Delanty, K., McLoone, P., Morrissey, E., Gordon, P., O'Briain, R., Matson, R., Rocks, K., O' Reilly, S., Brett A., Garland D. & Kelly, F.L. (2018) Fish Stock Survey of Lough Leane, September 2017. National Research Survey Programme, Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24. Coscia, I., McDevitt, A. D., King, J. J., Roche, W.K., McLoughlin, C., Mariani, S. (2013) A species-to-be? The genetic status and colonization history of the critically endangered Killarney shad. *Molecular Phylogenetics and Evolution* 69: 1190-1195. Doherty, D., Ó Maoleidigh, N. & McCarthy, T. K. (2004) The biology, ecology and future conservation of twaite shad (*Alosa fallax* Lacepede), allis shad (*Alosa alosa* L.) and Killarney shad (*Alosa fallax Killarnensis* Tate Regan) in Ireland. *Biology and Environment: Proceedings of the Royal Irish Academy* 104 B: 93-102. Habitats Directive and Red Data Book Species, Executive Report 2009, IFI/2010/1-0480. Inland Fisheries Ireland. Http://www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.html Habitats Directive and Red Data Book Species, Executive Report 2010, IFI/2011/1-0499. Inland Fisheries Ireland. Http://www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.html Habitats Directive and Red Data Book Species, Executive Report 2011, IFI/2012/1-4103. Inland Fisheries Ireland. Http://www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.html Habitats Directive and Red Data Book Species, Executive Report 2012, IFI/2013/1-4157. Inland Fisheries Ireland. Http://www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.html

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Habitats Directive and Red Data Book Species, Executive Report 2015, IFI/2016/1-4344. Inland Fisheries Ireland. Http://www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.html

Habitats Directive and Red Data Book Species, Executive Report 2016, IFI/2017/1-4383. Inland Fisheries Ireland. Http://www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.html

Kelly, F.L., Connor, L., Morrissey, E., Wogerbauer, C., Matson, R., Feeney, R. & Rocks, K. (2012) Water Framework Directive Fish Stock Survey of Lough Leane, September 2011. Inland Fisheries Ireland, Swords, Co. Dublin, Ireland. (http://www.wfdfish.ie/wp-content/uploads/2011/10/Leane_report1.pdf)

Kelly, F.L., Connor, L., Morrissey, E., Coyne, J., Feeney, R., Matson, R. & Rocks, K. (2015) Water Framework Directive Fish Stock Survey of Lough Leane, September 2014. Inland Fisheries Ireland, Dublin, Ireland.

King, J.J. & Roche, W.K. (2000) Fish Populations in L. Leane, Killarney: Report of a fish stock survey carried out in June 1999. A report commissioned by the Lough Leane Catchment Monitoring and Management group and prepared by the Central Fisheries Board. Central Fisheries Board. Dublin.

King, J. J. & Roche, W.K. (2008) Aspects of anadromous Allis shad (*Alosa alosa* Linnaeus) and Twaite shad (*Alosa fallax* Lacepede) biology in four Irish Special Areas of Conservation (SACs): status, spawning indications and implications for conservation designation. *Hydrobiologia* 602: 145–154.

King, J.J., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., FitzPatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K. & Cassidy, D. (2011) Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Maas, J., Stevens, M. & Breine, J. (2008) Poor water quality constrains the distribution and movements of Twaite shad *Alosa fallax fallax* (Lacepede, 1803) in the watershed of river Scheldt. *Hydrobiologia* 602: 129-143.

Maitland, P.S. & Hatton-Ellis, T.W. (2003) Ecology of the Allis and Twaite shad. Conserving Natura 2000 Rivers Ecology Series No. 3. English Nature, Peterborough.

O'Grady, M. F. (1993) A fish stock survey of L. Leane, Co. Kerry and

	management recommendations for this resource. Report commissioned by Office of Public Works (Parks and Monuments Section), Central Fisheries Board. O'Maoleidigh, N. (1990) A study of fish populations in the Killarney Lakes. Unpublished Ph.D. Thesis, National University of Ireland. Roche, W.K. & Rosell, R.S. (2003) Killarney shad (*Alosa fallax killarnensis*) investigations, 2003. Unpublished report to National Parks and Wildlife Service by the Central Fisheries Board, Dublin.
4.2i Additional information	Graham, C.T. & Harrod, C. (2009) Implications of climate change for the fishes of the British Isles. *Journal of Fish Biology* 74: 1143-1205. Sweeney, J., Albanito, F., Brereton, A., Caffarra, A., Charlton, R., Donnelly, A., Fealy, R., Fitzgerald, J., Holden, N., Jones, M. & Murphy, C. (2008) Climate Change in Ireland: Refining the Impacts. STRIVE Report (2001-CD-C3-M1). Environmental Protection Agency, Johnstown Castle, Wexford, Ireland. Tierney, D. & O'Boyle, S. (2018) Water Quality in 2016: An Indicators Report. Environmental Protection Agency, Johnstown Castle, Wexford, Ireland. 48 pages.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***300 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	

<table>
<tr><td rowspan="2">5.8 Long-term trend Magnitude

Optional</td><td>a) Minimum</td><td colspan="2">Percentage change over the period indicated in the field 5.6. If a precise value is known provide the same value under both minimum and maximum</td></tr>
<tr><td>b) Maximum</td><td colspan="2">Percentage change over the period indicated in the field 5.6. If a precise value is known provide the same value under both minimum and maximum</td></tr>
<tr><td>5.9 Long-term trend Method used

Optional</td><td colspan="3">Select one of the following methods:
a) Complete survey or a statistically robust estimate
b) Based mainly 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">5.10 Favourable reference range</td><td colspan="3">a) 300 km^2</td></tr>
<tr><td colspan="3">b) Indicate if operators were used (use these symbols ≈, >, >>) or</td></tr>
<tr><td colspan="3">c) If favourable reference range is unknown indicate by using ‘x’</td></tr>
<tr><td colspan="3">d) Indicate method used to set reference value if other than operators
The Favourable Reference Range has been set as the current range. This species has never been located outside its current range.</td></tr>
<tr><td rowspan="6">5.11 Change and reason for change in surface area of range</td><td colspan="3">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 colspan="2">a) yes, due to genuine change</td><td>YES/NO</td></tr>
<tr><td colspan="2">b) yes, due to improved knowledge/more accurate data</td><td>YES/NO</td></tr>
<tr><td colspan="2">c) yes, due to the use of different method</td><td>YES/NO</td></tr>
<tr><td colspan="2">d) yes, but there is no information on the nature of change</td><td>YES/NO</td></tr>
<tr><td colspan="3">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>5.12 Additional information

Optional</td><td colspan="3">The distribution grids for Killarney shad are confined to L. Leane. As the species is mobile and uses a number of habitats within the lake, the range was calculated by creating an envelope around the surface area of the lake.
This species is endemic to Lough Leane. The suite of habitats required by the species as spawning areas, nursery and adult habitat are contained within L. Leane and are not available in the adjoining lakes. The Favourable Reference Range is therefore equal to the current range.</td></tr>
</table>

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	***2013-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	
	c) Maximum	
	d) Best single value	***17,478***
6.3 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007-2018***	
6.8 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	

6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	a) Minimum	*Percentage change over the period indicated in the field 6.11. 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 6.11. If a precise value is known provide the same value under both minimum and maximum*
	c) Confidence interval	*Indicate confidence interval if a statistically reliable sampling scheme is used*
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) Population size (with unit) or*	
	b) Operator ≈ (approximately equal to) *or*	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information *Optional*	The population size (number of individuals) given in Field 6.2 was estimated from hydroacoustic and pelagic netting surveys carried out in 2017 (Connor *et al.*, 2018). The population estimate was 17,478 with 10,326 (59%) 0+ and 1+ juveniles and 7,152 (41%) adults. The current estimated population size (number of individuals in Field 6.2) was compared to the previous reported population size (Roche & Rosell, 2003) to obtain the short-term trend. Trend was assessed over the period 2008-2018 but is assumed to hold also over the default	

	period of 2007-2018. The Favourable Reference Population was determined from results of hydroacoustic and netting surveys of L. Leane in 2001 and 2003 (Roche & Rosell, 2003). This value was 20,000 and therefore considered to be approximately equal to the current population allowing for a margin of error.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994-2018***
7.7 Long-term trend Direction *Optional*	***stable** / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information	Killarney shad have two optimal habitat requirements: adult spawning habitat and nursery habitat for 0-group fish. This species is unique to one lake – Lough Leane, Killarney – in Ireland. Spawning

Optional	activity is anecdotally reported for gravelled littoral shelves around the islands of the lake and in areas of stony littoral shoreline with a moderate gradient and a diversity of depth-velocity conditions. The Killarney shad is a broadcast spawning species, releasing eggs and sperm into open water. Fertilised eggs hatch out either in the water column or on the stony littoral of the lake bed. The post larval fish swim up into the water column. The extent of available spawning habitat has not been altered over the period under examination here (2000-2018) and is assumed to have remained stable also over the default long-term trend period of 1994-2018.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
	Xxp No pressures	**F12** Discharge of urban waste water (excluding storm overflows and/or urban run-offs) generating pollution to surface or ground water (M) **G08** Management of fishing stocks and game (including illegal restocking with native fish) (M) **L06** Interspecific relations (competition, predation, parasitism, pathogens) (M) **I02** Other invasive alien species (other than species of Union concern) (M)
8.2 Sources of information *Optional*		
8.3 Additional information *Optional*	The species is found in one lake habitat only and has never been found outside it. Any pressure or threat that posed an extinction problem would be catastrophic for the species. In the most recent WFD assessment (2010-2015), L. Leane had a good ecological status (https://www.catchments.ie/maps/) and is not at risk of failing to meet surface water environmental objectives. The lake has been subject to pressures over the past 40 years and the Killarney shad has survived. Advanced nutrient treatment at the Killarney WWTP contributes significantly to moderating nutrient	

	input from a major point source. While L. Leane is currently at good ecological status, pollution from urban waste water (F12) is considered a medium threat over the next 12 years. Enrichment and nutrient pollution from both point and diffuse sources in the catchment of L. Leane could result in profusions of macrophytes and filamentous algae, obscuring gravel substrates in spawning areas and potentially diminishing their value as egg development habitats. Reduced water quality can impact on both larval and adult stages (Maitland & Hatton-Ellis, 2003; King & Roche, 2008; Maas *et al.*, 2008). Any enrichment could contribute to reduced oxygen levels in the lake's hypolimnion during periods of thermocline formation. The hypolimnion, or lower water layers in the lake, below the epilimnion, is important in providing cooler water for this pelagic species. The present fish fauna in Lough Leane is notable for the absence of pike, a top predator, and of rapidly-colonising fish species such as roach or dace. Any introduction of non-native or non-resident fish species (G08) could have detrimental effects on the Killarney shad, through predation from pike and via competition for zooplankton from roach and dace (L06). However, land-locked shad species in Greek lakes have been shown to predate on 0-group roach in shallow littoral areas (Bobori *et al.,* 2001). The introduction of the invasive zebra mussel or Asian clam (I02) to L. Leane could impact on the resident Killarney shad population. While National Parks and Wildlife Service (NPWS) implement strict regulatory controls on watercraft using the lake, this is considered to be a medium-level threat for the foreseeable future.

9 Conservation measures

To be reported only for Annex II species

9.1 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*
9.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, population and/or habitat for the species or* *b) Expand the current range of the species (related to 'Range') or* *c) Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population') or* *d) Restore the habitat of the species (related to 'Habitat for the species')*

9.3 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*
9.4 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 in field 9.2):* *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)*
9.5 List of main conservation measures	None taken
9.6 Additional information *Optional*	There are no physical impactors such as barriers to movement or water level regulation or abstraction in Lough Leane. Any measures that contribute to good status of water quality in the lake (CF05, CA11) are favourable to the status of the Killarney shad. Control of nutrient discharge to the lake, principally from the waste water treatment works (CF04), is important in controlling the growth of phytoplankton in the lake.

10 Future prospects		
10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	There are no major concerns in relation to potential threats for the next 12 years and the 3 parameters of Range, Population and Habitat for Killarney shad are expected to remain stable.	

11 Conclusions	
Assessment of conservation status at end of reporting period	
11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1)/ Bad (U2) / Unknown (XX)*

<table>
<tr><td>11.5 Overall assessment of Conservation Status</td><td colspan="3"><u>Favourable (FV)</u> / Inadequate (U1) / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>11.6 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">11.7 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 (11.5)</td><td>Overall trend in conservation status (11.6)</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 data</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>d) yes, due to the use of different method (including taxonomical change or use of different thresholds)</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>e) yes, but there is no information on the 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>11.8 Additional information

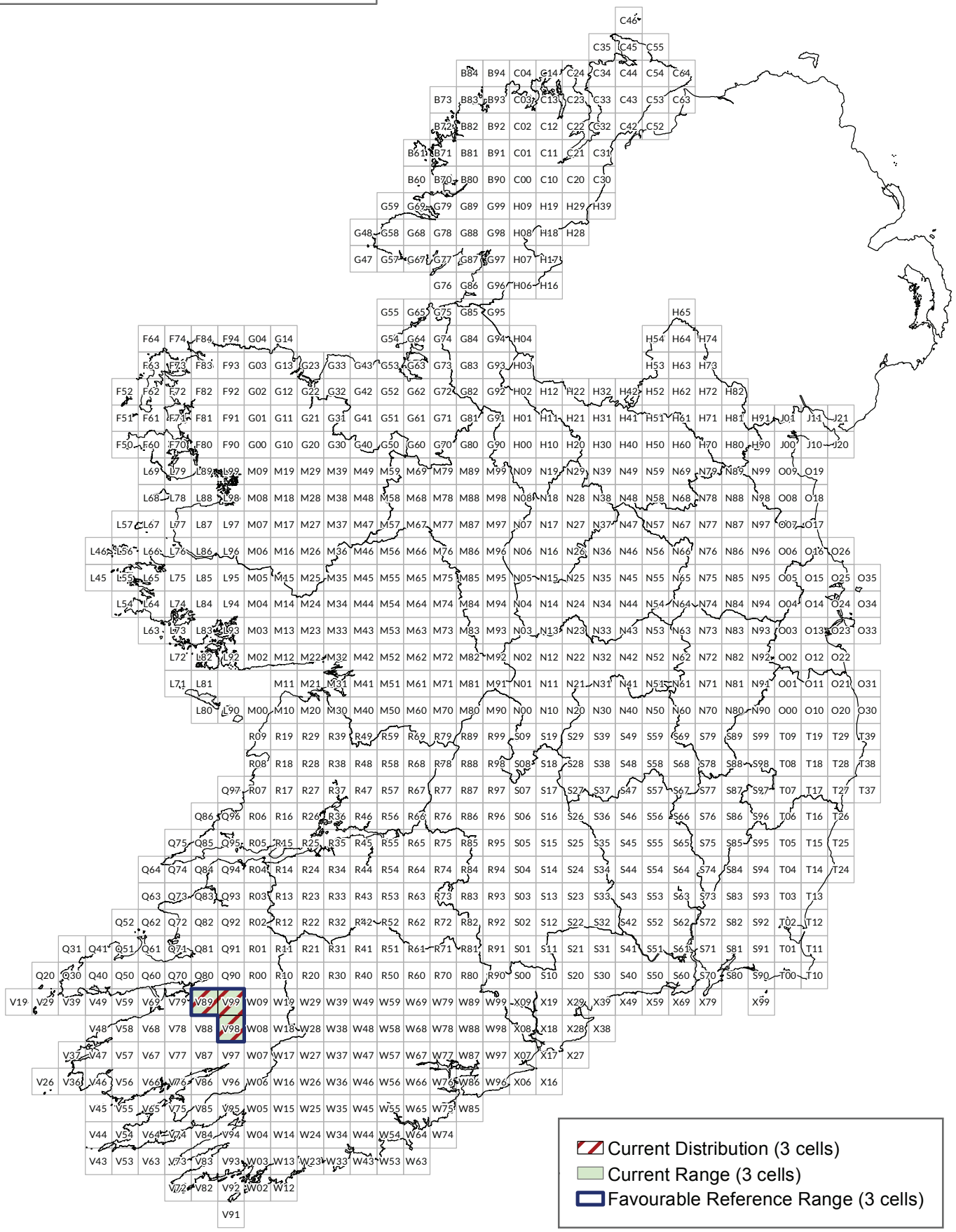
Optional</td><td colspan="3">Overall, the Range, Population and Habitat for Killarney shad have retained their Favourable status in the current reporting period and prospects for the foreseeable future are considered to be good. Hydroacoustic and netting surveys have indicated a stable population over time with a wide range of age classes and continuous successful recruitment. That said, the population is confined to a single lake, Lough Leane, in Ireland and is therefore vulnerable to any future negative impacts. Alosa killarnensis is at Favourable conservation status in the current reporting period.</td></tr>
</table>

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

12.1 Population size inside the pSCIs, SCIs and SACs network *(on the biogeographical/marine level including all sites where the species is present)*	**a) Unit**	***Number of individuals***
	b) Minimum	
	c) Maximum	
	d) Best single value	***17,478***
12.2 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
12.3 Population size 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*	
12.4 Short-term trend of population size within the network Direction	*Short-term trend of population size within the network over the period indicated in field 6.5 :* ***stable*** */ increasing / decreasing / uncertain / unknown*	
12.5 Short-term trend of population size within 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*	
12.6 Additional information *Optional*	The population size within the SAC was estimated from hydroacoustic and pelagic netting surveys carried out in 2017 (Connor *et al*., 2018). The population estimate was 17,478 with 10,326 (59%) 0+ and 1+ juveniles and 7,152 (41%) adults. The current estimated population size was compared to the previous reported population size (Roche & Rosell, 2003) to obtain the short-term trend.	

13 Complementary information

Killarney shad
Alosa fallax killarnensis (5046)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map - rscáil
V 2.0
Date áta
June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1103***
1.3 Species scientific name	*Alosa fallax*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Twaite shad (Sead fhallacsach)
1.6i Species description	The twaite shad (*Alosa fallax fallax*) is a diadromous species, spending most of its life in estuaries and coastal waters but returning upriver to spawn in late May/early June. The fertilised eggs hatch after a short period and juveniles can reach up to 100mm at the end of the first year. Limited knowledge indicates that Irish twaite shad may live in estuarine waters for at least two full years prior to going to sea. Catch-and-release angling as well as telemetry studies have encountered migrating adults in four rivers in the south / south-east of Ireland, namely the Blackwater, Suir, Barrow and Nore. Spawning was confirmed during the 2013-2018 period at the upper tidal limits of these rivers *via* kick-sampling for eggs, with young-of-the-year juveniles also recorded in the upper estuarine habitats, respectively. There are sporadic records of twaite shad from a small number of other rivers along the east, south and west coasts, however spawning has not been confirmed at any of those locations. It was noted during the previous 2007-2012 reporting period that the number of incidental twaite shad records was much reduced due to stricter control of commercial salmon fishing in Irish estuaries, accompanied by a movement towards non-destructive genetic verification by the Irish Specimen Fish Committee. Both scenarios persisted into the current period, exacerbated in recent years by a lack of funding to undertake genetic verification from submitted twaite shad scales. Anecdotal reports from recreational anglers on the Barrow during May-June 2016 suggested under-representation of older size classes (>40cms) in the spawning population that year, possibly due to reduced recruitment from 2012-2013. Recreational anglers increasingly targeted the R. Suir during 2016-2017 due to perceived increasing numbers on this river. A similar perception regarding increasing numbers and improving catches on the R. Barrow during 2017 and 2018 was also mooted. All perceptions lack scientific substantiation but are nevertheless noteworthy. An earlier assessment of habitat extent considered it was adequate to carry a larger population than was currently recorded, however it raised concerns regarding habitat quality, especially at spawning sites. Hybridisation between twaite shad and allis shad (*Alosa alosa*) has been identified as a further concern in certain rivers. It was believed

	that management measures would be required to ensure continued successful spawning in the Barrow and to stimulate improvements elsewhere.

2 Maps

Distribution of the species within the Member State concerned.

2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2009-2018***
2.3 Distribution map	Submitted
2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	The majority of records are for larval and 0+ juvenile *Alosa* sp. captured in target and non-target netting and trawling surveys of the estuaries of the Barrow, Nore, Suir and Munster Blackwater, all SAC rivers for *A. fallax*. Netting surveys included beach seine netting for juveniles (Kelly *et al*., 2011, 2015) and plankton netting (bongo netting) for post larvae (https://www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.html). The seine netting surveys were carried out in transitional waters around the coast of Ireland as part of WFD surveillance monitoring of fish species (http://wfdfish.ie/). Records for adult fish derive from angling surveys and shad egg surveys at spawning grounds in the Barrow, Nore, Suir and Munster Blackwater. Data were collected over a nine-year period from 2009 to 2018. All surveys were carried out within the R&D division of IFI and represent good quality reliable data.

3 Information related to Annex V species (Art. 14)

3.1 Is the species taken in the wild/exploited?	*Is the species taken in the wild/exploited? YES/**NO***

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned.	
4 Biogeographical and marine regions	
4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
4.2 Sources of information	Barry, J., Coghlan, B., Cullagh, A., Kerr, J.R. & King, J.J. (2018) Comparison of coarse-resolution rapid methods for assessing fish passage at riverine barriers: ICE and SNIFFER protocols. *River Res Applic*. 2018:1–11. https://doi.org/10.1002/rra.3358 Bracken, J. & Kennedy, M. (1967) Notes on some Irish estuarine and inshore fishes. Irish Fisheries Investigations, Series B (Marine), No.3. 28pp. Irish Specimen Fish Committee, Annual Report of the Annual Specimen Fish Committee 2012. www.irish-trophy-fish.com Bunn, S.E. & Arthington, A.H. (2002) Basic principles and ecological consequences of altered flow regimes for aquatic biodiversity. *Environmental Management* 30: 492–507. Coscia, I., Rountree, V., King, J.J., Roche, W.K. & Mariani, S. (2010) A highly permeable species boundary between two anadromous fishes. *Journal of Fish Biology* 77: 1137-1149. Fealy, R., Bruyère, C. & Duffy, C. (2018) Regional Climate Model Simulations for Ireland for the 21st Century. EPA Research Report, Environmental Protection Agency, Johnstown Castle, Wexford, Ireland. 137 pages. Graham, C.T. & Harrod, C. (2009) Implications of climate change for the fishes of the British Isles. *Journal of Fish Biology* 74: 1143-1205. Habitats Directive and Red Data Book Species, Executive Report 2009, IFI/2010/1-0480. Inland Fisheries Ireland. Http://www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.html Habitats Directive and Red Data Book Species, Executive Report 2010, IFI/2011/1-0499. Inland Fisheries Ireland. Http://www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.html Habitats Directive and Red Data Book Species, Executive Report 2011, IFI/2012/1-4103. Inland Fisheries Ireland. Http://www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.html Habitats Directive and Red Data Book Species, Executive Report 2012, IFI/2012/1-4103. Inland Fisheries Ireland. Http://www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.html Habitats Directive and Red Data Book Species, Executive Report 2013, IFI/2014/1-4207. Inland Fisheries Ireland. Http://www.fisheriesireland.ie/Projects/habitats-directive-and-

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Habitats Directive and Red Data Book Species, Executive Report 2017, IFI/2017/1-4383. Inland Fisheries Ireland. Http://www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.html

Humphries, P. & Lake, P.S. (2000) Fish larvae and the management of regulated rivers. *Regulated Rivers: Research & Management* 16: 421-432.

JNCC (2015) Common Standards Monitoring Guidance for freshwater fauna, ISSN 1743-8160 (online) http://jncc.defra.gov.uk/page-3514

Kelly, F., Harrison, A., Connor, L., Matson, R., Morrissey, E., Feeney, R., Wogerbauer, C., O'Callaghan, R. & Rocks, K. (2011). Sampling Fish for the Water Framework Directive – Summary Report 2010. Inland Fisheries Ireland.

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Kurz, I. & Costello, M.J. (1996) Current knowledge on the distribution of lampreys, and some other freshwater fish species listed in the Habitats Directive, in Ireland. Unpublished report to NPWS, Dublin.

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4.2i Additional information	Breine, J., Van den Bergh, E., Pauwels, I., Verhelst, P. & Coeck, J. (2016) The return of the twaite shad in the Zeeschelde, in: Meire, P. (ed.) *Book of abstracts: ECSA Local Meeting 2016. Estuarine Restoration: from theory to practice and back, University of Antwerp, Antwerp, Belgium, 5-9 July 2016. VLIZ Special Publication,* 77: pp. 96 Breine, J., Pauwels, I., Verhelst, P., Vandamme, L., Baeyens, R., Reubens, J. & Coeck, J. (2017) Successful external acoustic tagging

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5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***2,700 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	a) Minimum	*Percentage change over the period indicated in the field 5.6. 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 5.6. If a precise value is known provide the same value under both minimum and maximum*

<table>
<tr><td>5.9 Long-term trend
Method used

Optional</td><td>Select one of the following methods:
a) Complete survey or a statistically robust estimate
b) Based mainly 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">5.10 Favourable reference range</td><td>a) In km² or</td></tr>
<tr><td><u>b) Operator >> (much greater than)</u> or</td></tr>
<tr><td>c) If favourable reference range is unknown indicate by using ‘x’</td></tr>
<tr><td>d) Indicate method used to set reference value if other than operators</td></tr>
<tr><td rowspan="6">5.11 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>5.12 Additional information

Optional</td><td>The range for twaite shad was calculated by creating envelopes around the distribution grids for five main channel rivers (including four SACs). These range envelopes extend from the mouths of the rivers to the most upstream locations where twaite shad were recorded.
With the exception of a small number of fortuitous records for adult twaite shad for the River Slaney and River Boyne in the previous reporting period, the range for the two reporting periods was similar and was assessed as stable. The trend was assessed over the period 2009-2018 but is assumed to hold also over the default trend period of 2007-2018.
There was a small increase in the species range since the previous reporting period. This does not reflect a genuine change but is due to improved knowledge.
The FRR was calculated based on barriers to upstream migrations. The first impassable barrier was taken to represent the upstream extent of favourable range. On the River Barrow, this was St. Mullins weir; on the River Suir a weir in Clonmel; on the River Slaney at Clohamon and the River Blackwater at Carysville. The FRR is much greater than the current range as it should incorporate extensions to encompass barriers to upstream migrations in selected rivers. The FRR is estimated based on the assumption that adult shad should be</td></tr>
</table>

	able to migrate upstream on the R. Nore and R. Suir past the upper tidal limit to Thomastown and Clonmel, respectively. Individual shad have been encountered in the estuary of the R. Boyne in the past and it is considered to be part of the FRR.

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2009-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1x1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***69***
6.3 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

6.10 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*	
6.11 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	a) Minimum	*Percentage change over the period indicated in the field 6.11. 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 6.11. If a precise value is known provide the same value under both minimum and maximum*
	c) Confidence interval	*Indicate confidence interval if a statistically reliable sampling scheme is used*
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) Population size (with unit) or*	
	b) Operator >> (much greater than) *or*	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
6.16 Change and reason for change in population size	*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***
6.17 Additional information *Optional*	The population estimate (Field 6.2) represents the number of 1 km grids where larval and juvenile *Alosa* sp. were captured in target and non-target netting and trawling surveys during 2010-2018. It also includes the number of grids for positive results of angling and shad egg surveys. The 'number of subadults' captured in beach seine netting surveys for juvenile fish in the Barrow, Nore and Suir estuaries in 2010, 2013 and 2016 (Kelly *et al.*, 2011, 2015) is as follows: Forty net hauls were taken each year and the proportion of positive hauls ranged from 23% in 2016 to 50% in 2010. A total of 238 *Alosa* sp. were recorded in 2010 compared with 42 in 2016. Only young-of-year shads were captured in these surveys (from spawning events in May-July of those years) and results cannot give a true representation of the population size. They do, however, indicate that successful spawning events occurred in these years and that recruitment is likely to have occurred. The juvenile shads ranged in length from 42 to 104 mm, with an average total length of 74 mm. The population size unit changed from 'number of colonies' in the previous reporting period to the 'number of occupied 1x1 km grids' in the current cycle. Based on the limited available data and expert judgement, the short-term trend in population is assessed as stable. Trend was assessed over the period 2009-2018 but is assumed to be the same for the default trend period of 2007-2018. The change in population size between the two periods was due to a change in the reporting unit. Based on best expert judgement the FRP is estimated to be at least 25% greater than the current population.

7 Habitat for the species

7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? YES/**NO**/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? **YES**/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***

7.4 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994-2018***
7.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	Twaite shad have two optimal habitat requirements – adult spawning habitat and nursery habitat for 0-group fish. Over its European range, the species can migrate long distances into freshwater to spawn, where unimpeded migration pathways are available. Spawning activity is found in gravelled areas of main-stem SAC rivers with a moderate gradient and a diversity of depth-velocity conditions. Shad engage in external fertilisation and broadcast eggs and sperm into open water. Fertilised eggs hatch out either in the water column or on the channel bed. The post larval fish are exposed to tidal transport and can be moved up and down the estuaries with tidal movement until they develop swimming capacity to be able to hold station or residency, independent of flow conditions, in backwater and refuge areas. In Ireland, adults migrate into the upper tidal freshwater areas of the main designated rivers. There is unimpeded access for twaite shad into the freshwater reaches of the Rivers Nore and Suir (and to a certain extent in the Rivers Slaney and Munster Blackwater) but fish are not recorded in these riverine areas. The navigation weir on the River Barrow at its upper tidal limit prevents upriver migration. Given that twaite shad have access to freshwater spawning habitat in four SAC rivers, it is not fully understood why the species appears to spawn only in the upper tidal limits. It is unclear whether they are exhibiting a selective preference for more estuarine conditions or whether the quality of habitat in the riverine sections makes it unsuitable for spawning. The extent of available spawning habitat has been assessed visually, from bankside and via float-over survey, over the period 2000-2018.

	At low tide the extent of gravelled areas is apparent. This extent has not reduced over the period under review. The estuarine waters constitute the nursery habitat available to the 0-group twaite shad. Estuarine length has not altered over the long-term or short-term periods covered here. Short-term trend was assessed over the period 2009-2018, while long-term trend was assessed over the period 2000-2018. The trend assessments are assumed to apply also over the default short- and long-term trend periods.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**A19** Application of natural fertilisers on agricultural land (M) **A20** Application of synthetic (mineral) fertilisers on agricultural land (M) **D02** Hydropower (dams, weirs, run-off-the-river), including infrastructure (M) **E03** Shipping lanes, ferry lanes and anchorage infrastructure (e.g. canalisation, dredging) (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations (M) **G06** Freshwater fish and shellfish harvesting (recreational) (M) **G12** Bycatch and incidental killing (due to fishing and hunting activities) (M) **I02** Other invasive alien species (other than species of Union concern) (M) **N03** Increases or changes in precipitation due to climate change (M)	**A19** Application of natural fertilisers on agricultural land (H) **A20** Application of synthetic (mineral) fertilisers on agricultural land (H) **D02** Hydropower (dams, weirs, run-off-the-river), including infrastructure (M) **E03** Shipping lanes, ferry lanes and anchorage infrastructure (e.g. canalisation, dredging) (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations (M) **G06** Freshwater fish and shellfish harvesting (recreational) (M) **G12** Bycatch and incidental killing (due to fishing and hunting activities) (H) **I02** Other invasive alien species (other than species of Union concern) (M) **N01** Temperature changes (e.g. rise of temperature & extremes) due to climate change (M) **N03** Increases or changes in

		precipitation due to climate change (H)
8.2 Sources of information *Optional*		
8.3 Additional information *Optional*	A number of high-importance threats are listed including A19, A20, G12 and N03. These are also considered to be pressures of medium importance in the current reporting period. Enrichment and nutrient pollution from various sources (A19 and A20) can result in profusions of macrophytes and filamentous algae, obscuring gravel substrates in spawning areas and potentially diminishing their value as egg development habitats. Reduced water quality can impact on both larval and adult stages (Maitland & Hatton-Ellis, 2003; King & Roche, 2008; Maas *et al.*, 2008). A number of important spawning estuaries for twaite shad were at moderate or poor ecological status in the 2010-2015 WFD assessment (https://www.catchments.ie/maps/) by the Environmental Protection Agency (EPA). Some are at risk of not meeting surface water environmental objectives, with diffuse phosphorus loss to surface water identified as a major pressure. Twaite shad spawn at a time when water temperatures are on the rise. Higher water temperatures can lead to a growth in aquatic plants and extensive areas of filamentous algae have been observed during survey work at twaite shad spawning grounds. Adult shad (both twaite and allis) are vulnerable to commercial fishing at sea and becoming recorded as bycatch (G12). The extent of this is not known but recorded levels of the twaite shad in landings are low. When aspects of life history such as adult migration, spawning, egg survival, hatching and juvenile maturation are dependent on specific flow patterns, any pronounced increase in discharge (N03) could result in decreased or complete failure of recruitment for that year (Humphries & Lake, 2000; Bunn & Arthington, 2002). For spawning twaite shad in Irish catchments, the timing and scale of summer flood events (Lennon & Walsh, 2008, Walsh, 2016) are of concern, particularly given the increased likelihood of such incidents in the future (Sweeney *et al*., 2008; Graham & Harrod, 2009; Fealy *et al*., 2018). Major flood events occurred during the twaite shad spawning periods in 2012 and 2017. It is likely that these events had a significant impact on recruitment in those years (Habitats Directive and Red Data Book Species, Executive Reports, 2012 & 2017). Estuarine habitats serve as important nurseries for juvenile twaite shad as well as locations for adult congregation during spawning migrations. Estuaries are, however, highly vulnerable to habitat disturbance and environmental pressures, both natural and man-made (Vasconcelos *et al*., 2007), with the effects of pollution, dredging, shipping, channel and harbour maintenance (E03) posing immediate and long-term threats to resident and transient species, including twaite shad. A large population of the Asian clam, *Corbicula fluminea*, has been	

	recorded within kilometres of the twaite shad spawning ground on the River Barrow (I02). *C. fluminea* is considered to be of major risk to biodiversity in Ireland and could pose a threat to twaite shad (http://nonnativespecies.ie/wp-content/uploads/2014/03/Corbicula-fluminea-Asian-Clam1.pdf). This invasive species has the capacity to disperse and colonise extensively and to a dense level across the river bed, where fertilised shad eggs may drop down and settle for some days prior to hatching. It is not known if Asian clam is currently impacting on twaite shad in the R. Barrow but this 'intragravel' phase is vulnerable to substantial loss should the *C. fluminea* population expand over the shads' spawning ground. Barriers to migration, particularly in the form of weirs, can impede or prevent twaite shad accessing spawning habitat in designated rivers in Ireland (D02). A further issue is the potential for hybridisation (Coscia *et al.*, 2010) between converging populations of twaite and allis shad simultaneously obstructed below barriers. The R. Barrow (one of the SAC rivers for twaite shad) is a navigation river. A substantial weir at the upper tidal limit of this river, followed by a series of navigation weirs, prevent upstream migration of twaite shad and impact on the availability of spawning habitat in this river. Other likely pressures and threats for *A. fallax* include marine fish harvesting (G01) leading to a reduction in prey populations at sea and mortality from recreational fishing (G06) during the freshwater spawning phase.

9 Conservation measures

To be reported only for Annex II species

9.1 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*
9.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, population and/or habitat for the species or* *b) Expand the current range of the species (related to 'Range') or* *c) Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population') or* *d) Restore the habitat of the species (related to 'Habitat for the species')*

9.3 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*
9.4 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 in field 9.2):* *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)*
9.5 List of main conservation measures	None taken
9.6 Additional information *Optional*	Removal or remediation of physical barriers (CC04) to aid passage during spawning migration is an important consideration to promote the conservation status of twaite shad in Ireland (King & Linnane, 2004; King & Roche, 2008), especially in SACs where the availability of main stem channel from the estuary to the interior often falls well below the 75% criterion identified for this species (a target conservation objective for certain SAC rivers). This is particularly relevant for the River Barrow, a navigation river, where twaite shad are unable to ascend beyond the upper tidal limit due to a major weir. Detailed assessment of fish passability at all major barriers on the Irish SAC channels is underway and will be completed in 2019. To date these assessments have identified significant issues with many of these structures in regard to their capacity to permit upstream passage of adult diadromous species – Atlantic salmon and sea lamprey (Barry *et al*. 2018) – and it is likely that the same conclusions would apply to twaite shad. Management of hunting (CG02) is pertinent to twaite shad conservation. Hunting, in the form of angling for leisure purposes, is undertaken for twaite shad to a limited degree during May, annually, during the adult spawning run. Currently, no measures have been introduced at state level to manage the angling effort. While the Irish Specimen Fish Committee, which monitors catches of specimen-sized twaite shad, urges a fish-friendly catch-and-release policy, it is likely that mortalities do occur from angling during this vulnerable phase in their life-cycle. Conservation measure CG05 (reduce bycatch and incidental killing of non-target species) is relevant to the twaite shad as the species may be vulnerable to capture at sea as bycatch. It is not apparent that any measure can be undertaken to prevent such bycatch. Staff of the various state fisheries agencies (Marine Institute (MI), Sea Fisheries Protection Authority (SFPA) and Bord Iascaigh Mhara (BIM)) liaise with Inland Fisheries Ireland and retain material of twaite shad that presents as bycatch in commercial ports. A very small amount of material becomes available and may indicate a low level of bycatch.

	Any measure to reduce diffuse pollution to surface or ground waters from agricultural activities (CA11) would benefit water quality in rivers. This would have a knock-on beneficial effect on twaite shad during the freshwater spawning phase, when spawning grounds can experience substantial filamentous algal growth. Conservation measure CI03 (management, control or eradication of other invasive alien species) is relevant in regard to the spawning areas of twaite shad, at least in regard to the River Barrow. Large accumulations of the Asian clam *Corbicula fluminea* have been recorded within kilometres of the twaite shad spawning ground. There is potential for this invasive species to spread and ultimately cover the river bed in the spawning ground of the shad. Fertilised shad eggs dropping to the river bed may be enveloped by the clam populations and substantial mortalities may occur. Although not part of a targeted conservation measure for twaite shad, a dredging operation on the river bed within the current 6-year monitoring period yielded a very large quantity of *C. fluminea*. This was disposed of to landfill. Such measures may continue to be necessary as a conservation strategy to manage the *C. fluminea* population present. Management of professional/commercial fishing (CG01) would be expected to help alleviate pressures on marine prey species of twaite shad.

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	*Good / Poor / **Bad** / Unknown*
	b) Population	*Good / Poor / **Bad** / Unknown*
	c) Habitat of the species	*Good / **Poor** / Bad / Unknown*
10.2 Additional information *Optional*	No real change in the status of Range and Population is expected over the next 12 years even if certain conservation measures are adopted. Therefore, the Future prospects of these parameters are assessed as Bad. No real change in the status of Habitat is expected over the next 12 years even if certain conservation measures are adopted. Therefore, the Future prospects of habitat are assessed as Poor.	

11 Conclusions

Assessment of conservation status at end of reporting period	
11.1 Range	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*
11.2 Population	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*
11.3 Habitat for the species	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*
11.4 Future prospects	*Favourable (FV) / Inadequate (U1)/ **Bad (U2)** / Unknown (XX)*

<table>
<tr><td>11.5 Overall assessment of Conservation Status</td><td colspan="3">Favourable (FV) / Inadequate (U1) / <u>Bad (U2)</u> / Unknown (XX)</td></tr>
<tr><td>11.6 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">11.7 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 (11.5)</td><td>Overall trend in conservation status (11.6)</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 data</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>d) yes, due to the use of different method (including taxonomical change or use of different thresholds)</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>e) yes, but there is no information on the 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>11.8 Additional information

Optional</td><td colspan="3">The current range estimate is >10% below the FRR and is assessed as Bad.
The population size estimate is based on data for juvenile Alosa sp. and only limited data on adult twaite shad. It is considered to be >25% below the FRP and is therefore assessed as Bad. This represents a change from an assessment of Inadequate in the previous reporting period and is due to improved knowledge and best expert judgement.
The area of habitat is not sufficiently large for the long-term maintenance of the population. Spawning appears to be restricted to the upper tidal limits due to barriers to migration (weirs) or, in certain catchments where suitable habitat is available, due to reasons that are not well understood. Habitat is therefore assessed</td></tr>
</table>

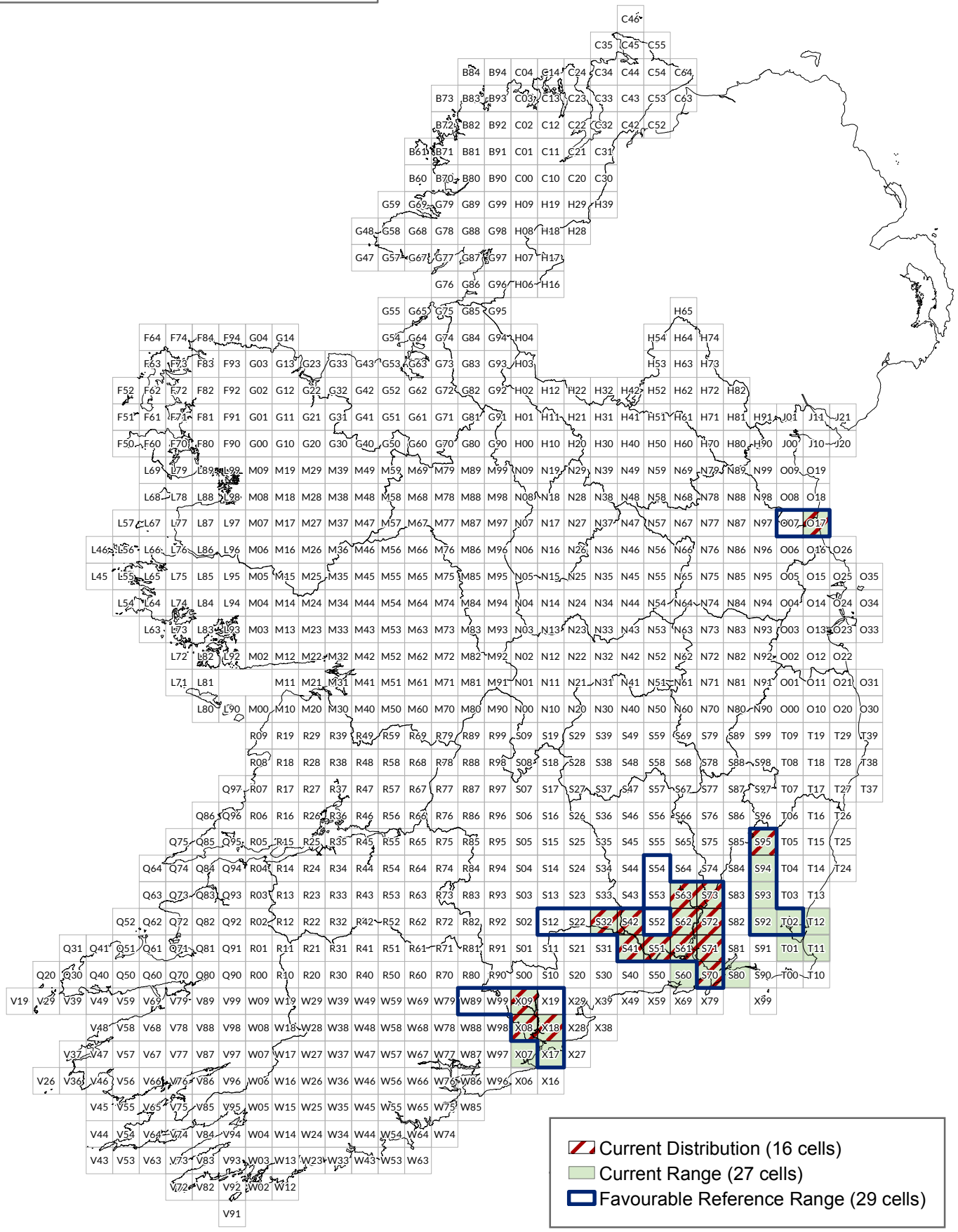
	as Inadequate. The overall conservation status remains unchanged from the previous reporting period and is assessed as Bad with a stable trend.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

12.1 Population size inside the pSCIs, SCIs and SACs network *(on the biogeographical/marine level including all sites where the species is present)*	**a) Unit**	***1x1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***69***
12.2 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
12.3 Population size 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*	
12.4 Short-term trend of population size within the network Direction	*Short-term trend of population size within the network over the period indicated in field 6.5 :* ***stable*** */ increasing / decreasing /uncertain / unknown*	
12.5 Short-term trend of population size within 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*	
12.6 Additional information *Optional*	Population size was estimated by counting the number of 1 km grids occupied by twaite shad (juvenile *Alosa* sp. and adult twaite shad) within the SAC network. The population size unit changed from 'number of colonies' in the previous reporting period to the 'number of occupied 1x1 km grids' in the current cycle. Based on the limited available data and expert judgement, the short-term trend in population is assessed as stable.	

13 Complementary information

Twaite shad
Alosa fallax (1103)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***5076***
1.3 Species scientific name	*Coregonus pollan*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Pollan (Polláin)
1.6i Species description	Pollan *(Coregonus pollan)* is a species of the whitefish or *Coregonidae* group unique to the island of Ireland. The species is found in three large lakes on the River Shannon – Lough Derg, Lough Ree and Lough Allen – as well as Lough Erne and Lough Neagh in Northern Ireland. With the exception of L. Neagh, these lakes are characterized by significant areas of deep water where the fish retreats during warm weather. The *Coregonidae* have a circumpolar distribution and the Irish populations are at the southern extremes of the group's geographical range. The majority of Coregonid species are diadromous, spending part of the life cycle in freshwater and part in the marine. The Irish populations differ in being entirely freshwater in habit. The pollan feeds on a mix of plankton, insect larvae and some benthic food items. They may make diurnal feeding movements up and down the water column in feeding. Netting surveys showed pollan to be distributed throughout the water column in overnight sampling in July and September in all three Shannon lakes. However, similar sampling effort in February recorded a virtual absence of the species from the open water. Spawning is thought to occur on gravelled areas in the shallow exposed lake shores in the December-January period. Visual surveys on Lough Ree and Lough Allen have indicated the presence of extensive areas of suitable spawning grounds – exposed shorelines around headlands and islands with shallow-water littoral beds of gravels. Pollan once constituted a significant proportion of fish biomass in the Shannon lakes; however, that is no longer the case. Recent hydro-acoustic surveys on the three lakes have enabled an assessment of overall population size in each lake. The overall status is assessed as Bad.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2009-2018***
2.3 Distribution map	Submitted
2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	Data for the distribution map for pollan were obtained from hydroacoustic and netting surveys of loughs Allen, Ree and Derg carried out over the current reporting period (Kelly *et al*., 2014, 2017; Morrissey-McCaffrey, 2018; Morrissey-McCaffrey *et al*., in press).

3 Information related to Annex V species (Art. 14)	
3.1 Is the species taken in the wild/exploited?	*Is the species taken in the wild/exploited? YES/**NO***

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned.	
4 Biogeographical and marine regions	
4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
4.2 Sources of information	Anonymous (2005) All Ireland Species Action Plans: Irish Lady's-tresses *Spiranthes romanzoffiana*, Pollan *Coregonus autumnalis*, Hare *Lepus timidus hibernicus*, Corncrake *Crex crex*. National Parks and Wildlife Service, Ireland and the Environment and Heritage Service, Northern Ireland. Dabrowski, K.R. (1981) The spawning and early life history of the Pollan (*Coregonus pollan* Thompson) in Lough Neagh, Northern Ireland. *Internationale Revue der gesamten Hydrobiologie und Hydrographie* 66: 299-326. Graham, C.T. & Harrod, C. (2009) Implications of climate change for the fishes of the British Isles. *Journal of Fish Biology* 74: 1143-1205.

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5 Range		
Range within the biogeographical/marine region concerned.		
5.1 Surface area	***1,800 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	

5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	a) Minimum	*Percentage change over the period indicated in the field 5.6. 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 5.6. If a precise value is known provide the same value under both minimum and maximum*
5.9 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*	
5.10 Favourable reference range	***a) 1,800 km²***	
	b) Indicate if operators were used (use these 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. There is no evidence of loss since the Directive came into force. This species has a very restricted natural range.	
5.11 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*	
5.12 Additional information *Optional*	Pollan were recorded from loughs Allen, Ree and Derg in the current reporting period. As pollan are mobile within the lake water bodies and use a variety of habitats, depending on the life-history stage, the range represents the intersection of the 10 km grid with the total surface area of the three lakes combined. There has been no change in the reported range for pollan between the two periods and the short-term trend is assessed as stable over	

	the period 2009-2018; this is assumed to be the case also over the default trend period. Within the national boundary, pollan are recorded only from loughs Allen, Ree and Derg. Therefore, the Favourable Reference Range is equal to the current range.

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	***2009-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1x1 km grids***
	b) Minimum	***33***
	c) Maximum	***427***
	d) Best single value	
6.3 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	***Number of individuals***
	b) Minimum	
	c) Maximum	
	d) Best single value	***129,066***
6.5 Type of estimate *Optional*	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

6.10 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*	
6.11 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	a) Minimum	*Percentage change over the period indicated in the field 6.11. 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 6.11. If a precise value is known provide the same value under both minimum and maximum*
	c) Confidence interval	*Indicate confidence interval if a statistically reliable sampling scheme is used*
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) Population size (with unit) or*	
	b) Operator >> (much greater than) *or*	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
6.16 Change and reason for change in population size	*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*
6.17 Additional information *Optional*	The estimated population size (Field 6.2) is reported as a minimum and maximum value. The minimum value is the number of 1 km grids where pollan were recorded from hydroacoustic and netting surveys of loughs Allen, Ree and Derg carried out over the period 2013-2018. The maximum value is the number of 1 km grids that intersect the total surface area of the three lakes combined. An additional population size (number of individuals) was generated from hydroacoustic and pelagic netting surveys carried out in 2013 (L. Ree), 2014 (L. Allen) and 2016 (L. Derg) (Kelly *et al*., 2017; Morrissey-McCaffrey, 2018; Morrissey-McCaffrey *et al*., in press). Based on data from these surveys, the estimated population size for the three lakes combined is 129,066, with the breakdown as follows: L. Allen: 120411 (± 8874) L. Ree : 5237 (± 1015) L. Derg North: 296 (± 277) L. Derg South: 3122 (± 1494) Population size for the previous reporting period (using 'number of individuals') was estimated from hydroacoustic and netting surveys of L. Allen and L. Ree only (Harrison *et al*., 2010, 2012). No estimate was available for L. Derg during that monitoring cycle. Based on expert opinion, the short-term trend was assessed as stable over the period 2009-2018; this is assumed to hold over the default trend period also. The increase in the population size in the current reporting period was due to increased sampling effort and more robust data. Acoustic and netting population estimates for this reporting cycle have identified a gradient of decreasing pollan density from the upper to lower Shannon lake systems. Pollan densities were very low in both L. Ree and L. Derg and the Favourable Reference Population is assessed as being much greater (>>) than the current estimated population size.

7 Habitat for the species

7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)?* YES*/**NO**/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/**NO**/Unknown*

7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	There are three habitat requirements for pollan including adult spawning habitat, nursery habitat for 0-group fish and open lake habitat for adult fish. This species is recorded in three lakes of the River Shannon system in Ireland. All three lakes have sufficient area and quality of habitat for the survival of the species. The scientific literature for the *Coregonidae* or whitefish, to which the pollan belongs, points to the use of exposed, shallow, gravelled littoral areas of lakes as spawning grounds for the whitefish. Recently-hatched 0-group fish can use the immediate shallow littoral areas before they enter the open water column of the lake. Pollan feed on zooplankton and can migrate diurnally as the zooplankton traverses up and down in the water column. Pollan is a cold-water species that colonised Ireland after the last Ice Age and can use the colder waters at depth in the water column during periods of summer warming. Both the chemical and physical habitat attributes are relevant for pollan in any lake habitat. Float-over surveys were conducted on the Shannon's pollan lakes during the current reporting period to ascertain and geo-reference

	the locations and extent of exposed, shallow, gravelled areas that have the potential to function as spawning habitat for pollan. These surveys identified a substantial number of such suitable habitat locations. Lake bathymetry of the three lakes indicates the availability of extensive areas of deeper water available to adult pollan for feeding. Such areas of depth may be relevant in circumstances of thermocline formation in summer conditions. Sampling using netting surveys indicated that pollan were occupying all depth levels in the water column during the summer and autumn periods. The species was almost entirely absent from the deep water column in winter sampling, suggesting a change of use of habitat at this time of year. Although there is adequate available habitat the quality of the habitat is compromised by the pressures listed below. Short-term trend in habitat was assessed as stable over the period 2009-2018 and this is assumed to be the case over the default trend period also.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**A19** Application of natural fertilisers on agricultural land (M) **A20** Application of synthetic (mineral) fertilisers on agricultural land (M) **F33** Abstraction of ground and surface waters (including marine) for public water supply and recreational use (M) **F12** Discharge of urban waste water generating pollution to surface or ground water (excluding storm overflows etc.) (M) **I02** Other invasive alien species (other than species of Union concern) (M) **L06** Interspecific relations (competition, predation,	**A19** Application of natural fertilisers on agricultural land (H) **A20** Application of synthetic (mineral) fertilisers on agricultural land (H) **F33** Abstraction of ground and surface waters (including marine) for public water supply and recreational use (H) **F12** Discharge of urban waste water generating pollution to surface or ground water (excluding storm overflows etc.) (H) **I02** Other invasive alien species (other than species of Union concern) (H) **L06** Interspecific relations (competition, predation,

	parasitism, pathogens) (M) **N05** Change of habitat location, size, and / or quality due to climate change (M)	parasitism, pathogens) (M) **N05** Change of habitat location, size, and / or quality due to climate change (M) **D02** Hydropower (dams, weirs, run-off-the-river), including infrastructure (M) **L05** Reduced fecundity / genetic depression (e.g. inbreeding or endogamy) (M) **N01** Temperature changes (e.g. rise of temperature & extremes) due to climate change (M)
8.2 Sources of information *Optional*		
8.3 Additional information *Optional*	Pollan are found in only three lakes in the Republic of Ireland, each population with a degree of genetic uniqueness. Any pressure or threat that posed an extinction problem would be catastrophic for the species. Current pressures impacting on pollan biology and ecology are poorly understood and more investigative work will need to be done in future monitoring programmes. For this reason, the focus here is on threats that may impact on this species over the next two reporting periods. In the most recent WFD assessment (2010-2015), all three of the Shannon lakes failed to achieve good ecological potential and were identified as being at risk of not meeting surface water environmental objectives (https://www.catchments.ie/). Significant pressures identified for these *at risk* lakes included agriculture (A19, A20) and urban waste water (F12). Enrichment and nutrient pollution from both point and diffuse sources can result in profusions of macrophytes and filamentous algae, obscuring gravel substrates in spawning areas and potentially diminishing their value as egg development habitats. Reduced water quality can impact on both larval and adult stages (Maitland & Hatton-Ellis, 2003; King & Roche, 2008; Maas *et al.*, 2008). Warm summer conditions may lead to thermocline formation, with elevated temperatures in the upper water column or epilimnion, forcing fish into cooler water. The Shannon's pollan lakes have adequate water depth to facilitate this downward movement. However, if thermocline formation occurs in the context of nutrient enrichment and increased algal production, it is possible that some degree of oxygen depletion may occur in the hypolimnion. Such a combination of factors would place pressure on the pollan population from above and below. Thermocline formation can occur in large Irish lakes, such as the Shannon lakes containing pollan, but intensity and duration were considered to be at a low level due to the exposed nature of these water bodies. Altered climatic scenarios, with extended drought conditions and dry settled conditions in summer, as in 2018 in Ireland, may serve to increase surface water temperatures in lakes and intensify the degree of	

	thermocline formation. Invasive species (I02), specifically zebra mussel and Asian clam, were also identified as a significant pressure for these three *at risk* pollan lakes. These invasive bivalves filter large quantities of water, removing plankton from the water column and potentially changing food webs in the lakes. The presumed spawning locations of pollan in the Shannon lakes, based on literature descriptions, have been identified and geo-referenced in surveys. These locations are shallow-water exposed littoral areas of gravel bed composition. Significant alterations or fluctuations in water surface level (D02, F33), due to regulation of water level for flood control or navigation or major abstraction, could have a severe impact on the success of pollan spawning or on the survival of the newly-released fertilised eggs. Water level regulation may become a concern, as flood control management on the Shannon basin looks at using the large Shannon lakes as storage and regulation controls for the riverine sections of the main river. Such level regulation must be undertaken in a manner that protects littoral spawning habitat of pollan. Other threats that may impact on pollan are climate-related (N01, N05) or threats that may reduce the genetic resilience (L05) of the populations due to the low numbers of this species in loughs Ree and Derg. Introduced fish species, namely perch and roach, are a substantial component of the fish community in these lakes and these species may compete with pollan for food (L06).

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	*Good / Poor /* ***Bad*** */ Unknown*
	c) Habitat of the species	*Good /* ***Poor*** */ Bad / Unknown*
10.2 Additional information *Optional*	The potential threats are not expected to impact on the current range for pollan over the next 12 years and the Future prospects for Range are assessed as Good. There is no indication that population will expand to <25% below the FRP in the next 12 years, even if measures to reduce pollution or manage the impact of invasive species are undertaken. Therefore the Future prospects for Population are assessed as Bad. The area of habitat for pollan is expected to remain stable over the next 12 years but it is imperative that water surface levels are maintained to ensure the availability of spawning habitat for this species. The quality of habitat is compromised by enrichment.	

	Overall, the Future prospects for Habitat are assessed as Poor.

11 Conclusions

Assessment of conservation status at end of reporting period			
11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	*Favourable (FV) / Inadequate (U1**)** / **Bad (U2)** / Unknown (XX)*		
11.3 Habitat for the species	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	*Favourable (FV) / Inadequate (U1)/ **Bad (U2)** / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating / **stable** / unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	***YES**/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/**NO***
	e) yes, but there is no information on the 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*

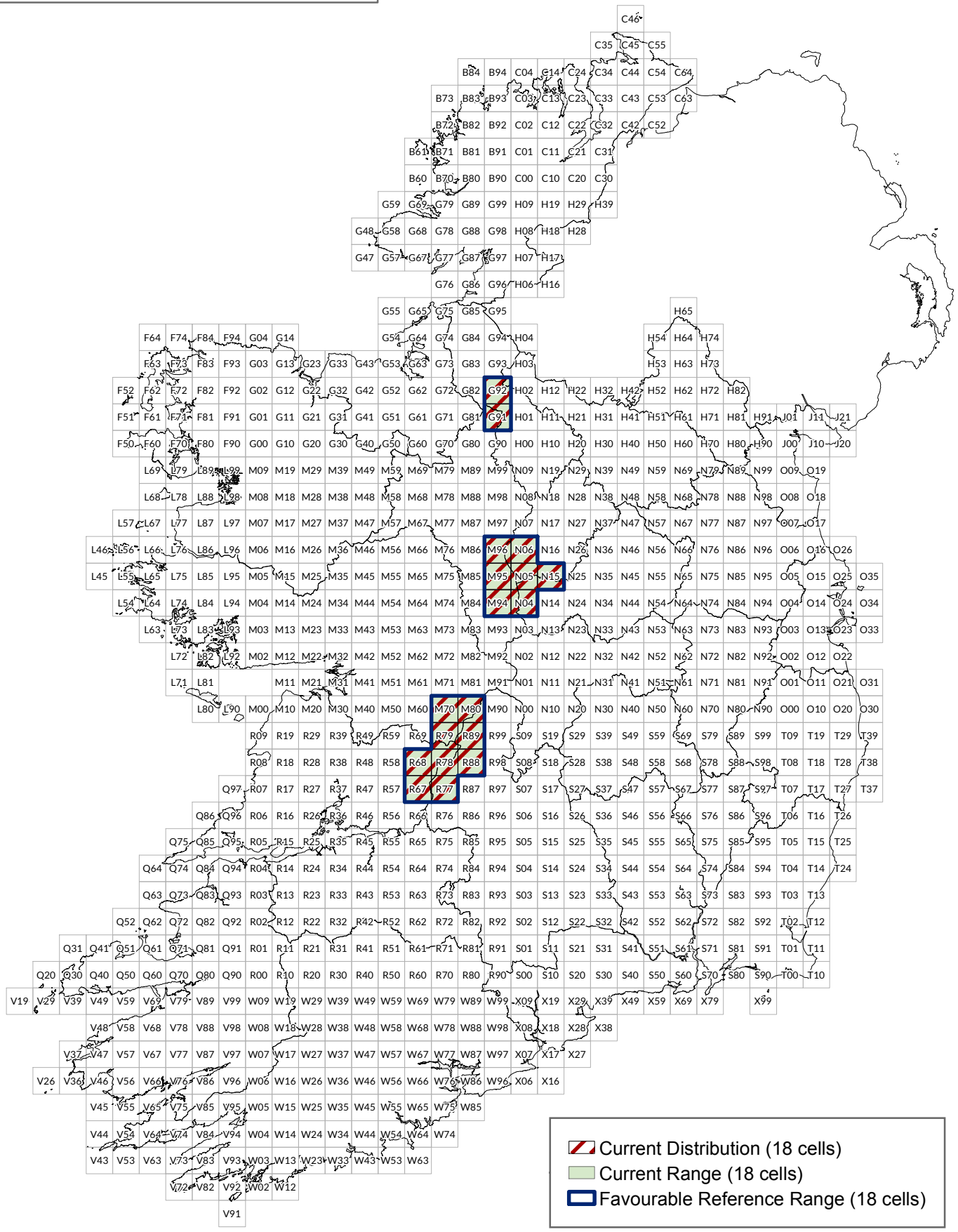
11.8 Additional information *Optional*	Range has remained stable since the previous reporting period and is assessed as Favourable. The current population size is estimated to be >25% below the FRP and low recruitment of pollan is evident in two of the Shannon lakes (L. Ree and L. Derg). Population is therefore assessed as Bad. The area of habitat for pollan is currently sufficient; however the water quality is Inadequate. As in the previous reporting period, the current conservation status for *Coregonus pollan* is Bad. Due to more improved knowledge/more accurate data, the overall conservation trend has been assessed as stable in this reporting period, whereas it was unknown in the previous reporting period.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Pollan
Coregonus pollan (5076)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1106***
1.3 Species scientific name	*Salmo salar*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Atlantic salmon (Bradán)
1.6i Species description	The Atlantic salmon is an anadramous species indigenous to the North Atlantic. In freshwater it is found in an arc from Northern Portugal in the east, to Connecticut River, New England, United States in the west. The Irish population generally comprises fish that spend two years (small numbers spend one or three years) as sub-adults in freshwater before going to sea as smolts. The majority of fish spend one winter at sea before returning to their natal rivers, mainly during the summer, as grilse. Smaller numbers spend two winters at sea, returning mainly in spring, hence "spring" salmon. A small proportion of the adult population returns to the sea post-spawning (known at this spent stage as a kelt) and can return to spawn again.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2013-2017***
2.3 Distribution map	Submitted
2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	Submitted maps are: Distribution of wild Atlantic salmon in Irish freshwaters 10km grid 2013-2017 Distribution of wild Atlantic salmon in Irish freshwaters 1km grid 2013-2017

	Range of wild Atlantic salmon in Irish freshwaters 10km grid 2013-2017 Distribution of wild Atlantic salmon in Special Areas of Conservation in Ireland Initially site-specific salmon distribution data were collated from three sources – IFI National Research Survey Programme / Water Framework Directive monitoring (lake survey data) (2013-2017); IFI National Research Survey Programme / Water Framework Directive monitoring (river survey data) (2013-2017); and IFI Catchment-wide electrofishing data period (2013-2017) – and amalgamated into a single geo-referenced file containing site presence data on wild Atlantic salmon. Additional presence data were collated based on the known distribution of wild salmon in rivers and lakes in designated salmon catchments where salmon are known to occur. Information from these catchments is routinely used by IFI / Standing Scientific Committee on Salmon (SSCS) / The Expert Group on Salmon (TEGOS) (2013 -2017). Waters above known impassable barriers for salmon were removed. First order streams (and associated lakes) were also excluded as these are typically 1) very small high-gradient streams or drain-like channels not typically considered to have salmon; and 2) not considered salmon spawning habitat by TEGOS in their assessment of salmon wetted area. Salmon sites considered to be solely of hatchery / feral origin were also excluded (in the lower Shannon region). The resulting river, lake and site presence data were overlain in ArcMap 10.3.1 as shapefiles and an extensive visual verification exercise was undertaken. This exercise ensured connectivity in river systems and the further exclusion of erroneous data in the shapefiles. The NPWS-provided range tool was run on the verified salmon distribution shapefiles using a gap of 2 x 10km grid cells. This generated the following after a further verification exercise: 10km grid range of salmon in Ireland 10km grid distribution of salmon in Ireland 1km grid distribution of salmon in Ireland The 1km grid distribution of salmon in Special Areas of Conservation (SACs) in Ireland was also determined by intersecting the NPWS SAC layer with the 1km grid distribution of salmon in Ireland. Corresponding maps were produced as outlined in Section 2.5. Comprehensive details on the full process outlined here to establish the range and distribution of salmon in Ireland for Article 17 reporting are contained in the MS Word file “Salmo READ me” provided with this submission.

3 Information related to Annex V species (Art. 14)

3.1 Is the species taken in the wild/exploited?	*Is the species taken in the wild/exploited?* ***YES****/NO* *If the reply is NO, or if the reply is YES and the conservation status of the species is Favourable (FV) in all biogeographical or marine regions where the species occurs, then do not fill in the remaining fields of this section* *If the reply is YES and the conservation status of the species is Unfavourable (U1 or U2) in one or more biogeographical/marine regions where the species occurs, complete the remaining relevant fields of this section*						
3.2 Which of the measures in Art. 14 have been taken?	*a) regulations regarding access to property*						*YES/****NO***
	b) temporary or local prohibition of the taking of specimens in the wild and exploitation						***YES****/NO*
	c) regulation of the periods and/or methods of taking specimens						***YES****/NO*
	d) application of hunting and fishing rules which take account of the conservation of such populations						***YES****/NO*
	e) establishment of a system of licences for taking specimens or of quotas						***YES****/NO*
	f) regulation of the purchase, sale, offering for sale, keeping for sale or transport for sale of specimens						***YES****/NO*
	g) breeding in captivity of animal species as well as artificial propagation of plant species						*YES/****NO***
	h) other measures, if yes, describe						*YES/****NO***
	If 'yes, other measures' have been taken, describe those measures						
3.3 Hunting bag or quantity taken in the wild for Mammals and *Acipenseridae* (Fish)	**a) Unit**	*Number of adults*					
	b) Statistics/ quantity taken	*Provide statistics/quantity taken per hunting season or per year (where season is not used) over the reporting period*					
		Season/ year 1	*Season/ year 2*	*Season/ year 3*	*Season/ year 4*	*Season/ year 5*	*Season/ year 6*
	Min. *(raw, i.e. not rounded)*	***32,303***	***20,883***	***23,415***	***21,511***	***21,842***	
	Max. *(raw, i.e. not rounded)*	***32,303***	***20,883***	***23,415***	***21,511***	***21,842***	
	Unknown						*Y*

3.4 Hunting bag or quantity taken in the wild Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*
3.5 Additional information *Optional*	For 3.3 the numbers of adult Atlantic salmon harvested in angling and commercial fisheries are based on the Salmon and Sea Trout Carcass Tagging and Logbook Scheme which are published in annual reports produced by Inland Fisheries Ireland (2013 to 2017). The following are the principal regulations concerning Atlantic salmon fisheries in Ireland: 1. Wild Salmon & Sea Trout Tagging Scheme (Amendment) Regulations (Statutory Instrument) define limits on catch and harvest on an annual basis. These regulations stipulate catchment-specific harvest restrictions (including quotas as total allowable catch) on river systems assessed as being above their conservation limit. 2. Conservation of Salmon & Sea Trout (Catch & Release) Bye-law specifies the catchments which are restricted to catch and release-only salmon fishing with further restrictions stipulated on the type of angling gear that can be used (i.e. the use of single barbless hooks and prohibition on the use of worms as bait) in these waters. 3. Conservation of Salmon & Sea Trout (Closed Rivers) Bye-law specifies river systems where salmon angling is prohibited each year. 4. Conservation of Salmon and Sea Trout (Bag Limits) Bye-law imposes daily and seasonal limits on angling catches per individual in rivers with harvest quotas. 5. Control of Fishing for Salmon Order (Statutory Instrument) sets out the statutory commercial license system on an annual basis and a register is maintained of all such licences issued. 6. Additional Bye-laws are periodically published which further define angling restrictions in particular systems or sections of these systems.

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
4.2 Sources of information	Published sources for 5. Range and 6. Population: ICES (2018) Report of the Working Group on North Atlantic Salmon (WGNAS), 4–13 April 2018, Woods Hole, MA, USA. ICES CM

	2018/ACOM:21. 386 pp. http://ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2018/WGNAS/wgnas_2018.pdf ICES (2017) Report of the Working Group on North Atlantic Salmon (WGNAS), 29 March–7 April 2017, Copenhagen, Denmark. International Council for the Exploration of the Seas. ICES CM 2017/ACOM:20 294pp. http://ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2017/WGNAS/wgnas_2017.pdf ICES (2016) Report of the Working Group on North Atlantic Salmon (WGNAS), 30 March–8 April 2016, Copenhagen, Denmark. International Council for the Exploration of the Seas. ICES CM 2016/ACOM:10 128pp. http://ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2016/WGNAS/wgnas_2016.pdf IFI (in press) Wild Salmon and Sea Trout Statistics Report 2017. Inland Fisheries Ireland, Dublin. IFI (2017) Wild Salmon and Sea Trout Statistics Report 2016. Inland Fisheries Ireland, Dublin, 115pp. https://www.fisheriesireland.ie/extranet/fisheries-management-1/1461-wild-salmon-and-sea-trout-statistics-report-2016/file.html IFI (2016) Wild Salmon and Sea Trout Statistics Report 2015. Inland Fisheries Ireland, Dublin, 120pp. https://www.fisheriesireland.ie/documents/983-wild-salmon-and-sea-trout-statistics-report-2015/file.html IFI (2015) Wild Salmon and Sea Trout Statistics Report 2014. Inland Fisheries Ireland, Dublin, 107pp. https://www.fisheriesireland.ie/documents/608-wild-salmon-and-sea-trout-statistics-report-2014/file.html IFI (2014) Wild Salmon and Sea Trout Statistics Report 2013. Inland Fisheries Ireland, Dublin, 110pp. https://www.fisheriesireland.ie/documents/469-wild-salmon-and-sea-trout-statistics-report-2013/file.html IFI (2013-2017) Consolidation Fish Counter Reports (2013-2017). Inland Fisheries Ireland, Dublin, various pp. https://www.fisheriesireland.ie/Fisheries-management/salmon-management.html NASCO Rivers Database Report Ireland (2018) North Atlantic Salmon Conservation Organisation, Edinburgh, Scotland 19 pp. http://www.nasco.int/pdf/riversdb/JurisdictionReportIreland.pdf SSCS (2016) The Status of Irish Salmon Stocks in 2016 with Precautionary Catch Advice for 2017. Report of the Standing Scientific Committee on Salmon to Inland Fisheries Ireland, 96 pp. https://www.fisheriesireland.ie/documents/1412-the-status-of-irish-salmon-stocks-in-2016-with-precautionary-catch-advice-for-2017/file.html SSCS (2015) The Status of Irish Salmon Stocks in 2015 with Precautionary Catch Advice for 2016. Report of the Standing Scientific Committee on Salmon to Inland Fisheries Ireland, 87 pp.

https://www.fisheriesireland.ie/documents/639-the-status-of-irish-salmon-stocks-in-2015-with-precautionary-catch-advice-for-2016/file.html

SSCS (2014) The Status of Irish Salmon Stocks in 2014 with Precautionary Catch Advice for 2015. Report of the Standing Scientific Committee on Salmon to Inland Fisheries Ireland, 88 pp. https://www.fisheriesireland.ie/documents/482-the-status-of-irish-salmon-stocks-in-2014-with-precautionary-catch-advice-for-2015/file.html

SSCS (2013) The Status of Irish Salmon Stocks in 2013 with Precautionary Catch Advice for 2014. Report of the Standing Scientific Committee on Salmon to Inland Fisheries Ireland, 91 pp. https://www.fisheriesireland.ie/documents/449-the-status-of-irish-salmon-stocks-in-2013-with-precautionary-catch-advice-for-2014/file.html

TEGOS (2017) The Status of Irish Salmon Stocks in 2017 with Precautionary Catch Advice for 2018. Report of the Technical Expert Group on Salmon – to Inland Fisheries Ireland (IFI), 45 pp. https://www.fisheriesireland.ie/extranet/fisheries-management-1/salmon/1496-the-status-of-irish-salmon-stocks-in-2017-with-catch-advice-for-2018/file.html

Wfdfish.ie (2018) Water Framework Directive Fish website. http://wfdfish.ie/ (accessed 10 October 2018).

Published sources for 7. Habitat for the species:

McGinnity, P., de Eyto, E., Gilbey, J., Gargan, P., Roche, W., Stafford, T., McGarrigle, M., Ó Maoiléidigh, N. & Mills, P. (2012) A predictive model for estimating river habitat area using GIS derived catchment and river variables. *Fisheries Management and Ecology* 19:69-77.

McGinnity, P., Gargan, P.,Roche, W.,Mills, P. & McGarrigle, M. (2003) Quantification of the Freshwater Salmon Asset in Ireland using data interpreted in a GIS platform. *Irish Freshwater Fisheries Ecology and Management Series*: Number 3. Central Fisheries Board, Dublin, Ireland.

Published sources for 8. Main pressures and threats

NASCO Rivers Database Report Ireland (2018) North Atlantic Salmon Conservation Organisation, Edinburgh, Scotland 19 pp. http://www.nasco.int/pdf/riversdb/JurisdictionReportIreland.pdf

NASCO (2013) CNL(13)44 NASCO Implementation Plan for the period 2013-18 EU-Ireland http://www.nasco.int/pdf/2013%20papers/CNL(13)44FINAL.pdf

River Basin Management Plan for Ireland. Department of Housing, Planning and Local Government. 183 pp. https://www.housing.gov.ie/sites/default/files/publications/files/rbmp_report_english_web_version_final_0.pdf

Published sources for 9. Conservation measures

NASCO (2018) Annual Progress Report on Actions Taken Under the Implementation Plan for the Calendar Year 2017 EU - Ireland. CNL(18)31. http://www.nasco.int/pdf/2018%20papers/APRs/CNL_18_31_APR_%20EU_Ireland.pdf

NASCO (2017)Compilation of Self-assessments on the Application of the Six Tenets for Effective Management of an Atlantic Salmon Fishery. pp. 19-29. http://www.nasco.int/pdf/2017%20papers/WGCIS_17_3_SixTenetsSelfAssessments.pdf

River Basin Management Plan for Ireland. Department of Housing, Planning and Local Government. 183 pp. (https://www.housing.gov.ie/sites/default/files/publications/files/rbmp_report_english_web_version_final_0.pdf)

Published sources for 10. Future Prospects:

Friedland, K.D. Shank, B.V., Todd, C.D., McGinnity, P. & Nye, J.A. (2014) Differential response of continental stock complexes of Atlantic salmon (Salmo salar) to the Atlantic Multidecadal Oscillation. *Journal of Marine Systems* 133: 77-87.

Gargan, P.G., Forde, G., Hazon, N., Russell, D.J.F. & Todd, C.D. (2012) Evidence for sea lice-induced marine mortality of Atlantic salmon (Salmo salar) in western Ireland from experimental releases of ranched smolts treated with emamectin benzoate. *Canadian Journal of Fisheries and Aquatic Sciences* 69(2):343–353.

ICES (2018) Report of the Working Group on North Atlantic Salmon (WGNAS), 4–13 April 2018, Woods Hole, MA, USA. ICES CM 2018/ACOM:21. 386 pp. http://ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2018/WGNAS/wgnas_2018.pdf

ICES (2017) Report of the Workshop on Potential Impacts of Climate Change on Atlantic Salmon Stock Dynamics (WKCCISAL), 27–28 March 2017, Copenhagen, Denmark . ICES CM 2017/ACOM:39. 90 pp. http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2017/WKCCISAL/wkccisal_2017.pdf

Krkosek, M., Revie, C.W., Gargan, P.G., Skilbrei, O.T., Finstad, B. & Todd, C.D. (2012) Impact of parasites on salmon recruitment in the Northeast Atlantic Ocean. Proceeding of the Royal Society B 20122359 . http://dx. doi.org/10.1098/rspb. 2012.2359

Shephard, S. & Gargan, P. (2017) Quantifying the contribution of sea lice from aquaculture to declining annual returns in a wild Atlantic salmon population. *Aquaculture Environment Interactions* 9: 181-192.

	Published sources for 12. NATURA 2000 (pSCIs, SCIs and SACs) coverage for Annex II species: IFI (in press) Wild Salmon and Sea Trout Statistics Report 2017. Inland Fisheries Ireland, Dublin. IFI (2017) Wild Salmon and Sea Trout Statistics Report 2016. Inland Fisheries Ireland, Dublin, 115 pp. https://www.fisheriesireland.ie/extranet/fisheries-management-1/1461-wild-salmon-and-sea-trout-statistics-report-2016/file.html IFI (2016) Wild Salmon and Sea Trout Statistics Report 2015. Inland Fisheries Ireland, Dublin, 120 pp. https://www.fisheriesireland.ie/documents/983-wild-salmon-and-sea-trout-statistics-report-2015/file.html IFI (2015) Wild Salmon and Sea Trout Statistics Report 2014. Inland Fisheries Ireland, Dublin, 107 pp. https://www.fisheriesireland.ie/documents/608-wild-salmon-and-sea-trout-statistics-report-2014/file.html IFI (2014) Wild Salmon and Sea Trout Statistics Report 2013. Inland Fisheries Ireland, Dublin, 110 pp. https://www.fisheriesireland.ie/documents/469-wild-salmon-and-sea-trout-statistics-report-2013/file.html IFI (2013-2017) Consolidation Fish Counter Reports (2013-2017). Inland Fisheries Ireland, Dublin, various pp. https://www.fisheriesireland.ie/Fisheries-management/salmon-management.html SSCS (2016) The Status of Irish Salmon Stocks in 2016 with Precautionary Catch Advice for 2017. Report of the Standing Scientific Committee on Salmon to Inland Fisheries Ireland, 96 pp. https://www.fisheriesireland.ie/documents/1412-the-status-of-irish-salmon-stocks-in-2016-with-precautionary-catch-advice-for-2017/file.html SSCS (2015) The Status of Irish Salmon Stocks in 2015 with Precautionary Catch Advice for 2016. Report of the Standing Scientific Committee on Salmon to Inland Fisheries Ireland, 87 pp. https://www.fisheriesireland.ie/documents/639-the-status-of-irish-salmon-stocks-in-2015-with-precautionary-catch-advice-for-2016/file.html SSCS (2014) The Status of Irish Salmon Stocks in 2014 with Precautionary Catch Advice for 2015. Report of the Standing Scientific Committee on Salmon to Inland Fisheries Ireland, 88 pp. https://www.fisheriesireland.ie/documents/482-the-status-of-irish-salmon-stocks-in-2014-with-precautionary-catch-advice-for-2015/file.html SSCS (2013) The Status of Irish Salmon Stocks in 2013 with Precautionary Catch Advice for 2014. Report of the Standing Scientific Committee on Salmon to Inland Fisheries Ireland, 91 pp. https://www.fisheriesireland.ie/documents/449-the-status-of-irish-salmon-stocks-in-2013-with-precautionary-catch-advice-for-2014/file.html

	TEGOS (2017) The Status of Irish Salmon Stocks in 2017 with Precautionary Catch Advice for 2018. Report of the Technical Expert Group on Salmon – to Inland Fisheries Ireland (IFI), 45 pp. https://www.fisheriesireland.ie/extranet/fisheries-management-1/salmon/1496-the-status-of-irish-salmon-stocks-in-2017-with-catch-advice-for-2018/file.html Wfdfish.ie (2018) Water Framework Directive Fish website. http://wfdfish.ie (accessed 10 October 2018).
4.2i Additional information	

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***61,900 km²***	
5.2 Short-term trend Period	***2007-2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*		
5.7 Long-term trend Direction *Optional*		
5.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
5.9 Long-term trend Method used *Optional*		
5.10 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	
5.11 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****/ No information on the nature of change*	
5.12 Additional information *Optional*	The range in the previous reporting period 2000-2012 was reported as "63,200 km^2". The apparent minor decrease in range in this reporting period is likely to be from some different sampling sites being visited and the resulting output of the range tool. This is further supported by the NASCO rivers database, originally published in 2005 and recently resubmitted in 2018 for 2019 publication, which identifies no extirpation of any populations in designated Irish Atlantic salmon rivers between the original and updated database. The Favourable Reference Range has been set as approximately equal to the current range. The current range is considered to be large enough to ensure the long-term survival of the species. Short-term trend was assessed as stable over the period 2007-2017 and this is assumed also to be valid for the default trend period of 2007-2018.	

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2013-2017***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1x1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***25,315***
6.3 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	

6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	***Number of adults***
	b) Minimum	
	c) Maximum	
	d) Best single value	***202,428***
6.5 Type of estimate *Optional*	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007-2018***	
6.8 Short-term trend Direction	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / increasing /* ***decreasing*** */ uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	***-74.8%***
	b) Maximum	***-74.8%***
	c) Confidence interval	

6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	***a) 258,414 adults***	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The 1x1 km grid approach is not ideal to estimate population size or favourable reference population for the freshwater adult salmon stock in Ireland as annual stock estimates for Ireland are available from ICES WGNAS. The sum of our national conservation limits for our one-sea-winter (211,471 fish) and multi-sea-winter (46,943 fish) stock components as is used in the annual ICES Stock assessment is therefore provided as the reference point.	
6.16 Change and reason for change in population size	*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/ No information on the nature of change*	
6.17 Additional information *Optional*	The 1x1 km grid was not used for salmon in the last reporting period assessment and a comparison is inadequate to estimate trends as the distribution data depend somewhat on sampling regime during each period. It would be preferable for Ireland to use adult returns which are calculated by the ICES Working Group on North Atlantic Salmon each year back to 1971. Linear trends in these data show 74.8% decrease in returns of adult salmon to Irish river systems in the period 1994-2017 and a 12.2% decrease in such returns from 2007 to 2017. These trends are assumed to be valid over the default long- and short-term trend periods also. However there has been an encouraging 12.2% increase in returns from 2013 to 2017. These data have been submitted to the NPWS.	

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / **uncertain** / unknown*
7.8 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***
7.9 Additional information *Optional*	Wetted area (i.e. fluvial accessible habitat) is the key measure of available salmon spawning habitat in Ireland since it was first calculated in 2002 (McGinnity *et al*. 2003). New wetted areas were derived in 2012 based on a more robust statistical approach and these were also incorporated into the salmon stock assessment from year 2013 to date (see McGinnity *et al*. 2012) and are still used by the TEGOS for their annual stock assessments and calculation of salmon conservation limits. There is insufficient information available to comprehensively assess or comment on long-term trends in habitat availability before 2002. However, it is considered that there have not been any significant,

	gross changes to salmon habitat availability from a national perspective since 1994. Despite the pressures listed below, the quality of the habitat is not considered to compromise the survival of the species.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**A26** Agricultural activities generating diffuse pollution to surface or ground waters (H) **G19** Other impacts from marine aquaculture, including infrastructure (H) **K05** Physical alteration of water bodies (H) **J01** Mixed source pollution to surface and ground waters (limnic and terrestrial) (H) **A25** Agricultural activities generating point source pollution to surface or ground waters (M) **B23** Forestry activities generating pollution to surface or ground waters (M) **D02** Hydropower (dams, weirs, run-off-the-river), including infrastructure (M) **G11** Illegal harvesting, collecting and taking (M) **G20** Abstraction of water, flow diversion, dams and other modifications of hydrological conditions for freshwater aquaculture (M) **L06** Interspecific relations (competition, predation, parasitism, pathogens) (M)	**A26** Agricultural activities generating diffuse pollution to surface or ground waters (H) **G19** Other impacts from marine aquaculture, including infrastructure (H) **K05** Physical alteration of water bodies (H) **N01** Temperature changes (e.g. rise of temperature & extremes) due to climate change (H) **A25** Agricultural activities generating point source pollution to surface or ground waters (M) **B23** Forestry activities generating pollution to surface or ground waters (M) **F12** Discharge of urban waste water (excluding storm overflows and/or urban run-offs) generating pollution to surface or ground water (M) **F28** Modification of flooding regimes, flood protection for residential or recreational development (M) **G11** Illegal harvesting, collecting and taking (M) **I02** Other invasive species (other than species of Union concern) (M)

8.2 Sources of information *Optional*	Ireland's River Basin Management Plan (RBMP) 2018-2021 (https://www.housing.gov.ie/sites/default/files/publications/files/rbmp_report_english_web_version_final_0.pdf) NASCO Implementation Plan for the period 2019 – 2024 for Atlantic salmon in Ireland (which is currently in a consultation process before finalisation and publication in summer 2019) NASCO Implementation Plan for the period 2013-18 EU-Ireland CNL(13)44. NASCO (2013). http://www.nasco.int/pdf/2013%20papers/CNL(13)44FINAL.pdf)
8.3 Additional information *Optional*	Ireland's River Basin Management Plan (RBMP) 2018-2021 (https://www.housing.gov.ie/sites/default/files/publications/files/rbmp_report_english_web_version_final_0.pdf) identifies the significant pressures impacting on water bodies and freshwater communities at a national level and identifies corresponding actions that will be taken to address these. The key pressures considered to pose threats / challenges to Atlantic salmon include: 1. Water quality from: a. agricultural production, domestic waste-water treatment systems and forestry which are key sources of both rural diffuse and point-source pollution; and b. urban waste-water pressures which are a source of point-source pollution. 2. Hydromorphological threats relating to physical modification or damage to habitat and natural river/lake processes, and changes functions caused by channelisation, drainage, dams, weirs, barriers and locks, overgrazing, embankments and culverts. 3. Climate change which has been identified by IFI as one of the greatest threats facing fish populations including salmon in the medium- to long-term. Temperature changes may shift the phenologies of anadromous fishes. The consequences of such changes are unknown, but the change has the potential to disrupt established ecological relationships at various life history stages. 4. Future warming may intensify the severity of floods and droughts, lessening the frequency of successful annual reproduction for anadromous fishes. 5. Certain invasive alien species have the potential to negatively impact wild salmon habitat in the freshwater or estuarine environment in Ireland through both direct and indirect means, although documented knowledge is limited. For example, the Asian clam (which has a limited distribution in Ireland to date) or certain invasive plant species have some potential to directly clog salmon spawning areas where present in abundance. The bank burrowing activities of Chinese mitten crab (confined to a single catchment but may now be extirpated there) and non-native crayfish (not recorded in rivers in Ireland to date) could increase sedimentation rates in impacted rivers and reduce the availability of suitable spawning habitat for native wild

	salmon. Invasive riparian plant species such as Himalayan balsam and knotweeds may also have such impacts by reducing bank stability during their winter die-back and concurrently increase sediment inputs. If Pacific pink salmon increase their presence in Irish waters in future, an abundance of their decaying carcasses after spawning in a river system may have potential impacts on ecosystem functioning which could indirectly induce habitat modification as a consequence of increased nutrient input. The NASCO Implementation Plan for the period 2019-2024 for Atlantic salmon in Ireland (which is currently in a consultation process before finalisation in summer 2019) also highlights these key threats in addition to the following: 1. Illegal catches, both at sea and within rivers which remain a concern and an impediment to stock recovery; 2. Over-reporting of catches which can affect population estimates and negatively impact stock assessments and their sustainable management; and 3. Impacts of salmon aquaculture on native wild stocks from disease and escapes. The current NASCO implementation plan in operation also identifies the above threats and pressures (NASCO (2013). CNL(13)44 NASCO Implementation Plan for the period 2013-18 EU-Ireland http://www.nasco.int/pdf/2013%20papers/CNL(13)44FINAL.pdf).

9 Conservation measures

To be reported only for Annex II species

9.1 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*
9.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, population and/or habitat for the species or* *b) Expand the current range of the species (related to 'Range') or* ***c) Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population')** or* *d) Restore the habitat of the species (related to 'Habitat for the species')*

9.3 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*
9.4 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 in field 9.2):* *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)*
9.5 List of main conservation measures *List a maximum of 10 measures using code list provided in the Reference portal*	**CA09** Manage the use of natural fertilisers and chemicals in agricultural (plant and animal) production **CA10** Reduce/eliminate point pollution to surface or ground waters from agricultural activities **CA11** Reduce diffuse pollution to surface or ground waters from agricultural activities **CB05** Adapt/change forest management and exploitation practices **CB10** Reduce diffuse pollution to surface or ground waters from forestry activities **CG01** Management of professional/commercial fishing (including shellfish and seaweed harvesting) **CG02** Management of hunting, recreational fishing and recreational or commercial harvesting or collection of plants **CG04** Control/eradication of illegal killing, fishing and harvesting **CF11** Manage water abstraction for public supply and for industrial and commercial use **CX02** Support conservation measures in countries outside the EU
9.6 Additional information *Optional*	Information on actions under conservation measures (CA09, CA10, CA11, CB05, CB10, CG01, CG02, CG04, CF11) for the period 2013-2017 can be found in the Irish annual progress report to the 2018 meeting of the North Atlantic Salmon Conservation Organisation (NASCO 2018) which covers the period of the Irish Implementation Plan (2013-2018). Additional specific information on actions under conservation measures CG01, CG02 and CG04 are detailed in the document "Compilation of Self-assessments on the Application of the Six Tenets for Effective Management of an Atlantic Salmon Fishery" (NASCO 2017). For conservation measure CX02, Ireland as part of the EU delegation to NASCO support agreed conservation measures implemented outside the EU area concerning salmon fisheries in West Greenland (active fishery) and the Faroe Islands region (non-active fishery). NASCO (2018). Annual Progress Report on Actions Taken Under the

	Implementation Plan for the Calendar Year 2017 EU - Ireland. CNL(18)31. http://www.nasco.int/pdf/2018%20papers/APRs/CNL_18_31_APR_%20EU_Ireland.pdf NASCO (2017). Compilation of Self-assessments on the Application of the Six Tenets for Effective Management of an Atlantic Salmon Fishery. pp. 19-29. http://www.nasco.int/pdf/2017%20papers/WGCIS_17_3_SixTenetsSelfAssessments.pdf Ireland's River Basin Management Plan (RBMP) 2018-2021 (https://www.housing.gov.ie/sites/default/files/publications/files/rbmp_report_english_web_version_final_0.pdf) identifies detailed conservation measures that will be taken in the period 2018-2021 to address challenges and threats posed to Irish salmon.

10 Future prospects		
10.1 Future prospects of parameters	**a) Range**	***Good*** / *Poor / Bad / Unknown*
	b) Population	*Good /* ***Poor*** */ Bad / Unknown*
	c) Habitat of the species	***Good*** / *Poor / Bad / Unknown*
10.2 Additional information *Optional*	a) Range: Based on expert judgement and information on salmon stocks from fish counter, catchment-wide electrofishing and angling and commercial catch records, the current range of salmon in Ireland is very unlikely to change in the next 12 years. b) Population: The survival of salmon during the marine phase of its lifecycle (i.e. marine survival) has been identified as the key determinant of trends in population size in natal rivers not only in Ireland, but also throughout the global range of the species (ICES 2018). Known factors which influence marine survival to homewaters include exploitation at sea in commercial fisheries including those at West Greenland and formerly at the Faroe Islands, and interceptory fisheries in coastal waters (ICES 2018). The impact of salmon aquaculture through increased sea lice-induced mortality on out migrating wild fish and predation pressure have also been identified as regional and local factors in marine survival (Gargan et al. 2012; Krkosek et al. 2012; Shephard and Gargan 2017). In addition, the influence of climate change and concomitant negative effects on food prey structure and abundance have increasingly been attributed to the declines observed in stocks at sea (Friedland *et al.* 2014; ICES 2017). Within river systems, variation in individual stock abundance can be influenced by a variety of factors, notably, alterations in physical habitat, water quality, environmental factors, predation, and angling and commercial fisheries exploitation	

	pressure. The ICES Working Group on North Atlantic Salmon (WGNAS) undertook a salmon stock forecast (2017 to 2021) (ICES 2018). For the southern North-Eastern Atlantic Commission (NEAC) stock complex, of which Ireland is a constituent jurisdiction, for maturing one-sea-winter stocks the Pre-Fisheries Abundance (PFA) is forecast to fall below the Spawner Escapement Reserve (SER) for all forecasted years (to 2021). The PFA for non-maturing one-sea-winter stocks (i.e. multi-sea-winter fish) is forecast to fall below the SER in 2018 and 2019. This essentially predicts that there will not be enough fish in the southern NEAC stock complex as a whole to meet combined national conservation limits for constituent jurisdictions such as Ireland. In addition, corresponding PFA forecasts specifically related to Irish stocks show that both stock components will be below the SER in the forecasted period (ICES 2018). This also predicts that there will not be enough Irish one-sea-winter or multi-sea-winter salmon present in the ocean to meet our national CL during this period (ICES 2018) and such stocks are below reproductive capacity or at risk of being below reproductive capacity. Therefore, Future prospects for the Population parameter are considered to remain poor in the next 12 years. c) Habitat of the species Habitat for species has been assessed as "Good" because there is considered to be sufficient habitat in Ireland as a whole to support a viable salmon population. A continuing focus on a broad range of conservation measures and actions (see Irish annual progress report to the 2018 meeting of the North Atlantic Salmon Conservation Organisation (NASCO 2018) supports this assessment. However, water quality in Irish freshwaters continues to remain a concern and Ireland continues to face major challenges to achieve water quality targets set for 2021 and 2027 as required by the Water Framework Directive (RBMP 2018; NASCO 2018).

11 Conclusions	
Assessment of conservation status at end of reporting period	
11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.2 Population	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.4 Future prospects	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*
11.5 Overall assessment of Conservation Status	*Favourable (FV) /* ***Inadequate (U1)*** */ Bad (U2) / Unknown (XX)*
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*

<table>
<tr><td rowspan="8">11.7 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 (11.5)</td><td>Overall trend in conservation status (11.6)</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 data</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>d) yes, due to the use of different method (including taxonomical change or use of different thresholds)</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>e) yes, but there is no information on the 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>11.8 Additional information

Optional</td><td colspan="2">There is no evidence of a decline in range since the Directive came into force. The current range is considered sufficient for the long-term survival of the species. Therefore Range has been assessed as Favourable.

Increasing trends have been noted in Salmon population size in the last 5 years. However the current population estimate is 78% of the Favourable Reference Population. Therefore Population has been assessed as Inadequate.

There is sufficient available habitat and ongoing pressures linked with habitat quality are not considered to be compromising the viability of the species. Therefore Habitat for the species has been assessed as Favourable.

Population estimates are unlikely to reach Favourable status in the next 12 years. Therefore Future prospects have been assessed as Inadequate.

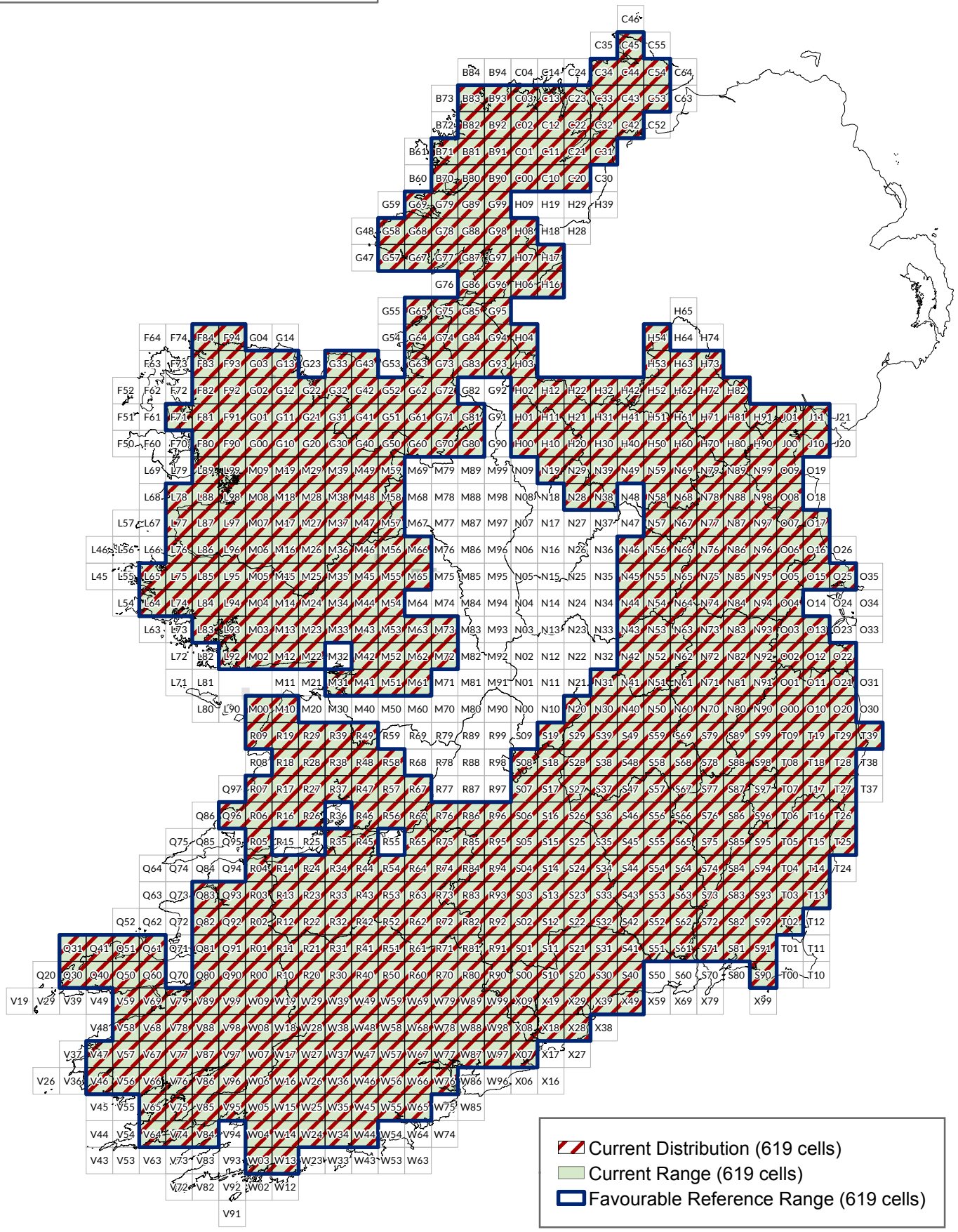
The overall conservation status has been assessed as Inadequate with a stable trend. Although a short-term negative trend is reported for this species, the trend has reversed in the last 5 years. Therefore</td></tr>
</table>

	an overall stable trend is reported.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species		
12.1 Population size inside the pSCIs, SCIs and SACs network *(on the biogeographical/marine level including all sites where the species is present)*	**a) Unit**	***1x1 km grids***
	b) Minimum	***8,819***
	c) Maximum	***8,819***
	d) Best single value	
12.2 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
12.3 Population size 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*	
12.4 Short-term trend of population size within the network Direction	*Short-term trend of population size within the network over the period indicated in field 6.5 :* *stable / increasing /* ***decreasing*** */ uncertain / unknown*	
12.5 Short-term trend of population size within 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*	
12.6 Additional information *Optional*	8,819 1x1 km grids equates to 881,900 ha. The population trend within the network mirrors the national trends.	

13 Complementary information	
13.1 Justification of % thresholds for trends *Optional*	Although a short-term negative trend is reported for this species, the trend has reversed in the last 5 years. Therefore an overall stable trend is reported.
13.2 Trans-boundary assessment *Optional*	
13.3 Other relevant information *Optional*	

Atlantic Salmon
Salmo salar (1106)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Species code	***6284***
1.3 Species scientific name	*Epidalea calamita*
1.4 Alternative species scientific name *Optional*	*Bufo calamita*
1.5 Common name *Optional*	Natterjack toad (Buaf; Cnádán)
1.6i Species description	The natterjack toad is widespread across continental Europe but lives at the edge of its climatic range in Ireland. It is one of only three amphibians found here and is confined to a small number of coastal sites around the Dingle and Iveragh peninsulas in West Kerry, with one translocated population in Wexford. The toad is the last of our amphibians to emerge from hibernation, normally appearing at the very end of March or early April. Males take up residence in traditional breeding ponds where, in the evenings, they call to females. Mating pairs form and eggs are laid in strings. In warm weather the resulting tadpoles can develop quickly and emerge onto land within 8-10 weeks. The toad is adapted to temporary water bodies; while dry years lead to mass mortalities of tadpoles due to pond desiccation, good years can see large numbers of strings laid and thousands of juveniles emerge successfully. Consequently, significant population fluctuations can be apparent between years. Natterjacks do best in warm, open grassy habitat such as dunes and coastal grasslands. They are most active at night and will forage until late Autumn. Toads feed on terrestrial invertebrates such as spiders and beetles. As nights get colder natterjacks retreat to frost-free refuges (e.g. under piles of logs/stones, in sandy rabbit burrows) where they will hibernate over winter.

2 Maps

Distribution of the species within the Member State concerned.

2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2016-2018***
2.3 Distribution map	Submitted

2.4 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*
2.5 Additional maps *Optional*	Map of distribution at 2x2km grid cell scale is also provided (Map 2)
2.6i Additional information	The data was collected as part of a three-year monitoring project in 2016-2018. It includes records of adult toads as well as spawn, tadpoles and juveniles. The data was collected by a team of trained ecologists and given the limited scope for confusion with other species, even at the tadpole stage, the quality of the data is very good.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic,*** *Marine Atlantic*
4.2 Sources of information	Bécart, E., Aubry, A. and Emmerson, M. (2007) Monitoring the conservation status of Natterjack toad (*Bufo calamita*) in Ireland, 2004 - 2006. *Irish Wildlife Manuals*, No. 31. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. Beebee, T.J.C. (2002) The Natterjack toad (*Bufo calamita*) in Ireland: current status and conservation requirements. *Irish Wildlife Manuals* No. 10. Dúchas the Heritage Service, Dublin. Beebee, T.J.C. and Griffiths, R.A. (2000) *Amphibians and reptiles*. HarperCollins Publishers, London. NPWS (2007) The status of EU protected habitats and species in Ireland. Backing documents, Article 17 forms and maps. Volume 1. NPWS. Dublin. NPWS (2013) The status of EU protected habitats and species in Ireland. Vol. 3 Species assessments. NPWS, Department of Arts, Heritage and the Gaeltacht, Dublin.. Reyne, M. *et al*. (in prep.) Natterjack toad (*Epidalea calamita*) monitoring and conservation status 2016-2018. *Irish Wildlife Manuals* 1XX. Department of Culture, Heritage and the

	Gaeltacht, Dublin, Ireland. Sweeney, P., Sweeney, N. and Hurley C. (2013) Natterjack toad monitoring project, 2011 - 2012. *Irish Wildlife Manuals*, No. 67. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
4.2i Additional information	Banks, B. and Beebee, T.J.C. (1988) Reproductive success of Natterjack toads *Bufo calamita* in two contrasting habitats. *Journal of Animal Ecology*, 57: 475-492. Beebee, T.J.C., Denton, J. and Buckley, J. (1996) Factors affecting population densities of adult Natterjack toads *Bufo calamita* in Britain. *Journal of Applied Ecology*, 33: 263-268 Buckley, J., Beebee, T.J.C. and Schmidt, B.R. (2014) Monitoring amphibian declines: population trends of an endangered species over 20 years in Britain. *Animal Conservation* 17: 27-34. King, J.L., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., FitzPatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K. and Cassidy, D. (2011) *Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Korky, J.K. (2011). Natterjack toad (*Epidalea calamita* Laurenti, 1768) breeding habitat survey, north Dingle Peninsula, Co. Kerry, Ireland. *Bulletin of the Irish Biogeographical Society* 35: 10-20. Miaud, C., Sanuy, D. and Avrillier, J. (2000). Terrestrial movements of the Natterjack toad *Bufo calamita* (Amphibia, Anura) in a semi-arid, agricultural landscape. *Amphibia-Reptilia* 21: 357-369.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***92 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	

5.6 Long-term trend Period *Optional*	*1994-2018*	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 172 km²***	
	b) Indicate if operators were used (use these 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 from 2013 is retained. It is considered to reflect the known historical range of the species in Kerry, based on Beebee (2002).	
5.11 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*	

5.12 Additional information *Optional*	The current range of the natterjack toad is well known following many years of intensive survey work. That said, some new breeding sites, normally adjacent to known populations, are discovered from time to time (see Reyne *et al*., in prep.). Natterjacks are concentrated in a small number of locations on the Dingle and Iveragh peninsulas. [The translocated population in Wexford, being outside the natural range of the species, is not considered in this assessment.] The range map is based on all the data collated by NPWS for the period 2016-2018. Most of the data was collected as part of a three-year monitoring project in 2016-2018 (Reyne *et al*., in prep.). It includes records of adult toads as well as spawn, tadpoles and juveniles. The data was collected by a team of trained ecologists and the quality of the data is very good. Distribution records correspond to 7 x 10km grid cells (see Map 1). To allow a better appreciation of this restricted distribution and the changes to it over time, the assessment of range is also presented at the 2km level (as was done in 2013) (Map 2). The current distribution extends to 19 x 2km grid cells (up from 16 cells in 2013). With the Range Tool extending that to 23 x 2km cells – 92km^2 – this is the figure used in 5.1. The increase in range is the result of better data arising from more comprehensive surveys at known sites (Inch, Lough Yganavan), rather than true range expansion. The Favourable Reference Range (43 x 2km grid cells = 172km^2) has been retained from the previous reporting period (NPWS, 2013) and is based on the known historical range of the species in Kerry. In brief the FRR is based on the maintenance of the current range (92km^2) plus the reinstatement of toads around Castlemaine Harbour (approx 80km^2), thereby providing linkages between the isolated Inch and Roscullen populations on the north side of the Harbour, with the existing populations on the south side. See Beebee (2002) for full details. Although larger than the range when the Directive came into force, it is considered necessary to restore the toad's range to this extent to ensure its long-term survival. Trend in range was assessed over the period 2006-2017 but the result is assumed to be the same for the default trend of 2007-2018.

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2016-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***25***
6.3 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population	**a) Unit**	***Number of adults***

size *(using population unit other than reporting unit)* *Optional*	**b) Minimum**	
	c) Maximum	
	d) Best single value	***7,542***
6.5 Type of estimate *Optional*	*Best estimate / **multi-year mean** / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** b) Based mainly on extrapolation from a limited amount of data *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing / decreasing / **uncertain** / unknown*	
6.9 Short-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	*1994–2018*	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
6.14 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*	
6.15 Favourable reference	***a) 13,000 adults***	

<table>
<tr><td rowspan="3">population
(using the unit in 6.2 or 6.4)</td><td colspan="2">b) Indicate if operators were used (using symbols ≈, >, >>, <) or</td></tr>
<tr><td colspan="2">c) If favourable reference population 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 FRP from the previous reporting period has been retained.</td></tr>
<tr><td rowspan="6">6.16 Change and reason for change in population size</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>6.17 Additional information
Optional</td><td colspan="2">The number of occupied 1x1km cells is provided in 6.2 as required, however this is not considered to be a useful measure of population size or trend for this species. A more useful estimate is provided in 6.4, i.e. the mean number of adults calculated over three consecutive breeding seasons - 2016-2018 (Reyne et al., in prep.).
Toad populations will fluctuate naturally from year to year in response to their boom-or-bust breeding ecology (Beebee & Griffiths, 2000). Population estimates, which are normally derived from egg string counts, are further complicated by the need to assume a ratio of males to females plus variations in the proportion of the total adult population that breeds in any particular year. Bécart et al. (2007) and Sweeney et al. (2013) assumed a 1:1 male to female sex ratio and that 35% of females did not spawn in an average year. They included correction factors to account for these assumptions in their adult population calculations – in effect multiplying the egg-string count by 3.077. However, in dry years, when many breeding sites fail to form, the proportion of non-breeding females may be considerably higher than 35% (T. Beebee, pers. comm.) and in wet years it may be lower. The intensive surveys in 2011 and 2012 were impacted by unseasonably dry conditions. The resulting population estimates [3,385 (2011); 3,446 (2012)] were likely to be underestimates of the true population, although to what extent is not clear. Using the same assumptions Reyne et al. (in prep.) calculated the population of toads in Kerry over their three-year study as 9,914 (2016), 4,458 (2017) and 8,250 (2018) respectively. These are higher than 2011 and 2012, but lower than 2005 and 2006. They go on to examine the enormous potential for uncertainty when extrapolating from egg string numbers to adult population “the total population could have been as low as 3,578 and as high as 30,905” before concluding that population trends should in future be directly based on egg-string counts without extrapolation.
We have good data on toad spawning activity from eight of the last 15 years. Nonetheless, we have had to conclude that population trend is</td></tr>
</table>

	uncertain. In this species, estimates of population trend are complicated by: a) inter-annual fluctuations in population size due to its boom-or-bust reproductive strategy; b) the variable proportion of females breeding in any given year; and c) the absence of validated sex ratio figures for natterjacks at Irish breeding sites. A better understanding of these variables in the Irish context is required to allow robust assessments of population trend in the future. The number of egg strings has been demonstrated as the best available method of tracking population change (Reyne *et al*., in prep.) and this is the parameter that we will continue to measure in Ireland. For the purposes of Art. 17 reports, unless egg strings is added as an alternative reporting unit, the number of egg strings will be multiplied x3.077 (see above) to provide a rough number of adults. The Favourable Reference Population of c. 13,000 adult toads (i.e. 4225 egg strings) that was calculated for the 2007 reporting period and used again in 2013 is based on an average population estimate of c. 9,000 adults from all breeding sites for the 2004-2006 breeding seasons (Bécart *et al*., 2007) plus an additional estimate of the lower density of toads required in the connecting habitat between main breeding sites necessary to ensure long-term viability of the species (see NPWS, 2007). The FRP from the previous reporting period is retained. The current population (in 6.4(d)) is estimated to be roughly 40% below FRP.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? YES/**NO**/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/**NO***
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	*stable / **increasing** / decreasing / uncertain / unknown*
7.5 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*

7.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	Toads require suitable waterbodies for breeding as well as suitable terrestrial habitat for foraging, dispersal and overwintering. Some excellent breeding areas occur within the current range with complexes of ponds connected by good feeding habitat, e.g. Magharees, Roscullen, Inch. However, in other areas ponds are isolated, or surrounded by unsuitable vegetation, or the ponds are overgrown or prone to early desiccation. NPWS's pond creation scheme has led to 100 new ponds being dug for toads and areas around these being managed for toads. Some of these have already proved suitable and been colonised but others have not and the habitat management at several sites has been questioned (Reyne *et al*., in prep.). Overall, although some habitat in good condition is available and some new breeding habitats have been created and are being managed, the absence of suitable habitat from extensive areas of the favourable range is limiting the potential for this species to thrive. Habitat area and quality are estimated, based on expert judgement, as inadequate but improving.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**A06** Abandonment of grassland management (H) **J01** Mixed source pollution (H) **L06** Interspecific faunal relationships (H) **I02** Other invasive alien species (M) **L02** Natural succession (M)	**A06** Abandonment of grassland management (H) **J01** Mixed source pollution (H) **L06** Interspecific faunal relationships (H) **I02** Other invasive alien species (M)
8.2 Sources of information *Optional*	Reyne, M. *et al*. (in prep.) Natterjack toad (*Epidalea calamita*) monitoring and conservation status 2016-2018. *Irish Wildlife Manuals* 10X. Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland. www.npws.ie/publications	
8.3 Additional information *Optional*	Reyne *et al*. (in prep.) provide a detailed and up-to-date assessment of the current pressures impacting on the natterjack toad in Kerry. Only pressures identified at more than 5% of sites are listed in 8.1. Pressures impacting more than 10% of sites are considered to be of High importance. Poor water quality (often characterised by algal blooms) was the most common threat, followed by lack of grazing/grassland management and interspecific faunal relationships (i.e. predation of tadpoles and eggs by invertebrates). Natural succession (L02) relates to ponds becoming overgrown with emergent vegetation, making them unsuitable for breeding, while the invasive species recorded (I02) were *Crassula helmsii* and *Hippophae rhamnoides.* All current pressures are also listed as threats as they are likely to continue into the future without concerted intervention. Poor water quality was not noted amongst the main threats in the 2013 assessment, suggesting that this is a relatively new problem for these sites. It was noted at artificial ponds as well as natural sites and was particularly evident at Lough Yganavan. Water abstraction was included in 2013 and is mentioned as a potential concern in Reyne *et al*. (in prep.), but it is not clear to what extent this is a real pressure and so it not listed this time. Further information is needed on the pattern and impacts of water abstraction on the dune slacks in the Magharees in particular. Although not included as a threat yet as it may be expected to act over a longer time frame, the potential for climate change to impact on the conservation status of the toad merits further investigation, in particular given the demonstrated effect of seasonal rainfall and temperature patterns on the species' reproductive success (Reyne *et al*., in prep.).	

9 Conservation measures

To be reported only for Annex II species

10 Future prospects		
10.1 Future prospects of parameters	**a) Range**	*Good / Poor / **Bad** / Unknown*
	b) Population	*Good / Poor / **Bad** / Unknown*
	c) Habitat of the species	*Good / **Poor** / Bad / Unknown*
10.2 Additional information *Optional*	A number of breeding sites have worryingly low numbers of spawn strings recorded in recent years and are vulnerable to extinction. On the other hand, the pond creation scheme is continuing to bring some benefits and additional conservation measures (i.e. translocation and captive rearing) have begun in recent years. Overall the threats and conservation measures are expected to balance each other out, with no significant change expected in the short term for the status of Range, Population or Habitat. While a continuation of the current conservation measures will help to offset the pressures on the toad population, significant additional investment will be needed to effect a marked improvement in the status of the natterjack in the medium to long term. This might take the form of a well-resourced and designed agri-environment scheme aimed at toad habitat creation and management in the relevant areas of Kerry.	

11 Conclusions			
Assessment of conservation status at end of reporting period			
11.1 Range	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
11.2 Population	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
11.3 Habitat for the species	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	*Favourable (FV) / Inadequate (U1)/ **Bad (U2)** / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / **Bad (U2)** / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating / **stable** / unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	***YES**/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	***YES**/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	The toad's range has increased since the Directive came into force. However, its current range is still significantly less than the historical range of the species due to an extensive contraction in distribution in the first half of the 20th century. Reinstatement of the historical range is deemed necessary to ensure the long-term survival of this species in Ireland. Range is considered Unfavourable-Bad. Natterjack populations are difficult to assess (see 6.17) and while the recent trend is uncertain, sustained improvement is clearly needed before FRP is reached. Population is assessed as Unfavourable-Bad. Habitat is considered Inadequate. A substantial amount of toad breeding habitat was lost due to drainage in the first half of the 20th century and although there are significant areas of suitable terrestrial habitat, suitable water bodies for spawning remain limited over much of its range. The last decade has seen a major programme of pond creation for the toad with 100 ponds dug and 22 colonised to date. Although there are still large areas of the favourable range without breeding waters, the pond scheme has significantly increased the availability of breeding sites for the species both within its current range and the wider area of its favourable reference range. Further pond creation is required and a stronger focus on habitat management around and between ponds will be necessary to allow toads to colonise and to thrive in these areas. The overall status of the toad is Unfavourable-Bad. The change in overall trend (from increasing to stable) reflects the most recent survey data, which indicates that the uptake of constructed ponds has not continued at the rate seen in the previous report. While a continuation of the current conservation measures will help to offset the pressures on the toad population, they will not on their own produce the necessary enhancements to restore conservation status. Significant additional investment is going to be needed to effect a marked improvement in the status of the natterjack in the medium to long term. This might take the form of a well-resourced and tailored agri-environment scheme aimed at toad habitat		

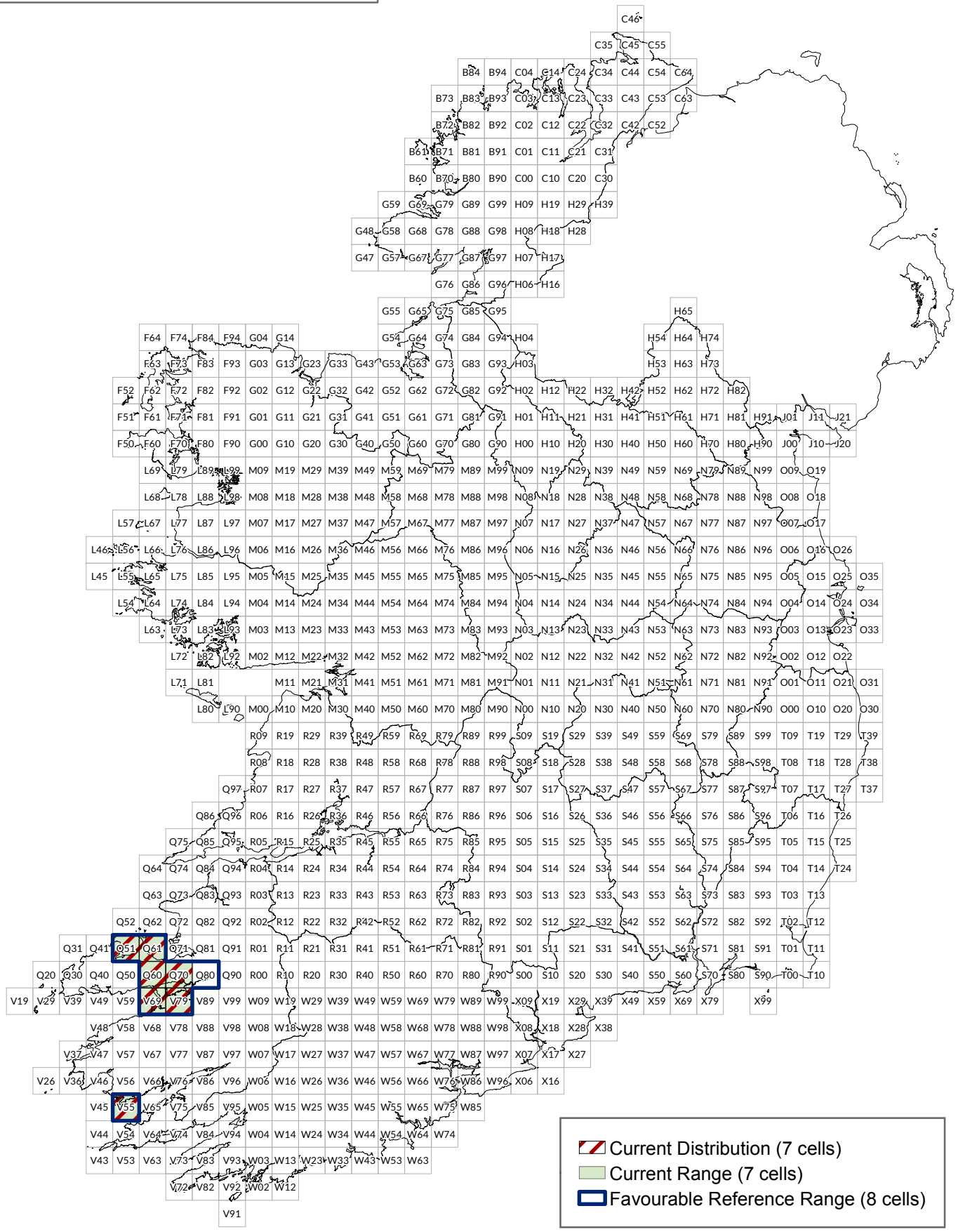
	creation and management across the species' historical range in Kerry.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Natterjack Toad
Epidalea calamita (6284)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1213***
1.3 Species scientific name	*Rana temporaria*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Common frog (loscán)
1.6i Species description	Common frog is one of only three amphibians found in Ireland. It is a widespread and very abundant species throughout the country, occurring in a broad range of habitats from uplands to urban gardens. Adults congregate to spawn in ponds, marshes and ditches in the spring. Eggs develop into tadpoles as water temperature rises and, following metamorphosis, young froglets emerge onto land in early summer. These young animals are particularly vulnerable to predation, but adult frogs are also an important prey item for several predators including otters and herons. Young frogs spend 2-3 years on land, feeding on terrestrial invertebrates, before returning to freshwater to breed. Life expectancy of 3-4 years would be typical.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2007-2018***
2.3 Distribution map	Submitted
2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted

2.6i Additional information	The distribution map represents data received between January 2007 and June 2018. Much of it comes from the National Survey conducted by NPWS in 2010/2011. Additional distribution records for the frog were collated by the National Biodiversity Data Centre (NBDC). In total, over 2,855 records of frogs were collated between January 2007 and June 2018. They include sightings of spawn, tadpoles and adults. While many of the records came from members of the public, there is only one frog species in Ireland, making records from the public very reliable. The resulting map is considered to give an accurate reflection of the current distribution of the frog in Ireland.

3 Information related to Annex V species (Art. 14)

3.1 Is the species taken in the wild/exploited?	*Is the species taken in the wild/exploited? YES/**NO***

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
4.2 Sources of information	Reid, N., Dingerkus, S.K., Stone, R.E., Buckley, J., Beebee, T.J.C. and Wilkinson, J.W. (2013a) National Frog Survey of Ireland 2010/11. *Irish Wildlife Manuals*, No. 58. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Reid, N., Dingerkus, K. Stone, R.E., Kelly, R., Buckley, J., Beebee, T.J.C., Marnell, F. and Wilkinson, J.W. (2013b) Population enumeration and assessing conservation status in a widespread amphibian: a case study of *Rana temporaria* in Ireland. *Animal Conservation* 16(5): 519–527. Reid, N., Dingerkus, K., Stone, R.E., Buckley, J., Beebee, T.J.C., Marnell, F. and Wilkinson, J.W. (2014) Assessing historical and current threats to common frog *Rana temporaria* populations in Ireland. *J. of Herpetology* 48 (1): 13-19.
4.2i Additional information	Dibner, R., Lawton, C. and Marnell, F. (2014) Reproduction of common frogs, *Rana temporaria*, in a managed conifer forest and bog landscape in western Ireland. *Herpetological Conservation and Biology* 9(1): 38−47. Dingerkus, S.K., Stone, R.E., Wilkinson, J.W., Marnell, F. and Reid, N. (2011) Developing a methodology for the National Frog Survey of Ireland: a pilot study in Co. Mayo. *Irish Naturalists' Journal* 31(2): 85-90. Marnell, F. (1998a) Discriminant analysis of the terrestrial and aquatic

	habitat determinants of the smooth newt (*Triturus vulgaris*) and the common frog (*Rana temporaria*) in Ireland. *J. Zoology* 244: 1-6. Marnell, F. (1998b) The distribution of the smooth newt, *Triturus vulgaris* L., in Ireland. *Bulletin of the Irish Biogeographical Society* 22: 84-96. Marnell, F. (1999) The distribution of the Common Frog *Rana temporaria* L. in Ireland. *Bulletin of the Irish Biogeographical Society* 23: 60-70.

5 Range		
Range within the biogeographical/marine region concerned.		
5.1 Surface area	***84,400 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994–2018***	
5.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	
5.10 Favourable reference	***a) 84,400 km²***	

range	*b) Indicate if operators were used (use these 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 total land area of Ireland (minus off-shore islands without records) is considered to be the range of the frog – 844 x 10km squares. This figure is also taken as the Favourable Reference Range (FRR).	
5.11 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***	
5.12 Additional information *Optional*	The range envelope is based on the distribution data collected from 2007-2018. This translated to 612 x 10km squares. Gaps in the range were filled on the basis that the species is ubiquitous in Ireland and suitable habitat is present throughout the land mass. The only exceptions were off-shore islands; these were only included where records of frogs were confirmed. In effect the total land area of Ireland (minus off-shore islands without records) is considered to be the range of the frog – 844 x 10km squares. This figure is also taken as the Favourable Reference Range (FRR). The removal of the off-shore islands without records from the range and FRR is the only change since the 2013 report.	

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2007-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***1,845***
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval /* ***minimum***	
6.4 Additional population	**a) Unit**	***Number of adults***

size *(using population unit other than reporting unit)* *Optional*	**b) Minimum**	***104,000,000***
	c) Maximum	***310,000,000***
	d) Best single value	***165,000,000***
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean /* ***95% confidence interval*** */ minimum*	
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

<table>
<tr><td>6.14 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">6.15 Favourable reference population
(using the unit in 6.2 or 6.4)</td><td colspan="2">a) 104,000,000 adults</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 population is unknown indicate by using ‘x’</td></tr>
<tr><td colspan="2">d) Indicate method used to set reference value if other than operators
Favourable reference population has been taken as 104M, the lower 95% confidence interval for the baseline estimates produced from the 2010/11 survey (Reid et al., 2013a, b). This is considered to be a minimum value and is considered sufficient to ensure the long-term survival of the species.</td></tr>
<tr><td rowspan="6">6.16 Change and reason for change in population size</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>YES/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>6.17 Additional information

Optional</td><td colspan="2">Two population estimates are provided, in 6.2 and 6.4 above. The number of occupied 1x1 km grids (1,845) is based on distribution data collated between January 2007 and June 2018. This is considered to significantly under-represent the true distribution of the species and is, therefore, not considered to be a useful proxy for population.
The number of adults (as given in 6.4) is derived from the national survey conducted in 2010/2011: population density was calculated as 15-44 adult frogs/ha, extrapolating to a national population estimate of c.165M (104-310M). See Reid et al. (2013a, b) for full details.
Amphibian populations are characterised by high inter-annual amplitude in abundance. However, there is no evidence to suggest that the overall short-term or long-term trend in frog numbers is increasing or decreasing. Both trends have been assumed to be stable.
Favourable reference population has been taken as 104M, the lower 95% confidence interval for the baseline estimates produced from the 2010/11 survey (Reid et al., 2013a, b). This is considered to be a minimum value and is considered sufficient to ensure the long-term</td></tr>
</table>

	survival of the species.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	***stable** / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	The frog is an extremely adaptable species. A total of 2% of the total land area of Ireland was estimated to be suitable as frog breeding habitat during the 2010/11 survey (Reid *et al*. 2013a). However, it should be noted that any area may be suitable for frogs outside the breeding season as no habitats appear to be avoided. See Reid *et al*. (2013a) for more details. Reid *et al*. (2014) concluded that the common frog appears largely unaffected in Ireland by pollution and disturbance. They also noted that despite the losses of ponds and natural wetland habitats

	throughout the country the frog has adapted to other breeding sites, in particular artificial field margin ditches which are common across the landscape. On this basis, the availability of suitable habitat is considered to have remained stable over both the short term and the long term.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**Xxp** No pressures	**Xxt** No threats
8.2 Sources of information *Optional*		
8.3 Additional information *Optional*	Reid *et al*. (2014) reviewed the threats to frog populations in Ireland. They concluded that the common frog appears largely unaffected by pollution and disturbance. They also examined the impact of pond loss throughout Ireland over a period of approximately 125 years. They calculated that the numbers of farmland ponds declined by 54% between the end of the 19th century and the start of the 21st century. Losses were coincident with major changes to the agricultural landscape including extensive land drainage. However, they concluded that the losses of pond and natural wetland habitats throughout Ireland may have been partially or wholly mitigated by a synchronous expansion of artificial field margin ditches associated with drainage projects during the mid-20th century. In summary, given the widespread, abundant and adaptable nature of the species, no significant pressures or threats have been identified. All those identified in the Article 17 report of 2013 were considered then, and are considered still, to be of low importance.	

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of	**a) Range**	***Good*** */ Poor / Bad / Unknown*

parameters	**b) Population**	***Good*** */ Poor / Bad / Unknown*
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	*Rana temporaria* is a widespread and abundant species in Ireland. It is found throughout the country, has a broad habitat niche and is adaptable to changes in land practices. The species has colonised garden ponds in urban areas and adapted to drainage ditches in agricultural areas. The most recent national survey estimated the population at over 150M adults, making it one of the most numerous vertebrates in the country.	

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*improving / deteriorating /* ***stable*** */ unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the nature of change	*YES/NO*	*YES/NO*

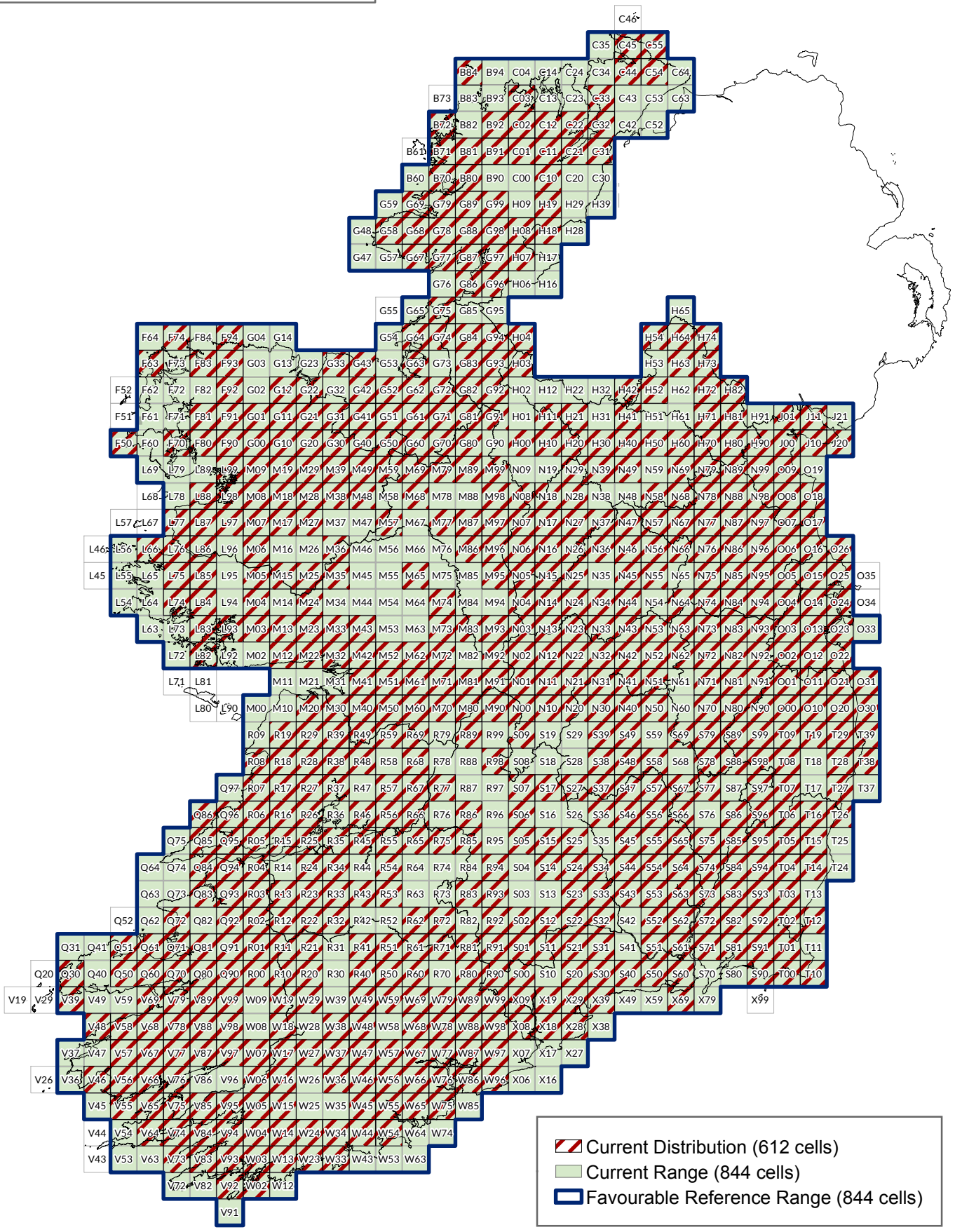
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
11.8 Additional information *Optional*	*Rana temporaria* is a widespread and very abundant species in Ireland. It is found throughout the country, has a broad habitat niche and is adaptable to changes in land practices. The species has colonised garden ponds in urban areas and drainage ditches in agricultural areas. The most recent national survey estimated the population at over 150,000,000 adults, making it one of the most numerous vertebrates in the country. No significant threats to the frog population have been identified. Its conservation status is considered to be Favourable.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Common frog
Rana temporaria (1213)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1223***
1.3 Species scientific name	*Dermochelys coriacea*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Leatherback turtle
1.6i Species description	The leatherback turtle (*Dermochelys coriacea*) is the most widely distributed living reptile species, being found in all oceans except the Southern Ocean. Within the North Atlantic its range extends from the tropics to the high latitudes of Newfoundland right across to Europe's north-westerly fringe. It is a widely roaming species, with individuals making extensive pan-oceanic movements. Breeding is confined to warm tropical regions because of thermal constraints on egg incubation, but the species has many unique anatomical and physiological adaptations that permit it, unlike other marine turtles, to forage seasonally into cooler temperate waters. Consequently, leatherback populations have a very dynamic range. During the summer months their range is at its greatest extent with individuals located throughout the North Atlantic, whereas during the winter months their range is restricted to areas where the sea surface temperature is >15 °C. Recent studies have shown that after nesting in the tropics the majority of North Atlantic leatherbacks head north towards cooler temperate waters. Some of these individuals head north towards the north-east Atlantic and Irish waters where they forage on jellyfish for the summer months before turning south again in the autumn as water temperatures decline.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2000-2018***
2.3 Distribution map	Submitted
2.4 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*

2.5 Additional maps *Optional*	Range map was submitted
2.6i Additional information	The map shows all known records from 2000 to 2018, i.e. 198 records, covering 41 x 50km grid cells. The distribution records included in the map come primarily from the TURTLE database – a collation of records from Ireland and the UK managed by Marine Environment Monitoring – with some additional records from Cape Clear Observatory collated by Tom Doyle of University College Cork. The quality of the data is considered to be good as the leatherback turtle is a distinctive species and the data comes from reliable sources.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

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

4.2 Sources of information	Doyle, T. K. (2007) Leatherback Sea Turtles (*Dermochelys coriacea*) in Irish waters. *Irish Wildlife Manuals* No. 32. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. Doyle, T., Houghton, J.D.R., Ó Súilleabháin, P.F., Hobson, V., Marnell, F., Davenport, J. and Hays, G.C. (2008) Leatherback turtles satellite-tagged in European waters. *Endangered Species Research* 4:23-31. Hamelin, K.M., James, M.C., Ledwell, W., Huntington, J. and Martin, K. (2017) Incidental capture of leatherback sea turtles in fixed fishing gear off Atlantic Canada: Incidental capture of leatherback turtles in Atlantic Canada. *Aquatic Conserv: Mar Freshw Ecosyst*. 2017: 1-12. Houghton, J.D.R., Doyle, T.K., Wilson, M.W., Davenport, J. and Hays, G.C. (2006) Jellyfish aggregations and leatherback turtle foraging patterns in a temperate coastal environment. *Ecology* 87:1967-1972. Huang, H-W. (2015) Conservation Hotspots for the Turtles on the High Seas of the Atlantic Ocean. PLoS ONE 10(8): e0133614. https://doi.org/10.1371/journal.pone.0133614 Lewison, R. L., Freeman, S.A. and Crowder, L.B. (2004) Quantifying the effects of fisheries on threatened species: The impact of pelagic longlines on loggerhead and leatherback sea turtles. *Ecology Letters* 7(3):221 – 231. ObSERVE (2018) Final report https://www.dccae.gov.ie/ObSERVE Pierpoint, C. (2000) Bycatch of marine turtles in UK and Irish waters. JNCC Report No. 310. JNCC, Peterborough, UK. Rivalan, P., Dutton, P.H., Baudry, E., Roden, S.E. and Girondot, M. (2006) Demographic scenario inferred from genetic data in leatherback turtles nesting in French Guiana and Suriname. *Biol. Conservation* 130:1-9. TURTLE database (2018) Marine Environmental Monitoring, Wales.
4.2i Additional information	Dodge, K. L., Galuardi, B., Miller, T. J. and Lutcavage, M. E. (2014). Leatherback Turtle Movements, Dive Behavior, and Habitat Characteristics in Ecoregions of the Northwest Atlantic Ocean. *PLoS ONE* 9(3): e91726. http://doi.org/10.1371/journal.pone.0091726 Dutton, D.L., Dutton, P.H., Chaloupka, M. and Boulon, R.H. (2005) Increase of a Caribbean leatherback turtle *Dermochelys coriacea* nesting population linked to long-term nest protection. *Biological Conservation* 126:186-194. Eckert, S.A. (2006) High-use oceanic areas for Atlantic leatherback sea turtles (*Dermochelys coriacea*) as identified using satellite telemetered location and dive information. *Marine Biology* 149:1257-1267. Hays, G.C., Hobson, V.J., Metcalfe, J.D., Righton, D. and Sims, D.W. (2006) Flexible foraging movements of leatherback turtles across the North Atlantic Ocean. *Ecology* 87:2647-2656. James, M.C., Eckert, S.A. and Myers, R.A. (2005) Migratory and reproductive movements of male leatherback turtles (*Dermochelys coriacea*). *Marine Biology* 147:845-853.

	King, G.L. and Berrow, S.D. (2009) Marine turtles in Irish waters. *Irish Naturalist's Journal* 30: Special Zoological Supplement. McMahon, C.R. and Hays, G.C. (2006) Thermal niche, large-scale movements and implications of climate change for a critically endangered marine vertebrate. *Global Change Biology* 12:1330-1338. Pierpoint, C. and Penrose, R. (1999) TURTLE: A Database of marine turtle records for the United Kingdom & Eire. Marine Environment Monitoring, Wales. Witt, M.J., Broderick, A.C., Johns, D.J., Martin, C., Penrose, R., Hoogmoed, M.S. and Godley, B.J. (2007) Prey landscapes help identify potential foraging habitats for leatherback turtles in the NE Atlantic. *Marine Ecology Progress Series.* 337: 231–244. Witt, M. J., *et al*. (2009). Aerial surveying of the world's largest leatherback turtle rookery: A more effective methodology for large-scale monitoring. *Biological Conservation* 142:1719–1727.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***142,500***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	*stable / increasing / decreasing / uncertain /* ***unknown***	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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***	
5.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	

5.9 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*	
5.10 Favourable reference range	*a) In km² or*	
	b) Indicate if operators were used (use these symbols ≈, >, >>) or	
	c) Favourable reference range is unknown	
	d) Indicate method used to set reference value if other than operators	
5.11 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*	
5.12 Additional information *Optional*	The TURTLE database is used to collate all leatherback records from Ireland and the UK. It is clear that leatherbacks migrate through Irish waters each year (with 198 records since 2000) and while most records are from sightings near to the coast, or strandings, they can also be encountered off-shore. It is likely that some off-shore areas are more important for this species than others; that some areas are important foraging grounds at certain times with significant concentrations of jellyfish whereas other areas are not. However it is not possible to identify these areas at this time and indeed these areas may vary between years depending on currents, sea-surface temperatures, upwellings and other hydromorphological parameters. For the last assessment (2013), it was assumed that the entire extent of Ireland's EEZ could constitute the range of the leatherback turtle. However, the results from the extensive ObSERVE aerial survey project in 2015-2016 may indicate a more restricted range than previously thought. That project was aimed at off-shore cetaceans but also recorded other megafauna and resulted in over 600,000 km^2 of sea being surveyed, but only recorded three turtles, all from the Celtic shelf (ObSERVE, 2018). Consequently, pending further survey work, (and it is noted that the ObSERVE surveys did not extend into August when many previous turtle records have been made), the range of this species is taken as the area incorporating the distribution records for 2000-2018.	

	Records of the leatherback turtle are sporadic and scattered around Irish waters; there is no information available to allow us to calculate changes in the range of this species and no trend can be estimated. Despite extensive offshore survey work in recent years (e.g. the ObSERVE project covered *ca*. 300,000 km^2 in 2015 and *ca.* 340,000 km^2 in 2016) almost no data on leatherback distribution were acquired. We still have much to learn about the migration patterns and seasonal behaviour of leatherbacks in the Northeast Atlantic. For now a definitive statement cannot be made on Favourable Reference Range.

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	***2016-2017***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	
	c) Maximum	
	d) Best single value	***3***
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval /* ***minimum***	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing / decreasing / uncertain /* ***unknown***	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

6.10 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***	
6.11 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) Population size (with unit) or*	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) Favourable reference population is unknown	
	d) Indicate method used to set reference value if other than operators *Free text*	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information *Optional*	Providing even a rough estimate of the number of leatherback turtles foraging within Irish waters is difficult as the area in question is enormous and the animal's numbers may be extremely low (Houghton *et al*., 2006). Population estimates are further complicated	

	by the inherent variability between years as a result of climate, long-term population cycles (Rivalan *et al*., 2006), and variation in gelatinous zooplankton biomass and distribution. Also, many animals may simply be passing through Irish waters whereas others may reside for longer periods (Doyle *et al*., 2008). Using leatherback sightings as an index of abundance can be informative, however variability in the reporting mechanisms, their consistency and effort, can mask any real trends. Determining if two sightings were of the same animal or two different animals can also add confusion to this index. The aerial survey estimates provided by Doyle *et al*. (2008) - 0.25 leatherbacks per 1000 km (or 0.06 leatherbacks per 100 km^2) - represent the only real estimate of leatherback activity in Irish waters to date. That figure was extrapolated to an estimate to 2-3,000 leatherbacks passing through or residing in Irish waters each year - which may be equivalent to 2-5% of the Atlantic population. However, it must be recognised that the confidence intervals for this estimate would be very large and that figures will vary annually for natural reasons. To complicate matters further, the ObSERVE project, which resulted in over 600,000 km^2 of aerial coverage in 2015-2016, only recorded three turtles, suggesting that numbers may be lower and/or even more variable than previously thought. For now, it is not possible to estimate the number of leatherbacks using Irish waters and this figure of three turtles seen is provided as an absolute minimum population estimate. With regard to population trend, leatherbacks are encountered in small numbers in Irish waters and it is not possible to judge whether numbers are increasing, decreasing or stable. Given concerns about the global decline of this species, further work is required throughout the North Atlantic and at the turtle's nesting beaches in the tropics to establish the full conservation status of this animal. Arising from that work a meaningful estimate of favourable reference population could be possible for the north Atlantic and for Irish waters. In the meantime, this parameter is considered to be Unknown.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? YES/NO/**Unknown*** *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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***
7.3 Short-term trend Period	***2007–2018***

7.4 Short-term trend Direction	*stable / increasing / decreasing / uncertain / **unknown***
7.5 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***
7.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	Little is known about the habitat requirements of the leatherback turtle in North Atlantic waters. It is clear that leatherbacks migrate through Irish waters each year and while most records are from strandings or sightings near to the coast, they are also encountered off-shore. The purpose of this migration appears to be solely related to food availability. It is likely that some offshore areas are more important than others; that some areas are important foraging grounds at certain times with significant concentrations of jellyfish whereas other areas are not. These areas are also likely to vary between years. However it is not possible to identify or characterise these areas at this time.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**Xe** Threats and pressures from outside the EU territory (H) **G12** Bycatch and incidental killing (M)	**Xe** Threats and pressures from outside the EU territory (H) **G12** Bycatch and incidental killing (M)

8.2 Sources of information *Optional*	
8.3 Additional information *Optional*	The turtles that migrate through Irish waters mate and breed in the tropics. The main known pressures relate to anthropogenic mortalities of adults, eggs and juveniles at nesting beaches in the Caribbean and northern coast of South America (e.g. French Guiana). These include direct predation by humans and dogs, disturbance of nesting females, damage to nests and eggs, and mortality of hatchlings due to disorientation arising from artificial light pollution and other tourist-related activities. Entanglement in fishing equipment in the coastal waters adjacent to nesting beaches can also lead to mortality. All of these are grouped in 8.1 as "Threats and pressure from outside the EU" and although further quantification is needed, they are considered to be of High importance. Long-line fishing in the Pacific is a significant cause of mortality, and this is also considered a risk in the North Atlantic (Lewison *et al*., 2004; Pierpoint, 2000; Huang, 2015), although the impact has not been fully quantified. Bycatch in fishing gear generally has also been identified as a significant concern (e.g. Hamelin *et al*., 2017). In Irish coastal waters animals have died and been injured as a result of becoming entangled in ropes associated with lobster and crab fisheries. Collisions with pleasure boats has been reported as a cause for concern for turtles in some waters, but this is not thought to be a significant issue in Irish waters. Despite successes at some tropical beaches, e.g. in Trinidad where nesting beaches are carefully patrolled and tourist disturbance is restricted, the current pressures are considered likely to continue as threats into the foreseeable future. Further research is required on the extent and severity of the impact of these on the North Atlantic population of leatherback turtle.

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	*Good / Poor / Bad /* ***Unknown***
	b) Population	*Good / Poor / Bad /* ***Unknown***
	c) Habitat of the species	*Good / Poor / Bad /* ***Unknown***
10.2 Additional information *Optional*	The most significant threats to this species occur outside Irish territorial waters at their nesting beaches and from fishing activities in international waters of the north Atlantic. Consequently, future prospects will be largely determined by international conservation efforts. Surveys of the nesting beaches in South America and Florida suggest that conservation efforts there are producing signs of population increases (Stewart *et al*., 2011). However, bycatch is	

	undoubtedly under-reported and further efforts are required to minimise the risk from fisheries (Hamelin *et al*., 2017). There is some evidence to suggest that the leatherback population in the North Atlantic has a more favourable future than the population in the Pacific, but given the collapse of the Pacific population that is of limited comfort. Our understanding of the population ecology, migration patterns and habitat utilisation of this species is very limited, and consequently Future prospects have been assessed as Unknown.

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***		
11.2 Population	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***		
11.3 Habitat for the species	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***		
11.4 Future prospects	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***		
11.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating / stable / unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the nature of change	*YES/NO*	*YES/NO*

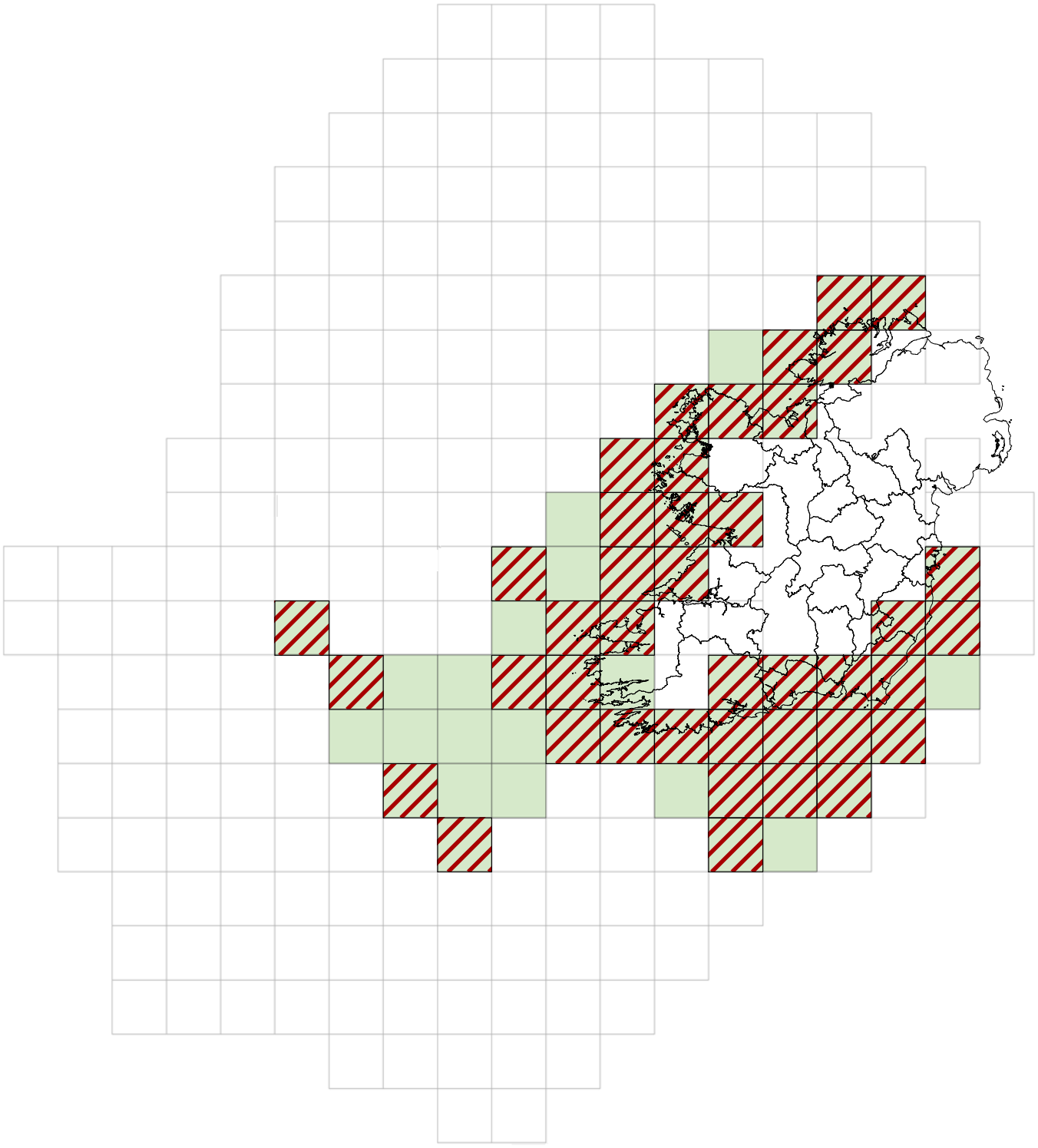
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
11.8 Additional information *Optional*	There are significant difficulties associated with reporting on this species. Despite some recent progress, the population ecology, range and habitat utilisation of this species in the NE Atlantic are not well understood. Although there is evidence of significant declines of leatherbacks in the Pacific, there are some indications that the Atlantic populations may be faring better, with recent surveys suggesting that numbers of females may be increasing at some nesting beaches. Nonetheless, mortalities of nesting adults and juveniles is a cause for concern in some areas and fishing causes further mortality during the animal's trans-Atlantic migrations. The Range, Population and Habitat have all been assessed as Unknown. A full assessment of the Future prospects is not possible at this stage and overall the status of this species is considered Unknown.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Leatherback turtle
Dermochelys coriacea (1223)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 25 50 100 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Species code	***1303***
1.3 Species scientific name	*Rhinolophus hipposideros*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Lesser horseshoe bat (Crú-ialtóg beag)
1.6i Species description	The lesser horseshoe bat (*Rhinolophus hipposideros*) is widely distributed through western, central and southern Europe and as far east as Kashmir, northern Africa and Arabia. Ireland represents the most north-westerly limit of the species' distribution and here it is confined to six west coast counties: Mayo, Galway, Clare, Limerick, Cork and Kerry. Lesser horseshoe bats are faithful to their roosts and will return to the same site each year. Summer roosts are often in the attics of old or derelict buildings. Hibernation sites are typically in caves, souterrains, cellars and icehouses. Lesser horseshoes rely on linear landscape features (e.g. treelines, stone walls and hedgerows) to navigate and commute from roosts to feeding sites and are reluctant to fly out in the open. The bats forage on flying insects predominantly in deciduous woodland and riparian vegetation normally within a few km of their roosts.

2 Maps

Distribution of the species within the Member State concerned.

2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2013-2018***
2.3 Distribution map	Submitted
2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted

2.6i Additional information	The lesser horseshoe bat has been well surveyed over the last 30 years (e.g. Kelleher, 2004; Roche, 2001) and NPWS holds a comprehensive dataset of roost locations. That said, new roosts are occasionally found and there are certainly hibernation sites that we are not aware of. There is also a network of night roosts which individual or small numbers of bats may occasionally use and these have not been comprehensively documented or surveyed. The lesser horseshoe bat is monitored at a wide range of summer and winter roosts across its distribution every year. In addition, a smaller number of peripheral roosts are surveyed on an *ad hoc* basis. All the resulting data is collated in a central database. The records for the current reporting period alone (2013-2018) are included in the distribution map provided. Monitoring of the lesser horseshoe bat is carried out by staff of NPWS and the Vincent Wildlife Trust (VWT) and the quality of the data is excellent.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
4.2 Sources of information	Aughney, T., Roche, N. and 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. DAFM (2018) Forest statistics – Ireland 2017. Department of Agriculture, Food and the Marine, Johnstown Castle Estate, Co. Wexford. Dool S.E., Puechmaille, S.J., Kelleher, C., McAney, K. and 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. Harrington, A. (2018) Assessment of the sex ratio of adult bats in lesser horseshoe summer roosts in Ireland. Unpublished report to NPWS. Part of PhD Thesis submitted to Waterford Institute of Technology. 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. NPWS (2013) Article 17 report. NPWS, Department of Arts, Heritage and the Gaeltacht, Dublin. Roche, N., Langton, S. and 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. and 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. and Lundy, M. (2014) *Irish bats in the 21st century*. Bat Conservation Ireland, Ulex House, Drumheel, Lisduff, Virginia, Co. Cavan, Ireland.
4.2i Additional information	Biggane, S. (2003) The lesser horseshoe bat *Rhinolophus hipposideros* (Bechstein 1800) at Dromore, Co. Clare: diet, foraging activity, habitat selection and nocturnal behaviour. Ph.D. Thesis, National University of Ireland, Galway, Ireland. Bontadina, F., Schofield, H. and Naef-Daenzer, B. (2002) Radio-tracking reveals that lesser horseshoe bats (*Rhinolophus hipposideros*) forage in woodland. *Journal of Zoology* 258: 281–290. European Commission (2013) Interpretation Manual of European Union Habitats - EUR 28. DG Environment - Nature and Biodiversity, Brussels, Belgium. Kelleher, C. and Marnell, F. (2006) Bat Mitigation Guidelines for Ireland. *Irish Wildlife Manuals* No. 25. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. Knight, T. and Jones, G. (2009) Importance of night roosts for bat conservation: roosting behaviour of the lesser horseshoe bat *Rhinolophus hipposideros*. *Endangered Species Research* 8: 79–86. Lysaght, L. and Marnell, F. (eds) (2016) *Atlas of Mammals in Ireland 2010-2015*, National Biodiversity Data Centre, Waterford. Marnell, F., Kingston, N. and Looney, D. (2009) *Ireland Red List No. 3: Terrestrial Mammals*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. McAney, C.M. (1994) The lesser horseshoe bat in Ireland - past, present and future. *Folia Zoologica* 43(4): 387–392. McAney, K., O'Mahony, C., Kelleher, C., Taylor, A. and Biggane, S. (2013) The Lesser Horseshoe Bat in Ireland: Surveys by The Vincent Wildlife Trust. *Irish Naturalists' Journal*, Occasional Publication.

	McGuire, C. (1998) Survey of lesser horseshoe bats *Rhinolophus hipposideros* (Bechstein) and other bat species in north Co. Clare. *Irish Naturalists' Journal* 26: 43–50. Mitchell-Jones, A.J., Amori, G., Bogdanowicz, W., Krystufek, B., Reijnders, P.J.H., Spitzenberger, F., Stubbe, M., Thissen, J.B.M., Vohralik, V. and Zima, J. (1999) *The Atlas of European Mammals*. Poyser Natural History. Roche, N. (2001) The status of lesser horseshoe bats *Rhinolophus hipposideros* Bechstein in Co. Limerick. *Irish Naturalists' Journal* 26: 437-484. Schofield, H. (2008) *The Lesser Horseshoe Bat Conservation Handbook*. The Vincent Wildlife Trust, Herefordshire, England. Schofield, H. *et al*. (in prep.) A review of man-made roosts for bats. Eurobats, Bonn.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***11,300 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	

5.9 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*	
5.10 Favourable reference range	***a) 11,400 km²***	
	b) Indicate if operators were used (use these 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 from the 2013 reporting period (11,400km^2) has been retained.	
5.11 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*	
5.12 Additional information *Optional*	A total of 1200 distribution records were collated for this species between 2013 and 2018. These records (which included multiple records for certain sites) translated to 74 x 10km squares. Using the range tool, with gap closure set to 20km, an additional 39 grid cells were incorporated giving a total range of 113 cells or 11,300km^2. This may slightly under-represent the current extent of the species' distribution in Ireland, as it is not feasible to survey all potential roosts around the periphery of the species range in every reporting period. Previous intensive surveys for new roosts in 2000-2002 around the edge of the species' known distribution located numerous night roosts and satellite roosts with only droppings or individual bats. Where these roosts have been resurveyed during the current reporting period and found to be empty they are not included in the distribution map. Where they have not been re-surveyed they have been retained, but will be prioritised for re-survey in the next reporting cycle. The data is mostly based on a systematic summer and winter monitoring programme undertaken by NPWS and VWT staff. The data quality is very good. Some additional squares have been added to the bat's range since 2013, notably L97 and R77. The latter represents the first record of this species east of the Shannon. However, it was a record of a single male in an occupied domestic dwelling and there is no indication of	

	an established roost in the area. L97, however, is a more typical underground roost and appears to represent a genuine expansion in the range, or at least in our knowledge of the range of the species. Despite these new squares, the range overall has contracted slightly since the last reporting period. Most of this decline is in the south and relates to a growing split between the Kerry and Limerick areas of distribution. While the beginning of this gap was first apparent in the 2013 report, it was not highlighted at that time, balanced as it was by range increases elsewhere. However, the gap has grown and the bat now appears to be completely absent from south-west Limerick and north Kerry. It is difficult to quantify the magnitude of decline in range as there have been expansions as well as contractions. However, at its simplest the extent of the current range (11,300km^2) based on records between 2013 and 2018 is c1% lower than the range reported in 2013 (11,400km^2). Further survey work is required around the periphery of the known range (particularly in the south-west) to establish whether this decline is more severe than first appearances, given that several of the roosts known from north Kerry never held many bats. For now the decline is taken to be less than 1% per year and this parameter is assessed as Unfavourable-Inadequate. The FRR from the 2013 reporting period (11,400km^2) is retained.

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2016-2017***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	
	c) Maximum	
	d) Best single value	***12,791***
6.3 Type of estimate	***Best estimate** / multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	a) Unit	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / minimum*	

6.6 Population size Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007-2018***	
6.8 Short-term trend Direction	*stable / **increasing** / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	***43%***
	b) Maximum	***44%***
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994-2018***	
6.12 Long-term trend Direction *Optional*	*stable / **increasing** / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	***62%***
	b) Maximum	***100%***
	c) Confidence interval	
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	***a) 12,791 individuals***	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) If favourable reference population 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 Population (FRP) is taken to be the same as the new current population, which in turn is based on a refinement of the 2013 population estimate. The new figure was calculated using the most up-to-date monitoring data and new evidence on gender ratios in roosts (see 6.17 for more information). It is larger than the population when the Directive came into force, and is considered large enough to allow the long-term survival of the species.</td></tr>
<tr><td rowspan="6">6.16 Change and reason for change in population size</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>6.17 Additional information

Optional</td><td colspan="2">The population estimate in 2013, which was based on summer roost counts in 2010/2011, was 14,010 (see NPWS 2013; Roche et al., 2012). The current estimate (12,791), which is based on the 2016/17 count data for 162 monitored summer roosts, looks to be a significant decrease. However, significant adjustments have been made to the population formula since 2013. New evidence shows that the percentage of males in summer roosts is nearer to 50% than the 25% figure used in our calculations last time (Harrington 2018). Using this 50% figure back in 2013 would have given us a population estimate of c.10,500. In light of this, the new figure represents a significant increase, which is in keeping with the trend data (Aughney et al., 2018).

Monitoring of lesser horseshoe bats has been going on for more than 25 years. Since 2006, counts have been conducted methodically on an annual basis at both winter and summer roosts. The short-term trend was determined from data from 2006 to 2017 but is assumed to apply also to the default reporting trend period of 2007-2018. Counts at 143 hibernation sites contribute to the winter trend analysis. The winter trend has been increasing since the start of the 1990s, with the exception of a five-year period between 2007 and 2011 when numbers were stable. In the last 12 years or so the trend index based on winter counts has increased by c.44% (Aughney et al., 2018). Results for the summer trend are very similar (+43%) and a comparable pattern has been observed in the UK. The summer and winter trends are provided as minimum and maximum values respectively in 6.9. Long-term trend figures based on winter and summer counts are also available for this species and are provided in 6.13 above. While these figures were based on data from 1998 to</td></tr>
</table>

	2017, they are assumed to apply to the default trend of 1994-2018. See Aughney *et al.* (2018) for full details of the calculations and associated errors. The new population estimate is taken as the new FRP. It is higher than when the Directive came into force and is considered sufficient to allow the long-term viability of the species with built-in capacity to allow for recolonisation of the areas of lost range.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? YES/**NO**/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/**NO**/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	*stable / increasing / **decreasing** / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	Habitat for this species can be separated into roosting and foraging requirements. Maternity roosts are almost exclusively in old and unoccupied buildings. By their nature these buildings tend to be

	neglected and subject to deterioration, with time becoming increasingly unsuitable as maternity colonies. Alternatively these buildings may be subject to renovation and development which can also cause the bats to abandon them. The loss of some of these summer roosts has been balanced to a certain extent by the successes at roosts renovated and managed specifically for these bats (e.g. the Vincent Wildlife Trust reserves where bat numbers continue to steadily rise). Winter roosts are usually in caves, mines and other underground sites where the bats can hibernate free from disturbance and fluctuations in temperature. Optimal foraging habitats are deciduous woodlands, riparian vegetation and mature hedgerows. Conifer plantations can be used for commuting and at times foraging, but are less suitable than mixed and deciduous stands. There is dietary evidence to suggest that pastures may be used in winter. While suitable mosaics of these habitat types are widespread in the west of Ireland, it is important to remember that lesser horseshoes will avoid intensive agriculture, urban areas and uplands and will not cross open ground. Hence a fully interconnected landscape with good linkages between suitable roosts and optimal foraging grounds is essential to support a thriving population. Lundy *et al.* (2011) modelled the core habitat area for the lesser horseshoe in Ireland. Their work indicated that the species range is limited by the availability of suitable habitat, with little scope for expansion. The growing gap between Limerick and Kerry in the distribution range of the lesser horseshoe appears to reflect the reduced habitat quality in this area. The bat now appears to be completely absent from south-west Limerick and a number of small roosts in north Kerry have also been abandoned. The gap between the northern and southern populations is already at least 30km, well beyond the normal dispersal distance for this species giving rise to concerns regarding genetic isolation (Dool *et al*., 2016). The loss of the species in Limerick/North Kerry has important implications for the species' conservation status nationally (Roche *et al*., 2014). Farm-based habitat management schemes will be required to reverse this decline and to re-establish landscape linkages and enable genetic flow between lesser horseshoe bat populations in Kerry and Limerick.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 5 entries for pressures and 5 for threats)* *M = medium importance*	
	Pressure	**Threat**
List a maximum of 10 pressures	**A05** Removal of small landscape	**A05** Removal of small landscape

and a maximum of 10 threats using code list provided in the Reference portal	features for agricultural land parcel consolidation (M) **A14** Livestock farming (without grazing) [impact of anti-helminthic dosing on dung fauna] (M) **B09** Clear-cutting, removal of all trees (M) **F01** Conversion from other land uses to housing, settlement or recreational areas (M) **F02** Construction or modification (e.g. of housing and settlements) in existing urban or recreational areas (M) **F24** Residential or recreational activities and structures generating noise, light, heat or other forms of pollution (M) **H08** Other human intrusions and disturbance not mentioned above (Dumping, accidental and deliberate disturbance of bat roosts (e.g. caving)) (M) **L06** Interspecific relations (competition, predation, parasitism, pathogens) (M) **M08** Flooding (natural processes) (M)	features for agricultural land parcel consolidation (M) **A14** Livestock farming (without grazing) [impact of anti-helminthic dosing on dung fauna] (M) **B09** Clear-cutting, removal of all trees (M) **F01** Conversion from other land uses to housing, settlement or recreational areas (M) **F02** Construction or modification (e.g. of housing and settlements) in existing urban or recreational areas (M) **F24** Residential or recreational activities and structures generating noise, light, heat or other forms of pollution (M) **H08** Other human intrusions and disturbance not mentioned above (Dumping, accidental and deliberate disturbance of bat roosts (e.g. caving) (M) **L06** Interspecific relations (competition, predation, parasitism, pathogens) (M) **M08** Flooding (natural processes) (M)
8.2 Sources of information *Optional*		
8.3 Additional information *Optional*	Impacts at roosts and to foraging and commuting habitats have been identified as most important for this species. Alterations at buildings used by bats, including renovations, disturbance and lighting, as well as natural flooding at caves, are all known to have caused population declines and in some cases roost abandonment. Predation by cats and pine martens in roosts can also pose a threat. Alterations to commuting routes (e.g. hedgerow clearances) and the felling of foraging habitats can also have significant local impacts. The impact of anti-parasitic drugs on dung fauna, an important component of this bat's diet in winter, is also a concern. These threats were identified in the last report and are also expected to continue into the future.	

9 Conservation measures

To be reported only for Annex II species

9.1 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*
9.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* *a) Maintain the current range, population and/or habitat for the species or* *b) Expand the current range of the species (related to 'Range') or* ***c) Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population')** or* *d) Restore the habitat of the species (related to 'Habitat for the species')*
9.3 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*
9.4 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 in field 9.2):* ***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)*
9.5 List of main conservation measures	**CS03** Improvement of habitat of species from the directives
9.6 Additional information *Optional*	Measures to improve roosting opportunities for the lesser horseshoe bat have been underway in Ireland for approximately 20 years. The VWT in particular have established dedicated reserves for this species, i.e. buildings renovated specifically to cater for these bats' roosting needs. Although expensive undertakings, these have been very successful, with significant increases in bat numbers already observed. NPWS have also undertaken roost repair and enhancement works at many sites and developed successful new hibernation roosts for the species. These roost-based measures, which have taken place almost exclusively within the SAC network, have facilitated an increase in the bat's population in the core areas of its range and have helped underpin the national population increase. However, in more marginal areas of the species' distribution, declines have occurred in habitat quality and consequently in range. New conservation measures are needed now to address the growing gap in distribution between Kerry and Limerick. An innovative, landscape level, agri-environment scheme to restore bat habitat is required in this area to:

	a) enhance or create infrastructure on and between farms to enable the lesser horseshoe bat to move between roosting sites and foraging areas; b) provide a range of roosting sites for the lesser horseshoe bat on farms; c) increase food availability for the lesser horseshoe bat on farms; and d) create awareness amongst the farming and other members of the rural community of the importance of their localities to the lesser horseshoe bat and the active role they can play in its conservation.

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	*Good / **Poor** / Bad / Unknown*
	b) Population	***Good** / Poor / Bad / Unknown*
	c) Habitat of the species	*Good / **Poor** / Bad / Unknown*
10.2 Additional information *Optional*	The population of this species has increased significantly since monitoring began. While individually managed roosts within the core area of this bat's range continue to thrive, population overall is likely to continue to do well, despite the loss of some roosts around the periphery of the species' range. There are significant concerns about the growing gap in the range between Limerick and Kerry and this appears to relate to habitat quality in the area. Until a well-funded, landscape-level intervention is initiated in this area (e.g. a wide-ranging, bat-focused agri-environment scheme), further declines in habitat and consequently in range can be expected.	

11 Conclusions

Assessment of conservation status at end of reporting period	
11.1 Range	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*
11.2 Population	***Favourable (FV)** / Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.3 Habitat for the species	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*
11.4 Future prospects	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*
11.5 Overall assessment of Conservation Status	*Favourable (FV) / **Inadequate (U1)** / Bad (U2) / Unknown (XX)*
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / **deteriorating** / stable / unknown*
11.7 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.*

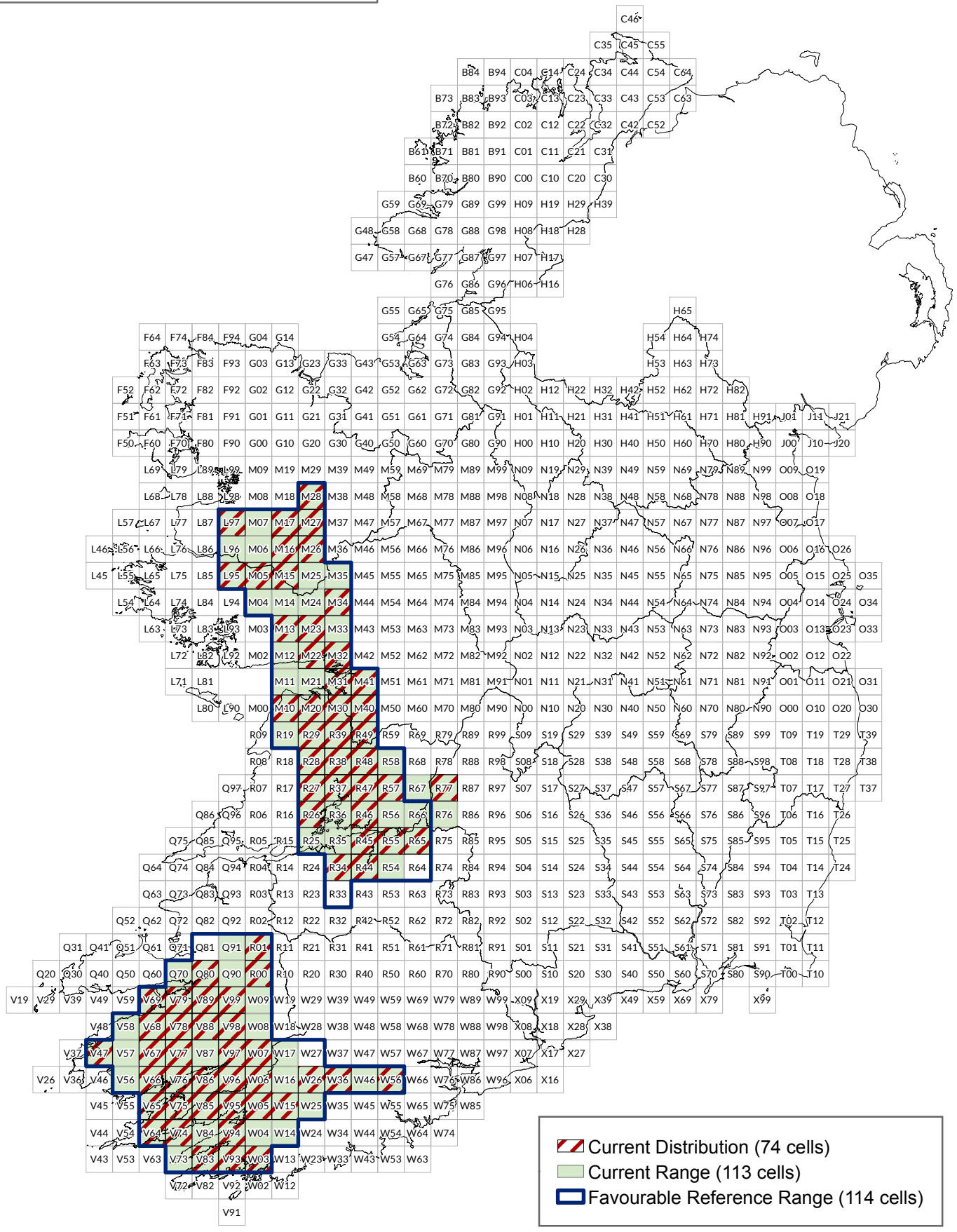
		Overall assessment of conservation status (11.5)	***Overall trend in conservation status (11.6)***
	a) no, there is no difference	***YES****/NO*	***YES****/NO*
	b) yes, due to genuine change	***YES****/NO*	***YES****/NO*
	c) yes, due to improved knowledge/more accurate data	*YES/**NO***	*YES/**NO***
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/**NO***	*YES/**NO***
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	The lesser horseshoe bat is restricted to six western counties from Cork to Mayo. The population overall is doing well and monitoring has demonstrated significant increases in numbers in the core areas. Over much of its distribution, both range and the area of suitable habitat have remained stable. In Limerick and North Kerry, however, worrying declines in habitat, and consequently in range, have been observed. These are considered likely to continue without significant intervention. For these reasons, Habitat, Range and their associated Future prospects, which were all considered to be Favourable in the last report, are now considered Unfavourable-Inadequate. Conservation measures for this species have proven successful where undertaken, and a significant proportion of this bat's summer and winter roosts are protected within SACs. However, innovative, landscape-level interventions are now required to bridge the habitat and distribution gap for this species and to halt and ultimately reverse the declines seen. Overall, the conservation status of this species is considered Unfavourable-Inadequate and declining.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

12.1 Population size inside the pSCIs, SCIs and SACs network *(on the biogeographical/marine level including all sites where the species is present)*	**a) Unit**	***Number of individuals***
	b) Minimum	***5,000***
	c) Maximum	***7,000***
	d) Best single value	
12.2 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
12.3 Population size 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*	
12.4 Short-term trend of population size within the network Direction	*Short-term trend of population size within the network over the period indicated in field 6.5 :* *stable /* ***increasing*** */ decreasing / uncertain / unknown*	
12.5 Short-term trend of population size within 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*	
12.6 Additional information *Optional*	The calculations used in 2013 have not been updated but are repeated here as the best currently available (they may underestimate the number of bats in the network, given the increasing population trend nationally since 2013, although the new figure calculated for sex ratio would balance that out somewhat – see 6.17 for full details): A total of 92 lesser horseshoe roosts, with count data since 2001, fall within the SAC network. Data is not available for all 92 roosts for the same year, but a combination of roost records over the period 2001-2012 indicates that approximately 6,000 bats roost within the SAC network. To account for possible under-recording a maximum figure of 7,000 is suggested; to account for possible double recording, as both winter and summer roosts are included in the network, a minimum figure of 5,000 is used. An increasing trend, in line with the national pattern, is indicated.	

13 Complementary information

Lesser Horseshoe Bat
Rhinolophus hipposideros (1303)
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

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Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1309***
1.3 Species scientific name	*Pipistrellus pipistrellus*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Common pipistrelle (Ialtóg fheascrach)
1.6i Species description	The common pipistrelle (*Pipistrellus pipistrellus*) is one of Ireland's smallest mammals. It is widespread throughout the country and commonly encountered during bat surveys, although it may be less common or even absent from some parts of the far west. It is very general in its habitat preference, foraging in woodland, riparian habitats and parkland, along linear features in farmland, and in towns and cities. Some association with broadleaved woodland and riparian habitats at a local scale have been identified, while mixed forestry may be more important at a wider scale in the landscape. Only areas of bog, marsh and heath appear to be avoided. Maternity roosts of this species are often in buildings, typically in the attics of dwelling houses, although it is occasionally found roosting under bridges and in trees. Bats normally disperse in autumn and hibernate over winter. This species has rarely been found hibernating in Ireland, but the available records for bats in winter are from modern dwelling houses.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2007-2018***
2.3 Distribution map	Submitted
2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted

2.6i Additional information	The distribution map represents over 14,000 records of common pipistrelle collected between January 2007 and June 2018. The data comes from the car transect monitoring programme, the BATLAS 2020 project as well as various other sources collated by Bat Conservation Ireland. They include roost records and records from detector surveys. The records all come from recognised bat experts and the data is considered to be very reliable. The species is widely recorded and the resulting map is considered to give a reasonable reflection of the current distribution of this bat in Ireland.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	***Atlantic***, *Marine Atlantic*
4.2 Sources of information	Aughney, T., Roche, N. and 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. Lundy, M.G., Aughney, T., Montgomery, W.I. and Roche, N. (2011) Landscape conservation for Irish bats & species specific roosting characteristics. Unpublished report. Bat Conservation Ireland. http://www.batconservationireland.org/pubs/reports/Landscape_Conservation_Irish_Bats.pdf Roche, N., Aughney, T. and Langton, S. (2013) Population estimates, trends and background information for six Irish bat species: Article 17 2007-2012 supporting document. Report submitted to the National Parks and Wildlife Service by Bat Conservation Ireland. Roche, N., Aughney, T., Marnell, F. and Lundy M. (2014) *Irish bats in the 21st Century*. Bat Conservation Ireland, Ulex House, Drumheel, Lisduff, Virginia, Co. Cavan, Ireland. Roche, N. (2016) Common pipistrelle (*Pipistrellus pipistrellus*) Pp 83-84. In Lysaght, L. and Marnell, F. (Eds.) (2016) *Atlas of Mammals in Ireland 2010-2015*, National Biodiversity Data Centre, Waterford.
4.2i Additional information	Berthinussen, A. and Altringham, J. (2012). The effect of a major road on bat activity and diversity. *Journal of Applied Ecology* 49: 82-89. Boughey, K.L., Lake, I.R., Haysom, K.A. and Dolman, P.M. (2011)

	Improving the biodiversity benefits of hedgerows: How physical characteristics and the proximity of foraging habitat affect the use of linear features by bats. *Biological Conservation* 144: 1790-1798. Carden, R., Aughney, T., Kelleher, C. and Roche, N. (2010) Irish Bat Monitoring Schemes: BATLAS Republic of Ireland, Report for 2008-2009. Unpublished Report. Bat Conservation Ireland. http://www.batconservationireland.org/pubs/reports/BATLAS2010_FinalReport.pdf Davidson-Watts, I. and Jones, G. (2006) Differences in foraging behaviour between *Pipistrellus pipistrellus* (Schreber, 1774) and *Pipistrellus pygmaeus* (Leach, 1825). *Journal of Zoology London* 268: 55-62. Dick, A. and Roche, N. (2017) Google Earth and Google Street View reveal differences in *Pipistrellus pipistrellus* and *P. pygmaeus* roadside habitat use in Ireland. *Irish Naturalists' Journal* 35: 83-93. Dietz, C., von Helverson, O. and Wolz, I. (2009) *Bats of Britain, Europe and Northwest Africa.* A&C Black Publishers, London. Feyerabend, F. and Matthias, S. (2000) Use of roosts and roost switching in a summer colony of 45 kHz phonic type pipistrelle bats (*Pipistrellus pipistrellus* Schreber, 1774) *Myotis* 38: 51-59. Lundy, M.G. and Montgomery, W.I. (2010) Summer habitat associations of bats between riparian landscapes and within riparian areas. *European Journal of Wildlife Research* 56: 385-394. Marnell, F., Kingston, N. and Looney, D. (2009) *Ireland Red List No. 3: Terrestrial Mammals*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. Nicholls, B. and Racey, P.A. (2006) Contrasting home-range size and spatial partitioning in cryptic and Sympatric pipistrelle bats. *Behavioral Ecology and Sociobiology* 61: 131-142. O'Sullivan, P. (1994). Bats in Ireland. *Irish Naturalists' Journal* 24: Special Zoological Supplement. Roche, N., Langton, S, Aughney, T., Russ, J.M., Marnell, F., Lynn, D. and Catto, C. (2011) A car-based monitoring method reveals new information on bat populations and distributions in Ireland. *Animal Conservation* 14: 642–651.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***79,300 km²***
5.2 Short-term trend Period	***2007-2018***

5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 79,300 km²***	
	b) Indicate if operators were used (use these 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 the same 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 of the current range is not large enough to allow the long-term survival of the species.	
5.11 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*	
5.12 Additional information *Optional*	A total of 14,084 distribution records were collated for this species between 2007 and 2018. These records translated to 679 x 10km squares. Using the range tool, with gap closure set to 20km, an additional 114 grid cells were incorporated giving a total range of 793 cells or 79,300km^2. This is thought to provide a good representation of the true extent of the species' distribution in Ireland. The range of the common pipistrelle bat in 2013, based on data from 2001-2012, was calculated as 69,500km^2. Although the current range appears significantly greater, this is considered to be a reflection of better data following more dedicated survey work (e.g. surveys on Aran Islands), rather than a genuine increase due to expansion. The trend is considered to be stable. The Favourable Reference Range is taken to be the same as the current range. The 2013 figure was based on the known range of the species at that time but it has been updated for this assessment to reflect the improved data now available. It is considered to be large enough to allow the long term survival of the species.	

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2007-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***3,637***
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval / **minimum***	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	***Number of individuals***
	b) Minimum	***1,070,000***
	c) Maximum	***2,400,000***
	d) Best single value	
6.5 Type of estimate *Optional*	***Best estimate** / multi-year mean / 95% confidence interval / minimum*	

6.6 Population size Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007-2018***	
6.8 Short-term trend Direction	*stable / **increasing** / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	**+37.5%**
	b) Maximum	**+37.5%**
	c) Confidence interval	**95% C.I. = +15.5 to +62%**
6.10 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*	
6.11 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	***a) 1,070,000 individuals***	
	b) Indicate if an operator was used	
	c) If favourable reference population 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 Population used in 2013 (~1.07 million individuals) is considered to be large enough to allow the long-term survival of the species and is retained for the current reporting period.</td></tr>
<tr><td rowspan="6">6.16 Change and reason for change in population size</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>6.17 Additional information

Optional</td><td colspan="2">The 2007 to 2018 distribution records held by Bat Conservation Ireland for this species were mapped at the 1km level to provide the population estimate used in 6.2. This is considered to reflect a minimum estimate of the species distribution in Ireland and is not considered a useful reflection of population.
The population estimate from the 2013 report (1.07 million - 2.4 million) is retained for the present reporting period and provided in 6.4. This population estimate is calculated based on the detection distance for echolocating common pipistrelles from the Car-based Bat Monitoring Scheme and the approximate area that is detectable. The area of Ireland is divided by the approximate detectable area and multiplied by the probability of detecting a common pipistrelle bat along any given roadside (2007-2012) on any given evening, from Car-based Bat Monitoring data. The minimum end of the range is based on the wider detection range (30m) while the maximum end is based on the closer detection range (20m). This population estimate uses a number of assumptions which may be only approximately correct and it could be improved with more detailed information on size and shape of detectable areas, better knowledge of common pipistrelle habitat use around roadsides and other factors. However, it may be considered a starting point from which to refine future estimates. See Roche et al. (2013) for further details.
The short-term trend is also based on the Car-based Bat Monitoring Scheme data. Common pipistrelles have shown a significant increase from the start of the scheme. In the past twelve years (2006-2017) this species has increased by 37.5% in total (95% C.I. = 15.5-62%), equivalent to a per-annum increase of 2.7% (Aughney et al., 2018).
The short-term trend was based on data from 2006-2017 but it is assumed to be the same for the default trend period 2007-2018.
The Favourable Reference Population used in 2013 (~1.07 million individuals) is retained for the current reporting period.</td></tr>
</table>

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	Habitat and roosting associations of the common pipistrelle were modelled using a Maximum Entropy model by Lundy *et al*. (2011) to determine likelihood of occurrence in specific habitats in the Irish landscape and maternity roost preferences. This modelling was carried out using roost and bat detector location data from 2000-2009 which is stored on the Bat Conservation Ireland bat database and included records from monitoring schemes, BATLAS 2010 and records contributed by ecologists, academics and volunteers, among others. CORINE landcover, altitude, climate data, soil pH and human bias layers were included in the model. Common pipistrelle bat records were widespread but found to be associated broadly with

	broadleaved woodland, riparian habitats and small amounts of urbanisation (Lundy *et al*. 2011). Since the species is widespread and these habitat types are currently stable or increasing, the habitat area and quality for the species are considered sufficient.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**Xxp** No pressures	**Xxt** No threats
8.2 Sources of information *Optional*		
8.3 Additional information *Optional*	Despite the identification in the 2013 assessment of numerous low and medium-level threats and pressures, it is clear now that the population of this species has been increasing significantly and steadily. On this basis, and given the widespread distribution and very large population present in the country, no threats or pressures are considered significant at this point.	

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	Ongoing car-based bat monitoring provides evidence for a significant increase in the population; there is no evidence of any decline in Range or Habitat. In general the Future prospects of these parameters are considered to be good.	

11 Conclusions			
Assessment of conservation status at end of reporting period			
11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* ***improving*** */ deteriorating /* stable */ unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	This species has a very wide distribution across the island including some off-shore islands and there is no evidence of any decline in Range or in Habitat. The most recent estimates suggest a population size in the order to 1-2 million animals, making it one of the most common mammals in Ireland. Ongoing car-based bat monitoring		

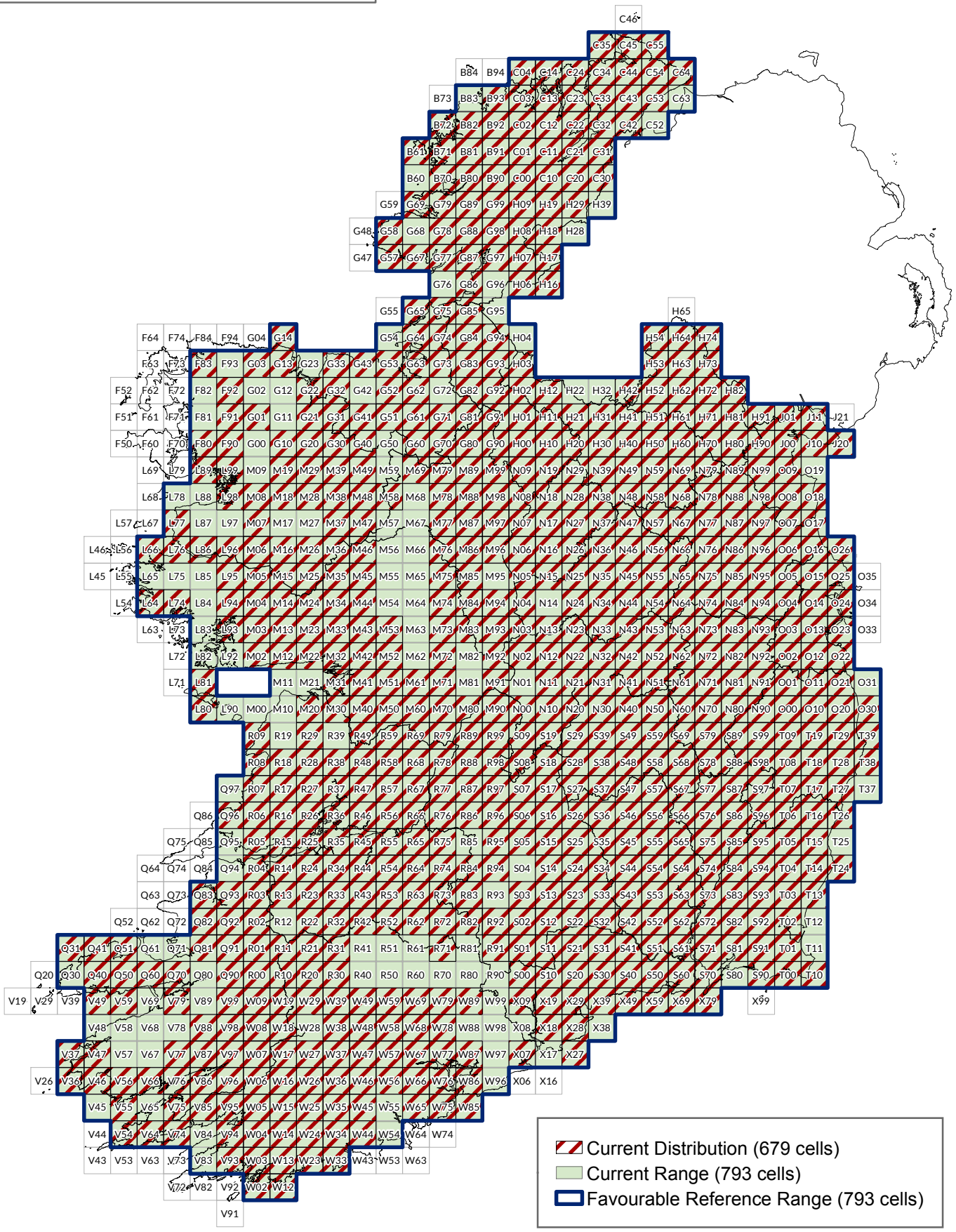
	indicates that the population is increasing. Furthermore, there is no indication of any major pressures currently impacting populations and Future prospects are considered good. Overall, the species is assessed as Favourable and the overall trend is demonstrating an on-going increase. There were no qualifiers for Favourable assessments in 2013.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Common Pipistrelle
Pipistrellus pipistrellus (1309)
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

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Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***5009***
1.3 Species scientific name	*Pipistrellus pygmaeus*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Soprano pipistrelle (Ialtóg fheascrach sopránach)
1.6i Species description	The soprano pipistrelle (*Pipistrellus pygmaeus*) is present across much of central Europe and into southern Scandinavia and Greece, but may be absent from parts of France and southern Italy. It is the most widespread bat species on the island of Ireland, occurring in all counties including the extreme north, west and south. It is the second most commonly encountered species in the national bat monitoring programme, although its abundance is variable across the island with no particular north-south or east-west pattern apparent. Summer roosts are usually in buildings, including modern suburban houses, old abandoned mansions, churches, amenity buildings and farm sheds. Bat boxes are also used. Soprano pipistrelles normally roost in very confined spaces, such as behind window sashes, under tiles and weather-boards, behind fascia and soffits, and within the cavities of flat roofs. Roosts of >1,500 individuals are known. The species is thought to hibernate in buildings and trees, but has seldom been recorded in winter. Although this bat is known to forage in a broad range of habitats, it shows some preference for aquatic habitats – riparian woodland, rivers and lakes.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2007-2018***
2.3 Distribution map	Submitted
2.4 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*

2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	The distribution map represents almost 10,000 records of soprano pipistrelle collected between January 2007 and June 2018. The data comes from the car transect monitoring programme, the BATLAS 2020 project, as well as various other sources collated by Bat Conservation Ireland. They include roost records and records from detector surveys. The records all come from recognised bat experts and the data is considered to be very reliable. The species is widely recorded and the resulting map is considered to be a good reflection of the distribution of this bat in Ireland, although it is likely that it is also present in further 10km squares in the south-west.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	***Atlantic***, *Marine Atlantic*
4.2 Sources of information	Aughney, T., Roche, N. and 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. Dick, A. and Roche, N. (2017) Google Earth and Google Street View reveal differences in *Pipistrellus pipistrellus* and *P. pygmaeus* roadside habitat use in Ireland. *Irish Naturalists' Journal* 35: 83-93. Lundy, M.G., Aughney, T., Montgomery, W.I. and Roche, N. (2011) Landscape conservation for Irish bats & species specific roosting characteristics. Unpublished report. Bat Conservation Ireland. http://www.batconservationireland.org/pubs/reports/Landscape_Conservation_Irish_Bats.pdf Roche, N., Aughney, T. and Langton, S. (2013) Population estimates, trends and background information for six Irish bat species: Article 17 2007-2012 supporting document. Report submitted to the National Parks and Wildlife Service by Bat Conservation Ireland. Roche, N., Aughney, T., Marnell, F. and Lundy M. (2014) *Irish bats in the 21st Century*. Bat Conservation Ireland, Ulex House, Drumheel, Lisduff, Virginia, Co. Cavan, Ireland. Roche, N. (2016) Soprano pipistrelle (*Pipistrellus pygmaeus*) Pp 85-86. In Lysaght, L. and Marnell, F. (Eds.) (2016) *Atlas of Mammals*

	in Ireland 2010-2015, National Biodiversity Data Centre, Waterford.
4.2i Additional information	Berthinussen, A. and Altringham, J. (2012). The effect of a major road on bat activity and diversity. *Journal of Applied Ecology* 49: 82-89. Boughey, K.L., Lake, I.R., Haysom, K.A. and Dolman, P.M. (2011) Improving the biodiversity benefits of hedgerows: How physical characteristics and the proximity of foraging habitat affect the use of linear features by bats. *Biological Conservation* 144: 1790-1798. Carden, R., Aughney, T., Kelleher, C. and Roche, N. (2010) Irish Bat Monitoring Schemes: BATLAS Republic of Ireland, Report for 2008-2009. Unpublished Report. Bat Conservation Ireland. http://www.batconservationireland.org/pubs/reports/BATLAS2010_FinalReport.pdf Davidson-Watts, I. and Jones, G. (2006) Differences in foraging behaviour between *Pipistrellus pipistrellus* (Schreber, 1774) and *Pipistrellus pygmaeus* (Leach, 1825). *Journal of Zoology*, *London* 268: 55-62. Dietz, C., von Helverson, O. and Wolz, I. (2009) *Bats of Britain, Europe and Northwest Africa.* A&C Black Publishers, London. Feyerabend, F. and Matthias, S. (2000) Use of roosts and roost switching in a summer colony of 45 kHz phonic type pipistrelle bats (*Pipistrellus pipistrellus* Schreber, 1774) *Myotis* 38: 51-59. Lundy, M.G. and Montgomery, W.I. (2010) Summer habitat associations of bats between riparian landscapes and within riparian areas. *European Journal of Wildlife Research* 56: 385-394. Marnell, F., Kingston, N. and Looney, D. (2009) *Ireland Red List No. 3: Terrestrial Mammals*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. Nicholls, B. and Racey, P.A. (2006) Contrasting home-range size and spatial partitioning in cryptic and Sympatric pipistrelle bats. *Behavioral Ecology and Sociobiology* 61: 131-142. O'Sullivan, P. (1994). Bats in Ireland. *Irish Naturalists' Journal* 24: Special Zoological Supplement. Roche, N., Langton, S, Aughney, T., Russ, J.M., Marnell, F., Lynn, D. and Catto, C. (2011) A car-based monitoring method reveals new information on bat populations and distributions in Ireland. *Animal Conservation* 14: 642–651.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***79,900 km²***
5.2 Short-term trend Period	***2007–2018***

5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 79,900 km²***	
	b) Indicate if operators were used (use these 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 the same 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 of the current range is not large enough to allow the long-term survival of the species.	
5.11 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*	
5.12 Additional information *Optional*	A total of 9,906 distribution records were collated for this species between 2007 and 2018. These records translated to 720 x 10km squares. Using the range tool, with gap closure set to 20km, an additional 79 grid cells were incorporated giving a total range of 799 cells or 79,900km^2. This is thought to provide a good representation of the true extent of the species' distribution in Ireland. The range of the soprano pipistrelle bat in 2013, based on data from 2007-2012, was calculated as 74,100km^2. Although the current range appears greater, this is considered to be a reflection of better data following more concerted survey work, rather than a genuine increase due to expansion. The trend is considered to be stable. The Favourable Reference Range is taken to be the same as the current range. The 2013 figure was based on the known range of the species at that time but it has been updated for this assessment to reflect the improved data now available. It is considered to be large enough to allow the long term survival of the species.	

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	***2013-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***3,759***
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval / **minimum***	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	***Number of individuals***
	b) Minimum	***500,000***
	c) Maximum	***1,200,000***
	d) Best single value	
6.5 Type of estimate *Optional*	***Best estimate** / multi-year mean / 95% confidence interval / minimum*	

6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007-2018***	
6.8 Short-term trend Direction	*stable / **increasing** / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	***105.8%***
	b) Maximum	***105.8%***
	c) Confidence interval	***95% C.I.= +61% to +151%***
6.10 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*	
6.11 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	***a) 1,000,000 individuals***	
	b) Operator	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The Favourable Reference Population used in 2013 (~1 million individuals) is considered to be large enough to allow the long-term survival of the species and is retained for the current reporting period.	

<table>
<tr><td rowspan="6">6.16 Change and reason for change in population size</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>6.17 Additional information

Optional</td><td colspan="2">Almost 10,000 distribution records collated by Bat Conservation Ireland between 2007 and 2018 for this species were mapped at the 1km level to provide the population estimate used in 6.2 (3,759 x 1km grid cells). This is considered to reflect a minimum estimate of the species distribution in Ireland and is not considered a useful reflection of population.

The population estimate from the 2013 report (0.5-1.2 million) is retained for the present reporting period and provided in 6.4. This population has been estimated using data from the Car-based Bat Monitoring Scheme and is calculated based on the detection distance for echolocating pipistrelles and the approximate area that is detectable. The area of Ireland is divided by the approximate detectable area and multiplied by the probability of detecting a soprano pipistrelle bat along any given roadside (2007-2012) on any given evening, from Car-based Bat Monitoring data. The minimum end of the range is based on the wider detection range (30m) while the maximum end is based on the closer detection range (20m). This population estimate uses a number of assumptions which may be only approximately correct and it could be improved with more detailed information on size and shape of detectable areas, better knowledge of common pipistrelle habitat use around roadsides and other factors. However, it may be considered a starting point from which to refine future estimates. See Roche et al. (2013) for further details.

The short-term trend is also based on the Car Monitoring Scheme data. In the past twelve years (2006-2017) the soprano pipistrelle population has increased by 105.8% (C.I. 95% = 61-151%), equivalent to a per-annum increase of 6.2% (Aughney et al., 2018).

The short-term trend was based on data from 2006-2017 but it is assumed to be the same for the default trend period 2007-2018.

The Favourable Reference Population used in 2013 (~1 million individuals) is retained for the current reporting period. This rounded figure at the higher end of the estimated population range has been chosen because the soprano pipistrelle echolocates at a higher frequency, and is consequently less detectable, than the common pipistrelle. Therefore, the detection radius for this species is likely to</td></tr>
</table>

	be smaller and the higher end of the estimate range is considered to be more accurate.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	Habitat and roosting associations of the soprano pipistrelle were modelled using a Maximum Entropy model by Lundy *et al*. (2011) to determine likelihood of occurrence in specific habitats in the Irish landscape and maternity roost preferences. This modelling was carried out using roost and bat detector location data from 2000-2009 which is stored on the Bat Conservation Ireland bat database and included records from monitoring schemes, BATLAS 2010 and records contributed by ecologists, academics and volunteers, among others. CORINE landcover, altitude, climate data, soil pH and human

	bias layers were included in the model. Soprano pipistrelle bat records were widespread but found to be associated broadly with broadleaved woodland, riparian habitats and small amounts of urbanisation (Lundy *et al.* 2011; Dick and Roche 2017). Since these habitat types are currently stable or increasing, the habitat area and quality for the species are considered sufficient. Although population is increasing, range appears to be stable and the trend overall for habitat was taken, conservatively, as stable.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**Xxp** No pressures	**Xxt** No threats
8.2 Sources of information *Optional*		
8.3 Additional information *Optional*	Despite the identification in the 2013 assessment of numerous low and medium-level threats and pressures, it is clear now that the population of this species has been increasing significantly and steadily. On this basis, and given the widespread distribution and very large population present in the country, no threats or pressures are considered significant at this point.	

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** / *Poor / Bad / Unknown*
	b) Population	***Good*** / *Poor / Bad / Unknown*
	c) Habitat of the species	***Good*** / *Poor / Bad / Unknown*
10.2 Additional information *Optional*	Ongoing car-based bat monitoring provides evidence for a significant increase in the population; there is no evidence of any decline in Range or Habitat. In general the Future prospects of these parameters are considered to be good.	

<table>
<tr><th colspan="4">11 Conclusions</th></tr>
<tr><td colspan="4">Assessment of conservation status at end of reporting period</td></tr>
<tr><td>11.1 Range</td><td colspan="3"><u>Favourable (FV)</u> / Inadequate (U1) / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>11.2 Population</td><td colspan="3"><u>Favourable (FV)</u> / Inadequate (U1) / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>11.3 Habitat for the species</td><td colspan="3"><u>Favourable (FV)</u> / Inadequate (U1) / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>11.4 Future prospects</td><td colspan="3"><u>Favourable (FV)</u> / Inadequate (U1) / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>11.5 Overall assessment of Conservation Status</td><td colspan="3"><u>Favourable (FV)</u> / Inadequate (U1) / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>11.6 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">11.7 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 (11.5)</td><td>Overall trend in conservation status (11.6)</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 data</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>d) yes, due to the use of different method (including taxonomical change or use of different thresholds)</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>e) yes, but there is no information on the 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>11.8 Additional information

Optional</td><td colspan="3">The soprano pipistrelle is the most widespread bat species on the island of Ireland. Recent estimates for this species suggest a population size in the order of 500,000 – 1,000,000 animals. Ongoing car-based bat monitoring provides evidence for a significant increase</td></tr>
</table>

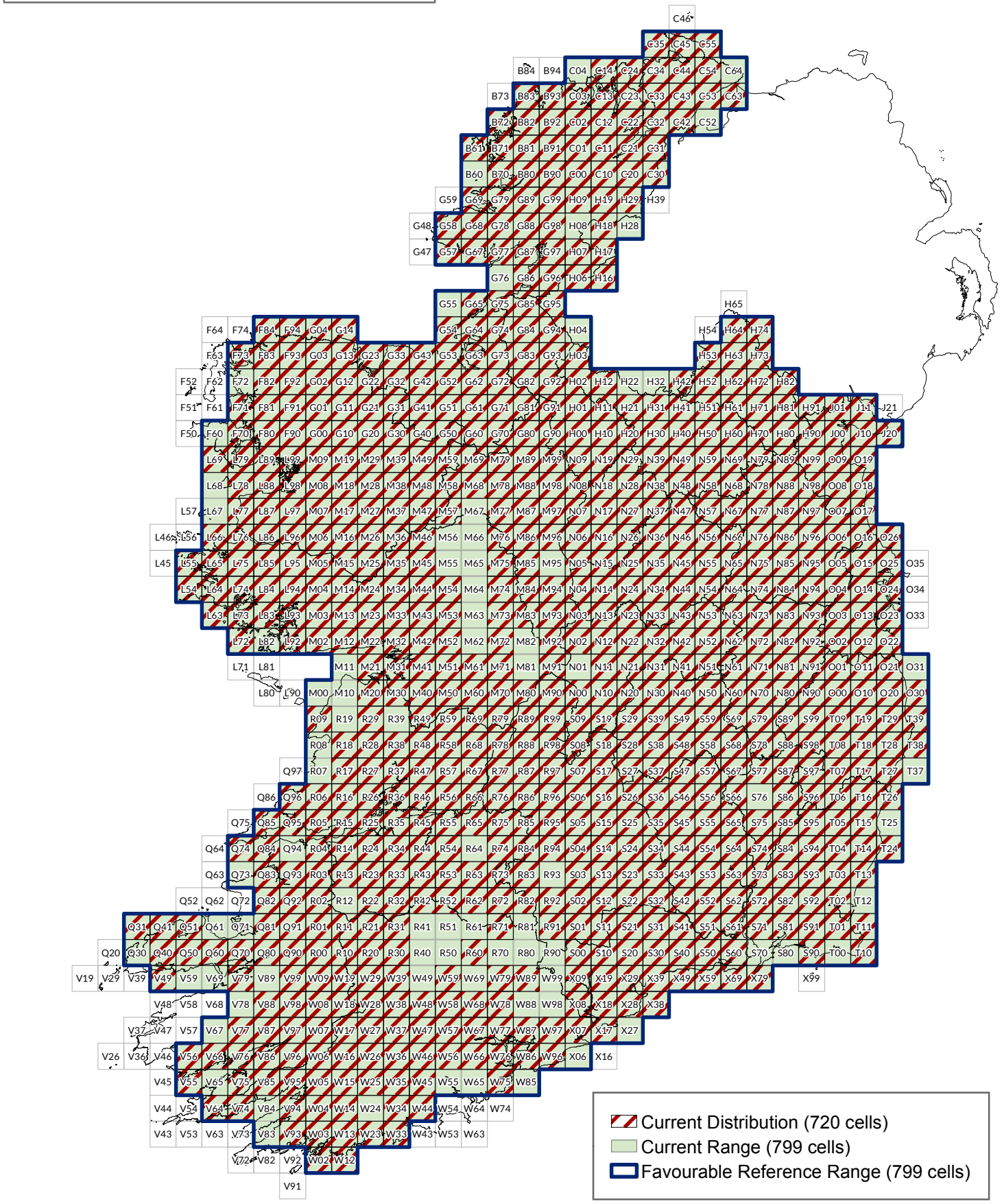
	in the population; there is no evidence of any decline in Range or Habitat. Furthermore, there is no indication of any major pressures currently impacting populations, and Future prospects are considered good. Overall, the species is assessed as Favourable and the overall trend is demonstrating an on-going increase. There were no qualifiers for Favourable assessments in 2013.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Soprano Pipistrelle
Pipistrellus pygmaeus (5009)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1317***
1.3 Species scientific name	*Pipistrellus nathusii*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Nathusius' pipistrelle (Ialtóg Nathusius)
1.6i Species description	The Nathusius' pipistrelle was recognised as a resident bat species on the island of Ireland following the discovery in 1997 of a maternity colony of 150 bats in Co. Antrim, Northern Ireland. Up to then it was described as a migrant species in Ireland (and Britain) based on a number of autumn and spring records during the 1980s and 1990s. The first bat detector record in Northern Ireland was made in Derry in August 1996, with further detector records from the Republic of Ireland in 1997 and 1998. This pipistrelle is typically a migrant species, found in eastern Europe in summertime and in south-western Europe in the winter. Ireland and the UK appear to lie in a transitional region, with resident bats being supplemented during winter by the migratory individuals returning from the north-east of the species range. To date, despite extensive survey work, there has been no maternity roost recorded in the Republic of Ireland. There have been no confirmed hibernation records for the species in the Republic of Ireland either. Winter roosts for the species in Europe tend to occur in tree holes, wood piles, crevices in buildings and cliffs. An analysis of records for this species in the UK showed that the distribution of Nathusius' pipistrelle was positively related to the area of water bodies, woodland and low levels of urbanisation. They also found that records for the species were associated with low seasonal variation in temperature and intermediate levels of rainfall. A major range expansion in the species to 2050 is projected for which the single most influential climate variable is increase in minimum temperature.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2007-2018***
2.3 Distribution map	Submitted

2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	The distribution map represents all records of Nathusius' pipistrelle collected between January 2007 and June 2018. The data comes from the Car Transect Bat Monitoring programme, dedicated detector surveys as well as various other *ad hoc* records collated by Bat Conservation Ireland. There are no roost records for this species in the Republic of Ireland. The records all come from recognised bat experts and the data is considered to be very reliable. The species has a scattered and disjunct distribution. Although we have records from Donegal to west Cork and Mayo to Wexford, the species is not commonly recorded and we have yet to develop a full understanding of its distribution in Ireland.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	***Atlantic***, *Marine Atlantic*
4.2 Sources of information	Aughney, T., Roche, N. and 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. Boston, E. (2016) Nathusius pipistrelle (*Pipistrellus nathusii*) Pp 87-88. In Lysaght, L. and Marnell, F. (Eds.) (2016) *Atlas of Mammals in Ireland 2010-2015*, National Biodiversity Data Centre, Waterford. Carden, R., Aughney, T., Kelleher, C. and Roche, N. (2010) Irish Bat Monitoring Schemes: BATLAS Republic of Ireland, Report for 2008-2009. Unpublished Report. Bat Conservation Ireland. http://www.batconservationireland.org/pubs/reports/BATLAS2010_FinalReport.pdf Lundy, M., Montgomery, I. and Russ, J. (2010). Climate change-linked range expansion of Nathusius' pipistrelle bat, *Pipistrellus nathusii*

	(Keyserling & Blasius, 1839). *J. Biogeogr*. Doi:10.1111/j.1365-2699.2010.02384.x Lundy, M.G., Aughney, T., Montgomery, W.I. and Roche, N. (2011) Landscape conservation for Irish bats & species specific roosting characteristics. Unpublished report. Bat Conservation Ireland. http://www.batconservationireland.org/pubs/reports/Landscape_Conservation_Irish_Bats.pdf Roche, N., Aughney, T. and Langton, S. (2013) Population estimates, trends and background information for six Irish bat species: Article 17 2007-2012 supporting document. Report submitted to the National Parks and Wildlife Service by Bat Conservation Ireland. Roche, N., Aughney, T., Marnell, F. and Lundy M. (2014) *Irish bats in the 21st Century*. Bat Conservation Ireland, Ulex House, Drumheel, Lisduff, Virginia, Co. Cavan, Ireland. Roche, N., Aughney, T., Kingston, N., Lynn, D. and Marnell, F. (2015). Records for Nathusius' Pipistrelle (*Pipistrellus nathusii*) in Ireland from a car-based bat monitoring scheme. *Irish Naturalists' Journal* 34(2):83–88. Rodrigues, L., L. Bach, M.-J. Dubourg-Savage, C. Harbusch *et al*. (2015): Guidelines for consideration of bats in wind farm projects. Revision 2014. *EUROBATS Publication Series No. 6*. UNEP/EUROBATS Secretariat, Bonn, Germany.
4.2i Additional information	Dietz, C., von Helverson, O. and Wolz, I. (2009) *Bats of Britain, Europe and Northwest Africa.* A&C Black Publishers, London. Flaquer, C., Puig-Montserrat, X., Goiti, U., Vidal, F., Curco, A. and Russo, D. (2009) Habitat selection in Nathusius' pipistrelle (*Pipistrellus nathusii*): the importance of wetlands. *Acta Chiropterologica* 11: 149–155. Lundy, M.G. and Montgomery, W.I. (2010) Summer habitat associations of bats between riparian landscapes and within riparian areas. *European Journal of Wildlife Research* 56:385-394. Marnell, F., Kingston, N. and Looney, D. (2009) *Ireland Red List No. 3: Terrestrial Mammals*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. Roche, N., Langton, S, Aughney, T., Russ, J.M., Marnell, F., Lynn, D. and Catto, C. (2011) A car-based monitoring method reveals new information on bat populations and distributions in Ireland. *Animal Conservation* 14:642–651. Russ, J.M., Hutson, A.M., Montgomery, W.I., Racey, P.A. and Speakman, J.R. (2001) The status of Nathusius' pipistrelle (*Pipistrellus nathusii* Keyserling & Blasius, 1839) in the British Isles. *Journal of Zoology* 254: 91–100. Russ, J.M. and Montgomery, W.I. (2002) Habitat association of bats in Northern Ireland: Implications for conservation. *Biological Conservation* 108:49-58.

5 Range		
Range within the biogeographical/marine region concerned.		
5.1 Surface area	***15,800 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	*stable / increasing / decreasing /* ***uncertain*** */ unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	*a) In km² or*	
	b) Indicate if operators were used (use these symbols ≈, >, >>) or	
	c) Favourable reference range is unknown	

<table>
<tr><td></td><td colspan="2">d) Indicate method used to set reference value if other than operators
The Nathusius' pipistrelle has undergone a range expansion across western Europe in recent decades (e.g. see EUROBATS national reports http://www.eurobats.org/official_documents/national_reports). It is a relatively recent addition to the Irish fauna. However, despite having records now from West Cork to Donegal, there is little evidence of an established range outside of Northern Ireland and no breeding or hibernating roosts have been confirmed here. Roche et al. (2015) refer to the species as "widespread but rare". It is unclear what range extent is required to provide for the long-term survival of the species and consequently the Favourable Reference Range is considered to be unknown. Survey work will continue and it is hoped that a clearer picture of the status of this species in Ireland will emerge in the coming years.</td></tr>
<tr><td rowspan="6">5.11 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):
<u>genuine change</u> / improved knowledge or more accurate data / the use of a different method</td></tr>
<tr><td>5.12 Additional information

Optional</td><td colspan="2">The Nathusius' pipistrelle has undergone a range expansion across western Europe in recent decades. It is a relatively recent addition to the Irish fauna and the latest map shows that its range has increased here. However, a distribution pattern has yet to emerge, with very few locations returning records for more than one year (Roche et al., 2015), suggesting a mobile and perhaps migratory population. The initial period of rapid expansion across Ireland has not been followed by range consolidation and breeding populations have not been confirmed. Furthermore, despite extensive field surveys (e.g. BATLAS [Carden et al., 2010] and the Car Transect Bat Monitoring [Roche et al., 2018]) the species is still rarely recorded and its current known distribution is restricted and disjunct. It is unclear whether further range expansion is required to provide for the long-term survival of the species and consequently the Favourable Reference Range is considered to be unknown. Survey work is continuing and it is hoped that a clearer picture of the status of this species in Ireland will emerge in the coming years.</td></tr>
</table>

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	***2007-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***100***
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval /* ***minimum***	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	***Number of individuals***
	b) Minimum	***3,000***
	c) Maximum	***5,000***
	d) Best single value	
6.5 Type of estimate *Optional*	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007-2018***	
6.8 Short-term trend Direction	*stable /* ***increasing*** */ decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	***+22%***
	b) Maximum	***+22%***
	c) Confidence interval	***95% C.I. = -7% to +69%***
6.10 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*	
6.11 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	

6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) Population size (with unit) or*	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) Favourable reference population is unknown	
	d) Indicate method used to set reference value if other than operators The population estimate for Nathusius' pipistrelle in the Republic of Ireland is 3,000-5,000 animals. This is based on the calculations detailed by Roche *et al*., 2013. Most detector records for this species are in the summer (Boston, 2016) and yet no breeding roosts have been found in the Republic of Ireland despite extensive survey work in the last 10 years. It remains unclear whether the species is successfully reproducing in Ireland and also what level of population would be required to ensure long-term viability. Consequently, the Favourable Reference Population is considered unknown at this time.	
6.16 Change and reason for change in population size	*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***	
6.17 Additional information *Optional*	All distribution records from 2007 and 2018 for this species were mapped at the 1km level to provide the population estimate used in 6.2. This is considered to be an underestimate of the species' disjunct distribution in Ireland and is not considered a useful reflection of population. The population estimate from the 2013 report (3,000-5,000 animals)	

	is retained for the present reporting period and provided in 6.4. This is based on limited data and is not considered a robust estimate (see Roche *et al*. 2013). The figures were extrapolated from the probability of encountering a Nathusius' pipistrelle bat in any given area based on the rate it is encountered during the Car-based Bat Monitoring Scheme. However, Nathusius' pipistrelle remains one of the least encountered species from the Car-based Bat Monitoring Scheme. It has been recorded less than 300 times since 2005 (Roche *et al*., 2015; Aughney *et al*., 2018). It may, however, be locally frequent in suitable areas (as is apparent around Lough Neagh) and could be missed by the random location of the car-based survey squares. Dedicated static monitoring and mist net surveys for this species have been undertaken in recent years with mixed results to date. In addition, as part of ongoing research into the distribution of the Nathusius' pipistrelle bat in the Republic of Ireland, six individuals were trapped and ringed in Co. Cavan in September 2018. They included three males and three females. None were in breeding condition or appeared to have bred prior to capture (P. Scott, pers. comm.). The short-term trend was based on data from 2006-2017 but it is assumed to be the same for the default trend period 2007-2018. Due to its rarity there is considerable uncertainty about the trend for this species. The trend line from the latest report suggest that the species may be slightly increasing (Aughney *et al*. 2018), but the trends should be treated with caution due to the very large variability between years, wide error bars and the fact that the confidence intervals include zero (C.I. 95% = -7% to +69%). Neither breeding nor hibernation roosts have been found in the Republic of Ireland despite extensive survey work in the last 10 years. It remains unclear whether the species is successfully reproducing in Ireland and also what level of population would be required to ensure long-term viability. Consequently, the Favourable Reference Population is considered unknown at this time.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***

7.4 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	Lundy *et al.* (2011) demonstrated a positive association between Nathusius' pipistrelle and broadleaved woodland, as well as a quadratic association with pasture and with freshwater. Although the modelled core area for the Nathusius' pipistrelle is by far the smallest of all bat species on the island, it is clear that there is still a significant area of suitable habitat available to be colonised by the species. The area of these habitats appears to be stable and in general these habitats appear to be in good condition. Although breeding roosts have not been recorded here, there are many buildings similar to the ones used as nursery colonies in Northern Ireland, so this does not appear to be a limiting factor. Overall, habitat area and quality are considered good and the trend is considered stable.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**Xxp** No pressures	**D01** Wind, wave and tidal power, including infrastructure (M)
8.2 Sources of information *Optional*		
8.3 Additional information *Optional*	It is not clear what pressures or threats may impact on this species in Ireland. Elsewhere in its European range, mortalities at wind farms are a significant concern, particularly during the periods of migration (Rodrigues *et al*., 2015). It is not clear how, or if, the Nathusius' pipistrelles found in Ireland migrate and the risk of collision with off-shore wind-farms in particular (e.g. in the Irish Sea) is limited. Nonetheless, this is a threat that merits monitoring, especially as plans for additional off-shore wind-farms are being prepared. Nathusius' pipistrelle still appears to be in a colonisation phase in Ireland. A breeding population is established in Northern Ireland but it is quite localised and has yet to spread significantly from its base around Lough Neagh. Although this species has been turning up consistently in the north-east of the Republic of Ireland, the records of this species in the rest of the country remain sporadic and disjunct. Several low and medium-level threats and pressures were listed in the 2013 assessment, but it seems unlikely that any of them are limiting its spread or establishment here. Lundy *et al*. (2010) predicted that climate change would underpin the further spread and establishment of this species and that may be the main determining factor in it reaching a favourable status in Ireland in the coming decades. For now, no pressures are considered significant and only wind farms are listed as a potential threat.	

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	*Good / Poor / Bad /* ***Unknown***
	b) Population	*Good / Poor / Bad /* ***Unknown***
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	The initial rapid expansion of this bat across Ireland, after it was first recorded here in 1997, was captured by the annual car transect surveys (Roche *et al*., 2011). However, more recent years of this survey suggest the species has not gone on to consolidate its range here (Roche *et al*., 2018). The Nathusius' pipistrelle remains rare in the Republic of Ireland, its range is disjunct and its modelled core area of habitat is relatively small. While Lundy *et al*. (2010) predict an expansion in the area of suitable habitat for the species up to 2050	

	with increasing temperatures it is, as yet, unclear whether the species has a viable and breeding population in the Republic of Ireland. In terms of Future prospects, Habitat is assessed as Good, while Range and Population are assessed as Unknown.

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (X)***		
11.2 Population	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (X)***		
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (X)***		
11.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (X)***		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* ***N/A***		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the nature of change	*YES/NO*	*YES/NO*

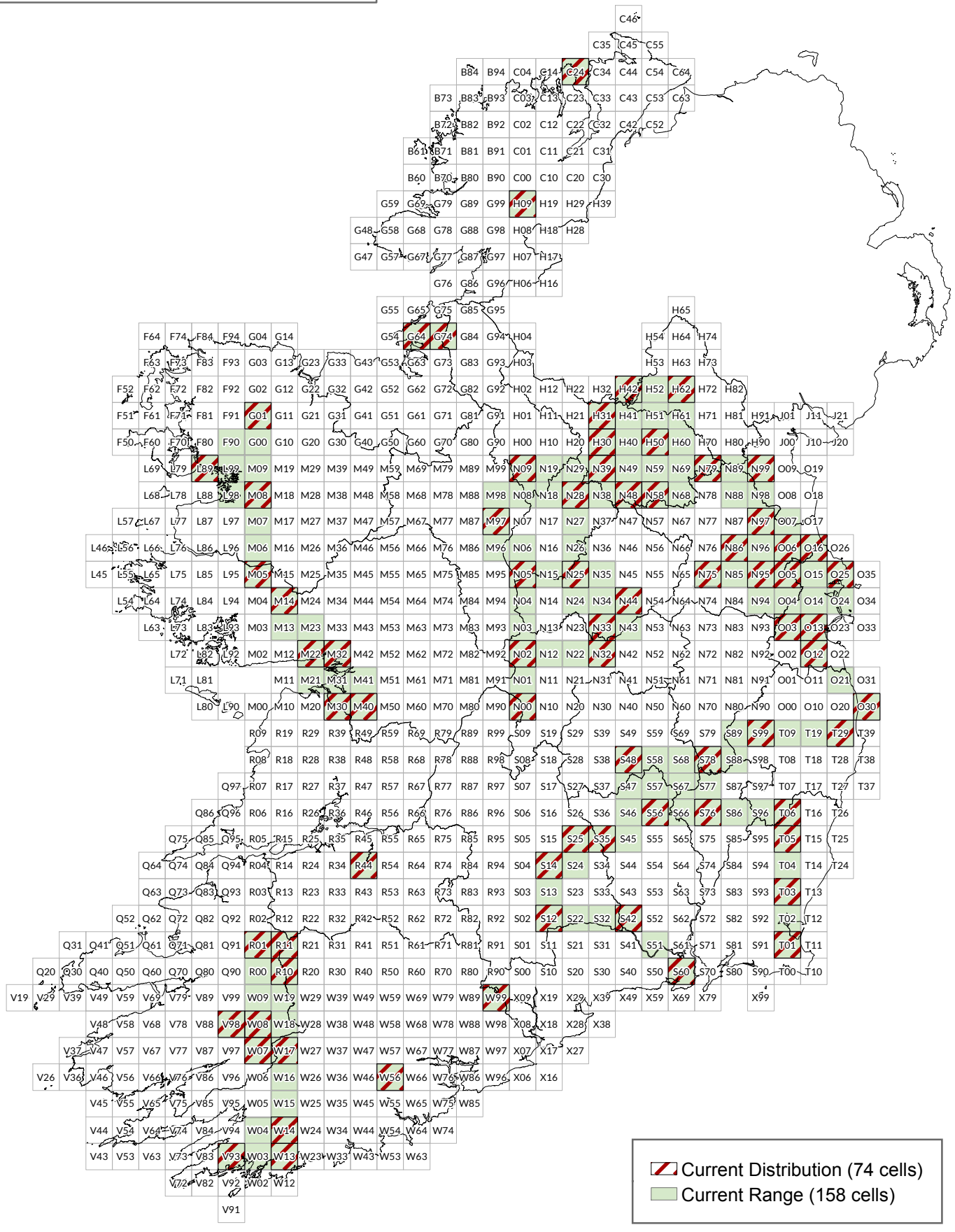
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
11.8 Additional information *Optional*	The initial period of range expansion across Ireland by Nathusius' pipistrelle has not been followed by range consolidation and no breeding populations have been confirmed, despite extensive field surveys. It is unclear whether the current range is sufficient or whether further range expansion is required to provide for the long term survival of the species. Hence, despite the increase in range since the last assessment, Favourable Reference Range, and consequently Range, are assessed as Unknown. The population of Nathusius' pipistrelle in Ireland is cautiously estimated to be in the low thousands. It remains unclear whether the species is successfully reproducing here and also what level of population would be required to ensure long-term viability. Hence, Favourable Reference Population, and therefore Population, are assessed as Unknown at this time. Lundy *et al.* (2011) demonstrated a positive association between Nathusius' pipistrelle and broadleaved woodland, as well as a quadratic association with pasture and with freshwater. Although the modelled core area for the Nathusius' pipistrelle is by far the smallest of all bat species on the island, it is clear that there is still a significant area of suitable habitat available to be colonised by the species. The area of these habitats appears to be stable and in general these habitats appear to be in good condition. Although breeding roosts have not been recorded here, there are many buildings similar to the ones used as nursery colonies in Northern Ireland, so this does not appear to be a limiting factor. Overall Habitat is considered to be Favourable. Given the uncertainty about range and population, Future prospects are considered to be Unknown and overall the conservation status of the species is assessed as Unknown.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Nathusius' Pipistrelle
Pipistrellus nathusii (1317)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Species code	***1322***
1.3 Species scientific name	*Myotis nattereri*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Natterer's bat (Ialtóg Natterer)
1.6i Species description	The Natterer's bat is widespread across Europe and found from Portugal and north-west Africa to the Urals and the near East. It is widely distributed in Ireland, though records are relatively scarce. Summer roosts are normally in old stone buildings or masonry bridges. Usually only small numbers of bats are present, often hidden in narrow spaces where they are difficult to locate. A few larger roosts (>50 bats) have been found in Church of Ireland churches. A number of important autumnal swarming sites have been identified. This species is seldom recorded in winter, but occasionally individuals have been observed in bridges, mines and caves. Detector records are limited due to the difficulty of distinguishing the *Myotis* species. This bat gleans most of its prey (spiders, beetles, caterpillars, moths) from foliage, rather than catching it in the air. Woodland habitats, river corridors and pastures appear to be favoured for foraging.

2 Maps

Distribution of the species within the Member State concerned.

2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2001-2018***
2.3 Distribution map	Submitted
2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted

2.6i Additional information	The distribution map represents data received between January 2001 and June 2018. Much of it comes from Bat Conservation Ireland. Additional distribution records for this species were received from a large EIA project in Galway and from Coillte. In total, 414 records of Natterer's bat were used to map the distribution and range. They include roost records, radio-tracking records and records from detector surveys. The records all come from recognised bat experts and the data is considered to be very reliable. This species is considered to be under-recorded. Nonetheless, the resulting map gives a general reflection of the current distribution of this bat in Ireland.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic,*** *Marine Atlantic*
4.2 Sources of information	Battersby, J. (comp.) (2010): Guidelines for Surveillance and Monitoring of European Bats. EUROBATS Publication Series No. 5. UNEP / EUROBATS Secretariat, Bonn, Germany. Boston, E., Roche, N., Aughney, T. and Langton, S. (2017) Development of a woodland monitoring scheme for bats in Ireland 2016-2017. Unpublished report to National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland. DAFM (2018) *Forest statistics – Ireland 2017*. Department of Agriculture, Food and the Marine, Johnstown Castle Estate, Co. Wexford. Lundy, M.G., Aughney, T., Montgomery, W.I. and Roche, N. (2011) Landscape conservation for Irish bats & species specific roosting characteristics. Unpublished report. Bat Conservation Ireland. http://www.batconservationireland.org/pubs/reports/Landscape_Conservation_Irish_Bats.pdf Marnell, F., Kingston, N. and Looney, D. (2009) *Ireland Red List No. 3: Terrestrial Mammals*. 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*. Species Assessments, Vol 3. National Parks and Wildlife Service, Department of the Environment, Heritage and Local

	Government. Dublin, Ireland. Roche, N., Aughney, T., Marnell, F. and Lundy M. (2014) *Irish bats in the 21st century*. Bat Conservation Ireland, Ulex House, Drumheel, Lisduff, Virginia, Co. Cavan, Ireland. Shiel, C. (2016) Natterer's bat (*Myotis nattereri*) Pp 79-80. In Lysaght, L. and Marnell, F. (Eds.) (2016) *Atlas of Mammals in Ireland 2010-2015*, National Biodiversity Data Centre, Waterford.
4.2i Additional information	Carden, R., Aughney, T., Kelleher, C. and Roche, N. (2010) Irish Bat Monitoring Schemes: BATLAS Republic of Ireland, Report for 2008-2009. Unpublished Report. Bat Conservation Ireland. http://www.batconservationireland.org/pubs/reports/BATLAS2010_FinalReport.pdf Dietz, C., von Helverson, O. and Wolz, I. (2009) *Bats of Britain, Europe and Northwest Africa*. A&C Black Publishers, London. Lundy, M. G., Buckley, D.J., Boston, E. S. M., Scott, D. D., Prodohl, P., Teeling, E.C., Marnell, F. and Montgomery, W.I. (2012) Behavioural context of multi-scale species distribution models assessed by radio-tracking. *Basic & Applied Ecology* 13:188-195. McAney, K. (2006) A conservation plan for Irish vesper bats. *Irish Wildlife Manuals* No. 20. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland. Mitchell-Jones, A.J., Amori, G., Bogdanowicz, W., Krystufek, B., Reijnders, P.J.H., Spitzenberger, F., Stubbe, M., Thissen, J.B.M., Vohralik, V. and Zima, J. (1999) *The Atlas of European Mammals*. Poyser Natural History. O'Sullivan, P. (1994) Bats in Ireland. *Irish Naturalists' Journal* 24: Special Zoological Supplement. Roche, N. (1998) A survey for bat roosts in Church of Ireland churches. The Heritage Council (unpublished). Russ, J.M. (1999) The Microchiroptera of Northern Ireland: Community Composition, Habitat Associations and Ultrasound. Unpublished Ph.D. thesis. The Queen's University of Belfast. Russ, J.M. and Montgomery, W.I. (2002) Habitat association of bats in Northern Ireland: Implications for conservation. *Biological Conservation* 108: 49-58. Shiel, C. (1999) Bridge usage by bats in County Leitrim and County Sligo. A report prepared for the Heritage Council. Shiel, C.B., McAney C.M. and Fairley J.S. (1991) Analysis of the diet of Natterer's bat *Myotis nattereri* and the common long-eared bat *Plecotus auritus* in the west of Ireland. *Journal of Zoology* 223: 299-305. Smiddy, P. (1991) Bats and Bridges. *Irish Naturalists' Journal* 23: 425-426.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***46,400 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 46,400 km²***	
	b) Indicate if operators were used (use these 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 range value is considered to be large enough to support a viable Natterer's bat population and is higher than the estimated range of the species when the Habitats Directive came into force in Ireland.	
5.11 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*	
5.12 Additional information *Optional*	A total of 414 distribution records were collated for this species between 2001 and 2018. These records translated to 207 x 10km squares. Using the range tool, with gap closure set to 20km, an additional 257 grid cells were incorporated giving a total range of 464 cells or 46,400km^2. This is thought to under-represent the true extent of the species distribution in Ireland. The range of the Natterer's bat in 2013, based on data from 2001-2012, was calculated as 379 x 10km squares. Although the current range appears significantly greater, this is considered to be a reflection of better data and the longer time period used for data collection, rather than any actual change in range. The new range, though still considered a minimum figure, is thought to better reflect the true distribution of the species and this figure is now taken to also represent the FRR. The value is considered to be large enough to support a viable Natterer's bat population and is higher than the estimated range of the species when the Habitats Directive came into force in Ireland.	

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2001-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***321***
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval / **minimum***	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	***10 x 10 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***464***
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / **minimum***	

6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007-2018***	
6.8 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	***a) 464 x 10km grids***	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The current population as presented in 6.4 (464 x 10km squares) is considered to be large enough to maintain the long-term viability of the species and is also taken as the Favourable Reference Population.	

6.16 Change and reason for change in population size	*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***	
6.17 Additional information *Optional*	The figure in 6.2 is derived from all known distribution records between 2001 and 2018 intersected with the 1x1 km grid. It is considered to be an underestimate of the true distribution of the species and not a useful indicator of population size. The 2013 report used 10km grid cells as a proxy for population. Although roost surveys are recommended for counting Natterer's bat (Battersby, 2010), this species roosts in small numbers in Ireland making monitoring based on roost counts unviable. Furthermore, bat detector records of this species are difficult to tell apart from other *Myotis* species. In 2016 and 2017, testing of woodland-based monitoring (Boston *et al*., 2017) indicated that dedicated surveys for Natterer's bat could provide robust population trends in time. However, the extent of the fieldwork required (50 sites to be monitored thrice annually) has meant that the roll out of such a monitoring scheme has not been possible to date due to the associated costs and the limited number of bat surveyors available. Until an effective method of population assessment is developed, the same method as used in 2013 – number of 10km grid cells in the range – is provided (in 6.4) as a proxy for population. No population trend data is available. Although the number of 10km cells occupied is higher than that shown in 2013, this reflects the longer time period used allowing a more complete representation of the species distribution and is not considered to be an indication of population increase. In the absence of data to the contrary, and using best expert judgement, the trend is assumed to be stable over a 12-year period of 2006-2017. This is assumed to apply also to the default trend of 2007-2018. The current population as presented in 6.4 (464 x 10km squares) is considered to be large enough to maintain the long-term viability of the species and is also taken as the Favourable Reference Population.	

7 Habitat for the species

7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown*

	b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	Old stone buildings and masonry bridges provide the roosting habitats for most Natterer's. Broadleaf woodland, riparian woods and pastures surrounded by hedgerows have been identified as the main foraging habitats for Natterer's bat in Ireland (Lundy *et al.*, 2011). It is hard to assess the ongoing availability of roosting habitats. Although some roosts are being lost due to natural deterioration and on occasion due to destruction, the gradual decline and deterioration of old stone buildings is offset to some extent by maintenance grants (e.g. the Heritage Council's Buildings at Risk and Traditional Farm Buildings schemes – both of which take bats into account during assessments and resulting works). Maintenance of old masonry road bridges by local authorities is ongoing, but generally an enlightened and informed approach is used with appropriate consideration and mitigation put in place for bats. The area of forest habitats is steadily increasing in Ireland. Although much of the forest estate is conifer plantation (and therefore sub-

	optimal for bats), the area of broadleaved and mixed woodland is also slowly expanding (DAFM, 2018). If pasture is taken as stable, the area of foraging habitat overall may even be increasing. Overall, however, it is assumed that the habitat area and quality required by this bat is stable.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**Xxp** No pressures	**Xxt** No threats
8.2 Sources of information *Optional*		
8.3 Additional information *Optional*	Pressures impacting on Natterer's bats can be divided into those affecting roosts and those reducing the quality of their foraging habitat. The former include the renovation/demolition/disturbance of buildings used as summer roosts. The repair of road bridges over rivers is also a potential concern, as this species will roost in the crevices of masonry bridges. Mixed woodlands provide important foraging habitat for these bats; unsympathetic forest management practices can have negative impacts. Although these pressures are noted here for completeness, none of them is considered to be having a significant impact on the Natterer's bat population in Ireland. This is due in part to an effective system of legal protection and in particular a widespread understanding among local authorities of the licensing requirements in relation to bat roost disturbance.	

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*

	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	The range of the species is stable and is not smaller than the Favourable Reference Range. There are no indications that this parameter will disimprove. The current population is equal to the Favourable Reference Population and considered to be large enough to maintain the long-term viability of the species. This bat uses a range of foraging habitats including woodlands and pastures. These habitats are widespread and increasing. Some declines in roosting opportunities may be happening but more information is needed on this issue. Overall, Habitat for the species is considered to be good.	

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*

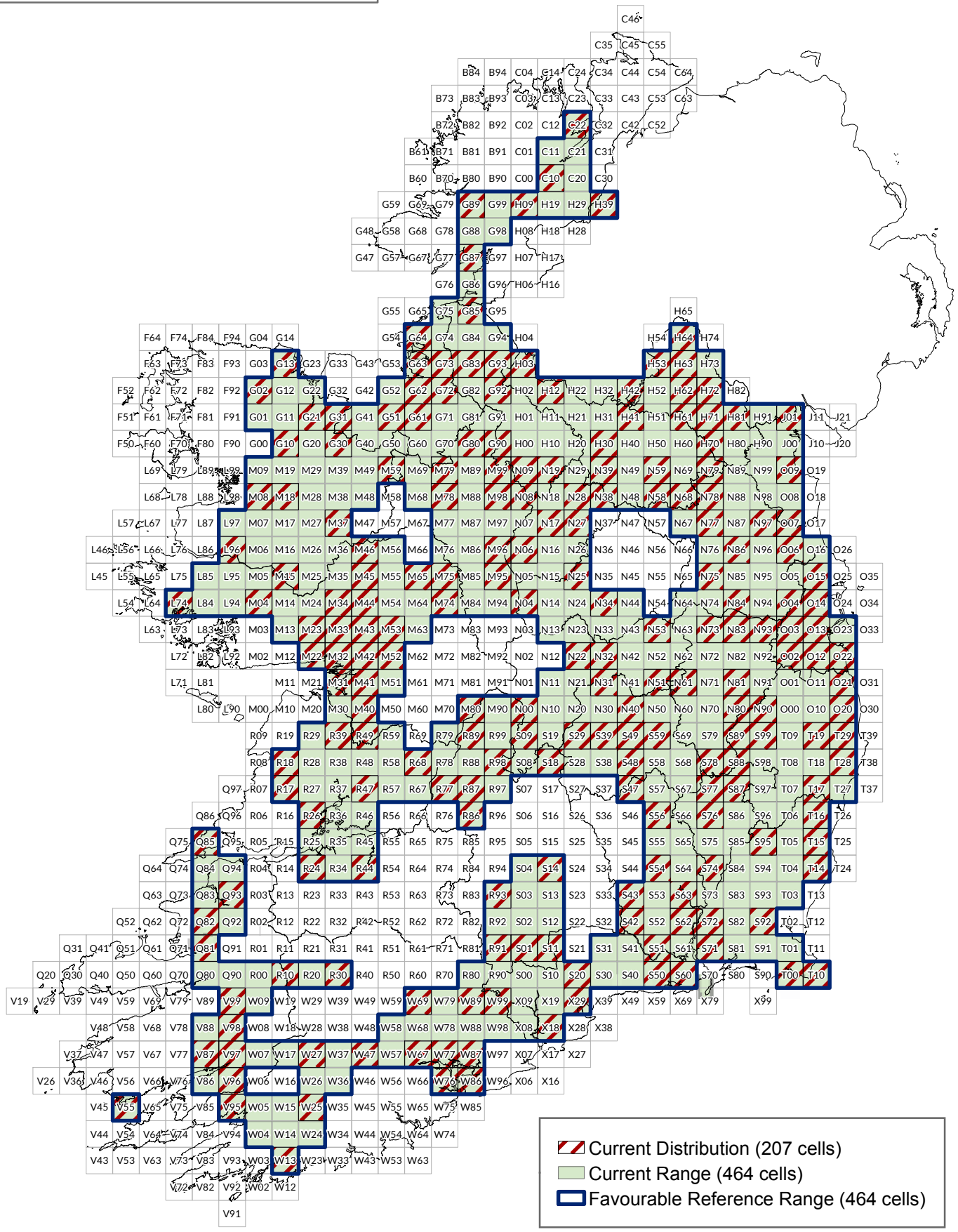
	e) yes, but there is no information on the nature of change	*YES/NO*	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
11.8 Additional information *Optional*	The Range of the species is assessed as Favourable and stable. The current population is equal to the Favourable Reference Population and the habitats used by this bat are stable or increasing. Building renovation and loss of foraging habitat are potential threats for this species, but are not considered to be significant. The most recent Red Data List for Irish Mammals (Marnell *et al*., 2009) lists Natterer's bat as least concern and, overall, the conservation status of this species has been assessed as Favourable.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Natterer's Ba t
Myotis nattereri (1322)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1314***
1.3 Species scientific name	*Myotis daubentonii*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Daubenton's bat (Ialtóg uisce)
1.6i Species description	The Daubenton's bat (*Myotis daubentonii*) is found throughout Ireland. It forages over water and is particularly associated with slow-moving rivers and with lakes. It favours waterways with riparian vegetation, particularly broadleaf woodlands, and is positively associated with good water quality and invertebrate diversity. It is less likely to be present where there are street lights. It also tends to avoid areas of peatland and is negatively associated with increasing altitudes. This species forages over the surface of water bodies, gaffing aquatic insects such as non-biting midges, caddis-flies and mayflies with its large feet. The majority of roosts known for this species are in masonry bridges and stone buildings such as castles and ruins. Confirmed hibernacula for the species are extremely rare in Ireland. Several cave locations have been confirmed as autumnal swarming sites for the species, but it is unknown whether these sites also function as hibernation roosts.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2007-2018***
2.3 Distribution map	Submitted
2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted

2.6i Additional information	The distribution map represents data collected between January 2007 and June 2018. The data comes from the waterways bat monitoring programme, the BATLAS 2020 project and bridge surveys as well as various other sources collated by Bat Conservation Ireland. They include roost records and records from detector surveys. In total, records of Daubenton's bat in 1,580 x 1km squares were used to map the distribution and range. The records all come from recognised bat experts and the data is considered to be very reliable. The species is quite widely recorded and the resulting map is considered to give a reasonable reflection of the current distribution of this bat in Ireland, although it might still be expected to be present in additional squares in the south-west.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic***, *Marine Atlantic*
4.2 Sources of information	Aughney, T. (2016) Daubenton's bat (*Myotis daubentonii*) Pp 77-78. In Lysaght, L. and Marnell, F. (Eds.) (2016) *Atlas of Mammals in Ireland 2010-2015*, National Biodiversity Data Centre, Waterford. Aughney, T., Roche, N. and 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. Lundy, M.G., Aughney, T., Montgomery, W.I., and Roche, N. (2011) Landscape conservation for Irish bats & species specific roosting characteristics. Unpublished Report. Bat Conservation Ireland. Http://www.batconservationireland.org/pubs/reports/Landscape_Conservation_Irish_Bats.pdf Mathews, F., Roche, N., Aughney, T., Jones, N., Day, J., Baker, J. and Langton, S. (2015) Barriers and benefits: implications of artificial night-lighting for the distribution of common bats in Britain and Ireland. *Phil. Trans. R. Soc. B* 370: 20140124. Roche, N., Aughney, T., Marnell, F. and Lundy M. (2014) *Irish bats in the 21st century*. Bat Conservation Ireland, Ulex House, Drumheel, Lisduff, Virginia, Co. Cavan, Ireland. Roche, N., Aughney, T. and Langton, S. (2013) Population estimates, trends and background information for six Irish bat species: Article 17 2007-2012 supporting document. Report submitted to

	the National Parks and Wildlife Service by Bat Conservation Ireland. Voigt, C.C, C. Azam, J. Dekker, J. Ferguson, M. Fritze, S. Gazaryan, F. Hölker, G. Jones, N. Leader, D. Lewanzik, H.J.G.A. Limpens, F. Mathews, J. Rydell, H. Schofield, K. Spoelstra and M. Zagmajster (2018): Guidelines for consideration of bats in lighting projects. *EUROBATS Publication Series* No. 8. UNEP/EUROBATS Secretariat, Bonn, Germany.
4.2i Additional information	Abbott I.M., Sleeman D.P. and Harrison S. (2009) Bat activity affected by sewage effluent in Irish rivers. *Biological Conservation* 142: 2904–2914. Aughney, T., Langton, S. and Roche, N. (2012) All Ireland Daubenton's Bat Waterway Monitoring Scheme 2006-2011. *Irish Wildlife Manuals* No. 61. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Ireland. Dietz, C., von Helverson, O. and Wolz, I. (2009) Bats of Britain, Europe and Northwest Africa. A&C Black Publishers, London. 400pp. Flavin, D.A., Biggane, S.S., Shiel, C.B., Smiddy, P. and Fairley, J.S. (2001) Analysis of the diet of Daubenton's bat *Myotis daubentonii* in Ireland. *Acta Theriologica* 46: 43-52. Langton, S.D., Briggs, P.A. and Haysom, K.A. (2010) Daubenton's bat distribution along rivers – developing and testing a predictive model. *Aquatic Conservation: Marine and Freshwater Ecosystems* 20: S45-S54. Lundy, M.G. and Montgomery, W.I. (2010) Summer habitat associations of bats between riparian landscapes and within riparian areas. *European Journal of Wildlife Research* 56: 385-394. Marnell, F., Kingston, N. and Looney, D. (2009) *Ireland Red List No. 3: Terrestrial Mammals*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. Russ, J.M. and Montgomery, W.I. (2002) Habitat association of bats in Northern Ireland: Implications for conservation. *Biological Conservation* 108: 49-58. Sullivan, C.M., Shiel, C.B., McAney, C.M. and Fairley, J.S. (1993) Analysis of the diets of Leisler's *Nyctalus leisleri*, Daubenton's *Myotis daubentoni* and pipistrelle *Pipistrellus pipistrellus* bats in Ireland. *Journal of Zoology* 231: 656-663. Tierney, D. and O'Boyle, S. (2018) Water Quality in 2016: An Indicators Report. Environmental Protection Agency, Wexford, Ireland. Warren, R.D., Waters, D.A., Altringham, J.D. and Bullock, D.J. (2000) The distribution of Daubenton's bats (*Myotis daubentonii*) and pipistrelle bats (*Pipistrellus pipistrellus*) (Vespertilionidae) in relation to small-scale variation in riverine habitat – a landscape-scale approach. *Biological Conservation* 92: 85-91.

5 Range		
Range within the biogeographical/marine region concerned.		
5.1 Surface area	***74,200 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 74,200 km²***	
	b) Indicate if operators were used (use these 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 the same 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 of the current range is not large enough to allow the long-term survival of the species.	

5.11 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*	
5.12 Additional information *Optional*	Distribution records were collated for this species between 2007 and 2018. These records translated to 604 x 10km squares. Using the range tool, with gap closure set to 20km, an additional 138 grid cells were incorporated giving a total range of 742 cells or 74,200km^2. This is thought to provide a good representation of the true extent of the species' distribution in Ireland, although additional survey work in the extreme south-west might be expected to expand the species' range there. The range of the Daubenton's bat in 2013, based on data from 2007-2012, was calculated as 69,800km^2. Although the current range is somewhat greater, this is considered to be a reflection of better data following more concerted survey work, rather than a genuine increase due to range expansion. The trend is considered to be stable. The Favourable Reference Range is taken to be the same as the Range. The 2013 figure was based on the known range of the species at that time but it has been updated for this assessment to reflect the improved data now available. It is considered to be large enough to allow the long term survival of the species.	

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2007-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***1,580***
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval /* ***minimum***	
6.4 Additional population size	**a) Unit**	***Mature individuals***
	b) Minimum	***57,000***

(using population unit other than reporting unit) *Optional*	**c) Maximum**	***79,000***
	d) Best single value	
6.5 Type of estimate *Optional*	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007-2018***	
6.8 Short-term trend Direction	*stable* / ***increasing*** / decreasing / uncertain / unknown	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	***10.91%***
	b) Maximum	***10.91%***
	c) Confidence interval	***95% C.I. = -7% to +31%***
6.10 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*	
6.11 Long-term trend Period *Optional*		
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
6.14 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*	

<table>
<tr><td rowspan="4">6.15 Favourable reference population
(using the unit in 6.2 or 6.4)</td><td colspan="2">a) 57,000 mature individuals</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 population 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 minimum population estimate provided in 6.4 (57,000) is taken as the favourable reference population. This figure was calculated from the waterway bat monitoring data as per methods detailed in Roche et al. (2013). This figure is considered to be large enough to allow the long-term survival of the species and is retained for the current reporting period.</td></tr>
<tr><td rowspan="6">6.16 Change and reason for change in population size</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>6.17 Additional information

Optional</td><td colspan="2">The figure in 6.2 is derived from all known distribution records between 2007 and 2018. This is considered to reflect a minimum estimate of the species distribution in Ireland and is not considered a useful reflection of population.
An actual population estimate is provided in 6.4. Since all Daubenton's bat roosts are not known it is not possible to count the population based on a complete census. Therefore, the population of mature (volant) individuals has been estimated using data from the Waterway Monitoring Scheme dataset. This population estimate is calculated based on the estimated detection range for echolocating Daubenton's bats and the approximate length of waterway and lake perimeter across the country, multiplied by the probability of detecting a Daubenton's bat in any given moment in time. The minimum end of the range is based on a smaller estimate for river length based on Water Framework Directive Data, while the maximum end is based on data for river length classified according to average widths from the Environmental Protection Agency (EPA). Both estimates include lake perimeter data from the EPA. This population estimate uses a number of assumptions which may be only approximately correct and it could be improved with more detailed information on size and shape of detectable areas, and greater knowledge of the extent of Daubenton's bat use of lakes. However, it may be considered a starting point from which to refine future estimates. These are the same figures provided in 2013. See Roche et al. (2013) for further details.</td></tr>
</table>

	The short-term trend is also based on data from the Waterways Bat Monitoring scheme which has been operating since 2006. The species abundance has hovered slightly above the baseline since then. Although the lower 95% confidence interval currently overlaps the 2007 baseline (i.e. 0), the 12-year trend indicates a total increase of 10.91% (C.I. 95% = -7 to +31%), which represents a yearly increase of 1.04%. See Aughney *et al*. (2018) for full details. No longer-term trend is available. The short-term trend was based on data from 2006-2017 but it is assumed to be the same for the default trend period 2007-2018. The Favourable Reference Population used for the 2013 report is retained. It is the lower end of the estimated population range calculated for this species (see Roche *et al*., 2013 for full details). The higher population estimate (79,000) is derived from EPA stream order data (2012); however, this may include some streams that are insufficiently wide to support the species. Therefore, the lower of the two estimates is selected as a minimum Favourable Reference Population.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994-2018)*

7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	Daubenton's bat forages over water and is particularly associated with slow-moving rivers and with lake shores; it can also be found on wide streams, canals and ponds. It favours waterways with riparian vegetation, particularly broadleaf woodlands, and is positively associated with good water quality and invertebrate diversity. It is less likely to be present where there are street lights. It also tends to avoid areas of peatland and is negatively associated with increasing altitudes. Habitat and roosting associations of Daubenton's bat were modelled using a Maximum Entropy model by Lundy *et al*. (2011) to determine likelihood of occurrence in specific habitats in the Irish landscape and maternity roost preferences. This modelling was carried out using roost and bat detector location data from 2000-2009 which is stored on the Bat Conservation Ireland bat database and includes records from monitoring schemes, BATLAS 2010 and records contributed by ecologists, academics and volunteers, among others. CORINE landcover, altitude, climate data, soil pH and human bias layers were included in the model. Modelling was carried out to a 5km scale. Daubenton's bat records were found to be associated broadly with riparian habitats, broadleaved woodland, and small amounts of urbanisation (Lundy *et al*., 2011). Since these habitat types are currently stable or increasing, the habitat quality for the species is considered good and the habitat trend is taken as stable.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**F24** Residential or recreational activities and structures generating noise, light, heat or other forms of pollution (M)	**F24** Residential or recreational activities and structures generating noise, light, heat or other forms of pollution (M)

8.2 Sources of information *Optional*	
8.3 Additional information *Optional*	Light pollution has been identified as a particular concern for *Myotis* bats such as Daubenton's bat (Matthews *et al*., 2015; Voigt *et al*. 2018). F24 has been selected to represent this pressure, although lighting from industrial developments and roadway developments also contribute to the problem. Despite some growing awareness of light pollution this pressure is likely to continue into the future and it is also listed as a threat. Ranking of importance is based on expert opinion on likely impact of the pressure on the species. Removal of riparian vegetation, bridge repairs and drainage works may also provide some cause for concern for this species and these issues merit further study. There is no evidence to date of an impact on Daubenton's bat distribution due to these issues and hence they are not listed in 8.1.

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	The Daubenton's bat is widespread across Ireland and its population is showing signs of increase. The species exploits a habitat niche which is widely available in Ireland and despite some local reductions in quality (e.g. due to light pollution) there appears to be sufficient suitable habitat going forward.	

11 Conclusions

Assessment of conservation status at end of reporting period	
11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* ***improving*** */ deteriorating /* stable */ unknown*
11.7 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.*

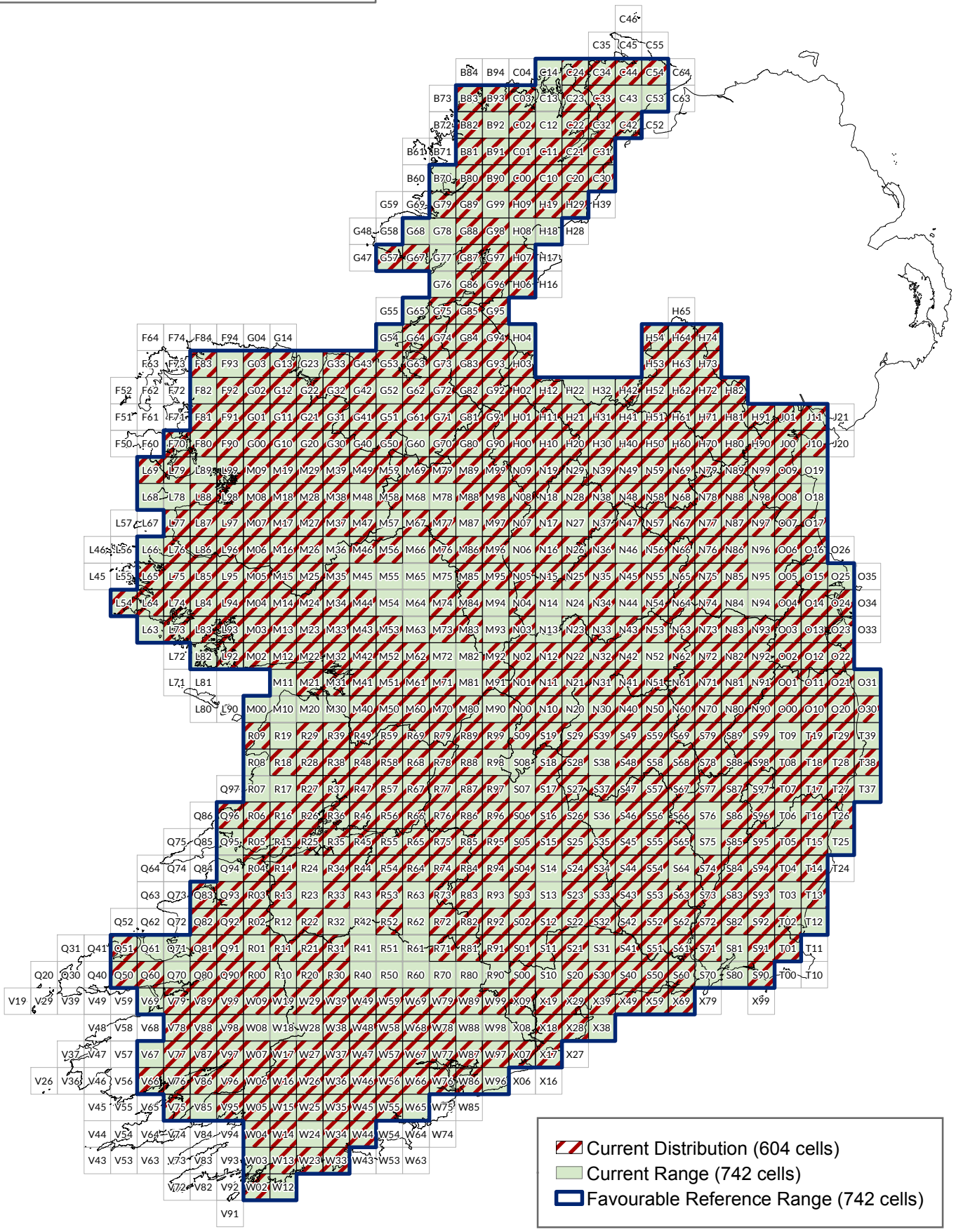
		Overall assessment of conservation status (11.5)	***Overall trend in conservation status (11.6)***
	a) no, there is no difference	*YES/**NO***	YES/***NO***
	b) yes, due to genuine change	*YES/NO*	*YES/NO*
	c) yes, due to improved knowledge/more accurate data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	The Daubenton's bat is widespread across all parts of the country and Range is assessed as Favourable as there is no evidence of any decline since the Directive came into force. Recent estimates for this species suggest a population size in the order to 57,000-79,000 animals. Ongoing monitoring indicates that the population is stable or even slightly increasing and there is no evidence of decline in suitable habitat. Although some pressures/threats have been noted, there is no indication of any major pressures currently impacting on the species and future prospects are considered good. Overall, the species is assessed as Favourable and the overall trend is demonstrating an on-going increase. There were no qualifiers for Favourable assessments in 2013.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Daubenton's Ba t
Myotis daubentonii (1314)
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

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Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1330***
1.3 Species scientific name	*Myotis mystacinus*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Whiskered bat (Ialtóg ghiobach)
1.6i Species description	The whiskered bat (*Myotis mystacinus*) is widespread across much of Europe although it is absent from northern Scotland and northern Scandinavia. There are records from throughout Ireland, from Donegal to Wexford, but the species is not common and its distribution appears to be naturally dispersed and disjunct. Summer roosts are normally in old stone buildings. Usually only small numbers of bats are present, often between rafters and felt and in other narrow spaces where they are difficult to locate. Bridge roosts are also known. A number of important autumnal swarming sites have been identified, and small numbers of wintering animals have been recorded in caves. Detector records are limited due to the difficulty of distinguishing the *Myotis* species. This bat is known to be a woodland specialist, foraging selectively in broadleaved and mixed woodland as well as riparian corridors. In Ireland farmland pasture and wet grassland is also used for foraging.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2001-2018***
2.3 Distribution map	Submitted
2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted

2.6i Additional information	The distribution map represents data received between January 2001 and June 2018. Much of it comes from Bat Conservation Ireland. Additional distribution records for this species were received from a large EIA project in Galway and from Coillte. In total, 258 records of whiskered bat were used to map the distribution and range. They include roost records, radio-tracking records and records from detector surveys. The records all come from recognised bat experts and the data is considered to be very reliable. Nonetheless, this species is considered to be under-recorded and the resulting map is considered to only give a general reflection of the current distribution of this bat in Ireland.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
4.2 Sources of information	Battersby, J. (comp.) (2010) Guidelines for surveillance and monitoring of European Bats. EUROBATS Publication Series No. 5. UNEP / EUROBATS Secretariat, Bonn, Germany. Boston, E., Roche, N., Aughney, T. and Langton, S. (2017) Development of a woodland monitoring scheme for bats in Ireland 2016-2017. Unpublished report to National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland. DAFM (2018) *Forest statistics – Ireland 2017*. Department of Agriculture, Food and the Marine, Johnstown Castle Estate, Co. Wexford. Lundy, M.G., Aughney, T., Montgomery, W.I., and Roche, N. (2011) Landscape conservation for Irish bats & species specific roosting characteristics. Unpublished report. Bat Conservation Ireland. http://www.batconservationireland.org/pubs/reports/Landscape_Conservation_Irish_Bats.pdf Marnell, F., Kingston, N. and Looney, D. (2009) *Ireland Red List No. 3: Terrestrial Mammals*. 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*. Species Assessments, Vol 3. National Parks and Wildlife Service, Department of the Environment, Heritage & Local

	Government. Dublin, Ireland. Roche, N., Aughney, T., Marnell, F. and Lundy M. (2014) *Irish bats in the 21st Century*. Bat Conservation Ireland, Ulex House, Drumheel, Lisduff, Virginia, Co. Cavan, Ireland. Teeling, E. (2016) Whiskered bat (*Myotis mystacinus*) Pp 73-74. In Lysaght, L. and Marnell, F. (Eds.) (2016) *Atlas of Mammals in Ireland 2010-2015*, National Biodiversity Data Centre, Waterford.
4.2i Additional information	Boston, E.S.M., Buckley, D., Bekaert, M.,Gager, Y., Lundy, M., Scott, D.D., Prodohl, P., Montgomery, W.I., Marnell, F. and Teeling, E. (2010) The status of the cryptic bat species, *Myotis mystacinus* and *Myotis brandtii* in Ireland *Acta Chiropterologica* 12(2): 457–461. Buckley, D.J., Lundy, M. G., Boston, E. S. M., Scott, D. D., Prodohl, P., Marnell, F., Montgomery, W. I. and Teeling E. C. (2013) The spatial ecology of the whiskered bat (*Myotis mystacinus*) at the western extreme of its range provides evidence of regional adaptation. *Mammalian Biology* 78:198-204. Carden, R., Aughney, T., Kelleher, C. and Roche, N. (2010) Irish Bat Monitoring Schemes: BATLAS Republic of Ireland, Report for 2008-2009. Unpublished Report. Bat Conservation Ireland. http://www.batconservationireland.org/pubs/reports/BATLAS2010_FinalReport.pdf Dietz, C., von Helverson, O. and Wolz, I. (2009) *Bats of Britain, Europe and Northwest Africa*. A&C Black Publishers, London. Lundy, M. G., Buckley, D.J., Boston, E. S. M., Scott, D. D., Prodohl, P., Teeling, E.C., Marnell, F. and Montgomery, W.I. (2012) Behavioural context of multi-scale species distribution models assessed by radio-tracking. *Basic & Applied Ecology* 13: 188-195. McAney, K. (2006) A conservation plan for Irish vesper bats. *Irish Wildlife Manuals* No. 20. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland. Mitchell-Jones, A.J., Amori, G., Bogdanowicz, W., Krystufek, B., Reijnders, P.J.H., Spitzenberger, F., Stubbe, M., Thissen, J.B.M., Vohralik, V. and Zima, J. (1999) *The Atlas of European Mammals*. Poyser Natural History. O'Sullivan, P. (1994) Bats in Ireland. *Irish Naturalists' Journal* 24: Special Zoological Supplement. Roche, N. (1998) A survey for bat roosts in Church of Ireland churches. The Heritage Council (unpublished). Russ, J.M. (1999) *The Microchiroptera of Northern Ireland: Community Composition, Habitat Associations and Ultrasound*. Unpublished Ph.D. thesis. The Queen's University of Belfast. Russ, J.M. (2008) Review of ASSI designation for bats in Northern Ireland. Northern Ireland Environment Agency, *Research and Development Series* 08/09. Russ, J.M. and Montgomery, W.I. (2002) Habitat association of bats in Northern Ireland: Implications for conservation. *Biological Conservation* 108: 49-58.

	Shiel, C. (1999) Bridge usage by bats in County Leitrim and County Sligo. A report prepared for the Heritage Council. Shiel, C.B., McAney C.M. and Fairley J.S. (1991) Analysis of the diet of Natterer's bat *Myotis nattereri* and the common long-eared bat *Plecotus auritus* in the west of Ireland. *Journal of Zoology* 223: 299-305. Smiddy, P. (1991) Bats and Bridges. *Irish Naturalists' Journal* 23: 425-426.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***27,000 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 27,000 km²***	
	b) Indicate if operators were used (use these 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 value is considered to be large enough to support a viable whiskered bat population and is higher than the estimated range of the species when the Habitats Directive came into force in Ireland.	
5.11 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*	
5.12 Additional information *Optional*	A total of 258 distribution records were collated for this species between 2001 and 2018. These records translated to 125 x 10km squares. Using the range tool, with gap closure set to 20km, an additional 145 grid cells were incorporated giving a total range of 270 cells or 27,000km^2. This is thought to under-represent the true extent of the species distribution in Ireland. The range of the whiskered bat in 2013, based on data from 2001-2012, was calculated as 93 x 10km squares. Although the current range appears significantly greater, this is considered to be a reflection of better data and the longer time period used for the data collection, rather than any actual change in range. The new range, though still considered a minimum figure, is thought to better reflect the true distribution of the species and this figure is now taken to also represent the FRR. The value is considered to be large enough to support a viable whiskered bat population and is higher than the estimated range of the species when the Habitats Directive came into force in Ireland.	

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2001-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	
	c) Maximum	

	d) Best single value	***185***	
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval / **minimum***		
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	***10 x 10 km grids***	
	b) Minimum		
	c) Maximum		
	d) Best single value	***270***	
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / **minimum***		
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*		
6.7 Short-term trend Period	***2007-2018***		
6.8 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*		
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**		
	b) Maximum		
	c) Confidence interval		
6.10 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*		
6.11 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*		
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*		
6.13 Long-term trend Magnitude	a) Minimum	*Percentage change over the period indicated in the field 6.11. If a precise value is known provide the same value under both minimum and maximum*	

Optional	b) Maximum	*Percentage change over the period indicated in the field 6.11. If a precise value is known provide the same value under both minimum and maximum*
	c) Confidence interval	*Indicate confidence interval if a statistically reliable sampling scheme is used*
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	***a) 270 x 10 km grids***	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The current Population as presented in 6.4 (270 x 10km squares) is considered to be large enough to maintain the long-term viability of the species and is also taken as the Favourable Reference Population.	
6.16 Change and reason for change in population size	*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***	
6.17 Additional information *Optional*	The figure in 6.2 is derived from all known distribution records between 2001 and 2018 intersected with the 1x1km grid. It is considered to be an underestimate of the true spread of the species and not a useful indicator of population size. The 2013 report used 10km grid cells as a proxy for population. Although roost surveys are widely used to count whiskered bat across its European range (Battersby, 2010), this species roosts in small numbers in Ireland making monitoring based on roost counts unviable. Furthermore, bat detector records of this species are difficult to tell apart from other *Myotis* species. In 2016 and 2017, testing of woodland-based monitoring (Boston *et al*., 2017) indicated that dedicated surveys for whiskered bat could provide robust population trends in time. However, the roll out of this new	

	monitoring scheme has not been possible to date due to the associated costs and the limited number of bat surveyors available. Until an effective method of population assessment is developed, the same method as used in 2013 – number of 10km grid cells in the range – is provided (in 6.4) as a proxy for population. No population trend data is available. Although the number of 10km cells occupied is higher than that shown in 2013, this reflects the longer time period used, allowing a more complete representation of the species distribution and is not considered to be an indication of population increase. In the absence of data to the contrary, and using best expert judgement, the trend is assumed to be stable. This is based on data from 2006-2017 but it is assumed to be the same for the default trend period 2007-2018. The current population as presented in 6.4 (270 x 10km squares) is considered to be large enough to maintain the long-term viability of the species and is also taken as the Favourable Reference Population.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*

7.8 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*
7.9 Additional information *Optional*	Old stone buildings and masonry bridges provide the main roosting habitats for whiskered bats. Broadleaf woodland, mixed forests, riparian woods and pasture have been identified as the main foraging habitats for this bat in Ireland, with some evidence of urban areas and scrub being used too (Lundy *et al*., 2011). It is hard to assess the ongoing availability of roosting habitats. Although some roosts are being lost due to natural deterioration and on occasion due to destruction, the gradual decline and deterioration of old stone buildings is offset to some extent by maintenance grants (e.g. the Heritage Council's Buildings at Risk and Traditional Farm Buildings schemes – both of which take bats into account during assessments and resulting works). Maintenance of old masonry road bridges by local authorities is ongoing, but generally an informed approach is used, with appropriate consideration and mitigation put in place for bats. The area of forest habitats is steadily increasing in Ireland. Although much of the forest estate is conifer plantation (and therefore sub-optimal for bats), the area of broadleaved and mixed woodland is also slowly expanding (DAFM, 2018). If the area of pasture is taken as stable, the area of foraging habitat overall may even be increasing. Overall, however, it is assumed that the habitat area and quality required by this bat is stable.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**Xxp** No pressures	**Xxt** No threats
8.2 Sources of information *Optional*		
8.3 Additional information	Pressures impacting on whiskered bats can be divided into those affecting roosts and those reducing the quality of their foraging habitat. The former include the renovation/demolition/disturbance	

Optional	of buildings used as summer roosts. The repair of road bridges over rivers is also a potential concern, as this species will roost in the crevices of masonry bridges. Mixed woodlands provide important foraging habitat for these bats; unsympathetic forest management practises can have negative impacts. Although these pressures are noted here for completeness, none of them is considered to be having a significant impact on the whiskered bat population in Ireland. This is due in part to an effective system of legal protection and in particular a widespread understanding among local authorities of the licensing requirements in relation to bat roost disturbance.

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	The range of the species is stable and is not smaller than the Favourable Reference Range. There are no indications that this parameter will disimprove. The current population is equal to the Favourable Reference Population and is considered to be large enough to maintain the long-term viability of the species. This bat uses a range of foraging habitats including woodlands and pastures. These habitats are widespread and increasing. Some declines in roosting opportunities may be happening but more information is needed on this issue. Overall, habitat is considered to be good.	

11 Conclusions

Assessment of conservation status at end of reporting period	
11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*

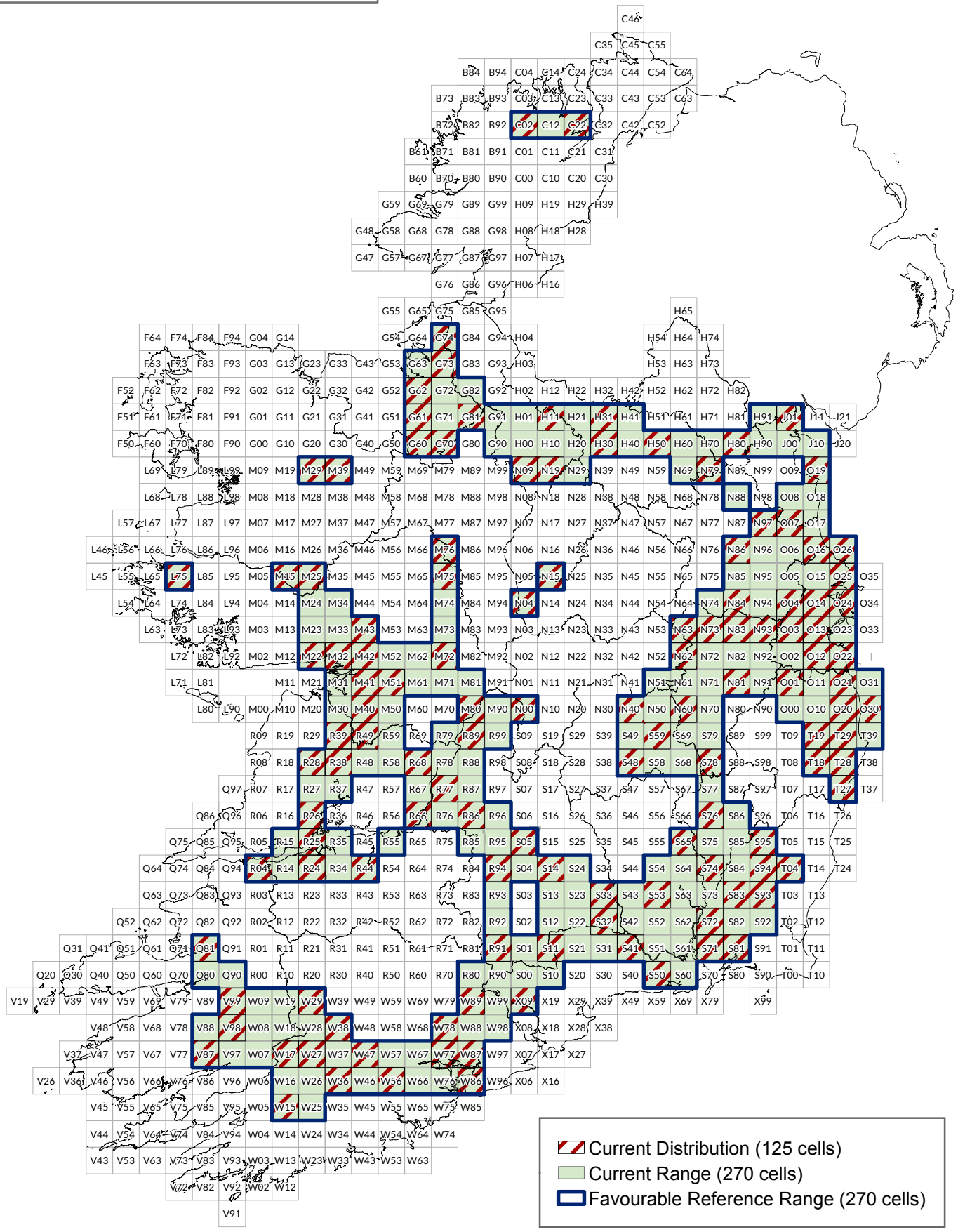
11.7 Change and reasons for change in conservation status and conservation status trend	*Indicate whether there is a change from the previous reporting round and (if yes) the nature of that change. More than one option (b to e) can be chosen.*		
		Overall assessment of conservation status (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	The current range of the species is stable and favourable. The current population is equal to the Favourable Reference Population and the habitats used by this bat are stable or increasing. Building renovation and loss of foraging habitat are potential threats for this species, but are not considered to be significant. The most recent Red Data List for Irish Mammals (Marnell *et al*., 2009) lists whiskered bat as least concern and, overall, the conservation status of this species has been assessed as Favourable.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Whiskered Bat
Myotis mystacinus (1330)
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

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Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Species code	***1326***
1.3 Species scientific name	*Plecotus auritus*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Brown long-eared bat (Ialtóg fhad chluasach dhonn)
1.6i Species description	The brown long-eared bat (*Plecotus auritus*) is widely distributed in Ireland and across Europe. Its slow flight limits the distance that this species can travel at night-time and studies have found that almost all bats will forage within 1.5km of the roost. However, its manoeuvrability means that it can access cluttered habitats and flightless arthropod prey make up a large proportion of its diet confirming the importance of gleaning as a foraging strategy for the species. Modelling indicates that the brown long-eared bat selects areas with broadleaf woodland and riparian habitats on a local scale, while the presence of mixed woodland at a wider landscape level is also important. It can cope with low levels of urbanisation, but wetlands such as bog, marsh and heath are avoided. Brown long-eared bats rely heavily on manmade structures for roosting. Most of the roosts recorded in Ireland are in buildings, with very small numbers in bridges, trees and bat boxes, although the natural summer roost of this species across Europe is tree holes. Brown long-eared bats show a high degree of roost fidelity and will often use traditional roosts for generations. While the species has been found in a range of building types, from old mills to bungalows, churches or large mansions typically support the largest numbers.

2 Maps

Distribution of the species within the Member State concerned.

2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2007-2018***
2.3 Distribution map	Submitted
2.4 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*

2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	The distribution map represents data collected between January 2007 and June 2018. The data comes from the brown long-eared bat roost monitoring programme, the BATLAS 2020 project, as well as various other sources collated by Bat Conservation Ireland. The data includes roost records, records from detector surveys and some radio-tracking data. Records of brown long-eared bat in 571 1km squares were used to map the distribution and range. The records all come from recognised bat experts and the data is considered to be very reliable. The species is quite widely recorded and the resulting map is considered to give a reasonable reflection of the current distribution of this bat in Ireland although further dedicated survey work would likely uncover additional records, notably in the south and south-west.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
4.2 Sources of information	Aughney, T. (2016) Brown long-eared bat (*Plecotus auritus*) Pp 89-90. In Lysaght, L. and Marnell, F. (Eds.) (2016) *Atlas of Mammals in Ireland 2010-2015*, National Biodiversity Data Centre, Waterford. Aughney, T., Roche, N. and 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. Entwistle, A.C., Racey, P.A. and Speakman, J.R. (1996) Habitat exploitation by a gleaning bat, *Plecotus auritus*. *Phil. Trans. R. Soc. Lond. B* 351: 921-931. Lundy, M.G., Aughney, T., Montgomery, W.I., and Roche, N. (2011) Landscape conservation for Irish bats & species specific roosting characteristics. Unpublished Report. Bat Conservation Ireland. http://www.batconservationireland.org/pubs/reports/Landscape_Conservation_Irish_Bats.pdf Roche, N., Aughney, T. and Langton, S. (2013) Population estimates, trends and background information for six Irish bat species: Article 17 2007-2012 supporting document. Report submitted to

	the National Parks and Wildlife Service by Bat Conservation Ireland. Roche, N., Aughney, T., Marnell, F. and Lundy M. (2014) *Irish bats in the 21st Century*. Bat Conservation Ireland, Ulex House, Drumheel, Lisduff, Virginia, Co. Cavan, Ireland.
4.2i Additional information	Aughney, T., Langton, S. and Roche, N. (2011) Brown long-eared bat roost monitoring scheme for the Republic of Ireland: synthesis report 2007-2010. *Irish Wildlife Manuals*, No. 56. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Berthinussen, A. and Altringham, J. (2012) The effect of a major road on bat activity and diversity. *Journal of Applied Ecology* 49: 82-89. Boughey, K.L., Lake, I.R., Haysom, K.A. and Dolman, P.M. (2011) Improving the biodiversity benefits of hedgerows: How physical characteristics and the proximity of foraging habitat affect the use of linear features by bats. *Biological Conservation* 144: 1790-1798. Carden, R., Aughney, T., Kelleher, C. and Roche, N. (2010) Irish Bat Monitoring Schemes: BATLAS Republic of Ireland, Report for 2008-2009. Unpublished Report. Bat Conservation Ireland. http://www.batconservationireland.org/pubs/reports/BATLAS2010_FinalReport.pdf Dietz, C., von Helverson, O. and Wolz, I. (2009) *Bats of Britain, Europe and Northwest Africa.* A&C Black Publishers, London. Entwistle, A.C., Racey, P.A. and Speakman, J.R. (2000) Social and population structure of a gleaning bat, *Plecotus auritus*. *J. Zool. Lond*., 252: 11-17. Lundy, M.G. and Montgomery, W.I. (2010) Summer habitat associations of bats between riparian landscapes and within riparian areas. *European Journal of Wildlife Research* 56: 385-394. Lundy M., Teeling E. C., Boston E. S. M, Scott D. D, Buckley D. J., Prodöhl P. A., Marnell F. and Montgomery W. I. (2011) The Shape of Sound: Elliptic fourier descriptors (EFD) discriminate the echolocation calls of *Myotis* bats (*M. daubentoni, M. nattereri* and *M. mystacinus*). *Bioacoustics* 20: 101-116 Marnell, F., Kingston, N. and Looney, D. (2009) *Ireland Red List No. 3: Terrestrial Mammals*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. O'Sullivan, P. (1994) Bats in Ireland. *Irish Naturalists' Journal* 24: Special Zoological Supplement. Sheil, C.B., McAney C.M., and Fairley J.S. (1991) Analysis of the diet of Natterer's bat *Myotis nattereri* and the common long-eared bat *Plecotus auritus* in the west of Ireland. *Journal of Zoology* 223: 299-305. Swift, S.M. (1998) *Long-eared Bats*. T & AD Poyser Natural History, London. 182pp.

5 Range		
Range within the biogeographical/marine region concerned.		
5.1 Surface area	***62,200 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	*1994–2018*	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 62,200km²***	
	b) Indicate if operators were used (use these 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 the same 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 of the current range is not large enough to allow the long-term survival of the species.	
5.11 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*	
5.12 Additional information *Optional*	Distribution records were collated for this species between 2007 and 2018. These records translated to 343 x 10km squares. Using the range tool, with gap closure set to 20km, an additional 279 grid cells were incorporated giving a total range of 622 cells or 62,200km^2. This is thought to provide a reasonable representation of the species' distribution in Ireland. It is interesting that some gaps apparent in the range in 2013 are still without records. In this regard, it is notable that the brown long-eared bat may not disperse to the same extent as other bat species since it is a slow flyer. Consequently, squares between known distribution records and that were not selected by the range tool may represent genuine gaps in range. That said, it is likely that the large gap in the mid-south (north and east Cork) could be reduced with some dedicated surveying. The range of the brown long-eared bat in 2013, based on data from 2001-2012, was calculated as 60,600km^2. Although the current range is slightly greater, this is considered to be a reflection of better data following more concerted survey work, rather than a genuine increase due to expansion. The trend overall is considered to be stable. The Favourable Reference Range is taken to be the same as the current range. The 2013 figure was based on the known range of the species at that time, but it has been updated for this assessment to reflect the improved data now available. It is considered to be large enough to allow the long-term survival of the species.	

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2007-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***571***
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval /* ***minimum***	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	***Number of adults***
	b) Minimum	***62,000***
	c) Maximum	***97,000***
	d) Best single value	
6.5 Type of estimate *Optional*	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007-2018***	
6.8 Short-term trend Direction	*stable /* ***increasing*** */ decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	***32.52%***
	b) Maximum	***32.52%***
	c) Confidence interval	***95% C.I. = +11 to +54%***
6.10 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*	
6.11 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	

6.13 Long-term trend Magnitude *Optional*	a) Minimum	*Percentage change over the period indicated in the field 6.11. 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 6.11. If a precise value is known provide the same value under both minimum and maximum*
	c) Confidence interval	*Indicate confidence interval if a statistically reliable sampling scheme is used*
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	***a) 62,000 adults***	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators The minimum population estimate provided in 6.4 (62,000) is taken as the favourable reference population. This figure was calculated from the roost monitoring data as per methods detailed in Roche *et al.* (2013). This figure is considered to be sufficient for the long-term survival of the species.	
6.16 Change and reason for change in population size	*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***	
6.17 Additional information *Optional*	The 2007 to 2018 distribution records held by Bat Conservation Ireland for this species were mapped at the 1km level to provide the population estimate used in 6.2. This is considered to be a minimum estimate of the species' distribution in Ireland and is not considered a useful reflection of population. The population estimate from the 2013 report (62,000 – 97,000) is retained for the present reporting period and provided in 6.4. Since all brown long-eared bat roosts are not known it is not possible to	

	count the population based on a complete census. Therefore, the population of mature (volant) individuals was estimated using roost count data from the Republic of Ireland. This includes data from the Brown Long-eared Bat Roost Monitoring Scheme as well as *ad hoc* roost records. The average foraging distance observed by Entwistle *et al*. (1996) from Scottish roosts is used to determine average area used by individuals around a roost, in absence of similar data for Ireland. The modelled core area for the species in the Republic of Ireland was determined using Maximum Entropy modelling by Lundy *et al*. (2011). To calculate the population of brown long-eared bats in the country, the total core area for the species was divided by the average foraging area for each roost and multiplied by mean and median roost numbers to give a population estimate range. This kind of population estimate would be improved with more detailed information on size and shape of foraging areas around a roost, greater knowledge of foraging distances, more *ad hoc* roost counts and information on sex ratios in the roosts that are counted. However, it may be considered a starting point from which to refine future estimates. See Roche *et al*. (2013) for further details. The brown long-eared bat is monitored through an annual roost monitoring programme which was started in 2007. The species has shown a significant increase of 32.5% (95% C.I. = +11 to +54%) over the monitoring period (11 years), equivalent to an average annual increase of 3.18%. See Aughney *et al*. (2018) for full details. Although the monitoring scheme has only been running for 11 years, the trend shown has been attributed to a 12-year period (2007-2018) to fit the short-term trend window requirements. The Favourable Reference Population proposed in the previous reporting period (2013) for the species is retained (62,000). This estimate was derived from the median roost size along with the average foraging distance (based on Scottish data, Entwistle *et al*., 1996) and the available core area of favourable habitat in Ireland (Lundy *et al*., 2011). See Roche *et al*. (2013) for full details. The lower end of the estimated population range is selected as the Favourable Reference Population. It is considered to be sufficient for the long-term survival of the population.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*

7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	Habitat and roosting associations of the brown long-eared bat were modelled using a Maximum Entropy model by Lundy *et al*. (2011) to determine likelihood of occurrence in specific habitats in the Irish landscape and maternity roost preferences. This modelling was carried out using roost and bat detector location data stored on the Bat Conservation Ireland bat database and included records from monitoring schemes, BATLAS 2010 and records contributed by ecologists, academics and volunteers, among others. CORINE landcover, altitude, climate data, soil pH and human bias layers were included in the model. Brown long-eared bat records were found to be associated broadly with broadleaved woodland, riparian habitats, mixed woodland and small amounts of urbanisation (Lundy *et al*. 2011). Aughney *et al*. (2018) in their more recent radio-tracking work found a similar picture of habitat usage, with parkland with mature trees also selected. Since these habitat types are generally stable or increasing (woodland) the habitat quality for the species is assessed as good and the trend overall is taken as stable.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**Xxp** No pressures	**Xxt** No threats
8.2 Sources of information *Optional*		
8.3 Additional information *Optional*	As this bat regularly roosts in old buildings (e.g. churches) it can come into conflict with roost owners. The loss of roosts in mature trees due to felling, light pollution and the absence of data on swarming and winter sites are also concerns. However, there is no evidence that any of these issues are impacting on distribution or population and hence they are not listed as medium or important threats for this species.	

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	The dedicated roost-based monitoring programme provides evidence of a significant increase in the population; there is no evidence of any decline in Range or Habitat. In general the Future prospects of these parameters are considered to be good.	

11 Conclusions

Assessment of conservation status at end of reporting period	
11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*

<table>
<tr><td>11.5 Overall assessment of Conservation Status</td><td colspan="3"><u>Favourable (FV)</u> / Inadequate (U1) / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>11.6 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">11.7 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 (11.5)</td><td>Overall trend in conservation status (11.6)</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 data</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>d) yes, due to the use of different method (including taxonomical change or use of different thresholds)</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>e) yes, but there is no information on the 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>11.8 Additional information

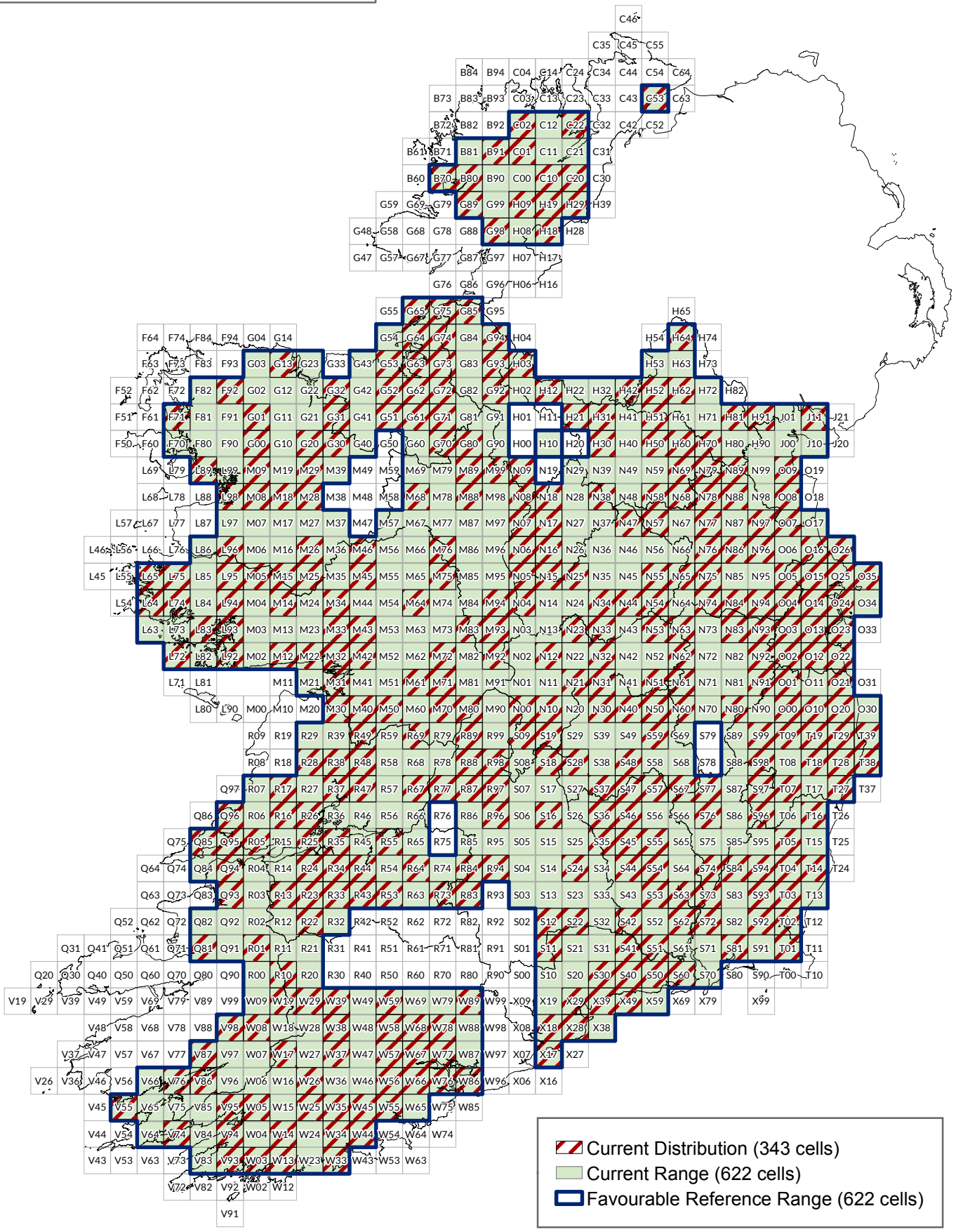
Optional</td><td colspan="3">Recent estimates put the Irish population of brown long-eared bats at 60,000-100,000 animals. Monitoring data suggests a recent significant increase in numbers and both Range and Habitat are considered to be stable and Favourable. There is no indication of any major pressures currently impacting the population and Future prospects are considered good. Overall, the species is assessed as Favourable and the overall trend is demonstrating an on-going increase. There were no qualifiers for Favourable assessments in 2013.</td></tr>
</table>

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Brown long-eared Bat
Plecotus auritus (1326)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1331***
1.3 Species scientific name	*Nyctalus leisleri*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Leisler's bat (Ialtóg Leisler)
1.6i Species description	Leisler's bat (*Nyctalus leisleri*) has been described as a 'typically Irish bat' due to its abundance in Ireland compared to the rest of Europe, where it is uncommon or absent. Its abundance in Ireland has been attributed to the absence of larger competing species, such as the closely related noctule (*N. noctula*). On continental Europe, Leisler's bat is considered a tree-dwelling species across most of its distribution. The majority of known roosts of this species in Ireland, however, have been found in buildings, although roost records from trees and bat boxes are also known. Of all the Irish bat species, Leisler's have the most specific maternity roosting habitat requirements, selecting sites with adjacent woodland and freshwater and avoiding areas of arable land and coniferous woodland. Surveys and modelling of foraging preferences indicate that woodlands, riparian habitats and small amounts of urbanisation are favoured while peatlands and areas of dense urbanisation are avoided.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2007-2018***
2.3 Distribution map	Submitted
2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted

2.6i Additional information	The distribution map represents over 7,000 records of Leisler's bat collected between January 2007 and June 2018. The data comes from the Car Transect Bat Monitoring programme, the BATLAS 2020 project, as well as roost records and various other sources collated by Bat Conservation Ireland. The records all come from recognised bat experts and the data is considered to be very reliable. The species is widespread and commonly recorded and the resulting map is considered to give a reasonable reflection of the current distribution of this bat in Ireland.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
4.2 Sources of information	Aughney, T., Roche, N. and 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. Boston, E. (2016) Leisler's bat (*Nyctalus leisleri*) Pp 81-82. In Lysaght, L. and Marnell, F. (Eds.) (2016) *Atlas of Mammals in Ireland 2010-2015*, National Biodiversity Data Centre, Waterford. Lundy, M.G., Aughney, T., Montgomery, W.I., and Roche, N. (2011) Landscape conservation for Irish bats & species specific roosting characteristics. Unpublished Report. Bat Conservation Ireland. Marnell, F., Kingston, N. and Looney, D. (2009) *Ireland Red List No. 3: Terrestrial Mammals*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. Roche, N., Aughney, T. and Langton, S. (2013) Population estimates, trends and background information for six Irish bat species: Article 17 2007-2012 supporting document. Report submitted to the National Parks and Wildlife Service by Bat Conservation Ireland. Roche, N., Aughney, T., Marnell, F. and Lundy M. (2014) *Irish bats in the 21st century*. Bat Conservation Ireland, Ulex House, Drumheel, Lisduff, Virginia, Co. Cavan, Ireland.
4.2i Additional information	Berthinussen, A. and Altringham, J. (2012). The effect of a major road on bat activity and diversity. *Journal of Applied Ecology* 49: 82-89. Boston E.S.M., Montgomery W.I., Hynes R. and Prodöhl P.A. (2015)

New insights on postglacial colonization in western Europe: the phylogeography of the Leisler's bat (*Nyctalus leisleri*). *Proceedings of the Royal Society B - Biological Sciences*: 282(1804):20142605. doi:10.1098/rspb.2014.2605.

Boughey, K.L., Lake, I.R., Haysom, K.A. and Dolman, P.M. (2011) Improving the biodiversity benefits of hedgerows: How physical characteristics and the proximity of foraging habitat affect the use of linear features by bats. *Biological Conservation* 144: 1790-1798.

Carden, R., Aughney, T., Kelleher, C. and Roche, N. (2010) Irish Bat Monitoring Schemes: BATLAS Republic of Ireland, Report for 2008-2009. Unpublished Report. Bat Conservation Ireland. http://www.batconservationireland.org/pubs/reports/BATLAS2010_FinalReport.pdf

Dietz, C., von Helverson, O. and Wolz, I. (2009) *Bats of Britain, Europe and Northwest Africa.* A&C Black Publishers, London.

Lundy, M.G. & Montgomery, W.I. (2010) Summer habitat associations of bats between riparian landscapes and within riparian areas. *European Journal of Wildlife Research* 56: 385-394.

Lundy, M.G., Aughney, T., Montgomery, W.I., and Roche, N. (2011) Landscape conservation for Irish bats & species specific roosting characteristics. Unpublished Report. Bat Conservation Ireland. http://www.batconservationireland.org/pubs/reports/Landscape_Conservation_Irish_Bats.pdf

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5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***76,200 km²***

5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** / increasing */ decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 76,200 km²***	
	b) Indicate if operators were used (use these 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 the same 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 of the current range is not large enough to allow the long-term survival of the species.	
5.11 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*	
5.12 Additional information *Optional*	Leisler's bat is one of the most common and widespread bat species in Ireland. Over 7,000 distribution records were collated for this species between 2007 and 2018. These records translated to 629 x 10km squares. Using the range tool, with gap closure set to 20km, an additional 133 grid cells were incorporated giving a total range of 762 cells or 76,200km^2. This is thought to provide a good representation of the true extent of the species' distribution in Ireland. Dedicated survey work in certain 10km squares (e.g. M54, M64, V67, V68) might fill the apparent gaps within the range, but it may be that these squares do not contain suitable habitat. The range of the Leisler's bat in 2013, based on data from 2001-2012, was calculated as 69,900km^2. Although the current range appears greater, this is considered to be a reflection of better data following more concerted survey work, rather than a genuine increase due to expansion. The trend is considered to be stable. The Favourable Reference Range is taken to be the same as the Range. The 2013 figure was based on the known range of the species at that time but it has been updated for this assessment to reflect the improved data now available.	

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2007-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1 x 1km grids***
	b) Minimum	
	c) Maximum	
	d) Best single value	***2,445***
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval / **minimum***	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	***Number of individuals***
	b) Minimum	***63,000***
	c) Maximum	***113,000***
	d) Best single value	

6.5 Type of estimate *Optional*	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007-2018***	
6.8 Short-term trend Direction	*stable /* ***increasing*** */ decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	***29.7%***
	b) Maximum	***29.7%***
	c) Confidence interval	***95% C.I. = -1% to +65%***
6.10 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*	
6.11 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	***a) 63,000 individuals***	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) If favourable reference population is unknown indicate by using 'x'	

	d) Indicate method used to set reference value if other than operators The Favourable Reference Population used in 2013 (~63,000 individuals) is considered to be large enough to allow the long-term survival of the species and is retained for the current reporting period.	
6.16 Change and reason for change in population size	*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***	
6.17 Additional information *Optional*	The 2007 to 2018 distribution records held by Bat Conservation Ireland for this species were mapped at the 1km level to provide the population estimate used in 6.2. This is considered to be a minimum estimate of the species' distribution in Ireland and is not considered a useful reflection of population. The population estimate from the 2013 report (63,000-113,000) is retained for the present reporting period and provided in 6.4. It is not possible to count the population based on a complete census. Instead, the population of mature (volant) individuals has been estimated using data from the Car-based Bat Monitoring Scheme. This population estimate is calculated based on the detection distance for echolocating Leisler's bats (60-80m) and the approximate area that is detectable. The area of Ireland is divided by the approximate detectable area and multiplied by the probability of detecting a Leisler's bat along any given roadside (2007-2012) on any given evening, from Car-based Bat Monitoring data. The minimum end of the range is based on the wider detection range (80m) while the maximum end is based on the closer detection range (60m). This population estimate uses a number of assumptions which may be only approximately correct and it could be improved with more detailed information on size and shape of detectable areas, better knowledge of Leisler's bat habitat use around roadsides and other factors. However, it may be considered a starting point from which to refine future estimates. See Roche *et al*. (2013) for further details. Data from the Car-based Bat Monitoring Scheme (2003-2017) shows that this species experienced a significant increase from 2003 until 2014 when the trend turned downwards. The lower 95% confidence interval around the smoothed trend currently overlaps the 2006 baseline index. In the latest twelve-year period (2006-2017) this species has increased by 29.7% in total (95% C.I. = -1% to +65%), equivalent to a per-annum increase of 2.2%. See Aughney *et al.*	

	(2018) for full details. The short-term trend was based on data from 2006-2017 but it is assumed to be the same for the default trend period 2007-2018. The Favourable Reference Population for the species from 2013 is retained for the current reporting period, i.e. 63,000 volant individuals.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	Habitat and roosting associations of the Leisler's bat were modelled using a Maximum Entropy model by Lundy *et al*. (2011) to determine likelihood of occurrence in specific habitats in the Irish landscape and maternity roost preferences. This modelling was carried out using

	roost and bat detector location data from 2000-2009 which is stored on the Bat Conservation Ireland bat database and included records from monitoring schemes, BATLAS 2010 and records contributed by ecologists, academics and volunteers, among others. CORINE landcover, altitude, climate data, soil pH and human bias layers were included in the model. Leisler's bat records were widespread but found to be associated broadly with broadleaved woodland, mixed woodland and riparian habitats and small amounts of urbanisation (Lundy *et al*., 2011). Since these habitat types are at least stable or, in the case of woodlands, increasing, the habitat area and quality for the species is considered good and the trend is taken, conservatively, to be stable.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**D01** Wind, wave and tidal power, including infrastructure (M) **F02** Construction or modification (e.g. of housing and settlements) in existing urban or recreational areas (M)	**D01** Wind, wave and tidal power, including infrastructure (M) **F02** Construction or modification (e.g. of housing and settlements) in existing urban or recreational areas (M)
8.2 Sources of information *Optional*		
8.3 Additional information *Optional*	Despite the identification in the 2013 assessment of numerous low and medium-level threats and pressures, it is clear now that the population of this species has been increasing steadily. Nonetheless, and bearing in mind the Near Threatened status of the species in the Irish Red List (Marnell *et al*., 2009), a number of threats and pressures are still considered to be potentially significant and are retained: wind energy (D01) and the impact on roosts associated with deliberate/accidental exclusion from houses (F01). Further work is required to determine the true impact of both of these.	

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	Ongoing car-based bat monitoring provides evidence for a steady increase in the population; there is no evidence of any decline in range or habitat. In general the future prospects of these parameters are considered to be good.	

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* ***improving*** */ deteriorating / stable / unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the nature of change	*YES/NO*	*YES/NO*

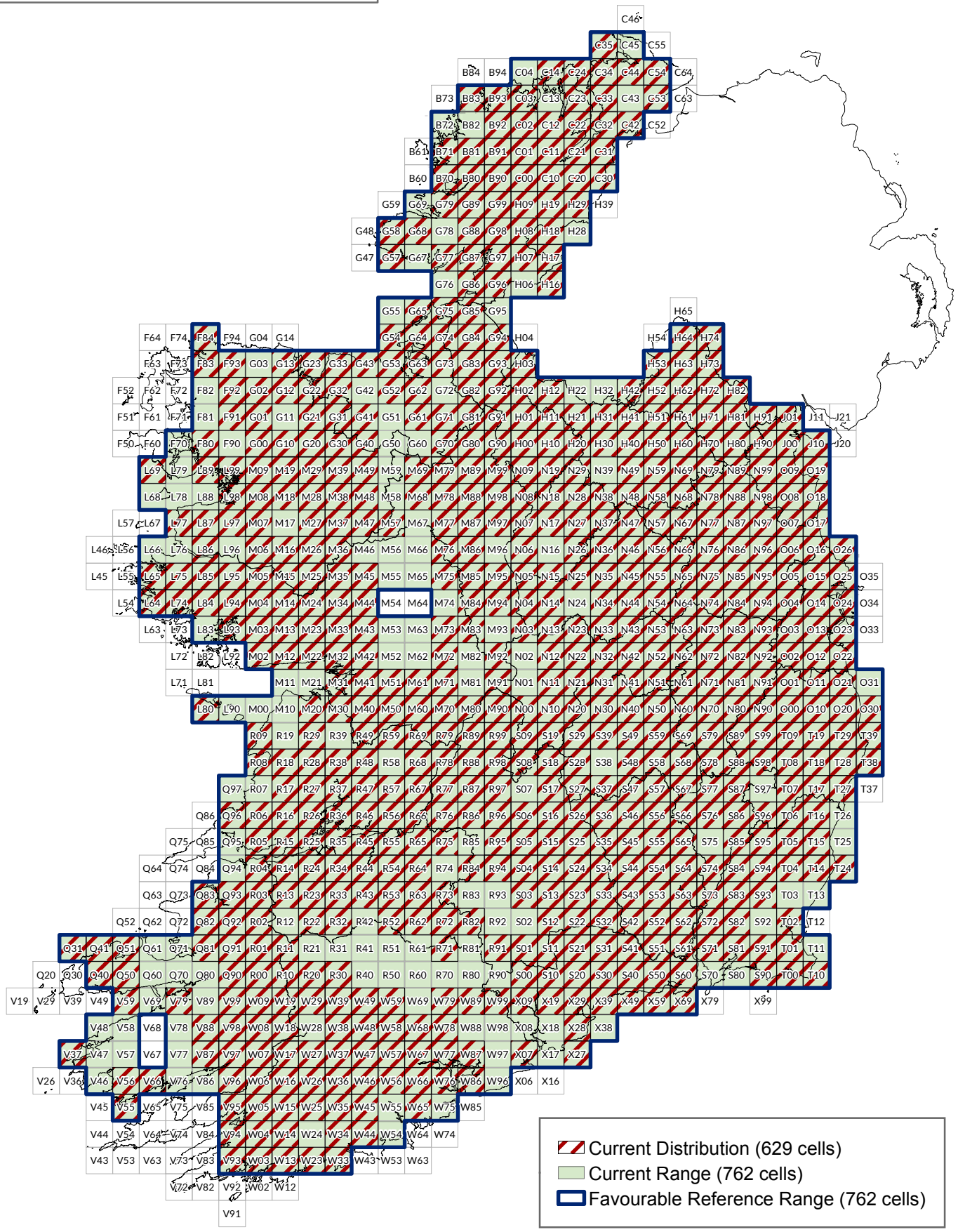
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
11.8 Additional information *Optional*	Leisler's bat is widespread across Ireland, but monitoring indicates it is more abundant in the east and south of the country. The most recent estimates for this species suggest a population size of ~60,000-110,000 animals with monitoring over the last 12 years indicating an increasing trend. Two threats/pressures have been identified and need to be investigated further. However, there is no evidence of decline in range or habitat and future prospects are considered good. Overall, the species is assessed as Favourable and the overall trend is demonstrating an on-going increase. There were no qualifiers for Favourable assessments in 2013.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Leisler's Bat
Nyctalus leisleri (1331)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1334***
1.3 Species scientific name	*Lepus timidus*
1.4 Alternative species scientific name *Optional*	*Lepus timidus hibernicus*
1.5 Common name *Optional*	Mountain hare; Irish hare (Giorria)
1.6i Species description	*Lepus timidus* (Mountain hare) is widely distributed across northern Europe and Asia, ranging from Ireland in the west to Japan in the east. In Ireland, *Lepus timidus* occurs as a distinct, endemic sub-species, *Lepus timidus hibernicus*, the Irish hare. Genetics indicates that the Irish hare's unique morphology and ecology is the result of adaptation due to the isolation from other Mountain hare populations for at least 35,000 - 57,000 years (Hughes *et al*., 2006). One of the notable differences between the Irish hare and *Lepus timidus* in other regions is that the former does not undergo complete winter whitening. The Irish hare is the only native hare in Ireland and while a number of introductions of the brown hare (*Lepus europaeus*) are known from the nineteenth century, this latter species is only currently known from isolated populations in Northern Ireland. The Irish hare is found throughout the country from coastal habitats to upland heath and bog. Diet in all these habitats tends to be dominated by grass species, but can also include herbs and shrubby species, where they are available. Leverets can be born at any time of year but peak breeding in spring is typical with a second litter later in the summer under suitable conditions. In good years, significant population increases can occur, but poor years with low breeding success and high mortality can lead to significant declines. Consequently, the species can show significant inter-annual fluctuations in population making it difficult to estimate trends. Density estimates stratified by habitat show that hares are more abundant in lowland, farmland habitat, while upland areas support lower densities of this species. As a result changes in agricultural practices can have a significant impact on hare populations.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2007-2018***

2.3 Distribution map	Submitted
2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	Distribution records for the hare are collated by the National Biodiversity Data Centre (NBDC) with some additional records submitted directly to NPWS. A complete national survey was undertaken in 2006/2007 (Reid *et al*., 2007). Ad hoc recording is ongoing by NPWS staff and others. A new dedicated survey began in 2018 and will continue into 2019. That dataset is not ready for inclusion in this assessment. All in all, over 3,500 records of hare were collated between January 2007 and June 2018. The resulting map is considered to give an accurate reflection of the current distribution of the hare in Ireland. The records used were submitted to NBDC/NPWS by NPWS staff, university researchers, ecological consultants and members of the public. They include live sightings, camera trap records as well as road kill records. The species is not easily confused with other animals in Ireland and the quality of the data is considered to be good.

3 Information related to Annex V species (Art. 14)

3.1 Is the species taken in the wild/exploited?	*Is the species taken in the wild/exploited?* ***YES****/NO* *If the reply is NO, or if the reply is YES and the conservation status of the species is Favourable (FV) in all biogeographical or marine regions where the species occurs, then do not fill in the remaining fields of this section*

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

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

4.2 Sources of information	Caravaggi, A., Leach, K., Santilli, F., Rintala, J., Helle, P., Tiainen, J., Bisi, F., Martinoli, A., Montgomery, W.I. and Reid, N. (2016) Niche overlap of mountain hare subspecies and the vulnerability of their ranges to invasion by the European hare; the (bad) luck of the Irish. *Biol Invasions*: DOI 10.1007/s10530-016-1330-z Dingerkus, S.K. and Montgomery, W.I. (2002) A review of the status and decline in abundance of the Irish hare (*Lepus timidus hibernicus*) in Northern Ireland. *Mammal Review* 32: 1-11. Hughes, M., Montgomery, I. and Prodöhl, P. (2006) Population genetic structure and systematics of the Irish hare. A report prepared by Quercus for the Environment and Heritage Service, Belfast. Jeffrey, R. (2016) Irish hare (*Lepus timidus hibernicus*). Pp 61-62. In Lysaght, L. and Marnell, F. (Eds) (2016) *Atlas of Mammals in Ireland 2010-2015*. National Biodiversity Data Centre, Waterford. Reid, N., Dingerkus, K., Montgomery, W.I., Marnell, F., Jeffrey, R., Lynn, D., Kingston, N. and McDonald, R.A. (2007a) Status of hares in Ireland: Hare Survey of Ireland. *Irish Wildlife Manuals*, No. 30. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland. Reid N., McDonald R. A. and Montgomery W. I. (2007b) Mammals and agri-environment schemes: hare haven or pest paradise? *Journal of Applied Ecology* 44: 1200–1208. Reid, N. and Montgomery, W.I. (2010) Retrospective analysis of the Northern Ireland Irish hare survey data from 2002-2010. Report prepared by Quercus, Queen's University Belfast for the Northern Ireland Environment Agency. Northern Ireland Environment Agency Research and Development Series No. 11/16. Reid N., Magee C. and Montgomery W. I. (2010) Integrating field sports, hare population management and conservation. *Acta Theriologica* 55: 61–71. Thulin C.G. (2003) The distribution of mountain hares *Lepus timidus* in Europe: a challenge from brown hares *L. europaeus*? *Mammal Review* 33: 29-42.
4.2i Additional information	Caravaggi, A., Montgomery, W. I. and Reid, N. (2015) Range expansion and comparative habitat use of insular, congeneric lagomorphs: invasive European hares *Lepus europaeus* and endemic Irish hares *Lepus timidus hibernicus*. *Biol. Invasions* 17, 687–698.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***81,400 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend	**a) Minimum**	

Magnitude *Optional*	**b) Maximum**	
5.5 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*	
5.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 81,400 km²***	
	b) Indicate if operators were used (use these 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) is the same 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 of the current range is not large enough to allow the long-term survival of the species.	
5.11 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*
5.12 Additional information *Optional*	This species remains widespread throughout Ireland occupying both lowland and upland niches. It even occurs on a number of off-shore islands (Jeffrey, 2016). A total of 3,542 distribution records were collated for this species between 2007 and 2018. This translated to 702 x 10km squares. Using the range tool, with gap closure set to 20km, an additional 112 grid cells were incorporated giving a total range of 814 cells or 81,400km^2. Although the current range is slightly larger than that reported in 2013 (78,000km^2), this is considered to be a reflection of the longer time period used and the more complete data set, rather than any genuine change. The range is considered to have remained stable. The Favourable Reference Range is taken to be the same as the Range. The 2013 figure was based on the known range of the species at that time but it has been updated for this assessment to reflect the improved data now available. It is considered to be large enough to allow the long-term survival of the species and is greater than the estimated range of the species when the Habitats Directive came into force in Ireland.

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2007***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	***338,000***
	c) Maximum	***999,000***
	d) Best single value	
6.3 Type of estimate	*Best estimate / multi-year mean / **95% confidence interval** / min*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	a) Unit	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / minimum*	

6.6 Population size Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	a) Minimum	
	b) Maximum	
	c) Confidence interval	
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	***a) 233,000 individuals***	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) If favourable reference population is unknown indicate by using 'x'	

	d) Indicate method used to set reference value if other than operators The FRP of 233,000 was used in 2013 and comes from Reid *et al*. (2007a). It corresponds to the national population estimated for 2006. (It comes with 95% CI of 138,000 to 434,000.) See Reid *et al.* (2007a) for details of how this figure was calculated.	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information *Optional*	The figures used for population size are based on the most recent national survey - 2007. Mean density nationally was estimated as 7.66 hares/km^2, or 535,000 hares, but the 95% C.I. is wide: 338,000-999,000. See Reid *et al*. (2007a) for full details of survey methods and analysis. Calculating national population size for hares is challenging due to the species capacity for short-term fluctuations in numbers, variations in densities between habitats and difficulties associated with surveying the species (Jeffrey, 2016). Reid *et al*. (2007a) provided population estimates for Ireland for 2006 and 2007. A statistically significant difference was observed between the estimates for the two years. The detailed analysis of the Northern Ireland hare survey data from 2002 to 2010 (Reid and Montgomery, 2010) also demonstrated significant inter-annual fluctuations in hare populations. This phenomenon has also been observed with mountain hare populations elsewhere. It is difficult to detect trends in the midst of such variations, but in the absence of any evidence of a declining or an increasing trend, the trend is taken as stable. Fluctuations in hare densities (and therefore population size) between years also makes it very difficult to pick a favourable reference population. The EC Guidance defines favourable reference population as: "Population in a given biogeographical region considered the minimum necessary to ensure the long-term viability of the species." The FRP of 233,000 was used in 2013 and comes from Reid *et al*. (2007a). It corresponds to the national population estimated for 2006. (It comes with 95% CI of 138,000 to 434,000.) It is noted that this population level was sufficient to produce a population of over 500,000 hares in 2007. This figure of 233,000 is equivalent to 3.33 hares/km^2, but it is recognised that hare densities will vary significantly between habitats. See Reid *et al*. (2007a) for details of how this figure was calculated. This FRP is retained for the	

	current report.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	*stable / increasing / decreasing / **uncertain** / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	The Irish hare is found throughout the country in a broad range of habitats from coastal dunes and lowland farmland to upland heath and bog. Irish hares can reach high densities in a habitat matrix of improved farmland providing good quality grassland for forage interspersed with areas of tall vegetation providing cover and shelter for diurnal lie-up sites, for example, *Juncus* spp. (Reid *et al*., 2007b). Change in land cover from pasture and mixed farmland to extensive areas of silage does not favour the hare. While these changes may not lead to a reduction in actual extent of habitat available to the hare, they can lead to reduced habitat quality and increased population pressures. Increased urbanisation and habitat fragmentation as a result of the

	recent road development programme is also a concern. Reductions in overgrazing in the uplands and the resulting improvement in habitat quality in some of those areas will have brought some benefits for hares. Overall, while ongoing agricultural intensification is causing some concern, there still appears to be sufficient habitat available and it is not clear what the cumulative changes have led to in terms of hare habitat. The trend is taken as uncertain. The results of the 2018/19 national hare survey will shed more light on this issue.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**A02** Conversion from one type of agricultural land use to another (H) **A05** Removal of small landscape features for agricultural land parcel consolidation (M) **A08** Mowing or cutting of grasslands (M) **B01** Conversion to forest from other land uses, or afforestation (M) **E01** Roads, paths, railroads and related infrastructure (M) **G07** Hunting (M)	**A02** Conversion from one type of agricultural land use to another (H) **A05** Removal of small landscape features for agricultural land parcel consolidation (M) **A08** Mowing or cutting of grasslands (M) **B01** Conversion to forest from other land uses, or afforestation (M) **E01** Roads, paths, railroads and related infrastructure (M) **G07** Hunting (M) **I02** Other invasive alien species (other than species of Union concern) (M)
8.2 Sources of information *Optional*		
8.3 Additional information *Optional*	Changes in agricultural practices are the main pressure, in particular intensification of grassland usage (switches from extensive grazing/rough grazing to silage production). The High ranking relates to the fact that this pressure acts over large areas in Ireland. Significant mortality of leverets (and perhaps adults) has been associated with intensive mowing operations, i.e. silage harvesting, although the full extent of this is hard to quantify. Conversion of grasslands to forestry reduces habitat quality for hares. Road kill remains a concern. Disturbance and mortality due to illegal hunting	

	(e.g. use of lurchers) is also a localised problem although the full impact on the population is not known. Although licensed coursing leads to some mortality each year, management of coursing reserves has also been shown to be beneficial to hares leading to higher local hare densities (Reid *et al*., 2010). All the identified pressures are also included as potential threats given that the issues are ongoing. In addition the risk associated with the expansion from Northern Ireland of the brown hare population (i.e. genetic introgression) is also included as a threat (Caravaggi *et al*., 2016).

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*
	c) Habitat of the species	*Good / Poor / Bad /* ***Unknown***
10.2 Additional information *Optional*	The range for this species covers nearly the entire landmass of Ireland including some off-shore islands and the animal is widespread and in places abundant. Agricultural intensification is leading to some reduction in habitat quality but the hare has a broad habitat niche, so the impacts of these changes are not clear.	

11 Conclusions

Assessment of conservation status at end of reporting period	
11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.3 Habitat for the species	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1)/ Bad (U2) / Unknown (XX)*
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*
11.7 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.*

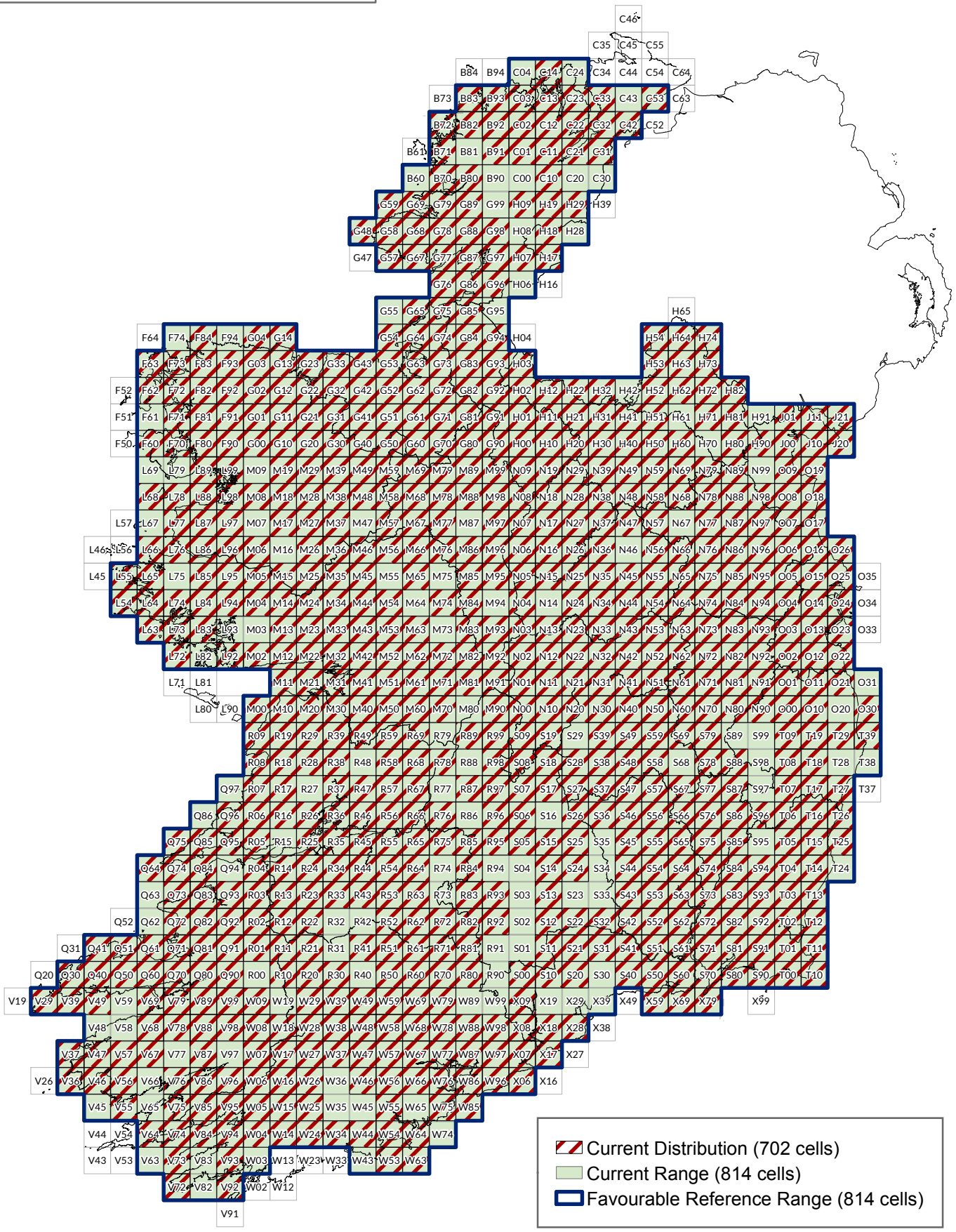
		Overall assessment of conservation status (11.5)	***Overall trend in conservation status (11.6)***
	a) no, there is no difference	*YES/**NO***	*YES/**NO***
	b) yes, due to genuine change	*YES/NO*	*YES/NO*
	c) yes, due to improved knowledge/more accurate data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	The range for this species covers nearly the entire landmass of Ireland including some off-shore islands. Despite natural inter-annual fluctuations in population density, the animal is widespread and in places abundant. Agricultural intensification is leading to some reduction in habitat quality and a number of related threats have been identified, but the hare has a broad habitat niche, so the impacts of these changes on habitat extent and quality are taken as unknown. Further work is required to evaluate the impact of land use change, but overall the animal is considered to be in Favourable status.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Irish Hare
Lepus timidus (1334)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1355***
1.3 Species scientific name	*Lutra lutra*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Otter (Madra uisce; Dobharchú)
1.6i Species description	Ireland continues to remain a stronghold for the European otter (*Lutra lutra*). Four national surveys have been conducted to date. The first in 1980/81 found signs of otters throughout the country, at 88% of sites surveyed. There was some suggestion of declines in the survey results of 1990/91 and 2004/05 but the most recent survey (2010) indicated recovery to 1980 levels. Otters have two basic requirements: aquatic prey and safe refuges where they can rest. In Ireland, otter populations are found along rivers, lakes and coasts, where fish and other prey are abundant, and where the bank-side habitat offers plenty of cover. The otter is an opportunistic predator with a broad and varied diet. In coastal areas fish, crabs and molluscs are known to be eaten. In freshwater areas a variety of fish from sticklebacks to salmon and eels will be taken, while crayfish and frogs can be important locally or seasonally. A total of 44 SACs have been designated for the otter comprising extensive stretches of river channels and coastline (including off-shore islands) as well as lakes and blanket bog systems. The main threats to the otter include pollution, particularly organic pollution resulting in fish kills; and accidental deaths (road traffic and fishing gear).

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2007-2018***
2.3 Distribution map	Submitted
2.4 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*

2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	Distribution records for the otter are collated by the National Biodiversity Data Centre (NBDC) with some additional records submitted directly to NPWS. A complete national survey was undertaken in 2010/11 (Reid *et al*. 2013a, b). Ad hoc recording is ongoing by NPWS staff and the wider public with some recent dedicated surveys of individual catchments also included in the current dataset. All in all, over 5,000 records of otter were collated between January 2007 and June 2018. Although the data spans two reporting periods, the resulting map is considered to give an accurate reflection of the current distribution of the otter in Ireland. The records used were submitted to NBDC/NPWS by University researchers, ecological consultants, NPWS staff, fisheries officers and members of the public. They include live sightings and records of spraints as well as road kill records. The species is not easily confused with other animals in Ireland and the quality of the data is considered to be good.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
4.2 Sources of information	Bailey, M. and Rochford, J. (2006) Otter Survey of Ireland 2004/2005. *Irish Wildlife Manuals,* No. 23. NPWS, Department of Environment, Heritage and Local Government, Dublin, Ireland. Lunnon, R. M. and Reynolds, J.D. (1991) Distribution of the otter *Lutra lutra* in Ireland, and its value as an indicator of habitat quality. In D.W Jeffrey and Madden (editors), *Bioindicators and environmental management.* London, Academic Press. Marnell, F. (2016) Otter (*Lutra lutra*). Pp 100-101. In Lysaght, L. and Marnell, F. (Eds) (2016) *Atlas of Mammals in Ireland 2010-2015*. National Biodiversity Data Centre, Waterford. Marnell, F., O'Neill, L. and Lynn, D. (2012) How to calculate range and population size for otter? The Irish approach as a case study. *IUCN Otter Spec. Group Bull*. 28(B) 2011 15-22. NPWS (2007) *Lutra lutra* (1335) Conservation status assessment report. In: The status of EU protected habitats and species in Ireland, Volume 1. DAHG, Dublin.

	https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2007_Cons_Ass_Backing_V1.pdf NPWS (2009) *Threat response plan: Otter* (2009-2011) National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland O'Neill, L. (2008) Population dynamics of the Eurasian otter in Ireland. Integrating density and demography into conservation planning. PhD thesis. Trinity College, Dublin. Poole, W.R., Rogan, G. and Mullen, A. (2007) Investigation into the impact of fyke nets on otter populations in Ireland. *Irish Wildlife Manuals*, No. 27. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland. Reid, N., Hayden, B., Lundy, M.G., Pietravalle, S., McDonald, R.A. and Montgomery, W.I. (2013a) National Otter Survey of Ireland 2010/12. *Irish Wildlife Manuals,* No. 76. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Reid, N. Lundy, M. Hayden, B., Lynn, D., Marnell, F., McDonald, R.A. and Montgomery, W.I. (2013b) Detecting detectability: identifying and correcting bias in binary wildlife surveys demonstrates their potential impact on conservation assessments. *European Journal of Wildlife Research* DOI 10.1007/s10344-013-0741-8. Reid, N., Thompson, D., Hayden, B., Marnell, F. and Montgomery, W.I. (2013c) Review and quantitative meta-analysis of diet suggests the Eurasian otter (*Lutra lutra*) is likely to be a poor bioindicator. *Ecological Indicators* 26: 5-13. Reid, N. Lundy, M. Hayden, B., Waterman, T., Looney, D., Lynn, D., Marnell, F., McDonald, R.A. and Montgomery, W.I. (2014) Covering over the cracks in conservation assessments at EU interfaces: A cross-jurisdictional eco-region scale approach using the Eurasian otter (*Lutra lutra*). *Ecological Indicators* 45: 93–102.
4.2i Additional information	Foster-Turley, P., MacDonald, S.M. and Mason, C.F. (1990). Otters - an action plan for the conservation. Broad-view: IUCN/SSC Otter Specialist Group, Kelvin Press. Kruuk, H. (1995) *Wild otters: Predation and populations.* Oxford University Press, Oxford, UK. Kruuk, H. (2006). *Otters – ecology, behaviour, and conservation.* Oxford University Press, Oxford, UK. Lundy, M.G. and Montgomery, W.I. (2010) A multi-scale analysis of the habitat associations of European otter and American mink and the implications for farm scale conservation schemes. *Biodiversity and Conservation* 19: 3849-3859. Lysaght, L. and Marnell, F. (eds) (2016) *Atlas of Mammals in Ireland 2010-2015*, National Biodiversity Data Centre, Waterford. Ottino, P. and Giller, P. (2004) Distribution, density, diet and habitat use of the otter in relation to land use in the Aragan valley, southern Ireland. *Biology and Environment* 104B: 1-17. Preston, S.J., Portig, A.A., Montgomery, W.I., McDonald, R.A., Dick, J.T.A. and Fairley, J.S. (2007) Temporal and spatial variation in otter *Lutra lutra* diet in Northern Ireland. *Biology and Environment*

	107B: 61-66.

5 Range		
Range within the biogeographical/marine region concerned.		
5.1 Surface area	***83,600 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994–2018***	
5.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 83,600km²***	
	b) Indicate if operators were used (use these 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) is the same 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 of the current range is not large enough to allow the long-term survival of the species.	
5.11 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*	
5.12 Additional information *Optional*	More than 5,000 distribution records were collated for this species between 2007 and 2018. This translated to 718 x 10km squares. Using the range tool, with gap closure set again to 20km, an additional 118 grid cells were incorporated giving a total range of 836 cells or 83,600km^2. The range in 2013 (based on data from 2007-2013) was calculated as 812 cells (10km squares). The current range, based on all data from 2007-2018 is slightly larger, but this is considered to be a reflection of better data and a longer time period, rather than a genuine increase due to expansion. On the basis of previous national surveys and the current distribution of records, range is considered to have remained stable over both the short and long term. The Favourable Reference Range is taken to be the same as the Range. The 2013 figure was based on the known range of the species at that time but it has been updated for this assessment to reflect the improved data now available. It is considered to be large enough to allow the long term survival of the species and is greater than the estimated range of the species when the Habitats Directive came into force in Ireland.	

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2007-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***1 x 1 km grids***
	b) Minimum	

	c) Maximum	
	d) Best single value	***2,511***
6.3 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	***Breeding females***
	b) Minimum	***7,218***
	c) Maximum	***10,186***
	d) Best single value	
6.5 Type of estimate *Optional*	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	stable */* ***increasing*** */ decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	***stable*** */* increasing */ decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

<table>
<tr><td>6.14 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">6.15 Favourable reference population
(using the unit in 6.2 or 6.4)</td><td colspan="2">a) 7,046 breeding females</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 population 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 population figure (for adult females) calculated in 2007 and used in 2013 is still valid.</td></tr>
<tr><td rowspan="6">6.16 Change and reason for change in population size</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>6.17 Additional information

Optional</td><td colspan="2">The 2007 to 2018 distribution records held by NBDC for this species were mapped at the 1km level to provide the population estimate used in 6.2. This is considered to be a minimum estimate of the species distribution in Ireland and is not considered a useful reflection of population.

Number of adult (breeding) females was used as the population unit in 2013. No new data on population size has emerged since then and the population is considered to have remained stable since then. Hence, these figures are used again in 6.4. The breeding female population estimate is based on the number of female otter territories available (assuming no overlap) and occupied across Ireland. Female territory sizes in coastal, lake and river habitats were estimated based on a combination of radio-tracking, GSM tracking, modelling and extrapolation. This allowed an estimate of the total carrying capacity of the country for female otters to be made (i.e. the total number of available territories). This figure was multiplied by the proportion of positive survey sites as observed during the most recent national survey (after correcting for biases), i.e. x 0.93. See Reid *et al*. (2013a) for full details. The methods are the same as those used in the 2007 and 2013 reports. There are some indications (e.g. from tracking studies in Roaringwater Bay) that female territories</td></tr>
</table>

	may overlap to some extent in certain situations. Where overlapping territories do occur, higher densities of otters may be present, implying that our current population figure is an underestimate. Further work is required to shed more light on this issue. More research on otter territory size in different habitats across Ireland would also be useful. An increase in population between the 2004/05 national survey and the 2010/11 survey was demonstrated in Reid *et al*. (2013a). Since 2011 the population is assumed to have remained relatively stable. The 12 years over which the short-term trend is reported (2007-2018) is assumed to have taken in some of that population increase and so the short-term trend is reported as increasing. Reid *et al*. (2013a) provided estimates of population increase (min and max) compared to the 2004/05 survey, but given that extensive corrections for survey biases are built into the 2010/11 survey results and are not available for the 2004/05 survey, the true extent of the increase is unclear and the max and min figures calculated by Reid *et al*. (2013a) are not included here. The 1991 national survey results (Lunnon & Reynolds, 1991) are taken as the starting point for the 24-year trend (1991 – 2015). Despite an apparent dip in otter numbers in 2004/05 (Bailey & Rochford 2006), the otter population had recovered by 2011. If, as we expect, the population has remained stable since the 2010/11 survey, this indicates a stable overall trend, although some fluctuations may have occurred within the 24-year period. Although the trend was examined between 1991 and 2015, the results are assumed to apply also to the default period of 1994-2018. The Favourable reference population figure (for adult females) calculated in 2007 and used in 2013 is still valid. This was based on returning all otter SACs to the population levels recorded in the Chapman & Chapman survey (1982), while simultaneously ensuring that no loss of status occurs outside SACs (see Background document to *Lutra lutra* (1355) Conservation Status Assessment, 2007 for full details).

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)?* ***YES***/NO *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***

7.4 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	***stable*** */ increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	The otter is widespread in Ireland, occupying lotic and lentic freshwater systems from headwaters to estuaries, remote mountain lakes to city canals. It is also present along the coast including many off-shore islands. Expert judgement was used to assess habitat availability/quality based on overall assessment of riparian, lacustrine and coastal waters, the species' catholic and adaptable diet (Reid *et al*. 2013c), plus the widespread nature of otters and the apparent population recovery seen over the short term. Given the widespread and adaptable nature of the otter (e.g. Reid *et al*., 2013a, b), habitat availability/quality is not considered to be or to have been a limiting factor in the species' range. Hence, the underlying trend in habitat is assumed to have remained stable.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**Xxp** No pressures	**Xxt** No threats
8.2 Sources of information *Optional*		
8.3 Additional information *Optional*	A number of pressures were listed in 2013: Roadkill data from 2007-2012 (from biology.ie) reported 10-30 otters killed on Irish roads each year. Roadkill was considered a Medium pressure in 2013 and while otters are still killed on Irish roads, this is not considered to pose a risk to conservation status nationally. The network of mammal underpasses, on new roads in particular, and the erection of road signs at known locations of repeated RTAs are examples of positive measures that have been taken to reduce otter roadkill. Entanglement in fixed fishing nets (e.g. tangle nets) and pots (e.g. fyke nets / lobster pots) was also a concern although it is difficult to estimate the level of resulting mortality due to limited reporting (Poole *et al*., 2007). Otter guards are now used on fyke nets by IFI during their surveys, reducing the risk from this threat. A monitoring study by the Marine Institute of by-catch in fishing gear is also underway. Diffuse and point-source pollution of freshwaters and coastal waters is likely to impact otters indirectly through changes to prey abundance. These threats are considered to produce local impacts only and are not listed above in 8.1.	

9 Conservation measures

To be reported only for Annex II species

9.1 Status of measures	*Are measures needed? YES/**NO***

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	Range is extensive and stable. Population is also considered to be currently stable having recovered from previous decline. Broad habitat niche is occupied and is generally considered to be in good condition. No significant pressures or threats were identified.	

11 Conclusions			
Assessment of conservation status at end of reporting period			
11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1)/ Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* ***improving*** */ deteriorating / stable / unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*

11.8 Additional information *Optional*	The most recent distribution data shows that the otter continues to be widespread throughout Ireland and present nationwide in a wide variety of habitat types. Although recent studies on territory overlaps and animal movements suggest that refinements to the population estimation formula are needed, the otter population is considered to be stable and none of the threats or pressures identified is considered likely to impact significantly on the species. Overall, the species is assessed as Favourable and the overall trend is demonstrating an on-going increase. There were no qualifiers for Favourable assessments in 2013.

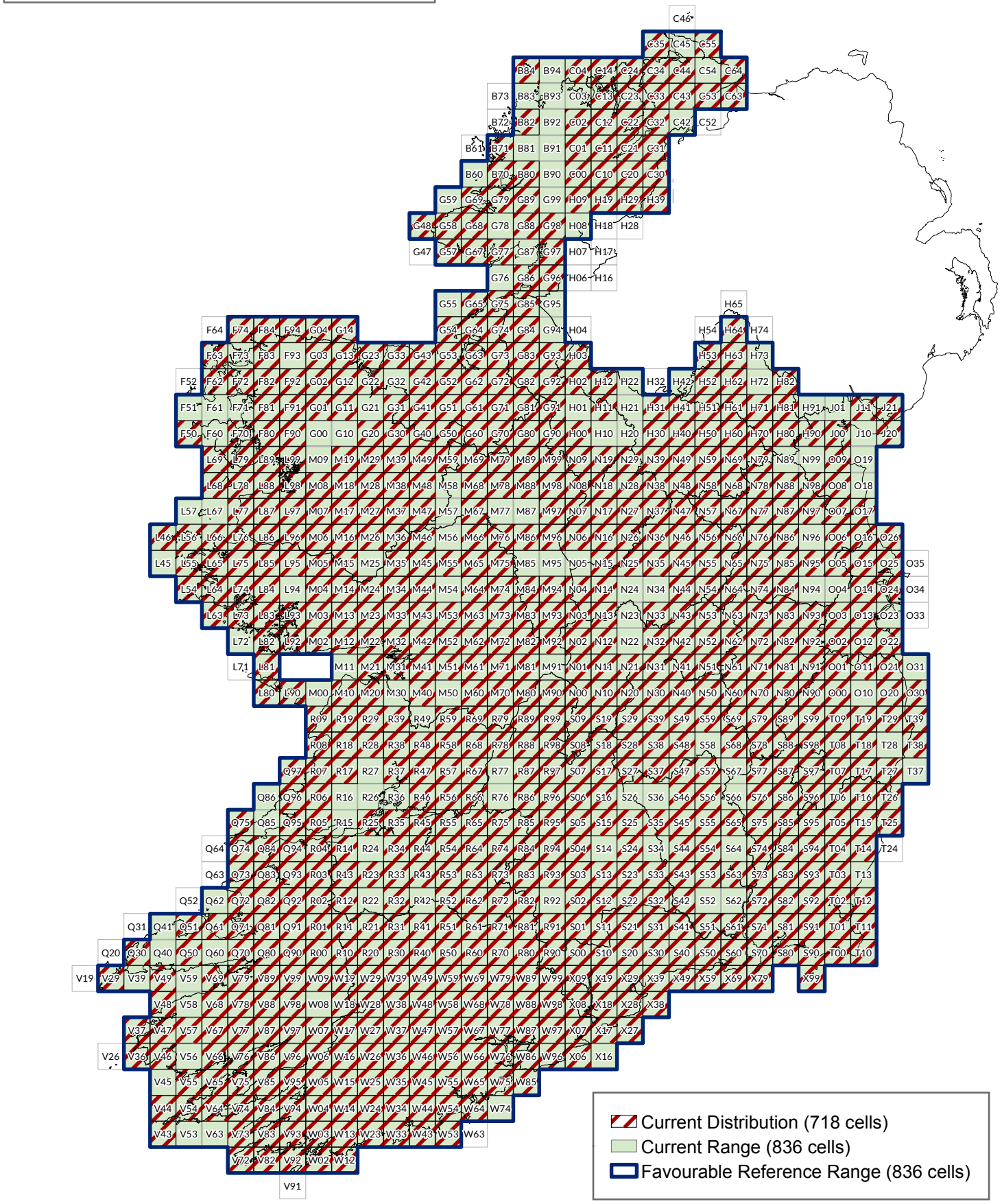
12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

12.1 Population size inside the pSCIs, SCIs and SACs network *(on the biogeographical/marine level including all sites where the species is present)*	**a) Unit**	***1 x 1 km grid cells***
	b) Minimum	
	c) Maximum	
	d) Best single value	**1,121**
12.2 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval /* ***minimum***	
12.3 Population size 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*	
12.4 Short-term trend of population size within the network **Direction**	*Short-term trend of population size within the network over the period indicated in field 6.5* *stable /* ***increasing*** */ decreasing / uncertain / unknown*	
12.5 Short-term trend of population size within 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*	
12.6 Additional information *Optional*	The number of 1x1km grid cells provided in 12.1 is not based on complete surveys of all SACs, but was calculated by overlaying the otter distribution data from 2007-2018 with the entire SAC network. It was assumed that otters can be found throughout the country from mountain lakes and rivers to coasts and off-shore islands. Only the off-shore marine SACs were excluded from the calculations. The figure calculated is considered to be a significant under-estimate of the true status of otters within the SAC and as noted in 6.17 (in relation to the population figure provided in 6.2) is not considered to be a useful measure of population size.	

	The figure provided for this section in 2013 is more useful and still considered to be valid as the otter population is assumed to have remained stable since then. For that figure, the otter population within the SAC network was estimated on the basis of available otter habitat. The total area of otter habitat in the country was calculated as 3,115km^2. The area of suitable habitat within SACs is 711km^2 (see O'Neill, 2008; NPWS, 2009), i.e. 22% of available habitat occurs within the SAC network. Given that otters are widely distributed throughout the country wherever suitable habitat is available (O'Neill, 2013), it is fair to assume that SACs support approximately 22% of the national otter population. The minimum otter population present within the SAC network is therefore based on the following calculation. The minimum number of breeding adults – 14,436 (from 6.4) - multiplied by 0.22 = 3,176. In terms of short term trend, the otter population is assumed to have increased inside SACs between 2007 and 2018, in line with the general increase seen nationally (as reported in 6.8; see 6.17 for explanation).

13 Complementary information

Otter
Lutra lutra (1355)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1357***
1.3 Species scientific name	*Martes martes*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Pine marten (Cat crainn)
1.6i Species description	The pine marten (*Martes martes*) is a medium-sized arboreal carnivore, typically inhabiting forested ecosystems or landscapes with substantial woodland or scrub. It is an opportunistic feeder on small mammals, berries, nuts, frogs, lizards, birds and invertebrates. Pine martens maintain territories and typically occur in low densities, with females giving birth to 2-4 cubs every one or two years. Young animals disperse to find their own territories and the mortality at this stage may be high. Adults in productive habitats may live for 5 or 6 years. The pine marten was formerly widespread in Ireland but declined in the 17th century with the deforestation of the country. Pine martens suffered further in the 19th and early 20th centuries due to persecution by gamekeepers and trappers. However, the species is now undergoing a phase of re-colonisation. It has greatly increased its range in recent decades and although its population is still low, it is rising. The animal's resurgence is largely attributed to the banning of strychnine and other poisons, the legal protection afforded the species since 1976 under the Wildlife Acts and the steady increase in afforestation.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2007-2018***
2.3 Distribution map	Submitted
2.4 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*

2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	Distribution records for the pine marten were collated by the National Biodiversity Data Centre (NBDC) with some additional records submitted directly to NPWS. Although a complete national survey has not been undertaken, over 2,700 records of pine martens were collated between January 2007 and June 2018. The resulting map is considered to give an accurate reflection of the current distribution of the pine marten in Ireland. The records used were submitted to NBDC/NPWS by University researchers, foresters, NPWS staff and members of the public. They include live sightings as well as road kill records. The species is not easily confused with other animals in Ireland and the quality of the data is considered to be good. All the data up to the end of 2015 was collated, validated and cleaned for the production of the Atlas of Mammals in Ireland (Lysaght and Marnell, 2016). Records continue to be received by NBDC on ad hoc basis. The distribution map represents all data submitted between Jan 2007 and June 2018.

3 Information related to Annex V species (Art. 14)

3.1 Is the species taken in the wild/exploited?	*Is the species taken in the wild/exploited? YES/**NO***

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* ***Atlantic**, Marine Atlantic*
4.2 Sources of information	DAFM (2018) Forest statistics – Ireland 2017. Department of Agriculture, Food and the Marine, Johnstown Castle Estate, Co. Wexford Lysaght, L. and Marnell, F. (eds) (2016) *Atlas of Mammals in Ireland 2010-2015*, National Biodiversity Data Centre, Waterford. O'Mahony, D., O'Reilly, C. and Turner, P. (2012) Pine marten (*Martes martes*) distribution and abundance in Ireland: A cross-jurisdictional analysis using non-invasive genetic survey techniques. *Mammalian Biology* 77: 351–357. O'Mahony, D.T., Powell, C., Power, J., Hannify, R., Turner, P. and O' Reilly, C. (2017a). National pine marten population assessment 2016. *Irish Wildlife Manuals*, No. 97. National Parks and Wildlife Service, Department of the Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Ireland.https://www.npws.ie/sites/default/files/publications/pdf/I

	WM97.pdf O'Mahony, D.T., Powell, C., Power, J. Hanniffy, R., Marnell, F., Turner, P. and O'Reilly, C. (2017b) Non-invasively determined multi-site variation in pine marten *Martes martes* density, a recovering carnivore in Europe. *Eur. J. Wildl. Res*. 63: 48.
4.2i Additional information	Casey, J. and Ryan. M. (2012) Situation and outlook for forestry 2011/2012. Forestry Development Department,Teagasc, Athenry, Co. Galway. http://www.teagasc.ie/forestry/docs/advice/Teagasc_Situation_Outlook_Forestry_2012.pdf Fairley, J. (2001) A basket of weasels. Privately published. Belfast, Northern Ireland. Lynch, A.B., Brown, M.J.F. and Rochford, J.M. (2006) Fur snagging as a method of evaluating the presence and abundance of a small carnivore, the pine marten (*Martes martes*). *J. Zoology* 270: 330-339. Marnell, F., Kingston, N. and Looney, D. (2009) Ireland Red List No. 3: Terrestrial Mammals, National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. O'Mahony, D.T. (2017) A species distribution model for pine marten (*Martes martes*) in the least forested region of Europe. *Mammal Research* 62:195–200. O'Mahony, D., O'Reilly, C. and Turner, P. (2007) National pine marten survey of Ireland: an assessment of the current distribution of pine marten in the Republic of Ireland. Unpublished report to the Forest Service and National Parks and Wildlife Service. O'Sullivan, P. (1983) Distribution of the pine marten in the Republic of Ireland. *Mammal Review* 13: 39-44. Whilde, A. (1993) Irish red data book 2: vertebrates. HMSO, Belfast. Zalewski, A. and Jedrzejewski, W. (2006) Spatial organisation and dynamics of the pine marten *Martes martes* population in Bialowieza Forest (E. Poland) compared with other European woodlands. *Ecography* 29: 31-43.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***68,500 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	*stable / **increasing** / decreasing / uncertain / unknown*	
5.4 Short-term trend	**a) Minimum**	***32%***

Magnitude *Optional*	**b) Maximum**	***32%***
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994–2018***	
5.7 Long-term trend Direction *Optional*	*stable / **increasing** / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 38,200 km²***	
	b) Indicate if operators were used (use these 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 Although the range of the pine marten continues to expand, the FRR reported in 2007 and used again in 2013 has been retained. The value is considered to be large enough to support a viable pine marten population and is higher than the estimated range of the species when the Habitats Directive came into force in Ireland.	
5.11 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*
5.12 Additional information *Optional*	This species is undergoing a phase of re-colonisation. It has greatly increased its range in recent decades and continues to expand. The animal's resurgence is largely attributed to the banning of strychnine and other poisons, the legal protection afforded the species since 1976 under the Wildlife Acts, and the steady increase in afforestation. More than 2,700 distribution records were collated for this species between 2007 and 2018. This translated to 523 x 10km squares. Using the range tool, with gap closure set to 20km, an additional 162 grid cells were incorporated giving a total range of 685 cells or 68,000km^2. The range of the pine marten in 2013, based on data from 2007-2012, was calculated as 520 x 10km squares. The current range has been calculated at 685 x 10km squares, an increase of 165 x 10km squares or 32%. Although the range of the pine marten continues to expand, the FRR reported in 2007 and used again in 2013 has been retained. The value is considered to be large enough to support a viable pine marten population and is higher than the estimated range of the species when the Habitats Directive came into force in Ireland.

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2016***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	***2,330***
	c) Maximum	***3,852***
	d) Best single value	***3,043***
6.3 Type of estimate	*Best estimate / multi-year mean /* ***95% confidence interval*** */ minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	a) Unit	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*		

6.6 Population size Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / **increasing** / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	***c10%***
	b) Maximum	***c10%***
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / **increasing** / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	***a) 3,043 individuals***	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) If favourable reference population 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 latest population estimate based on the 2016 survey (O'Mahony et al. 2017a, b) is 3,043 individuals. The 95% Confidence Intervals around that figure are 2,330-3,852. These fall within the 90% Confidence Intervals calculated for the 2013 population estimate: 1,350-4,330. Therefore, while there are indications that the pine marten population is rising, statistically there is the possibility that it has not. Either way, the newer population estimate is considered to be more accurate, due to the tighter confidence intervals. Although this number is low, it is clear that this species has recovered from much lower numbers and hence the current population is considered adequate to ensure the long-term viability of the species. On this basis the FRP is taken as approximately equal to 3,043 individuals. The increasing short-term trend was determined over the period 2005-2016 but the trend is assumed to be the same for the default trend period of 2007-2018.</td></tr>
<tr><td rowspan="6">6.16 Change and reason for change in population size</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):

<u>genuine change</u> / improved knowledge or more accurate data / the use of a different method</td></tr>
<tr><td>6.17 Additional information

Optional</td><td colspan="2">As a complete survey of all individuals is not feasible, population estimates must rely on partial surveys producing occurrence and habitat data together with estimates of density in different habitats/regions. This is further complicated in Ireland by the varying densities of the species across its range. The 2012 estimate (based on survey work in 2005-2007) was updated in 2016 and the resulting publications from that survey give full details of the methods used to produce the population estimate, together with the 95% confidence intervals (O'Mahony et al. 2017a, b).

The short-term (12 year) trend is based on a simple comparison of the 2012 and the 2016 population estimates. The population estimate published in 2012 (O'Mahony et al., 2012) was 2,740 individuals. That estimate was based on data collected in 2005-2007. The 2016 survey produced a population estimate of 3,043 individuals. In simple terms that is an increase, over approximately 12 years, of 303 individual pine martens or 9.9%, which we have rounded up to 10%.

The favourable reference population has been updated based on the results of the most recent survey. The newer population estimate is considered to be more accurate, due to the tighter confidence intervals. Although this number is low, it is clear that this species has</td></tr>
</table>

	recovered from much lower numbers and hence the current population is considered adequate to ensure the long term viability of the species. On this basis the FRP is taken as approximately equal to 3,043 individuals.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	*stable / **increasing** / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994-2018***
7.7 Long-term trend Direction *Optional*	*stable / **increasing** / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	The pine marten is an arboreal specialist, typically inhabiting forested ecosystems or landscapes with substantial woodland or scrub. While there is some evidence that martens will use hedgerows to move through the Irish landscape and pine martens have been observed several kilometres from the nearest woodland (pers. obs.), woodlands are still considered an essential element of a pine

	marten's territory. Forest cover in Ireland fell to its lowest level in 1928 when it accounted for a mere 1.2% of the land area. Since then there has been a national policy of afforestation and the percentage of land under forest has slowly but steadily increased. In 1994 it had reached approximately 7.9%. The figure in 2006 was 10.1% and by 2012 national cover was 10.5% the highest it had been for 350 years (DAFM, 2018). Based on afforestation rates since then (DAFM 2018), forest cover is currently at c10.9%. Despite this, forest cover in Ireland remains one of the lowest in Europe. Conifers account for 75% of all new forestry (DAFM, 2018). Consequently, the vast majority of the forests available for pine martens are dominated by commercial conifer species e.g. Sitka spruce, Norway spruce, lodgepole pine. While this appears to be sufficient to support low densities of pine marten, broadleaved woodlands of mixed ages, where available, have been shown to support higher marten densities presumably by providing more food (e.g. higher prey densities) and, perhaps, better denning opportunities. The increasing short- and long-term trends were determined over the period 2007-2017 and 1993-2017 respectively but are assumed to be the same for the default short- and long-term trend periods.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**G08** Management of fishing stocks and game (M) **E01** Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (M) **B09** Clear-cutting, removal of all trees (M)	**G08** Management of fishing stocks and game (M) **E01** Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) (M) **B09** Clear-cutting, removal of all trees (M)
8.2 Sources of information *Optional*		

8.3 Additional information *Optional*	The same pressures and threats have been identified as in 2013. Pressures:- Pine martens rely on woodlands and the majority of woodland in Ireland is managed for commercial purposes. The expansion of the forest estate has facilitated pine marten expansion, but forestry management practices, especially clear-felling, can have a significant impact on pine marten populations. A significant number of pine martens are killed on Irish roads annually (NBDC data). The return of pine martens to areas where they have not been seen in a generation can lead to conflict, in particular with gun clubs who rear game birds and with farmers who have unprotected hen runs, both of which can be prone to pine marten predation. Threats:- Future expansion of the national forest estate will facilitate continued pine marten expansion, but forestry management practices (e.g. clear-felling) are also expected to continue to impact on pine marten populations. A significant number of pine martens are killed on Irish roads annually and this is expected to continue as mitigation for this wide-ranging species is problematic. The conflict between gun clubs who rear game birds and with farmers who have unprotected hen runs, both of which can be prone to pine marten predation, may be expected to expand as the pine marten expands its range. Stakeholder engagement on the issue has taken place and an education and awareness campaign is underway to help manage this situation.

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	The expansion in range of the pine marten in recent decades has brought it into conflict with hunting groups, due to the incidences of game bird predation. This conflict appears to be particularly acute in the north midlands of the country where illegal killing of pine martens is suspected. It is hoped that ongoing stakeholder engagement and an education and awareness campaign will help manage the issue. Roadkill continues to be reported and no solutions for this problem are anticipated, but this is not considered to be a significant threat to the favourable conservation status of the population.	

11 Conclusions

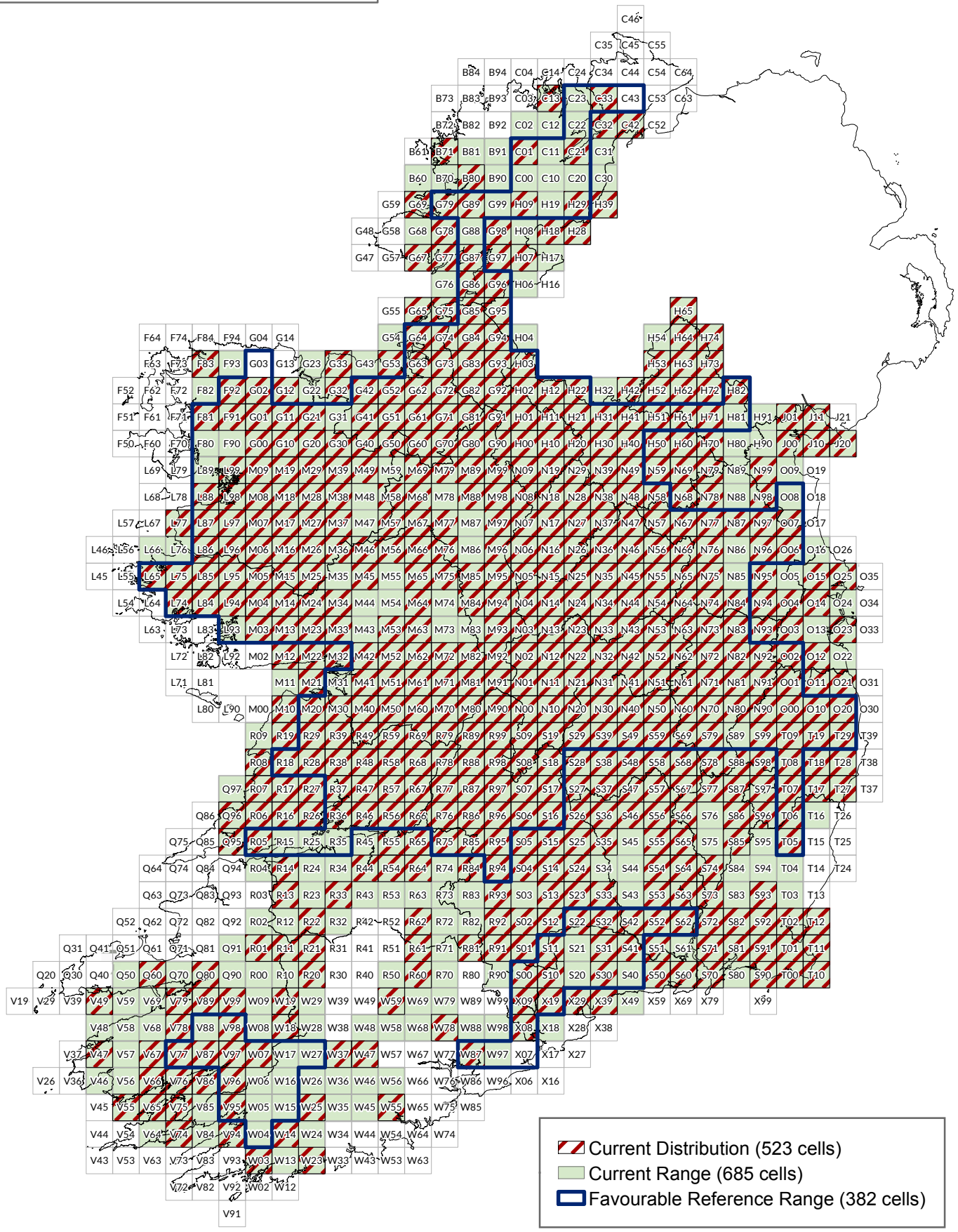
Assessment of conservation status at end of reporting period			
11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1)/ Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* ***improving*** */ deteriorating / stable / unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	The pine marten is expanding its range in Ireland. There is ample habitat available across the country to allow the species to continue its spread and to allow the population to expand as well. While some threats have been identified, none of them are considered sufficiently serious to undermine the continued recovery of the species. Overall, the conservation status of the pine marten is considered Favourable.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Pine Marten
Martes martes (1357)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 12.5 25 50 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1364***
1.3 Species scientific name	*Halichoerus grypus*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Grey seal (Rón glas)
1.6i Species description	The grey seal is the larger of two seal species that commonly breed around Ireland and inhabit its inshore and offshore waters. Notable by a pronounced sexual dimorphism (Bonner, 1990), adult males can measure 2.0-2.5m in length and weigh up to 300kg in comparison to adult females which tend to be less than 2m in length and weigh less than 180-190kg. Where the animal's head is clearly visible, grey seals can be identified by their characteristic long muzzle and comparatively straight or convex snout from forehead to nose (Duck, 2007). Fur colouration can be highly variable in juveniles and adults of both sexes (Hall & Thompson, 2009) ranging from a slate-grey dorsal surface and a lighter, mottled ventral surface to uniformly dark grey or brown with lighter blotches. Grey seals are primarily pelagic or demersal in their feeding habits and can be wide-ranging. They are only found in the Northern Hemisphere, mainly in cold temperate and sub-polar waters, in the North-East Atlantic from Iceland and Norway to the French coast (Thompson & Härkönen, 2008; Bowen, 2016). Those in Ireland are generally considered part of a larger population or meta-population that also inhabits adjacent jurisdictions (i.e. the UK and France at least).

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2013-2018***
2.3 Distribution map	Submitted
2.4 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*

2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	The distribution map for this species represents all terrestrial and intertidal haul-out sites at which grey seals were recorded during targeted surveillance between 2013 and 2018. The primary surveillance programmes that contributed data to this projection are cited as follows: Ó Cadhla *et al.* (2013); Morris & Duck (2019). Additional grey seal distribution data integrated into this map were collected during annual site monitoring, dedicated monitoring for harbour seals and grey seals (NPWS, 2018 - unpublished data) and also from records submitted to the National Biodiversity Data Centre by a wide range of contributors. The data highlight a very widespread distribution by grey seals around the entire coastline of Ireland including many offshore islands and skerries. It should be noted that the described distribution may not fully represent the localised use of certain caves for resting or breeding (e.g. along parts of the south and west coasts). Nevertheless the map drawn for this species provides a good representation of its principal observed distribution.

3 Information related to Annex V species (Art. 14)

3.1 Is the species taken in the wild/exploited?	*Is the species taken in the wild/exploited? YES/**NO***

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic, **Marine Atlantic***
4.2 Sources of information	Baines, M.E. & Evans, P.G.H. (2009) *Atlas of the Marine Mammals of Wales*. CCW Monitoring Report No. 68. Countryside Council for Wales. 88pp. Bonner, W.N. (1990) *The natural history of seals*. Facts on File Inc. New York. 196pp. Bowen, D. (2016) *Halichoerus grypus* ssp. *macrorhynchus*. *The IUCN Red List of Threatened Species* 2016: e.T61382025A61382327. http://dx.doi.org/10.2305/IUCN.UK.2016-1.RLTS.T61382025A61382327.en. Cronin, M., Duck, C., Ó Cadhla, O., Nairn, R., Strong, D. & O'Keeffe, C. (2004) Harbour seal population assessment in the Republic of Ireland: August 2003. *Irish Wildlife Manuals* No. 11. National Parks and Wildlife Service, Department of the Environment,

Heritage and Local Government, Dublin, Ireland.

Cronin, M.A. (2011) The conservation of seals in Irish waters: How research informs policy. *Marine Policy* 35 (6): 748-755.

Duck, C.D. (2007) *Seals (naturally Scottish).* Scottish Natural Heritage Design and Publications, Redgorton, Perth. 56pp.

Duck, C. & Morris, C. (2012a) An aerial survey of harbour seals and grey seals in Ireland. Part 1: Lough Foyle to Galway Bay August 2011. A report for the National Parks and Wildlife Service of the Department of Arts, Heritage and the Gaeltacht (DAHG). NERC Sea Mammal Research Unit, Scottish Oceans Institute, University of St. Andrews, Scotland.

Duck, C. & Morris, C. (2012b) An aerial survey of harbour and grey seals in Ireland. Part 2: Galway Bay to Carlingford Lough August-September 2012. A report for the National Parks and Wildlife Service of the Department of Arts, Heritage and the Gaeltacht (DAHG). NERC Sea Mammal Research Unit, Scottish Oceans Institute, University of St. Andrews, Scotland.

Hall, A. & Thompson, D. (2009) Gray seal. *Halichoerus grypus*. In W.F. Perrin, B. Würsig, J.G.M. Thewissen (eds.). *Encyclopedia of Marine Mammals* – 2nd edition. Academic Press, Elsevier Inc. p.500-503.

ICES (2012) Report of the Working Group on Marine Mammal Ecology (WGMME), March 5-8, Copenhagen, Denmark. ICES CM 2012/ACOM:27.

Matthiopoulos, J., McConnell, B., Duck, C. & Fedak, M. (2004) Using satellite telemetry and aerial counts to estimate space use by grey seals around the British Isles. *Journal of Applied Ecology* 41: 476-491.

Morris, C.D. & Duck, C.D. (2019) Aerial thermal imaging survey of seals in Ireland, 2017-2018. Report (unpublished) for the National Parks and Wildlife Service of the Department of Culture, Heritage and the Gaeltacht, Dublin.

NPWS (2018) Unpublished data collected during local site surveillance and regional monitoring of Ireland's seal populations along the east-southeast, west-southwest, and northwest coasts between 2009 and 2018.

Ó Cadhla, O. & Strong, D. (2007) Grey seal moult population survey in the Republic of Ireland, 2007. Report to the National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

Ó Cadhla, O., Strong, D., O'Keeffe, C., Coleman, M., Cronin, M., Duck, C., Murray, T., Dower, P., Nairn, R., Murphy, P., Smiddy, P., Saich, C., Lyons, D. & Hiby, A.R. (2008) An assessment of the breeding population of grey seals in the Republic of Ireland, 2005. *Irish Wildlife Manuals* No. 34. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

Ó Cadhla, O., Keena, T., Strong, D., Duck, C. and Hiby, L. (2013) Monitoring of the breeding population of grey seals in Ireland,

	2009 - 2012. *Irish Wildlife Manuals* No. 74. National Parks and Wildlife Service, Department of the Arts, Heritage and the Gaeltacht, Dublin, Ireland. Pollock, C.M., Mavor, R., Weir C.R., Reid, A., White, R.W., Tasker, M.L., Webb, A. & Reid, J.B. (2000) *The distribution of seabirds and marine mammals in the Atlantic Frontier, north and west of Scotland.* Joint Nature Conservation Committee, Aberdeen. 92pp. Thompson, D. & Härkönen, T. (IUCN SSC Pinniped Specialist Group) (2008) *Halichoerus grypus*. In IUCN 2012. *IUCN Red List of Threatened Species.* Version 2012.2. http://www.iucnredlist.org . Vincent, C., Ridoux, V., Fedak, M.A., & Hassani, S. (2002) Mark-recapture and satellite tracking of rehabilitated juvenile grey seals (*Halichoerus grypus*): dispersal and potential effect on wild populations. *Aquatic Mammals* 28: 121–130. Wall, D., Murray, C., O'Brien, J., Kavanagh, L., Wilson, C., Ryan, C., Glanville, B., Williams, D., Enlander, I., O'Connor, I., McGrath, D., Whooley, P. & Berrow, S. (2013) *Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters 2005 - 2011.* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 62pp.
4.2i Additional information	Cosgrove, R., Cronin, M., Reid, D., Gosch, M., Sheridan, M., Chopin, N. & Jessopp, M. (2013) Seal depredation and bycatch in set net fisheries in Irish waters. *BIM Fisheries Resource Series*, Vol. 10. Cosgrove, R., Cronin, M., Reid, D., Gosch, M., Sheridan, M., Chopin, N. & Jessopp, M. (2016) Seal bycatch in gillnet and entangling net fisheries in Irish waters. *Fisheries Research* 183: 192-199. Cronin, M.A., Duck, C.D. & Ó Cadhla, O. (2007) Aerial surveying of grey seal breeding colonies on the Blasket Islands, Co. Kerry, the Inishkea Group, Co. Mayo and the Donegal coast, Ireland. *Journal for Nature Conservation* 15(2): 73-83. Cronin, M., Jessopp, M., Houle, J., Reid, D. (2014) Fishery-seal interactions in Irish waters: Current perspectives and future research priorities. *Marine Policy* 44: 120–30. Gosch, M., Cronin, M., Rogan, E., Hunt, W., Luck, C. & Jessopp, M. (2019) Spatial variation in a top marine predator's diet at two regionally distinct sites. *PLoS ONE* 14(1): e0209032. https://doi.org/10.1371/journal.pone.0209032. Jessopp, M., Cronin, M. & Hart T. (2013) Habitat-mediated dive behavior in free-ranging grey seals. *PLoS One* 8(5): e63720. https://doi.org/10.1371/journal.pone.0063720 PMID: 23667663 Jones, E.L., McConnell, B.J., Smout, S., Hammond, P.S., Duck, C.D., Morris C.D., *et al.* (2015) Patterns of space use in sympatric marine colonial predators reveal scales of spatial partitioning. *Marine Ecology Progress Series* 534: 235–49. Kiely, O., Lidgard, D.C., McKibben, M., Baines, M.E. & Connolly, N. (2000) Grey Seals: Status & Monitoring in the Irish & Celtic Seas. Maritime Ireland/Wales INTERREG report No. 3. Marine Institute, 80 Harcourt St., Dublin.

	Lyons, D.O. (2004) Summary of National Parks & Wildlife Service surveys for common (harbour) seals (*Phoca vitulina*) and grey seals (*Halichoerus grypus*), 1978 to 2003. *Irish Wildlife Manuals* No. 13. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. McConnell, B.J., Fedak, M.A., Lovell, P. & Hammond, P.S. (1999) Movements and foraging areas of grey seals in the North Sea. *Journal of Applied Ecology* 36: 573-590. SCOS (2017) *Scientific advice on matters relating to the management of seal populations: 2017*. NERC Special Committee on Seals, UK.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***264,900 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994-2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */* unknown	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	

5.9 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*	
5.10 Favourable reference range	***a) 264,900 km²***	
	b) Indicate if operators were used (use these 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 range value derived from the range map referred to in 2.4 is considered to remain the baseline for this species. As there is no evidence of a decline since the Directive came into force the current range is set as the FRR.	
5.11 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***	
5.12 Additional information *Optional*	The species' natural range in Irish waters has been shown to be part of its wider range in the waters of western Europe, particularly those of neighbouring states the UK and France (e.g. Vincent *et al*., 2002; Matthiopoulos *et al*., 2004; Cronin, 2011; ICES, 2012), with offshore movements primarily occurring in waters overlying the continental shelf and upper continental slope. The range map provided consists of its recorded and likely predominant natural range based on recent data (2001-2018) and expert judgement. It consists of a block of contiguous 10km x 10km grid cells distributed in Irish coastal and marine waters up to 1,000m deep including shallow coastal bays and estuaries and excluding the eastern margin of the Rockall Bank. Over the last two decades records of the occurrence of this species around Ireland have increased considerably in parallel with more active surveillance and assessment (see Cronin *et al*., 2004; Ó Cadhla *et al*., 2008) and continued seal population monitoring since 2005-06 (Ó Cadhla & Strong, 2007; NPWS, 2018 - unpublished data). The accurate assessment of grey seal occurrence at sea presents	

	significant challenges, however, particularly when attempting to work at a regional or population scale and offshore. Sighting records may be obtained incidentally during ship-based surveys (e.g. Pollock *et al*., 2000; Wall *et al*., 2013) but in general seals are not easily detected and identified in the open sea except at close range and such data may be recorded erratically (Baines & Evans, 2009), introducing uncertainty into the assessment of true distribution. Knowledge of grey seal distribution in Ireland is therefore concentrated on records gathered at haul-out sites within the current and previous reporting periods (i.e. 2001-2012) including during the annual moult (Ó Cadhla & Strong, 2007), breeding (Ó Cadhla *et al*., 2008; Ó Cadhla *et al*., 2013; NPWS, 2018 - unpublished data) and summer seasons (Cronin *et al*., 2004; Duck & Morris, 2012a, 2012b; Morris & Duck, 2019). Change in range since the last report is due to slight mapping differences at the jurisdictional boundary with the UK.

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	***2013***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	***7,284***
	c) Maximum	***9,365***
	d) Best single value	
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval /* ***minimum***	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*		
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	

6.8 Short-term trend Direction	*stable / **increasing** / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / **increasing** / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) Population size (with unit) or*	
	***b) Operator < (less than)** or*	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
6.16 Change and reason for change in population size	*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*
6.17 Additional information *Optional*	The minimum and maximum population sizes provided are based on pup production estimates from the seven most important breeding areas for grey seals in Ireland (i.e. c. 84% of the total breeding population according to a comprehensive assessment in 2005; Ó Cadhla *et al.*, 2008). These areas were subject to renewed aerial surveillance over three breeding seasons (2009 – east/southeast, 2011 – west/southwest, 2012 – west/northwest) and surveillance effort has continued periodically since then. The resultant pup production figures for all seven areas were combined with pupping data from 2005 for sites of lesser importance on national/regional scales, to yield a total Irish production estimate (P) of 2,081 pups. This figure was then scaled up to minimum and maximum all-age population estimates using standard multipliers (3.5x[P] and 4.5x[P], respectively) that have been applied consistently in Irish studies. For further details concerning grey seal population estimation, previous studies in Ireland and the breeding sites concerned, see Ó Cadhla *et al*. (2008) and Ó Cadhla *et al*. (2013). While some inter-annual variability in grey seal pup production is commonplace, the overall population figures are considered a representative sample at the commencement of the current reporting period. An assumption is made that the breeding sites of lesser importance (c. 16% of the 2005 total) have not seen nationally/regionally significant increases or declines in pup production since they were last surveyed. Given more recent information from annual surveillance (NPWS, 2018 unpublished data) that suggests continued growth in pup production at the seven main breeding colonies during the period 2013-2018, the population figures presented here are considered to be minimum estimates for the 2013-2018 reporting period. Since estimates for grey seal population size, derived from data on the principal breeding colonies, are periodic and variable figures depending on the year of coverage, and they represent a small number of samples of such abundance estimates, a realistic FRP since the Directive came into force remains difficult to determine. However, based on the estimates provided in this assessment along with previous abundance information, the FRP is considered to be less than the minimum population estimate provided here.

7 Habitat for the species

7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / **uncertain** / unknown*
7.8 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*
7.9 Additional information *Optional*	Use of the range descriptor and range surface area calculation as proxies for habitat and habitat area are judged appropriate for this wide-ranging coastal and offshore species. The habitat used by grey seals in Ireland is diverse and dynamic, from coastal and estuarine waters close to human activity and undisturbed offshore islands, to deeper Atlantic shelf waters and shallow seas shared with adjacent member states. Current information broadly indicates that grey seals of all ages move freely about this diverse habitat and, based on the population size and distribution data available and knowledge of its population ecology, all indications are that sufficient high quality habitat is available to support the maintenance and/or expansion of the species in Ireland into the future. Consequently the habitat quality is

	considered good. Long-term trends in habitat for grey seal remain uncertain due to insufficient accurate data for this species throughout its range in Ireland prior to 2000. However, with improved surveillance and numerous ongoing records of grey seals in the last 18 years, the short-term trend indicates (a) the continued existence of sufficient quality habitat for the species and (b) an expansion in haul-out distribution around the island of Ireland, based on comparison with previous nationwide assessments and the results of repeated aerial surveillance (Morris & Duck, 2019).

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**C09** Geotechnical surveying (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M)	**C09** Geotechnical surveying (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M)

8.2 Sources of information *Optional*	*https://www.npws.ie/marine/marine-species/grey-seal* *https://www.dccae.gov.ie/en-ie/natural-resources/topics/Oil-Gas-Exploration-Production/Pages/home.aspx* *https://www.agriculture.gov.ie/seafood/sea-fisheriespolicymanagementdivision/*
8.3 Additional information *Optional*	Grey seals may be subject to a number of local and/or regional environmental pressures and threats throughout their North Atlantic range and in Irish coastal/offshore waters. The main pressures thought to be acting on this species are considered to involve commercial vessel-based or shipping-based activities that occur primarily on a local or regional scale and/or on a persistent or intermittent basis (e.g. impacts from local/regional prey removal by fisheries or by-catch in fisheries; impacts arising from geophysical seismic exploration). Since the species is known to be broadly pelagic/demersal in its ecology in the North-East Atlantic and current grey seal distribution is very wide in its spatial and temporal occurrence, where a pressure may be regionally intensive the ranking given is one of medium importance. It should be noted, in relation to grey seal interactions with

	commercial fisheries, including accidental by-catch interactions with certain fishing métiers, that active research into the scale and extent of interactions is ongoing and definitive conclusions are difficult to determine at present. It should also be noted that in relation to seismic exploration, which tends to occur on a local or occasionally regional scale in the waters of Ireland's EEZ and is comparatively low in coverage relative to several other member states, a robust regulatory and management regime applies in order to avoid potentially significant impacts on all species of marine mammal. This regime takes cognisance of recent scientific research and surveillance findings and it is expected that this practice will continue into the future. There is no evidence to suggest a change in the main pressures thought to be acting on this species in the near future (i.e. threats). However surveillance of the species and the pressures potentially acting upon it will continue, while the application of strong management measures (e.g. via the statutory/regulatory process) to avoid potentially significant impacts is also expected to continue.

9 Conservation measures	
To be reported only for Annex II species	
9.1 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*
9.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, population and/or habitat for the species** or* *b) Expand the current range of the species (related to 'Range') or* *c) Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population') or* *d) Restore the habitat of the species (related to 'Habitat for the species')*
9.3 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*

9.4 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 in field 9.2):* *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)*
9.5 List of main conservation measures	**CC12** Reduce/eliminate noise, light, thermal and other forms of pollution related to resource exploitation and energy production **CF09** Reduce/eliminate noise, light, heat or other forms pollution from industrial, commercial, residential and recreational areas and activities **CG05** Reduce bycatch and incidental killing of non-target species **CG09** Other measures to reduce impacts from marine aquaculture infrastructures and operation
9.6 Additional information *Optional*	All measures taken during the reporting period are designed to ensure the maintenance of grey seal at a favourable conservation status in Ireland and to ensure that the conservation provisions for this species, as underpinned by Article 6 of the Habitats Directive in particular, are robustly implemented including via national legislation (EC Birds and Natural Habitats Regulations S.I. No. 477/2011, Wildlife Acts 1976-2012, etc.).

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	Based on current available information a number of pressures have been identified. While the effect of these pressures may act on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, based on current information none is considered to be of sufficient magnitude to be causing an adverse impact on the population of grey seal in Ireland. The available evidence, as supported by ongoing surveillance, indicates continued growth in the species' breeding population size and its distribution around the coastline. Ongoing threats as listed or identified into the future via surveillance will be managed appropriately. Hence the Future prospects for the species are considered Favourable.	

11 Conclusions

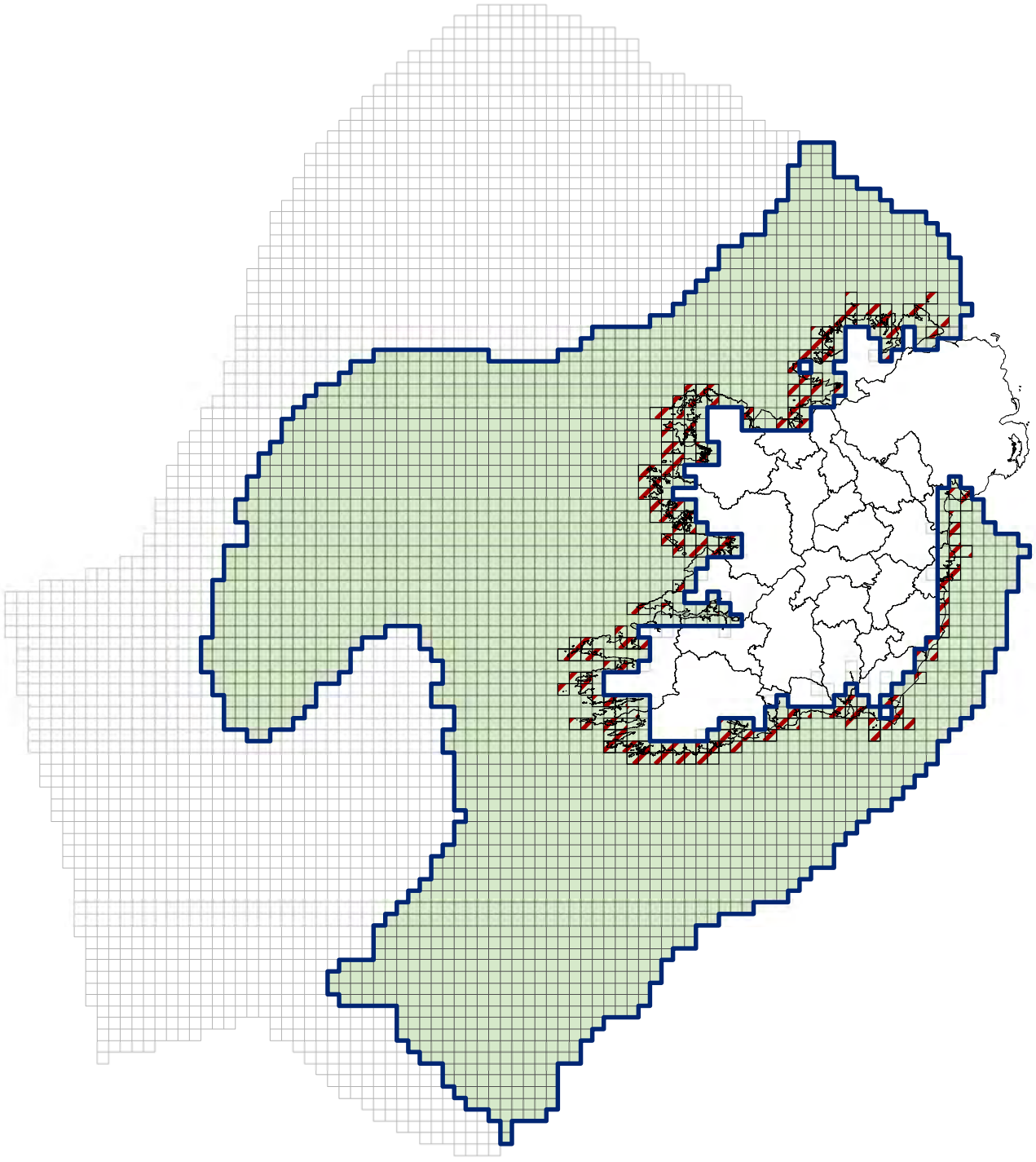
Assessment of conservation status at end of reporting period

11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1)/ Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* ***improving*** */ deteriorating / stable / unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	Based on the assessments for Range, Population, Habitat and Future prospects parameters, the conservation status of the species is assessed as Favourable and the overall trend is demonstrating an on-going increase. There were no qualifiers for Favourable assessments in 2013.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species		
12.1 Population size inside the pSCIs, SCIs and SACs network *(on the biogeographical/marine level including all sites where the species is present)*	**a) Unit**	***Number of individuals***
	b) Minimum	***6,850***
	c) Maximum	***8,850***
	d) Best single value	
12.2 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval /* ***minimum***	
12.3 Population size 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*	
12.4 Short-term trend of population size within the network Direction	*Short-term trend of population size within the network over the period indicated in field 6.5 :* *stable /* ***increasing*** */ decreasing / uncertain / unknown*	
12.5 Short-term trend of population size within 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*	
12.6 Additional information *Optional*	Evidence from population estimation surveys carried out since the Directive came into force indicates that the all-age population of grey seals (within the Natura 2000 network designated for the species in Ireland) has increased, driven largely by local increases in pup production within several key breeding areas. The ability to accurately and statistically determine population trends in this species is dependent on the frequency and precision of population surveys undertaken. Ongoing high quality surveillance will assist in the continued determination and verification of population trend data. Given the sizes and distribution of SACs in Ireland, including coastal and offshore waters, it is considered that these estimates of population size best capture the potential use of these sites by grey seal throughout the year. It should be noted that this measurement method is not precise and cannot be so, given the species' mobility, variability in occurrence and abundance, constraints on offshore surveillance, and limited knowledge of its ecology and habitat use across the very wide range of terrestrial/inter-tidal sites and waters in which it occurs.	

13 Complementary information

Grey seal
Halichoerus grypus (1364)
Article 17 (2013 - 2018) Assessment



Current Distribution (221 cells)
Current Range (2,649 cells)
Favourable Reference Range (2,649 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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 25 50 100 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1365***
1.3 Species scientific name	*Phoca vitulina*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Harbour seal; Common seal (Rón beag)
1.6i Species description	The harbour seal is the smaller of two seal species that commonly breed around the coast of Ireland and inhabit its inshore and offshore waters. Unlike the larger grey seals, harbour seals do not show a very pronounced sexual dimorphism when mature. Adult males can measure up to 1.9m in length and weigh between 70kg and 150kg, while adult females may be up to 1.7m in length and weigh between 60kg and 110kg (Thompson & Härkönen, 2008). At all ages harbour seal fur colouration patterns can be highly variable (Burns, 2009; Duck, 2007) ranging from yellow-brown, tan or mid-brown to grey-black and with variable spotted, dappled or speckled markings along the body length (Bonner, 1990; Duck, 2007). Harbour seals are one of the most widespread species of pinniped, inhabiting the Northern Hemisphere from warm temperate and even subtropical waters to northern polar regions (Burns, 2009). Substantial declines and die-offs have been recorded both historically and recently in this species, including via viral disease in Europe and elsewhere. In Ireland harbour seals occur in estuarine, coastal and fully marine areas and also occupy regular haul-out sites about which animals breed, moult, rest and engage in social activity, for example.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES*/***NO***
2.2 Year or period	***2013-2018***
2.3 Distribution map	Submitted

2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	The distribution map for this species represents all terrestrial and intertidal haul-out sites at which harbour seals were recorded during targeted surveillance between 2017 and 2018. The primary surveillance programme that contributed data to this projection is reported on in Morris & Duck (2019). Additional harbour seal distribution data integrated into this map were collected during annual site monitoring (e.g., see NPWS, 2010, 2011, 2012), dedicated monitoring for harbour seals and grey seals (NPWS, 2018 – unpublished data) and also from records submitted to the National Biodiversity Data Centre by a wide range of contributors. The data highlight a very widespread distribution by harbour seals around the entire coastline of Ireland including skerries and even some offshore islands (e.g., the Aran Islands). It should be noted that the described distribution may not fully represent the localised use of certain sites for resting or breeding, since primary surveillance effort is focused on the annual moult season (August-September). Nevertheless the map drawn for this species provides a good representation of its principal observed distribution.

3 Information related to Annex V species (Art. 14)

3.1 Is the species taken in the wild/exploited?	*Is the species taken in the wild/exploited? YES/**NO***

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic, **Marine Atlantic***
4.2 Sources of information	Bonner, W.N. (1990) *The natural history of seals*. Facts on File Inc. New York. 196pp. Burns, J.J. (2009) Harbor seal and Spotted seal. *Phoca vitulina* and *P. largha*. In W.F. Perrin, B. Würsig, J.G.M. Thewissen (eds.).

Encyclopedia of Marine Mammals – 2nd edition. Academic Press, Elsevier Inc. p.533-542.

Cronin, M., Duck, C., Ó Cadhla, O., Nairn, R., Strong, D. & O'Keeffe, C. (2004) Harbour seal population assessment in the Republic of Ireland: August 2003. *Irish Wildlife Manuals* No. 11. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

Cronin, M. A. (2007) The abundance, habitat use and haul-out behaviour of harbour seals (*Phoca vitulina vitulina*) in southwest Ireland. Unpublished PhD thesis, University College Cork. 262 pp.

Cronin, M. & Ó Cadhla, O. (2007) NPWS phocid monitoring methods and interval assessment. Recommendations for monitoring of the harbour seal (*Phoca vitulina vitulina*) & grey seal (*Halichoerus grypus*) populations in the Republic of Ireland. Report commissioned by the National Parks and Wildlife Service. Coastal and Marine Resources Centre, University College, Cork. 47pp.

Cronin, M.A., Kavanagh, A. & Rogan, E. (2008) Foraging ecology of the harbour seal (*Phoca vitulina vitulina*) in Ireland. Final report to the Marine Institute - Project ST/05/12. Coastal and Marine Resources Centre, University College, Cork. 145pp.

Cronin, M.A. (2011) The conservation of seals in Irish waters: How research informs policy. *Marine Policy* 35 (6): 748-755.

Duck, C.D. (2007) *Seals (naturally Scottish).* Scottish Natural Heritage Design and Publications, Redgorton, Perth. 56pp.

Duck, C. & Morris, C. (2012a) An aerial survey of harbour seals and grey seals in Ireland. Part 1: Lough Foyle to Galway Bay August 2011. A report for the National Parks and Wildlife Service of the Department of Arts, Heritage and the Gaeltacht (DAHG). NERC Sea Mammal Research Unit, Scottish Oceans Institute, University of St. Andrews, Scotland.

Duck, C. & Morris, C. (2012b) An aerial survey of harbour and grey seals in Ireland. Part 2: Galway Bay to Carlingford Lough August-September 2012. A report for the National Parks and Wildlife Service of the Department of Arts, Heritage and the Gaeltacht (DAHG). NERC Sea Mammal Research Unit, Scottish Oceans Institute, University of St. Andrews, Scotland.

Heardman, C., O'Donnell, D. & McMahon, D. (2006) The status of the harbour seal *Phoca vitulina* L. in inner Bantry Bay, Co Cork and inner Kenmare River, Co. Kerry: 1964-2004. *Irish Naturalists' Journal* 28(5): 181-191.

ICES (2012) Report of the Working Group on Marine Mammal Ecology (WGMME), March 5-8, Copenhagen, Denmark. ICES CM 2012/ACOM:27.

Lyons, D.O. (2004) Summary of National Parks and Wildlife Service surveys for common (harbour) seals (*Phoca vitulina*) and grey seals (*Halichoerus grypus*), 1978 to 2003. *Irish Wildlife Manuals* No. 13. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

Minto, C., & Rakka, M. (2015) Power analysis to detect trends in

	haul-out counts of Harbour seals (*Phoca vitulina vitulina*) in Ireland. Statistical modelling and power analysis of NPWS Harbour seal monitoring data - Phase 2. Report to the National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. Marine and Freshwater Research Centre, Galway-Mayo Institute of Technology, Galway. Morris, C.D. & Duck, C.D. (2019) Aerial thermal imaging survey of seals in Ireland, 2017-2018. Report (unpublished) for the National Parks and Wildlife Service of the Department of Culture, Heritage and the Gaeltacht, Dublin. NPWS (2010) Harbour seal population monitoring 2009-2012: Report no. 1. Report on a pilot monitoring study carried out in southern and western Ireland, 2009. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin. NPWS (2011) *Harbour seal pilot monitoring project, 2010.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. NPWS (2012) *Harbour seal pilot monitoring project, 2011.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. NPWS (2018) Unpublished data collected during local site surveillance and regional monitoring of Ireland's seal populations along the east, south, west and northwest coasts between 2009 and 2018. Rakka, M. & Minto, C. (2015) An investigation of the effects of environmental and observational variables on haul-out counts of Harbour seals (*Phoca vitulina vitulina*) in Ireland. Statistical modelling and power analysis of NPWS Harbour seal monitoring data - Phase 1. Report to the National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. Marine and Freshwater Research Centre, Galway-Mayo Institute of Technology, Galway. Thompson, D. & Härkönen, T. (IUCN SSC Pinniped Specialist Group) (2008) *Phoca vitulina*. In IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. http://www.iucnredlist.org.
4.2i Additional information	Cosgrove, R., Cronin, M., Reid, D., Gosch, M., Sheridan, M., Chopin, N. & Jessopp, M. (2013) *Seal depredation and bycatch in set net fisheries in Irish waters*. BIM Fisheries Resource Series, Vol. 10. Cronin, M., Jessopp, M., Houle, J., Reid, D. (2014) Fishery-seal interactions in Irish waters: Current perspectives and future research priorities. *Marine Policy* 44: 120–30. Goodman, S.J. (1998) Patterns of extensive genetic differentiation and variation among European harbor seals (*Phoca vitulina vitulina*) revealed using microsatellite DNA polymorphisms. *Molecular Biology and Evolution* 15(2): 104-118. Jones, E.L., McConnell, B.J., Smout, S., Hammond, P.S., Duck, C.D., Morris C.D., *et al*. (2015) Patterns of space use in sympatric marine colonial predators reveal scales of spatial partitioning.

	Marine Ecology Progress Series 534: 235–49. SCOS (2017) Scientific advice on matters relating to the management of seal populations: 2017. NERC Special Committee on Seals, UK. Wall, D., Murray, C., O'Brien, J., Kavanagh, L., Wilson, C., Ryan, C., Glanville, B., Williams, D., Enlander, I., O'Connor, I., McGrath, D., Whooley, P. & Berrow, S. (2013) *Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters 2005 - 2011.* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 62pp.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***176,300 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994-2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	

<table>
<tr><td rowspan="4">5.10 Favourable reference range</td><td colspan="2">a) 176,300 km²</td></tr>
<tr><td colspan="2">b) Indicate if operators were used (use these 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 range value derived from the range map referred to in 2.4 is considered to remain the baseline for this species. As there is no evidence of a decline since the Directive came into force the current range is set as the FRR.</td></tr>
<tr><td rowspan="7">5.11 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>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>5.12 Additional information

Optional</td><td colspan="2">The species’ natural range in Irish waters is likely to be part of its wider range in the waters of western Europe, especially those of the UK, according to information currently available on regional harbour seal movements (e.g. ICES, 2012).
However some degree of geographic and possibly even genetic isolation by distance of Irish harbour seal communities (e.g. in the west of Ireland) cannot be ruled out at this time, based on the comparatively short-range movements shown by a sample of animals tagged in the southwest of Ireland (Cronin *et al*., 2008; Cronin, 2011).
While individual harbour seal movements measuring several hundred kilometres have been recorded (ICES, 2012) these have tended to occur in the waters of shallow regional seas (e.g., the North Sea) and/or overlying the continental shelf. The range map provided consists of the species’ recorded and likely predominant natural range based on recent data (2001-2012) and expert judgement. It consists of a block of contiguous 10km x 10km grid cells distributed in Irish coastal and marine waters up to 200m deep, including shallow coastal bays and estuaries and excluding the offshore Porcupine Bank.
Prior to the early 2000s there was limited information available concerning the population status and distribution of harbour seals around Ireland and the extent to which these animals travelled within Irish and neighbouring waters. From 2004 the results of research and monitoring involving key Irish breeding and non-breeding haul-out sites began to emerge (e.g., Lyons, 2004; Cronin *et al*., 2004;</td></tr>
</table>

	Heardman *et al.*, 2006). Increased emphasis was placed on completion of (i) a national evaluation of harbour seal population size and distribution and (ii) the first in-depth regional studies of harbour seal ecology and movement within Irish waters (Cronin, 2007). Consequently, with regard to this species it is considered that the years 2007-2018 represent an appropriate period for the evaluation of short-term trends. Records from a range of collaborative telemetry studies conducted since the 1990s (summarised by ICES, 2012) demonstrate this species' capacity for wide-ranging travel at sea as first suggested by early flipper-tagging experiments. This information, along with current harbour seal distribution data for Ireland, indicate that a decline in range within Irish waters is unlikely to have occurred in the recent past; therefore accordingly the short-term trend for range is considered to be stable. Change in range since the last report is due to slight mapping differences at the jurisdictional boundary with the UK.

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2013***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	
	c) Maximum	
	d) Best single value	***4,007***
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval /* ***minimum***	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*		
6.6 Population size Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) Population size (with unit) or*	
	b) Operator **< (less than)** *or*	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information *Optional*	The minimum population size provided is derived from a comprehensive survey of the entire coastline of Ireland carried out in two parts in August 2017 and August 2018 (Morris & Duck, 2019). A relevant assumption here is that no significant change in seal haul-out behaviour or regional distribution occurred between the two successive survey legs, thus the results should be interpreted with a level of caution. Production of a robust maximum or best all-age population estimate is more difficult since the proportion of all animals hauled out ashore during the period of survey is required in order to correct for the animals not available for counting and scale up appropriately (see Cronin & Ó Cadhla, 2007). Evidence from annual monitoring in Ireland (NPWS, 2010, 2011, 2012; Rakka & Minto, 2015; NPWS, 2018 unpublished data) and a range of international studies suggests that the proportion of harbour seals available for counting can be variable depending on the site, environmental covariates and ecological factors, for example. Since there are no statistical data available for this parameter across the broad range of Irish sites surveyed in 2017-2018, an accurate population maximum could not be determined and the minimum estimate remains the appropriate descriptor of population size. While the current minimum population estimate derived via moult data gathered in 2017-2018 is higher than that recorded via comparable aerial surveys in 2003 (2,905-2,955 harbour seals of all ages; Cronin *et al*., 2004; Duck & Morris, 2012b) and 2011-12 (3,489 harbour seals; Duck & Morris, 2012b), there are insufficient data available at this stage to statistically determine a population trend for this species and further scientific work is required. Nevertheless, the short-term trend in Ireland's harbour seal population is considered to be stable given the similarity in national population estimates between 2003, 2011-12 and 2017-2018, and the results of site surveillance within the current reporting period which indicate comparatively stable numbers at a wide range of monitored sites (Minto & Rakka, 2015; NPWS, 2018 unpublished data). Since estimates of minimum harbour seal population size derived from haul-out count data during the moult season are periodic and variable figures depending on the year of coverage, and they represent a small number of samples of such abundance estimates, a realistic FRP since the Directive came into force remains difficult to determine. However, based on the estimates provided in this assessment along with previous abundance information, the FRP is considered to be less than the minimum population estimate provided here.	

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / **uncertain** / unknown*
7.8 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*
7.9 Additional information *Optional*	Use of the range descriptor and range surface area calculation as proxies for habitat and habitat area are judged appropriate for this wide-ranging coastal and offshore species. The habitat used by harbour seals in Ireland is diverse and dynamic, from coastal and estuarine waters close to human activity and undisturbed offshore islands, to continental shelf waters and the comparatively shallow Irish Sea. Current information broadly indicates that harbour seals of all ages may move freely about this diverse habitat and, based on the

	population size and distribution data available and knowledge of its population ecology, all indications are that sufficient high quality habitat is available to support the maintenance and/or expansion of the species in Ireland into the future. Consequently the habitat quality is considered good. Long-term trends in habitat for harbour seal remain uncertain due to insufficient accurate data for this species throughout its range in Ireland prior to 2003. However, with improved surveillance and numerous ongoing records of harbour seals in the last 15 years, the short-term trend indicates the continued existence of sufficient quality habitat for the species, based on comparison with previous nationwide assessments and the results of repeated aerial surveillance (Morris & Duck, 2019).

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**C09** Geotechnical surveying (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M)	**C09** Geotechnical surveying (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M)

8.2 Sources of information *Optional*	*https://www.npws.ie/marine/marine-species/common-seal* *https://www.dccae.gov.ie/en-ie/natural-resources/topics/Oil-Gas-Exploration-Production/Pages/home.aspx* *https://www.agriculture.gov.ie/seafood/sea-fisheriespolicymanagementdivision/*
8.3 Additional information *Optional*	Harbour seals may be subject to a number of local and/or regional environmental pressures and threats throughout their North Atlantic range and in Irish coastal/offshore waters. The main pressures thought to be acting on this species are considered to involve commercial vessel-based or shipping-based activities that occur primarily on a local or regional scale and/or on a persistent or intermittent basis (e.g. impacts from local/regional prey removal by fisheries or by-catch in fisheries; impacts arising from geophysical seismic exploration). Other possible impacts may occur from coastal tourism and localised human disturbance at haul-out sites, though further research into this aspect is currently required to assess the degree and nature of

	such potential impacts around the Irish coast. Since the species is known to be broadly pelagic/demersal in its ecology in the North-East Atlantic, and current harbour seal distribution is very wide in its spatial and temporal occurrence, where a pressure may be regionally intensive the ranking given is one of medium importance. It should be noted, in relation to harbour seal interactions with commercial fisheries, including accidental by-catch interactions with certain fishing métiers, that active research into the scale and extent of interactions is ongoing and definitive conclusions are difficult to determine at present. It should also be noted that in relation to seismic exploration, which tends to occur on a local or occasionally regional scale in the waters of Ireland's EEZ and is comparatively low in coverage relative to several other member states, a robust regulatory and management regime applies in order to avoid potentially significant impacts on all species of marine mammal. This regime takes cognisance of recent scientific research and surveillance findings and it is expected that this practice will continue into the future. There is no evidence to suggest a change in the main pressures thought to be acting on this species in the near future (i.e. threats). However surveillance of the species and the pressures potentially acting upon it will continue, while the application of strong management measures (e.g. via the statutory/regulatory process) to avoid potentially significant impacts is also expected to continue.

9 Conservation measures

To be reported only for Annex II species

9.1 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*
9.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, population and/or habitat for the species** or* *b) Expand the current range of the species (related to 'Range') or* *c) Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population') or* *d) Restore the habitat of the species (related to 'Habitat for the species')*

9.3 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*
9.4 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 in field 9.2):* *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)*
9.5 List of main conservation measures	**CC12** Reduce/eliminate noise, light, thermal and other forms of pollution related to resource exploitation and energy production **CF09** Reduce/eliminate noise, light, heat or other forms pollution from industrial, commercial, residential and recreational areas and activities **CG05** Reduce bycatch and incidental killing of non-target species **CG09** Other measures to reduce impacts from marine aquaculture infrastructures and operation
9.6 Additional information *Optional*	All measures taken during the reporting period are designed to ensure the maintenance of harbour seal at a favourable conservation status in Ireland and to ensure that the conservation provisions for this species, as underpinned by Article 6 of the Habitats Directive in particular, are robustly implemented including via national legislation (EC Birds and Natural Habitats Regulations S.I. No. 477/2011, Wildlife Acts 1976-2012, etc.).

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	Based on current available information a number of pressures have been identified. While the effect of these pressures may act on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, based on current information none is considered to be of sufficient magnitude to be causing an adverse impact on the population of harbour seal in Ireland. The available evidence, as supported by ongoing surveillance, indicates continued relative stability in the species' population size and its distribution around the coastline. Ongoing threats as listed or identified into the future via surveillance will be managed appropriately. Hence the Future prospects for the species are considered Favourable.	

11 Conclusions			
Assessment of conservation status at end of reporting period			
11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1)/ Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*

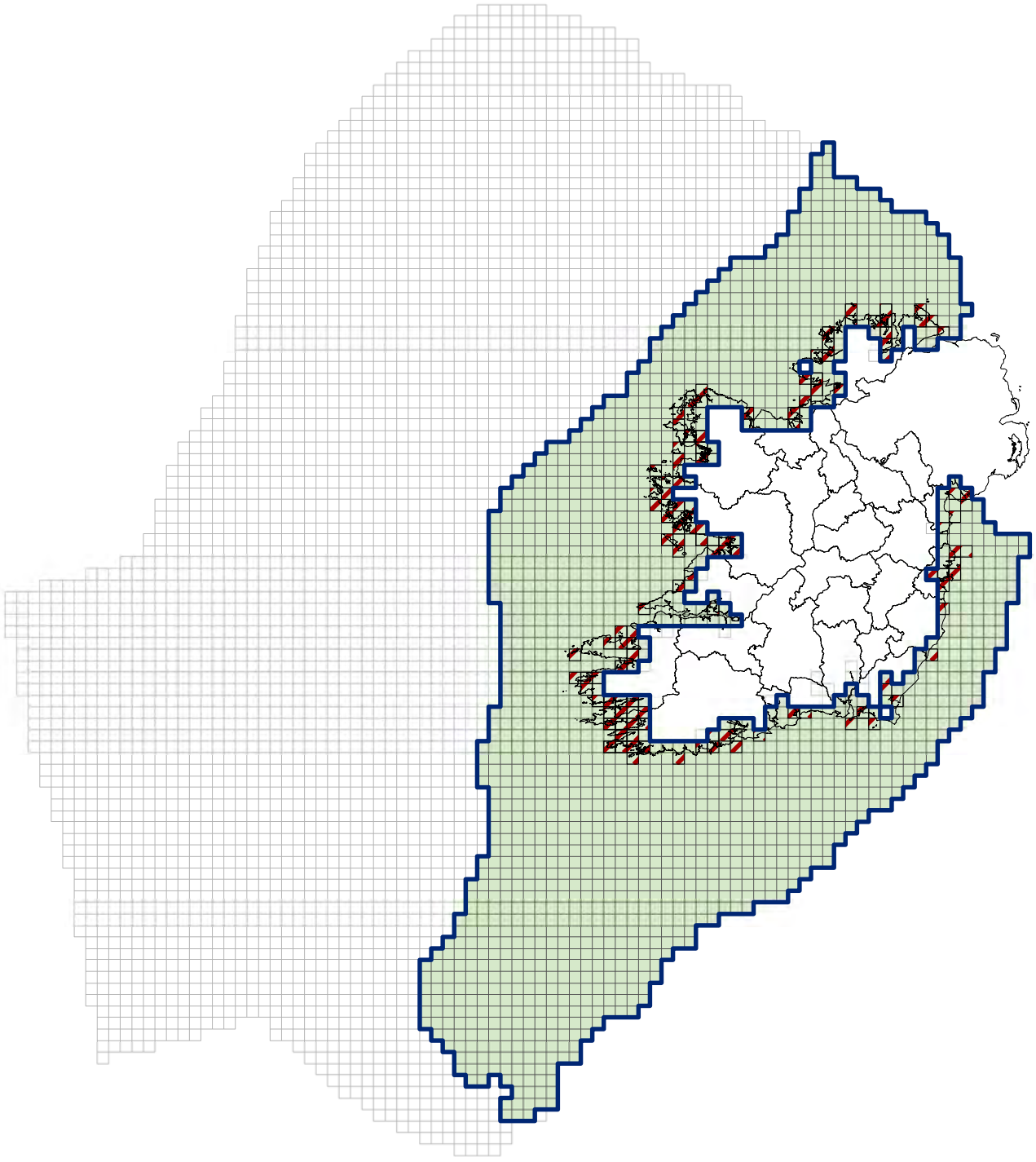
11.8 Additional information *Optional*	Based on the assessments for Range, Population, Habitat and Future prospects parameters, the overall conclusion is that the conservation status of harbour seal in Ireland is considered Favourable. This overall result and the results for the three assessment parameters are the same as in the previous two Article 17 assessments (i.e. Favourable).

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species		
12.1 Population size inside the pSCIs, SCIs and SACs network *(on the biogeographical/marine level including all sites where the species is present)*	**a) Unit**	***Number of individuals***
	b) Minimum	***3,000***
	c) Maximum	
	d) Best single value	
12.2 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
12.3 Population size 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*	
12.4 Short-term trend of population size within the network **Direction**	*Short-term trend of population size within the network over the period indicated in field 6.5 :* ***stable*** / increasing */ decreasing / uncertain / unknown*	
12.5 Short-term trend of population size within 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*	

12.6 Additional information *Optional*	Evidence from population estimation surveys carried out since the Directive came into force indicates that the all-age population of harbour seals (within the Natura 2000 network designated for the species in Ireland) has remained relatively stable. The ability to accurately and statistically determine population trends in this species is dependent on the frequency and precision of population surveys undertaken. Ongoing high quality surveillance will assist in the continued determination and verification of population trend data. Given the sizes and distribution of SACs in Ireland, including coastal and offshore waters, it is considered that this minimum estimate of population size best captures the potential use of all these sites by harbour seal throughout the year. It should be noted that this measurement method is not precise and cannot be so, given the species' mobility, variability in occurrence and abundance, constraints on marine surveillance, and limited knowledge of its ecology and habitat use across the very wide range of terrestrial/inter-tidal sites and waters in which it occurs.

13 Complementary information

Common seal
Phoca vitulina (1365)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 25 50 100 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1345***
1.3 Species scientific name	*Megaptera novaeangliae*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Humpback whale (Míol mór dronnach)
1.6i Species description	The humpback whale is the fourth largest baleen whale species found in Ireland. It is readily identifiable at close range due to several diagnostic features including its characteristic low 'bushy' blow, a small irregularly-shaped dorsal fin, uniquely long, white and flexible pectoral fins, and white patterning on the underside of the tail flukes. Having been hunted intensively into the early 20th century this species has seen some post-whaling recovery in parts of its range. Yet records are uncommon in offshore Irish waters compared to more numerous whale species like fin and minke whales. It is possible that humpback whales are under-recorded, e.g., due to difficulties in distinguishing them from other whales in the open sea; nevertheless sightings off the Irish coast have increased substantially over the last two decades. Humpback whales feed on small shoaling fish, krill and zooplankton, and they commonly move between cold high latitude feeding grounds in summer and warm tropical waters in winter, during which calving and mating occurs. Some identifiable whales have repeatedly returned to forage off Ireland's southwest and south coasts in autumn/winter. Individuals have also been recorded in Iceland or Norway, underlining the species' tendency for long-range movement and migration.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2013-2018***
2.3 Distribution map	Submitted
2.4 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*

2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	The distribution map presented for this species represents all available live sighting records during extensive scientific research and monitoring in Irish waters between 2013 and 2018. The period selected for mapping represents a period of intensive and high quality surveillance for cetaceans in Irish waters across a range of research projects and monitoring programmes. It should be noted that the spatial and temporal distribution of this species could be underestimated due to the difficulty in discriminating large baleen whale species from one another in the offshore Atlantic environment (e.g., see Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Wall *et al.*, 2013; Rogan *et al.*, 2018). This distribution map does not include records where the observed species could not be distinguished, for example, from other members of the Family *Balaenopteridae* (e.g., the fin/sei whale category) or the *unidentified whale* or *unidentified large whale* categories often used for indeterminate sightings. Clearly identified observations of this depleted migratory species in Irish offshore waters have remained comparatively rare over the last century but new records have been emerging, simultaneous to more rigorous surveillance in the last 20-25 years. In contrast, over the last two decades there have been numerous and generally increasing sightings of humpback whales in Irish coastal waters, particularly off the southwest, south and southeast coasts (Ryan *et al.*, 2015). Many of these records have been voluntarily submitted to the Irish Whale and Dolphin Group which operates and maintains a cetacean sightings database for Irish waters and which validates submitted records. In 2017 these exceeded 100 distinct sightings of humpback whales (P.Whooley, IWDG, pers.comm.). The surveillance programmes, projects and publications that contributed sighting data to this distribution projection are cited as follows: Cronin & Barton (2014), Kavanagh *et al.* (2017), O'Donnell *et al.* (2017), O'Donnell *et al.* (2018), O'Sullivan & Manning (2017) and Rogan *et al.* (2018). Along with the results of previous visual survey effort (i.e., Pollock *et al.*, 1997; Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Berrow *et al.*, 2010; Hammond *et al.*, 2011; Wall *et al.*, 2013; Ryan *et al.*, 2015), recent extensive aerial surveys in summer and winter (Rogan *et al.*, 2018) and acoustic monitoring (Charif & Clark, 2009; Berrow *et al.*, 2018) these data were integrated into the development of the species' range map presented under section 2.5. The available scientific information indicates a predominant distribution in Atlantic Ocean waters to the west of Ireland, including waters overlying the Rockall Trough and Porcupine Seabight, the continental slope and the wider continental shelf. It includes more shallow waters of the Celtic Sea and even occasionally the Irish Sea. While all reliable cetacean records obtained in Irish waters were not available for use in this exercise, the map drawn for this species

	provides a good sample of its observed distribution within the period given in 2.2.

3 Information related to Annex V species (Art. 14)

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
4.2 Sources of information	Berrow, S.D., O'Brien, J., Meade, R., Delarue, J., Kowarski, K., Martin, B., Moloney, J., Wall, D., Gillespie, D., Leaper, R., Gordon, J., Lee, A. & Porter, L. (2018).) *Acoustic Surveys of Cetaceans in the Irish Atlantic Margin in 2015–2016: Occurrence, distribution and abundance.* Department of Communications, Climate Action & Environment and the National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland, 348pp. Berrow, S.D., Whooley, P., O'Connell, M. & Wall, D. (2010) *Irish Cetacean Review (2000-2009).* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 60pp. Charif, R.A. & Clark, C.W. (2009) *Acoustic monitoring of large whales in deep waters north and west of the British Isles: 1996-2005*. Technical Report 08-07 for the UK DECC. Cornell University Bioacoustics Research Program, Laboratory of Ornithology, Cornell University, New York. 40pp. Clapham, P.J. (2009).) Humpback whale. *Megaptera novaeangliae*. In W.F. Perrin, B. Würsig, J.G.M. Thewissen (eds.). Encyclopedia of Marine Mammals – 2nd edition. Academic Press, Elsevier Inc. p.582-584. Cronin, C. & Barton, C. (2014).) *Cetacean monitoring during the Celtic Sea Herring Acoustic Survey (CSHAS) October 2014.* Report to the National Parks & Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Cork Ecology, Castlefreke, Clonakilty, Co. Cork. 24pp. DEHLG (2009) *Conservation Plan for Cetaceans in Irish Waters.* Department of the Environment, Heritage and Local Government, 7 Ely Place, Dublin. 97pp. Hammond, P.S., Macleod, K., Burt, L. Cañadas, A., Lens, S. Mikkelsen, B., Rogan, E., Santos, B., Uriarte, A., Van Canneyt, O. & Vázquez, J.A. (2009) *Cetacean Offshore Distribution and Abundance in the European Atlantic (CODA).* Final Report. University of St Andrews, Scotland. Hammond, P.S., Macleod, K., Burt, L., Cañadas, A., Lens, S.,

Mikkelsen, B., Rogan, E., Santos, B., Uriarte, A., Van Canneyt, O., & Antonio Vázquez, J. (2011) Abundance of baleen whales in the European Atlantic. Report to the Scientific Committee of the International Whaling Commission, Cambridge. SC/63/RMP24. 22pp.

Kavanagh, A.S., Hunt, W., Richardson, N. & Jessopp, M. (2017).) *Cetaceans in Irish offshore waters: Final report of the SFI-KOSMOS Project 2015-2017.* MaREI Centre for Marine and Renewable Energy, University College Cork. 66pp.

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. 149pp.

Ó Cadhla, O., Mackey, M., Aguilar de Soto, N., Rogan, E. & Connolly, N. (2004) *Cetaceans and Seabirds of Ireland's Atlantic Margin. Volume II - Cetacean distribution and abundance.* Report on research carried out under the Irish Petroleum Infrastructure Programme (PIP): Rockall Studies Group (RSG) projects 98/6 and 00/13, Porcupine Studies Group project P00/15 and Offshore Support Group (OSG) project 99/38. 82pp.

O'Donnell, C., O'Malley, M., Lynch, D., Lyons, K., Keogh, N. & O'Driscoll, D. (2017).) *Celtic Sea Herring Acoustic Survey. Cruise Report 2017, 15 - 04 November, 2017*. FSS Survey Series: 2017/04. Marine Institute, Oranmore, Co. Galway. 38pp.

O'Donnell, C., O'Malley, M., Lynch, D., Mullins, E., Keogh, N., Power, J., Long, A. & Croot, P. (2018).) *Western European Shelf Pelagic Acoustic Survey (WESPAS). 10 June – 24 July, 2018*. FSS Survey Series: 2018/03. Marine Institute, Oranmore, Co. Galway. 65pp.

O'Sullivan, C. & Manning, L. (2017*).) Cetacean monitoring undertaken during the Western European Shelf Pelagic Acoustic Survey (WESPAS), June - July 2017*. Final Report to the Marine Institute and National Parks & Wildlife Service. 38pp.

Pollock, C.M., Reid, J.R., Webb, A. & Tasker, M.L. (1997) *The distribution of seabirds and cetaceans in the waters around Ireland.* JNCC Report No. 267. Joint Nature Conservation Committee, Peterborough. 167pp.

Reid, J.B., Evans, P.G.H. & Northridge, S.P. (2003) *Atlas of Cetacean Distribution in North-west European Waters.* Joint Nature Conservation Committee, Peterborough. 76pp.

Reilly, S.B., Bannister, J.L., Best, P.B., Brown, M., Brownell Jr., R.L., Butterworth, D.S., Clapham, P.J., Cooke, J., Donovan, G.P., Urbán, J. & Zerbini, A.N. (2008).) *Megaptera novaeangliae*. In IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. http://www.iucnredlist.org.

Rogan, E., Breen, P., Mackey, M., Cañadas, A., Scheidat, M., Geelhoed, S. & Jessopp, M. (2018).) *Aerial surveys of cetaceans and seabirds in Irish waters: Occurrence, distribution and abundance in 2015-2017.* Department of Communications, Climate Action & Environment and National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland. 297pp.

	Ryan, C.G. (2012).) On the ecology of rorqual whales (Balaenopteridae) in Irish waters using intrinsic markers. Unpublished PhD. thesis submitted to the Higher Education and Training Awards Council. Galway-Mayo Institute of Technology. 227pp. Ryan, C., Whooley, P., Berrow, S.D., Barnes, C., Massett, N., Strietman, W.J., Broms, F., Stevick, P.T., Fernald Jr, T.W. & Schmidt, C. (2015).) A longitudinal study of humpback whales in Irish waters. *Journal of the Marine Biological Association of the United Kingdom* 96(4): 877-883. Wall, D., Murray, C., O'Brien, J., Kavanagh, L., Wilson, C., Ryan, C., Glanville, B., Williams, D., Enlander, I., O'Connor, I., McGrath, D., Whooley, P. & Berrow, S. (2013) Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters 2005 - 2011. Irish Whale and Dolphin Group, Kilrush, Co. Clare. 63pp.
4.2i Additional information	

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***610,000 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994-2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */* unknown	
5.8 Long-term trend Magnitude	**a) Minimum**	

Optional	**b) Maximum**	
5.9 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*	
5.10 Favourable reference range	***a) 610,000 km²***	
	b) Indicate if operators were used (use these 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 range value derived from the range map referred to in 2.4 is considered to be the baseline for this species. As there is no evidence of a decline since the Directive came into force the current range is set as the FRR.	
5.11 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***	

5.12 Additional information *Optional*	The species' natural range in Irish waters, and marine waters covered by the Directive, is a small component of its wider North Atlantic migratory range (Clapham, 2009; DEHLG, 2009; Ryan *et al.*, 2015; Berrow *et al.*, 2018). The range map provided consists of its recorded and likely predominant natural range based on comparatively recent data (2001-2018) and expert judgement, and is partly derived from 2.3. It consists of a block of contiguous 50km x 50km grid cells distributed in Irish marine waters, excluding enclosed shallow bays, and now includes the relevant assessment area under the Marine Strategy Framework Directive. Prior to 1999-2000, survey effort targeting cetacean species in Irish offshore waters was comparatively limited in coverage, both spatially and temporally. Since 1999-2000 a number of dedicated multi-annual surveillance programmes for cetaceans have operated in Irish waters, with visual and acoustic surveys extending to the limits of Ireland's EEZ and beyond. With regard to this species it is considered that the years 2007-2018 represent an appropriate period for the evaluation of short-term trends since all survey efforts intensified further during this period. Sighting and acoustic records from dedicated surveillance effort in Irish waters (Berrow *et al.*, 2010; Wall *et al.*, 2013; Cronin & Barton, 2014; Ryan *et al.*, 2015; Kavanagh *et al.*, 2017; O'Donnell *et al.*, 2017; O'Donnell *et al.*, 2018; O'Sullivan & Manning, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018) provide no evidence of a decline in distribution/range in the recent past; therefore the short-term trend for range is considered to be stable. The long-term trend period (1994-2018) is considered to be uncertain for this species due to limited data availability prior to 1999-2000, as outlined above. The range value derived from the map referred to above is considered to be the baseline for this species. This surface area calculation is identical to that reported in 2013. Since there is no evidence of a decline in range since the Directive came into force the current range remains set as the FRR. There is an assumption that the current range in Irish waters is large enough (a) to encompass all of the ecological variation required by this species during its occurrences therein and (b) to contribute to the long-term survival of the species.

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2013-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	***25***

	c) Maximum	***12,000***
	d) Best single value	
6.3 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	a) Unit	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing / decreasing /* ***uncertain*** */ unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain /* ***unknown***	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

<table>
<tr><td>6.14 Long-term trend
Method used

Optional</td><td>Select one of the following methods:

a) Complete survey or a statistically robust estimate
b) Based mainly on extrapolation from a limited amount of data
c) Based mainly on expert opinion with very limited data
<u>d) Insufficient or no data available</u></td></tr>
<tr><td rowspan="4">6.15 Favourable reference population
(using the unit in 6.2 or 6.4)</td><td>a) Population size (with unit) or</td></tr>
<tr><td>b) Indicate if operators were used (using symbols ≈, >, >>, <) or</td></tr>
<tr><td><u>c) Favourable reference population is unknown</u></td></tr>
<tr><td>d) Indicate method used to set reference value if other than operators

Robust data on humpback whale population size and trends in Irish waters are not available, mirroring persistent uncertainty regarding this species in parts of its North Atlantic range and in European waters. Since it has not been possible to determine a realistic baseline value since the Directive came into force the FRP is unknown.</td></tr>
<tr><td>6.16 Change and reason for change in population size</td><td>
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.
<table>
<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>
</table>
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>6.17 Additional information

Optional</td><td>Sighting records of humpback whales in offshore waters have been comparatively infrequent (Ó Cadhla et al., 2004; Berrow et al., 2010; Wall et al., 2013; Kavanagh et al., 2017; Rogan et al., 2018) but the species is seen more regularly off the south, southwest and southeast coasts of Ireland (Ryan et al., 2015). Here 1-3 animals are most commonly recorded and up to six or more individuals may be recorded on occasion.

Associated photo-identification efforts have so far identified a combined total of 85 distinct individuals over more than two decades (IWDG, 2018 – unpublished data). Several of these whales have repeated visits to the same foraging areas off the south coast.

This photo-identification output provides a rudimentary minimum figure over a protracted period but it does not provide an equivalent minimum count for the 2013-2018 period. While Ryan et al. (2015) describe an extensive photo-identification archive accumulated in Ireland since 1999, the estimation of animal abundance based on these photographic ‘capture-recapture’ data remains to be</td></tr>
</table>

	attempted. Nevertheless based on the available published and unpublished information it would appear reasonable to ascribe a crude minimum estimate of 25 individual humpback whales for the period 2013-2018. This minimum figure is slightly higher than that reported in 2013. A reliable figure for maximum population size cannot be provided due to ongoing data limitations. Instead a provisional figure is given based on approximate population estimates for the species in the central and western North Atlantic (Clapham, 2009). Since it has not been possible to determine a realistic baseline value since the Directive came into force, the FRP is unknown. The number of sighting records of humpback whales in Irish waters have generally been increasing since 2001 but the influence of changing observer effort, increased public interest or changes in prey distribution, for example, obscures a clear insight into short-term or long-term population trends. While current data indicate a recovery to perhaps pre-exploitation levels in the central and western North Atlantic (Reilly *et al.*, 2008), evidence of an increase in the northeast Atlantic population(s) of humpback whale is currently very limited. The origin/stock identity of those whales occurring in Irish and neighbouring waters of western Europe is not known but efforts have recently been under way to investigate this aspect further (e.g., Ryan, 2012; Ryan *et al.*, 2015).

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*
7.5 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*

7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*
7.8 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*
7.9 Additional information *Optional*	Use of the range descriptor and range surface area calculation as proxies for habitat and habitat area are judged appropriate for this wide-ranging and migratory pelagic species. The species' natural range and thus habitat in Irish waters is a small component of its wider North Atlantic migratory range (DEHLG, 2009; Clapham, 2009; Ryan *et al.*, 2015; Berrow *et al.*, 2018). The quality of habitat for humpback whale was determined by consideration of the relevant direct and indirect pressures thought to be acting on the species and/or its functional group, and its habitat within its natural environment. These pressures were evaluated in development of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009) and informed by more recent scientific surveillance (e.g., Cronin & Barton, 2014; Ryan *et al.*, 2015; Kavanagh *et al.*, 2017; O'Donnell *et al.*, 2017; O'Donnell *et al.*, 2018; O'Sullivan & Manning, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018), using available data concerning, *inter alia*, habitat use, population size, distribution and ecology, and threats to the species' protection (e.g., via natural/biological sources, human sectoral activities, management gaps, etc). Humpback whales may be subject to a number of local and/or regional environmental pressures throughout their range in Irish waters (DEHLG, 2009). However, based on current spatial and temporal data none are considered to be of sufficient impact on the species to be causing a significant deterioration in overall habitat quality in Ireland from a status that is sufficient for long-term survival. Long-term trends in habitat for humpback whale remain uncertain due to insufficient accurate data for this species prior to 1999-2000. However, with improved surveillance and ongoing (if low incidence offshore) records of humpback whales in the last 18 years, the short-term trend indicates the continued existence of sufficient quality habitat for the species.

8 Main pressures and threats

8.1 Characterisation of pressures/threats		
a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**C09** Geotechnical surveying (M) **E02** Shipping lanes and ferry lanes transport operations (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M)	**C09** Geotechnical surveying (M) **E02** Shipping lanes and ferry lanes transport operations (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M)
8.2 Sources of information *Optional*	*https://www.npws.ie/marine/marine-species/cetaceans* *https://www.dccae.gov.ie/en-ie/natural-resources/topics/Oil-Gas-Exploration-Production/Pages/home.aspx* *https://www.agriculture.gov.ie/seafood/sea-fisheriespolicymanagementdivision/*	
8.3 Additional information *Optional*	Humpback whales may be subject to a number of local and/or regional environmental pressures and threats throughout their North Atlantic range and in Irish offshore waters. In the development and preparation of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009), a comprehensive review of the pressures and threats believed and/or documented to be acting on this species and/or its functional group was undertaken. The main pressures thought to be acting on this species in Irish waters are considered to involve commercial shipping-based or vessel-based activities that occur primarily on a local or regional scale and/or on a temporary or intermittent basis (e.g., impacts arising from shipping movements or geophysical seismic exploration; impacts from local/regional prey removal by fisheries; DEHLG, 2009). Since current humpback whale distribution is shown to be offshore Atlantic but also inshore/coastal in nature, where a pressure may be regionally intensive, the ranking given is one of medium importance due also to the species' depleted population status. It should be noted that in relation to seismic exploration, which tends to occur on a local or occasionally regional scale in the waters of Ireland's EEZ and is comparatively low in coverage relative to several other member states, a robust regulatory and management regime applies in order to avoid potentially significant impacts on all species of marine mammal. This regime takes cognisance of recent scientific research and surveillance findings (e.g., Ryan, 2012; Ryan *et al.*, 2015; Kavanagh *et al.*, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018) and it is expected	

	that this practice will continue into the future. There is no evidence to suggest a change in the main pressures thought to be acting on this species in the near future (i.e., threats). However surveillance of the species and the pressures potentially acting upon it will continue, while the application of strong management measures (e.g., via the statutory/regulatory process) to avoid potentially significant impacts is also expected to continue.

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	*Good / Poor / Bad /* ***Unknown***
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	Visual records of humpback whale in Irish offshore waters have remained comparatively uncommon, yet contemporary sightings and increasing acoustic data nevertheless indicate a wide occurrence in deep oceanic waters and those overlying the continental slope and continental shelf. The species appears to be increasingly recorded in coastal waters off the southwest, south and southeast of Ireland. Since many significant (i.e., high level) anthropogenic impacts that may affect this wide-ranging species' distribution are more localised in space and time within this extensive and diverse marine area, the Future prospects for the Range and Habitat for the species are considered to be Good. A number of pressures that could act upon this species have been identified. The effect of these pressures may operate on a temporary and/or regional scale and some are likely to continue to act as pressures into the future thereby constituting a potential threat. However the impacts on individuals or populations of humpback whale in Irish waters are not well understood. This is largely due to the species' occurrence in small numbers whether far offshore or more coastally, and to continuing limited or uncertain data on its overall numbers, ecology and behaviour during its occurrence within Ireland's marine area. A further confounding factor is the extensive transnational nature of humpback whale life history and movements in the North Atlantic, both within and outside the marine jurisdictions of many states in which the species may be subject to a range of pressures. While ongoing threats as listed or identified into the future via surveillance in Ireland will be managed appropriately, the Future	

	prospects for this large scale migratory population are considered to be Unknown since the significance of the main pressures and threats, and the species' long-term viability remain uncertain. Although the guidelines recommend a Favourable assessment of Future prospects where prospects of one parameter are unknown and prospects of the others are good, Future prospects has been assessed as Unknown due to the paucity of information on population parameters.

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***		
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***		
11.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating / stable / unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the nature of change	*YES/NO*	*YES/NO*

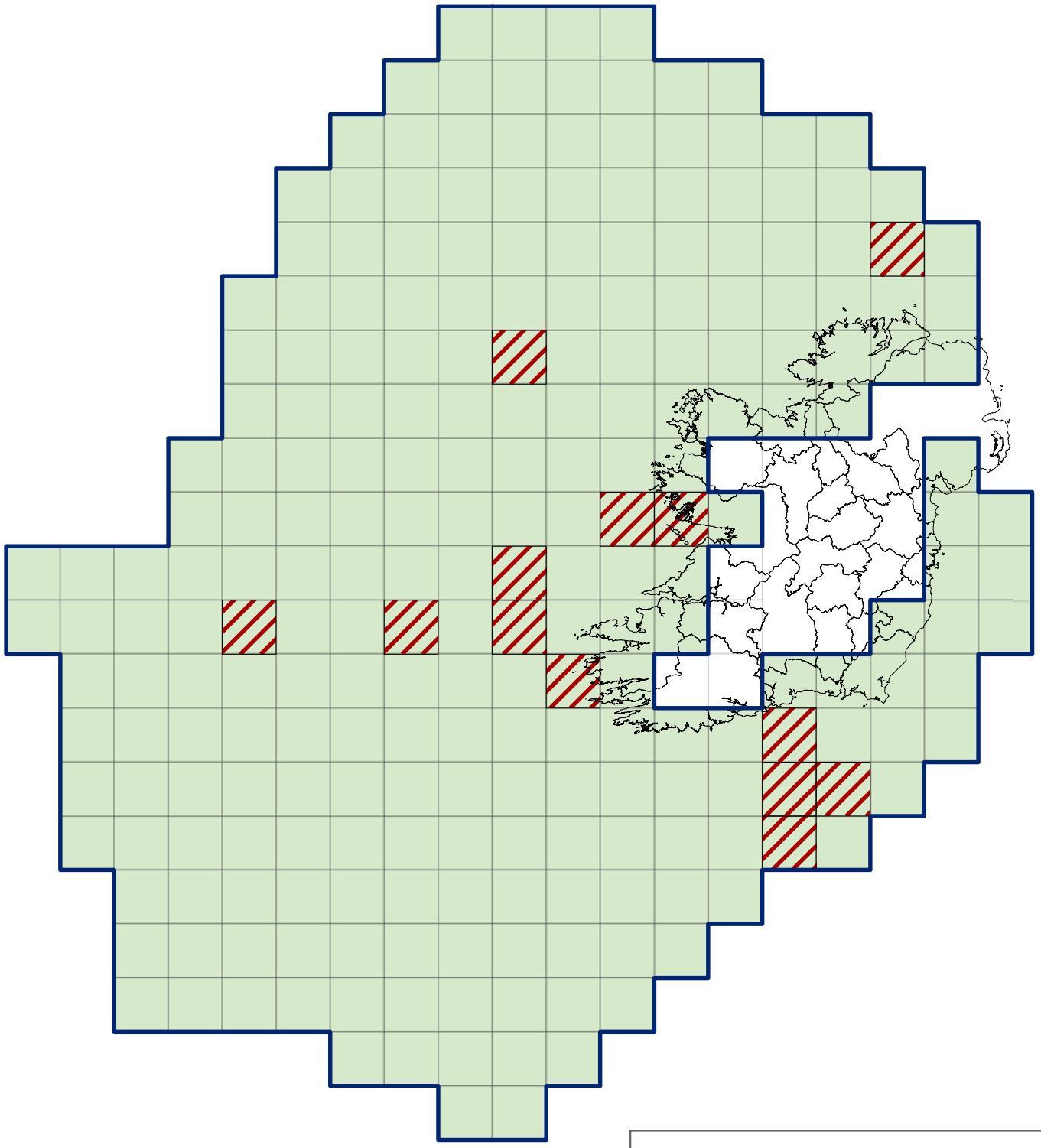
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
11.8 Additional information *Optional*	Contemporary sightings of humpback whales and some recent acoustic data indicate a wide but comparatively low level of occurrence in deep oceanic waters and those overlying the continental slope and continental shelf. Hence the Range and Habitat for the species are considered to be Favourable. However there is currently little numerical evidence that the North Atlantic humpback whale population, at least in its central/eastern component, may be increasing following the cessation of commercial whaling. Furthermore the origin/stock identity of whales occurring in Irish waters is not known at present. Considering these key data gaps and ongoing limited positive sighting records from Irish waters, particularly offshore, the Population parameter is considered to be Unknown. Based on the assessments for the Range, Population, Habitat and Future prospects parameters, the overall conclusion is that the Conservation Status of humpback whale in Ireland remains Unknown. Nevertheless the trend in Conservation Status is considered to be stable. No improvements are reported in the assessments for the Population or Future prospects parameters, due to uncertainty regarding population numbers and trends for this depleted and migratory species. This overall result is the same as in the previous two Article 17 assessments due to limited ongoing information on the species' occurrence and population ecology in Irish waters.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Humpback whale
Megaptera novaeangliae (1345)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 25 50 100 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1349***
1.3 Species scientific name	*Tursiops truncatus*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Bottlenose dolphin (Deilf bholgshrónach)
1.6i Species description	The Bottlenose dolphin is found throughout the world's tropical and temperate marine waters, though in the North-East Atlantic it is rarely recorded in the Baltic Sea or north of the Faroe Islands (Hammond *et al.*, 2012). Classified by the IUCN as a species of Least Concern, partly due to its global distribution and abundance, the Bottlenose dolphin is regularly recorded in Irish coastal and offshore waters (Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010a; Wall *et al.*, 2013) while some communities show a level of residency in quite discrete coastal areas (DEHLG, 2009). Bottlenose dolphins are one of the most frequently recorded and familiar cetaceans occurring in Ireland. With adults averaging up to 3.0-3.8m in length, they are quite readily identifiable, bearing a substantial curved grey dorsal fin, a short but pronounced rounded beak, and lacking an obvious pattern in their grey body colouration except for a paler ventral surface. Genetic and/or ecological separation of coastal and offshore populations of Bottlenose dolphins has been demonstrated in the western and eastern North Atlantic (Wells & Scott, 2009; Louis *et al.*, 2014). However clear seasonal or latitudinal/longitudinal patterns in movement by populations in the North-East Atlantic are not evident.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2013-2018***
2.3 Distribution map	Submitted
2.4 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*

2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	Over the last two decades there have been continuing and widespread records of Bottlenose dolphins in Irish waters, particularly to the south, west and north of Ireland (e.g., Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013; Kavanagh *et al.*, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018a). The distribution map presented for this species represents all available live sighting records during extensive scientific research and monitoring in Irish waters between 2013 and 2018. The period selected for mapping represents a period of intensive and high quality surveillance for cetaceans in Irish waters across a range of research projects and monitoring programmes. The surveillance programmes, projects and publications that contributed sighting data to this distribution projection are cited as follows: Baines *et al.* (2013); Cronin & Barton (2014); Rogan *et al.* (2015); Craig *et al.* (2016); Kavanagh *et al.* (2017), O'Donnell *et al.* (2018); O'Sullivan & Manning (2017); Berrow *et al.* (2018), Rogan *et al.* (2018a) and Rogan *et al.* (2018b). Along with the results of previous visual survey effort (e.g., Hammond *et al.*, 2002; Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Berrow *et al.*, 2010; Wall *et al.*, 2013), recent extensive ship-based and aerial surveys in summer (Hammond *et al.*, 2017; Rogan *et al.*, 2018a) and winter (Rogan *et al.*, 2018a), these data were integrated into the development of the species range map presented under section 2.5. It should be noted that the spatial and temporal distribution of Bottlenose dolphins could be somewhat underestimated due to the difficulty in discriminating various dolphin species from one another, particularly in the offshore Atlantic environment (e.g., see Ó Cadhla *et al.*, 2004; Wall *et al.*, 2013; Hammond *et al.*, 2017; Rogan *et al.*, 2018a). Thus the distribution map presented does not include records where the observed species could not be distinguished, for example, from other members of the Family *Delphinidae* (e.g., Atlantic white-sided dolphin, White-beaked dolphin, Risso's dolphin), or the *unidentified dolphin* or *unidentified small cetacean* categories often used for indeterminate sightings. The distribution of recent sightings (e.g., Baines *et al.*, 2013; Craig *et al.*, 2016; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; O'Sullivan & Manning, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018a) along with regional sighting records obtained across three preceding decades (e.g., Berrow *et al.*, 2002; Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Berrow *et al.*, 2010; Oudejans *et al.*, 2010; Wall *et al.*, 2013) indicate a predominant distribution in waters overlying the continental shelf and the continental slope plus adjacent deeper ocean waters and topographical basins (e.g., the Porcupine Seabight and Rockall Trough). The species can also occur in enclosed bays and in close proximity to the Irish coast (e.g., Oudejans *et al.*, 2010; Wall *et al.*, 2013; Rogan *et al.*, 2018b).

	While all reliable cetacean records obtained in Irish waters were not available for use in this exercise, the map drawn for this species provides a good sample of its observed distribution within the period given in 2.2.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
4.2 Sources of information	Baines, M., Reichelt, M., Coles, D., Williams, A., Griffin, D. & Corkhill, O. (2013) Marine Mammal Observers' and passive acoustic monitoring operators' report during 3D seismic survey off southwest Ireland for KOSMOS. RPS Energy, Axminster, Devon, UK. 24pp. Berrow, S.D., Whooley, P. & Ferriss, S. (2002) *Irish Whale and Dolphin Group Cetacean Sighting Review (1991-2001)*. Irish Whale and Dolphin Group, Kilrush, Co. Clare. 34 pp. Berrow, S.D., Whooley, P., O'Connell, M. & Wall, D. (2010) *Irish Cetacean Review (2000-2009).* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 60pp. Berrow, S.D., O'Brien, J., Meade, R., Delarue, J., Kowarski, K., Martin, B., Moloney, J., Wall, D., Gillespie, D., Leaper, R., Gordon, J., Lee, A. & Porter, L. (2018) *Acoustic Surveys of Cetaceans in the Irish Atlantic Margin in 2015–2016: Occurrence, distribution and abundance.* Department of Communications, Climate Action & Environment and the National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland, 348pp. Craig, D., Hunt, W. & Kavanagh, A. (2016) Report on line-transect surveys for cetaceans conducted during the 2016 Mackerel Egg Survey. Report to the Marine Institute and National Parks & and Wildlife Service. Irish Whale and Dolphin Group and University College Cork. 20pp. Cronin, C. & Barton, C. (2014) Cetacean monitoring during the Celtic Sea Herring Acoustic Survey (CSHAS) October 2014. Report to the National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Cork Ecology, Castlefreke, Clonakilty, Co. Cork. 24pp.

DEHLG (2009) *Conservation Plan for Cetaceans in Irish Waters.* Department of the Environment, Heritage and Local Government, 7 Ely Place, Dublin. 97pp.

Hammond, P.S., Benke, H., Berggren, P., Borchers, D.L., Buckland, S.T., Collet, A., Heide-Jorgensen, M.P., Heimlich-Boran, S., Hiby, A.R., Leopold, M.F. & Øien, N. (2002) Abundance of harbour porpoise and other cetaceans in the North Sea and adjacent waters. *Journal of Applied Ecology* 39: 361-376.

Hammond, P.S., Macleod, K., Burt, L. Cañadas, A., Lens, S. Mikkelsen, B., Rogan, E., Santos, B., Uriarte, A., Van Canneyt, O. & Vázquez, J.A. (2009) Cetacean Offshore Distribution and Abundance in the European Atlantic (CODA). Final report. University of St. Andrews, Scotland.

Hammond, P.S., Bearzi, G., Bjørge, A., Forney, K.A., Karczmarski, L., Kasuya, T., Perrin, W.F., Scott, M.D., Wang, J.Y., Wells, R.S. & Wilson, B. (2012) *Tursiops truncatus*. In IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. http://www.iucnredlist.org.

Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., K Macleod, K., Ridoux, V., Santos, M.B., Scheidat, M., Teilmann, J., Vingada, J. & Øien, N. (2017) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. Final project report. University of St. Andrews, Scotland. 40pp.

Kavanagh, A.S., Hunt, W., Richardson, N. & Jessopp, M. (2017) Cetaceans in Irish offshore waters: Final report of the SFI-KOSMOS Project 2015-2017. MaREI Centre, University College Cork. 66pp.

Louis, M., Viricel, A., Lucas, T. *et al.* (2014) Habitat-driven population structure of bottlenose dolphins, *Tursiops truncatus*, in the North-East Atlantic. *Mol. Ecol*. 23: 857–874.

Ó Cadhla, O., Mackey, M., Aguilar de Soto, N., Rogan, E. & Connolly, N. (2004) Cetaceans and Seabirds of Ireland's Atlantic Margin. Volume II - Cetacean distribution and abundance. Report on research carried out under the Irish Petroleum Infrastructure Programme (PIP): Rockall Studies Group (RSG) projects 98/6 and 00/13, Porcupine Studies Group project P00/15 and Offshore Support Group (OSG) project 99/38. 82pp.

O'Donnell, C., O'Malley, M., Lynch, D., Mullins, E., Keogh, N., Power, J., Long, A. & Croot, P. (2018) *Western European Shelf Pelagic Acoustic Survey (WESPAS). 10 June – 24 July, 2018*. FSS Survey Series: 2018/03. Marine Institute, Oranmore, Co. Galway. 65pp.

O'Sullivan, C. & Manning, L. (2017) Cetacean monitoring undertaken during the Western European Shelf Pelagic Acoustic Survey (WESPAS), June - July 2017. Final Report report to the Marine Institute and National Parks & and Wildlife Service. 38pp.

Oudejans, M., Ingram, S., Englund, A., Visser,, F. & Rogan, E. (2010) Bottlenose dolphins in Connemara and Mayo 2008-2009. Movement patterns between two coastal areas in the west of

	Ireland. Report to the National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government. 29pp. Reid, J.B., Evans, P.G.H. & Northridge, S.P. (2003) *Atlas of Cetacean Distribution in North-west European Waters.* Joint Nature Conservation Committee, Peterborough. 76pp. Rogan, E., Nykänen, M., Gkaragkouni, M. & Ingram, S. (2015) *Bottlenose dolphin surveys in the Lower River Shannon SAC, 2015*. Final report to National Parks and Wildlife Service. The Department of Arts, Heritage and the Gaeltacht, 23pp. Rogan, E., Breen, P., Mackey, M., Cañadas, A., Scheidat, M., Geelhoed, S. & Jessopp, M. (2018a) *Aerial surveys of cetaceans and seabirds in Irish waters: Occurrence, distribution and abundance in 2015-2017.* Department of Communications, Climate Action & Environment and National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland. 297pp. Rogan, E., Garagouni, M., Nykänen, M., Whitaker, A. & Ingram, S. (2018b) Bottlenose dolphin survey in the Lower River Shannon SAC, 2018. Report to the National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. University College Cork. 19pp. Wall, D., Murray, C., O'Brien, J., Kavanagh, L., Wilson, C., Ryan, C., Glanville, B., Williams, D., Enlander, I., O'Connor, I., McGrath, D., Whooley, P. & Berrow, S. (2013) *Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters 2005 - 2011.* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 63pp. Wells, R.S. & Scott, M.D. (2009) Common bottlenose dolphin. *Tursiops truncatus*. In W.F. Perrin, B. Würsig, J.G.M. Thewissen (eds.). *Encyclopedia of Marine Mammals* – 2nd edition. Academic Press, Elsevier Inc. p.249-255.
4.2i Additional information	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. 149pp.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***620,000 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend	**a) Minimum**	

Magnitude *Optional*	**b) Maximum**	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994-2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 620,000 km²***	
	b) Indicate if operators were used (use these 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 range value derived from the range map referred to in 2.4 is considered to be a new baseline for this species. As there is no evidence of a decline since the Directive came into force the current range is set as the FRR.	
5.11 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*
5.12 Additional information *Optional*	The natural range of Bottlenose dolphins in Irish waters, and marine waters covered by the Directive, is a small component of the species' wider North Atlantic range (Hammond *et al.*, 2012; Wells & Scott, 2009; DEHLG, 2009; Hammond *et al.*, 2017; Rogan *et al.*, 2018a), while ongoing evidence from repeated high quality surveys (Berrow *et al.*, 2018; Rogan *et al.*, 2018a) continues to confirm the species' occurrence in Irish waters in all seasons. The range map provided consists of the species' recorded and likely predominant natural range based on comparatively recent data (2001-2018) and expert judgement, and is partly derived from 2.3. It consists of a block of contiguous 50km x 50km grid cells distributed in Irish marine waters including the Irish Sea and coastal areas, and now includes the relevant assessment area under the Marine Strategy Framework Directive. Prior to 1999-2000, survey effort targeting cetacean species in Irish offshore waters was comparatively limited in coverage, both spatially and temporally. Since 1999-2000 a number of dedicated multi-annual surveillance programmes for cetaceans have operated in Irish waters, with visual and acoustic surveys extending to the limits of Ireland's EEZ and beyond. With regard to this species it is considered that the years 2007-2018 represent an appropriate period for the evaluation of short-term trends since all survey efforts intensified further during this period. Sighting records from ongoing dedicated surveillance effort in Irish waters (e.g., Berrow *et al.*, 2010; Baines *et al.*, 2013; Wall *et al.*, 2013; Cronin & Barton, 2014; Rogan *et al.*, 2015; Craig *et al.*, 2016; Kavanagh *et al.* 2017; O'Sullivan & Manning, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018a; Rogan *et al.*, 2018b) provide no evidence of a decline in distribution/range in the recent past. Therefore the short-term trend for Range is considered to be stable. The long-term trend over the period 1994-2018 is considered to be uncertain for this species due to limited data availability prior to 1999-2000, as outlined above. The range value derived from the map referred to above is considered to be a revised baseline for this species. This surface area calculation is slightly greater than that reported in 2013. Since there is no evidence of a decline in range since the Directive came into force the current range is set as the FRR. There is an assumption that the current range in Irish waters is large enough (a) to encompass all of the ecological variation required by this species during its occurrences therein and (b) to contribute to the long-term survival of the species.

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	***2013-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	***68,714***
	c) Maximum	***147,267***
	d) Best single value	
6.3 Type of estimate	*Best estimate / multi-year mean / **95% confidence interval** / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*		
6.6 Population size Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing / decreasing / **uncertain** / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	

<table>
<tr><td>6.12 Long-term trend Direction

Optional</td><td colspan="2">stable / increasing / decreasing / <u>uncertain</u> / unknown</td></tr>
<tr><td rowspan="3">6.13 Long-term trend Magnitude

Optional</td><td>a) Minimum</td><td></td></tr>
<tr><td>b) Maximum</td><td></td></tr>
<tr><td>c) Confidence interval</td><td></td></tr>
<tr><td>6.14 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">6.15 Favourable reference population
(using the unit in 6.2 or 6.4)</td><td colspan="2">a) Population size (with unit) or</td></tr>
<tr><td colspan="2"><u>b) Operator ≈ (approximately equal to)</u> or</td></tr>
<tr><td colspan="2">c) If favourable reference population 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">6.16 Change and reason for change in population size</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>6.17 Additional information

Optional</td><td colspan="2">Evidence from multi-annual surveillance programmes (e.g., Ó Cadhla et al., 2004; Berrow et al., 2010; Wall et al., 2013; Kavanagh et al., 2017; Berrow et al., 2018; Rogan et al., 2018a) demonstrate that Bottlenose dolphins occur widely in Irish waters and do so throughout the year. This is generally the case throughout continental shelf and slope habitats and also in adjacent waters over 2,000m in depth, though the species’ presence is much less pronounced in the western Irish Sea.

Recent and comprehensive data for the entire region of western Europe have been lacking until recently, particularly with regard to sufficient temporal (i.e., beyond one or more summer months or one year) and spatial coverage (i.e., spanning continental shelf, slope and deeper abyssal waters, all of which may represent Bottlenose dolphin habitat).</td></tr>
</table>

	Within the North-East Atlantic, based on aerial survey effort approximately 19,200 Bottlenose dolphins were estimated to occur in the summer of 2016 in waters off western Europe but excluding Ireland (Hammond *et al.*, 2017). A further 8,496 Bottlenose dolphins were estimated from ship-based survey data collected further offshore during the same period (Hammond *et al.*, 2017). Bottlenose dolphin data from Ireland's ObSERVE Programme (see Berrow *et al.*, 2018 and Rogan *et al.*, 2018a) have not yet been integrated into a European-wide assessment of population size for the species, although this should now be feasible given simultaneous aerial survey efforts in the summer of 2016 (Hammond *et al.*, 2017; Rogan *et al.*, 2018a). In a new departure for data acquisition in Irish offshore and inshore waters, the aerial surveys carried out under this programme were successful in enabling abundance estimates to be derived from data acquired in the summer and winter months. However due to difficulties distinguishing visual records of this species from other small- to medium-sized dolphins, particularly Atlantic white-sided dolphins and White-beaked dolphins, for this assessment it was necessary to use only those estimates derived from confirmed sightings of the species (i.e., Rogan *et al.*, 2018a). The most robust and reliable of these four seasonal estimates (i.e., that with the lowest CV = 0.21; summer 2016) has been presented in 6.2 via minimum and maximum 95% Confidence Limits. It should be noted that higher estimates and lower CVs were obtained from extensive aerial survey data gathered in winter 2016 (Rogan *et al.*, 2018a); however the latter figures are somewhat unusual in the context of what is known about the species' abundance and distribution in the North-East Atlantic (e.g., Hammond *et al.*, 2012) and the record figures could be influenced by significant breaks in survey effort across the full 2016-2017 winter period. The Favourable Reference Population has been set as approximately equal to the current population to account for improved knowledge. Although the short-term trends are uncertain this value is considered to represent the minimum necessary to ensure the long-term survival of the species.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*

7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*
7.8 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*
7.9 Additional information *Optional*	Use of the range descriptor and range surface area calculation as proxies for habitat and habitat area are judged appropriate for this wide-ranging pelagic and oceanic species. The species' natural range and thus habitat in Irish waters is a small component of its wider North Atlantic range (Wells & Scott, 2009; DEHLG, 2009; Hammond *et al.*, 2012; Wall *et al.*, 2013; Hammond *et al.*, 2017; Rogan *et al.*, 2018a). The quality of habitat for Bottlenose dolphin was determined by consideration of the relevant direct and indirect pressures thought to be acting on the species and/or its functional group, and its habitat within its natural environment. These pressures were evaluated in development of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009) and informed by more recent scientific surveillance (e.g., Baines *et al.*, 2013; Cronin & Barton, 2014; Rogan *et al.*, 2015; Craig *et al.*, 2016; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; O'Sullivan & Manning, 2017; Berrow *et al.*, 2018; O'Donnell *et al.*, 2018; Rogan *et al.*, 2018a; Rogan *et al.*, 2018b), using available data concerning, *inter alia*, habitat use, population size, distribution and

	ecology, and threats to the species' protection (e.g., via natural/biological sources, human sectoral activities, management gaps, etc.). Bottlenose dolphins may be subject to a number of local and/or regional environmental pressures throughout their range in Irish waters (DEHLG, 2009). However, based on current spatial and temporal data none are considered to be of sufficient impact on the species to be causing a significant deterioration in overall habitat quality in Ireland from a status that is sufficient for long-term survival. Long-term trends in habitat for Bottlenose dolphin remain uncertain due to insufficient accurate data for this species prior to 1999-2000. However, with improved surveillance and numerous ongoing records of Bottlenose dolphins in the last 18 years, the short-term trend indicates the continued existence of sufficient quality habitat for the species.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**C09** Geotechnical surveying (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M)	**C09** Geotechnical surveying (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M)
8.2 Sources of information *Optional*	*https://www.npws.ie/marine/marine-species/cetaceans* *https://www.dccae.gov.ie/en-ie/natural-resources/topics/Oil-Gas-Exploration-Production/Pages/home.aspx* *https://www.agriculture.gov.ie/seafood/sea-fisheriespolicymanagementdivision/*	

8.3 Additional information *Optional*	Bottlenose dolphins may be subject to a number of local and/or regional environmental pressures and threats throughout their North Atlantic range (Hammond *et al.*, 2012) and in Irish coastal/offshore waters. In the development and preparation of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009), a comprehensive review of the pressures and threats believed and/or documented to be acting on this species and/or its functional group was undertaken. The main pressures thought to be acting on this species in Irish waters are considered to involve commercial shipping-based or vessel-based activities that occur primarily on a local or regional scale and/or on a temporary or intermittent basis (e.g., impacts arising from geophysical seismic exploration; impacts from local/regional prey removal by fisheries or by-catch in fisheries; DEHLG, 2009). Since the species is known to be broadly pelagic and oceanic in its ecology in the North-East Atlantic (Wells & Scott, 2009; Hammond *et al.*, 2012) and current Bottlenose dolphin distribution is very wide in its spatial and temporal occurrence, where a pressure may be regionally intensive the ranking given is one of medium importance. It should be noted that in relation to seismic exploration, which tends to occur on a local or occasionally regional scale in the waters of Ireland's EEZ and is comparatively low in coverage relative to several other member states, a robust regulatory and management regime applies in order to avoid potentially significant impacts on all species of marine mammal. This regime takes cognisance of recent scientific research and surveillance findings (e.g., Baines *et al.*, 2013; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018a; Rogan *et al.*, 2018b) and it is expected that this practice will continue into the future. There is no evidence to suggest a change in the main pressures thought to be acting on this species in the near future (i.e., threats). However surveillance of the species and the pressures potentially acting upon it will continue, while the application of strong management measures (e.g., via the statutory/regulatory process) to avoid potentially significant impacts is also expected to continue.

9 Conservation measures

To be reported only for Annex II species

9.1 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*

9.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, population and/or habitat for the species or*** *b) Expand the current range of the species (related to 'Range') or* *c) Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population') or* *d) Restore the habitat of the species (related to 'Habitat for the species')*
9.3 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*
9.4 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 in field 9.2):* *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)*
9.5 List of main conservation measures	**CC12** Reduce/eliminate noise, light, thermal and other forms of pollution related to resource exploitation and energy production **CF09** Reduce/eliminate noise, light, heat or other forms of pollution from industrial, commercial, residential and recreational areas and activities **CG05** Reduce bycatch and incidental killing of non-target species **CG09** Other measures to reduce impacts from marine aquaculture infrastructures and operation
9.6 Additional information *Optional*	All measures taken during the reporting period are designed to ensure the maintenance of Bottlenose dolphin at a favourable conservation status in Ireland and to ensure that the conservation provisions for this species, as underpinned by Articles 6 and 12 of the Habitats Directive in particular, are robustly implemented including via national legislation (e.g., EC Birds and Natural Habitats Regulations S.I. No. 477/2011, etc.). Key ongoing actions and protection measures for the species (e.g., protection from disturbance/harassment or sectoral impacts) were also identified in the Conservation Plan for Cetaceans in Irish Waters (DEHLG, 2009) and these are being pursued.

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*

	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	Visual records of Bottlenose dolphin in Irish waters indicate a wide and quite regular occurrence of the species in waters overlying the continental shelf and slope, and also deeper oceanic basins, off the south, west and north of Ireland in particular. Since many significant (i.e., high level) anthropogenic impacts that may affect this wide-ranging species' distribution are more localised in space and time within this extensive and diverse marine area, the Future prospects for the Range and Habitat for the species are considered to be Good. A number of pressures that could act upon this species have been identified. The effect of these pressures may operate on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, thereby constituting a potential threat. While the impacts on individuals or populations of Bottlenose dolphin in Irish waters are not well understood, partly due to continuing uncertainty regarding its population trends and ecology within Ireland's marine area, ongoing threats as listed or identified into the future via surveillance will be managed appropriately in Ireland. Therefore the Future prospects for the Population are considered to be Good.	

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1)/ Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	Contemporary sightings of Bottlenose dolphins indicate a wide occurrence of this species throughout Irish coastal and offshore waters, from those overlying the continental shelf and continental slope to deeper ocean basins (e.g., Rockall Trough, Porcupine Seabight). Hence the Range and Habitat for the species are considered to be Favourable. While robust and long-term data on Bottlenose dolphin population size and trends in Irish waters as a whole are not available, knowledge of the species' seasonal distribution and summer abundance in western European waters has improved significantly since the Directive came into force. There has also recently been some improvement in population abundance data from a large part of the Irish EEZ, yielding new estimates and associated 95% Confidence Limits based on dedicated cetacean surveillance since 2013. While there is some uncertainty in the trajectory of North-East Atlantic populations of Bottlenose dolphin, given the available estimates for a large part of Irish waters and the species' wide occurrence throughout the year, the Population parameter is considered to be Favourable. A number of pressures have been identified. While the effect of these pressures may act on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, none is considered to be of sufficient magnitude to be causing an adverse impact on populations of Bottlenose dolphin in Irish waters. Ongoing threats as listed or identified into the future via surveillance will be managed appropriately. Hence the Future prospects for the species are considered to be Favourable. Based on the assessments for the Range, Population, Habitat and		

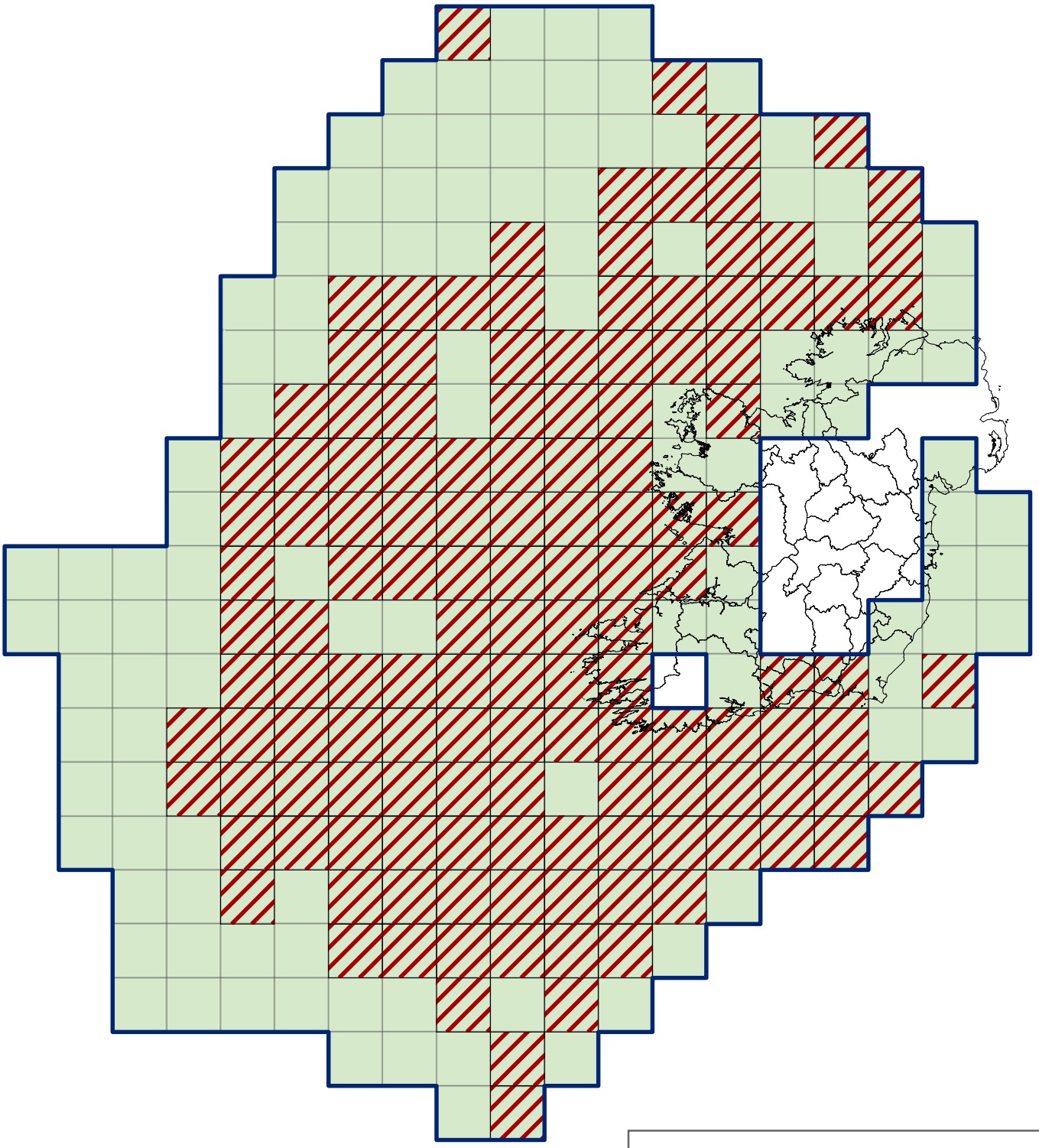
	Future prospects parameters, the overall conclusion is that the Conservation Status of Bottlenose dolphin in Ireland remains Favourable. This overall result is the same as the previous two Article 17 assessments.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species		
12.1 Population size inside the pSCIs, SCIs and SACs network *(on the biogeographical/marine level including all sites where the species is present)*	**a) Unit**	***Number of individuals***
	b) Minimum	***6,609***
	c) Maximum	***24,148***
	d) Best single value	
12.2 Type of estimate	*Best estimate / multi-year mean / **95% confidence interval** / minimum*	
12.3 Population size 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*	
12.4 Short-term trend of population size within the network Direction	*stable / increasing / decreasing / **uncertain** / unknown*	
12.5 Short-term trend of population size within 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*	
12.6 Additional information *Optional*	Attributing an accurate population size estimate for such a mobile marine species whose occurrence is variable on a daily, seasonal and inter-annual basis is a challenging task, particularly when working such figures into relatively small spatial dimensions (e.g., within Ireland's network of Natura 2000 sites) within the species' broader transnational species range. The minimum and maximum population sizes given here for this highly mobile and wide-ranging dolphin species are derived from the results of the ObSERVE Aerial project (Rogan *et al.*, 2018) which succeeded in delivering four separate seasonal estimates of population size and associated 95% Confidence Intervals for Bottlenose dolphin within a large proportion of Ireland's EEZ. Further details concerning data considerations and the method used are	

	given in 6.6 and 6.17. In seeking to estimate and represent Bottlenose dolphin population size within all SACs in Irish coastal and offshore waters, the lowest of the four abundance estimates derived from the ObSERVE Aerial line transect data is used, this being from summer 2015 and comprising the lower and upper 95% Confidence Intervals around the estimate (Rogan *et al*., 2018). Given the sizes and distribution of SACs in Irish coastal and offshore waters it is considered that these 95% CI-based estimates of population size best capture the potential use of all these sites by Bottlenose dolphin throughout the year. It should be noted that this measurement method is not precise and cannot be so, given the species' mobility, variability in occurrence and abundance, constraints on offshore surveillance, and limited knowledge of its life history and ecology in offshore waters.

13 Complementary information

Bottlenose dolphin
Tursiops truncatus (1349)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 25 50 100 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1350***
1.3 Species scientific name	*Delphinus delphis*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Short-beaked common dolphin (Deilf choiteann)
1.6i Species description	The Short-beaked common dolphin is one of the smallest dolphin species occurring in Irish waters with adults averaging to just 1.7-2.0m in length. Found throughout the world's oceans and in the North-East Atlantic from Norway to West Africa (Hammond *et al.*, 2008; Perrin, 2009), it is classified by the IUCN as a species of Least Concern since its global distribution and abundance estimates indicate that it is well above thresholds for a threatened category (Hammond *et al.*, 2008). Short-beaked common dolphins are the most frequently recorded dolphin species in Irish waters (Ó Cadhla *et al.*, 2004; DEHLG, 2009; Berrow *et al.*, 2010; Wall *et al.*, 2013; Kavanagh *et al.*, 2018), partly due to a tendency to closely approach moving vessels. They are quite readily identifiable when they break clear of the surface showing the species' characteristic pronounced beak, relatively tall curved dorsal fin and an extended horizontal 'hourglass' colour pattern on the flanks. Although Short-beaked common dolphins are broadly pelagic in their population ecology and foraging ecology, and may conduct seasonal movements in some regions (DEHLG, 2009; Perrin, 2009), separate breeding stocks and clear latitudinal patterns in movement by populations in the North-East Atlantic are not apparent (Perrin, 2009).

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2013-2018***
2.3 Distribution map	Submitted

2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	Over the last two decades there have been continuing and widespread records of Short-beaked common dolphins in Irish waters, particularly to the south, west and north of Ireland (e.g., Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013; Kavanagh *et al.*, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018). The distribution map presented for this species represents all available live sighting records during extensive scientific research and monitoring in Irish waters between 2013 and 2018. The period selected for mapping represents a period of intensive and high quality surveillance for cetaceans in Irish waters across a range of research projects and monitoring programmes. The surveillance programmes, projects and publications that contributed sighting data to this distribution projection are cited as follows: Baines *et al.* (2013); Berrow & O'Brien (2013); Cronin & Barton (2014); Oudejans (2014); Craig *et al.* (2016); Kavanagh *et al.* (2017), O'Brien & Berrow (2014, 2015, 2018); O'Donnell *et al.* (2017); O'Donnell *et al.* (2018a); O'Donnell *et al.* (2018b); O'Sullivan & Manning (2017); Berrow *et al.* (2018) and Rogan *et al.* (2018). Along with the results of previous visual survey effort (e.g., Hammond *et al.*, 2002; Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Berrow *et al.*, 2010; Wall *et al.*, 2013), recent extensive ship-based and aerial surveys in summer (Hammond *et al.*, 2017; Rogan *et al.*, 2018) and winter (Rogan *et al.*, 2018), these data were integrated into the development of the species range map presented under section 2.5. It should be noted that the spatial and temporal distribution of Short-beaked common dolphins could be somewhat underestimated due to the difficulty in discriminating many dolphin species from one another, particularly in the offshore Atlantic environment (e.g., see Ó Cadhla *et al.*, 2004; Wall *et al.*, 2013; Hammond *et al.*, 2017; Berrow *et al.*, 2018; O'Donnell *et al.*, 2018b; Rogan *et al.*, 2018). Thus the distribution map presented does not include records where the observed species could not be distinguished, for example, from other members of the Family *Delphinidae* (e.g., Striped dolphin, Atlantic white-sided dolphin, White-beaked dolphin, Bottlenose dolphin), from Harbour porpoise (*Phocoena phocoena*), or the *unidentified dolphin* or *unidentified small cetacean* categories often used for indeterminate sightings. The distribution of recent sightings (e.g., Baines *et al.*, 2013; Oudejans, 2014; Craig *et al.*, 2016; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; O'Sullivan & Manning, 2017; Berrow *et al.*, 2018; O'Donnell *et al.*, 2018a; Rogan *et al.*, 2018) along with regional sighting records

	obtained across three preceding decades (e.g., Berrow *et al.*, 2002; Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Berrow *et al.*, 2010; Wall *et al.*, 2013) indicate a predominant distribution in waters overlying the continental shelf and the continental slope plus adjacent deeper ocean waters and topographical basins (e.g., the Porcupine Seabight and Rockall Trough). The species can also occur in larger enclosed bays and in close proximity to the Irish coast. While all reliable cetacean records obtained in Irish waters were not available for use in this exercise, the map drawn for this species provides a good sample of its observed distribution within the period given in 2.2.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
4.2 Sources of information	Baines, M., Reichelt, M., Coles, D., Williams, A., Griffin, D. & Corkhill, O. (2013) Marine Mammal Observers' and passive acoustic monitoring operators' report during 3D seismic survey off southwest Ireland for KOSMOS. RPS Energy, Axminster, Devon, UK. 24pp. Berrow, S.D. & O'Brien, J. (2013) Harbour porpoise SAC survey 2013. Report to the National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Irish Whale and Dolphin Group. pp. 37. Berrow, S.D., Whooley, P. & Ferriss, S. (2002) *Irish Whale and Dolphin Group Cetacean Sighting Review (1991-2001)*. Irish Whale and Dolphin Group, Kilrush, Co. Clare. 34 pp. Berrow, S.D., Whooley, P., O'Connell, M. & Wall, D. (2010) *Irish Cetacean Review (2000-2009).* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 60pp. Berrow, S.D., O'Brien, J., Meade, R., Delarue, J., Kowarski, K., Martin, B., Moloney, J., Wall, D., Gillespie, D., Leaper, R., Gordon, J., Lee, A. & Porter, L. (2018) *Acoustic Surveys of Cetaceans in the Irish Atlantic Margin in 2015–2016: Occurrence, distribution and abundance.* Department of Communications, Climate Action & Environment and the National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin,

Ireland, 348pp.

Craig, D., Hunt, W. & Kavanagh, A. (2016) Report on line-transect surveys for cetaceans conducted during the 2016 Mackerel Egg Survey. Report to the Marine Institute and National Parks and Wildlife Service. Irish Whale and Dolphin Group and University College Cork. 20pp.

Cronin, C. & Barton, C. (2014) Cetacean monitoring during the Celtic Sea Herring Acoustic Survey (CSHAS) October 2014. Report to the National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Cork Ecology, Castlefreke, Clonakilty, Co. Cork. 24pp.

DEHLG (2009) *Conservation Plan for Cetaceans in Irish Waters.* Department of the Environment, Heritage and Local Government, Dublin. 97pp.

Hammond, P.S., Benke, H., Berggren, P., Borchers, D.L., Buckland, S.T., Collet, A., Heide-Jorgensen, M.P., Heimlich-Boran, S., Hiby, A.R., Leopold, M.F. & Øien, N. (2002) Abundance of harbour porpoise and other cetaceans in the North Sea and adjacent waters. *Journal of Applied Ecology* 39: 361-376.

Hammond, P.S., Bearzi, G., Bjørge, A., Forney, K., Karczmarski, L., Kasuya, T., Perrin, W.F., Scott, M.D., Wang, J.Y., Wells, R.S. & Wilson, B. (2008) *Delphinus delphis*. In IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. http://www.iucnredlist.org.

Hammond, P.S., Macleod, K., Burt, L. Cañadas, A., Lens, S. Mikkelsen, B., Rogan, E., Santos, B., Uriarte, A., Van Canneyt, O. & Vázquez, J.A. (2009) Cetacean Offshore Distribution and Abundance in the European Atlantic (CODA). Final report. University of St. Andrews, Scotland.

Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., K Macleod, K., Ridoux, V., Santos, M.B., Scheidat, M., Teilmann, J., Vingada, J. & Øien, N. (2017) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. Final project report. University of St. Andrews, Scotland. 40pp.

Kavanagh, A.S., Hunt, W., Richardson, N. & Jessopp, M. (2017) Cetaceans in Irish offshore waters: Final report of the SFI-KOSMOS Project 2015-2017. MaREI Centre, University College Cork. 66pp.

O'Brien, J. & Berrow, S.D. (2014) Harbour porpoise surveys in Blasket Islands SAC, 2014. Report to the National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Irish Whale and Dolphin Group. pp. 29pp.

O'Brien, J. & Berrow, S.D. (2015) Harbour porpoise surveys in Roaringwater Bay and Islands SAC, 2015. Report to the National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Irish Whale and Dolphin Group. pp. 41pp.

O'Brien, J. & Berrow, S.D. (2018) Harbour porpoise surveys in Blasket Islands SAC, 2018. Report to the National Parks and Wildlife

Service, Department of Culture, Heritage and the Gaeltacht. Irish Whale and Dolphin Group. pp. 23pp.

Ó Cadhla, O., Mackey, M., Aguilar de Soto, N., Rogan, E. & Connolly, N. (2004) Cetaceans and Seabirds of Ireland's Atlantic Margin. Volume II - Cetacean distribution and abundance. Report on research carried out under the Irish Petroleum Infrastructure Programme (PIP): Rockall Studies Group (RSG) projects 98/6 and 00/13, Porcupine Studies Group project P00/15 and Offshore Support Group (OSG) project 99/38. 82pp.

O'Donnell, C., O'Malley, M., Lynch, D., Lyons, K., Keogh, N. & O'Driscoll, D. (2017) Celtic Sea Herring Acoustic Survey. Cruise Report 2017, 15 - 04 November, 2017. FSS Survey Series: 2017/04. Marine Institute, Oranmore, Co. Galway. 38pp.

O'Donnell, C., Johnston, G., Mullins, E., Keogh, N. & Power, J. (2018a) Blue Whiting Acoustic Survey Cruise Report. March 20 – April 06, 2018. FSS Survey Series: 2018/01. 31pp.

O'Donnell, C., O'Malley, M., Lynch, D., Mullins, E., Keogh, N., Power, J., Long, A. & Croot, P. (2018b) Western European Shelf Pelagic Acoustic Survey (WESPAS). 10 June – 24 July, 2018. FSS Survey Series: 2018/03. Marine Institute, Oranmore, Co. Galway. 65pp.

O'Sullivan, C. & Manning, L. (2017) Cetacean monitoring undertaken during the Western European Shelf Pelagic Acoustic Survey (WESPAS), June - July 2017. Final Report report to the Marine Institute and National Parks and Wildlife Service. 38pp.

Oudejans, M.G. (2014) Cetacean monitoring undertaken during the Blue Whiting Acoustic Survey (BWAS) 2014. Report to the National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Dúlra Research, Belmullet, Co. Mayo. 16pp.

Perrin, W.F. (2009) Common dolphins. *Delphinus delphis and D.capensis*. In W.F. Perrin, B. Würsig, J.G.M. Thewissen (eds.). *Encyclopedia of Marine Mammals* – 2nd edition. Academic Press, Elsevier Inc. p.255-259.

Reid, J.B., Evans, P.G.H. & Northridge, S.P. (2003) *Atlas of Cetacean Distribution in North-west European Waters.* Joint Nature Conservation Committee, Peterborough. 76pp.

Rogan, E., Breen, P., Mackey, M., Cañadas, A., Scheidat, M., Geelhoed, S. & Jessopp, M. (2018) *Aerial surveys of cetaceans and seabirds in Irish waters: Occurrence, distribution and abundance in 2015-2017.* Department of Communications, Climate Action & Environment and National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland. 297pp.

Wall, D., Murray, C., O'Brien, J., Kavanagh, L., Wilson, C., Ryan, C., Glanville, B., Williams, D., Enlander, I., O'Connor, I., McGrath, D., Whooley, P. & Berrow, S. (2013) *Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters 2005 - 2011.* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 63pp.

4.2i Additional information	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. 149pp.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***612,500 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994-2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */* unknown	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 612,500 km²***	
	b) Indicate if operators were used (use these 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 range value derived from the range map referred to in 2.4 is considered to be a new baseline for this species. As there is no evidence of a decline since the Directive came into force the current range is set as the FRR.</td></tr>
<tr><td rowspan="6">5.11 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>5.12 Additional information

Optional</td><td colspan="2">The natural range of Short-beaked common dolphins in Irish waters, and marine waters covered by the Directive, is a small component of the species' wider North Atlantic range (Hammond et al., 2008; Perrin, 2009; DEHLG, 2009; Hammond et al., 2017; Rogan et al., 2018), while ongoing evidence from repeated high quality surveys (Berrow et al., 2018; Rogan et al., 2018) continues to confirm the species' occurrence in Irish waters in all seasons.

The range map provided consists of the species' recorded and likely predominant natural range based on comparatively recent data (2001-2018) and expert judgement, and is partly derived from 2.3. It consists of a block of contiguous 50km x 50km grid cells distributed in Irish marine waters including the Irish Sea and coastal areas, and now includes the relevant assessment area under the Marine Strategy Framework Directive.

Prior to 1999-2000, survey effort targeting cetacean species in Irish offshore waters was comparatively limited in coverage, both spatially and temporally. Since 1999-2000 a number of dedicated multi-annual surveillance programmes for cetaceans have operated in Irish waters, with visual and acoustic surveys extending to the limits of Ireland's EEZ and beyond. With regard to this species it is considered that the years 2007-2018 represent an appropriate period for the evaluation of short-term trends since all survey efforts intensified further during this period.

Sighting records from ongoing dedicated surveillance effort in Irish waters (e.g., Berrow et al., 2010; Baines et al., 2013; Wall et al., 2013; Oudejans, 2014; Cronin & Barton, 2014; Craig et al., 2016; Kavanagh et al. 2017; O'Donnell et al., 2017; O'Sullivan & Manning, 2017; Berrow et al., 2018; O'Brien & Berrow, 2018; Rogan et al., 2018) provide no evidence of a decline in distribution/range in the recent</td></tr>
</table>

	past. Therefore the short-term trend for range is considered to be stable. The long-term trend over the period 1994-2018 is considered to be uncertain for this species due to limited data availability prior to 1999-2000, as outlined above. The range value derived from the map referred to above is considered to be a revised baseline for this species. This surface area calculation is slightly greater than that reported in 2013. Since there is no evidence of a decline in range since the Directive came into force the current range is set as the FRR. There is an assumption that the current range in Irish waters is large enough (a) to encompass all of the ecological variation required by this species during its occurrences therein and (b) to contribute to the long-term survival of the species.

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	***2013-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	***47,108***
	c) Maximum	***123,866***
	d) Best single value	
6.3 Type of estimate	*Best estimate / multi-year mean / **95% confidence interval** / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*		
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	

6.8 Short-term trend Direction	*stable / increasing / decreasing / **uncertain** / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / **uncertain** / unknown*	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) Population size (with unit) or*	
	***b) Operator ≈ (approximately equal to)** or*	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
6.16 Change and reason for change in population size	*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*
6.17 Additional information *Optional*	Evidence from multi-annual surveillance programmes (e.g., Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013; Kavanagh *et al.*, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018) demonstrate that Short-beaked common dolphins occur widely in Irish waters and do so throughout the year. This is generally the case throughout continental shelf and slope habitats and also in adjacent waters over 2,000m in depth, though the species' presence is much less pronounced in the western Irish Sea. Recent and comprehensive data for the entire region of western Europe have been lacking until recently, particularly with regard to sufficient temporal (i.e., beyond one or more summer months or one year) and spatial coverage (i.e., spanning continental shelf, slope and deeper abyssal waters, all of which may represent Short-beaked common dolphin habitat). Within the North-East Atlantic, based on aerial survey effort approximately 269,000 Short-beaked common dolphins were estimated to occur in the summer of 2016 in waters off western Europe but excluding Ireland (Hammond *et al.*, 2017). A further 199,133 Short-beaked common dolphins were estimated from ship-based survey data collected further offshore during the same period (Hammond *et al.*, 2017). Short-beaked common dolphin data from Ireland's ObSERVE Programme (see Berrow *et al.*, 2018 and Rogan *et al.*, 2018) have not yet been integrated into a European-wide assessment of population size for the species, although this should now be feasible given simultaneous aerial survey efforts in the summer of 2016 (Hammond *et al.*, 2017; Rogan *et al.*, 2018). In a new departure for data acquisition on Short-beaked common dolphins in Irish offshore and inshore waters the aerial surveys carried out under this programme were quite successful in enabling abundance estimates to be derived from the sighting data on small dolphin species. However due to difficulties distinguishing visual records of this species from other smaller dolphins, particularly Striped dolphins, for this assessment it was necessary to use only those estimates derived from confirmed sightings of the species (i.e., common dolphin; Rogan *et al.*, 2018). The most robust of these four seasonal estimates (i.e., those with the lowest CV = 0.39; winter 2015) has been presented in 6.2 via minimum and maximum 95% Confidence Limits. The Favourable Reference Population has been set as approximately equal to the current population to account for improved knowledge. Although the short-term trends are uncertain this value is considered to represent the minimum necessary to ensure the long-term survival of the species.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / **uncertain** / unknown*
7.8 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*
7.9 Additional information *Optional*	Use of the range descriptor and range surface area calculation as proxies for habitat and habitat area are judged appropriate for this wide-ranging pelagic and oceanic species. The species' natural range and thus habitat in Irish waters is a small component of its wider North Atlantic range (Hammond *et al.*, 2008; Perrin, 2009; DEHLG, 2009; Wall *et al.*, 2013; Hammond *et al.*, 2017; Rogan *et al.*, 2018). The quality of habitat for Short-beaked common dolphin was determined by consideration of the relevant direct and indirect pressures thought to be acting on the species and/or its functional group, and its habitat within its natural environment. These pressures were evaluated in development of the Conservation Plan

	for Cetaceans in Irish waters (DEHLG, 2009) and informed by more recent scientific surveillance (e.g., Baines *et al.*, 2013; Cronin & Barton, 2014; Craig *et al.*, 2016; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; O'Sullivan & Manning, 2017; Berrow *et al.*, 2018; O'Donnell *et al.*, 2018a; O'Donnell *et al.*, 2018b; Rogan *et al.*, 2018), using available data concerning, *inter alia*, habitat use, population size, distribution and ecology, and threats to the species' protection (e.g., via natural/biological sources, human sectoral activities, management gaps, etc.). Short-beaked common dolphins may be subject to a number of local and/or regional environmental pressures throughout their range in Irish waters (DEHLG, 2009). However, based on current spatial and temporal data none are considered to be of sufficient impact on the species to be causing a significant deterioration in overall habitat quality in Ireland from a status that is sufficient for long-term survival. Long-term trends in habitat for Short-beaked common dolphin remain uncertain due to insufficient accurate data for this species prior to 1999-2000. However, with improved surveillance and numerous ongoing records of Short-beaked common dolphins in the last 18 years, the short-term trend indicates the continued existence of sufficient quality habitat for the species.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**C09** Geotechnical surveying (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M)	**C09** Geotechnical surveying (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M)

8.2 Sources of information *Optional*	*https://www.npws.ie/marine/marine-species/cetaceans* *https://www.dccae.gov.ie/en-ie/natural-resources/topics/Oil-Gas-Exploration-Production/Pages/home.aspx* *https://www.agriculture.gov.ie/seafood/sea-fisheriespolicymanagementdivision/*

8.3 Additional information *Optional*	Short-beaked common dolphins may be subject to a number of local and/or regional environmental pressures and threats throughout their North Atlantic range (Hammond *et al.*, 2008) and in Irish coastal/offshore waters. In the development and preparation of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009), a comprehensive review of the pressures and threats believed and/or documented to be acting on this species and/or its functional group was undertaken. The main pressures thought to be acting on this species in Irish waters are considered to involve commercial shipping-based or vessel-based activities that occur primarily on a local or regional scale and/or on a temporary or intermittent basis (e.g., impacts arising from geophysical seismic exploration; impacts from local/regional prey removal by fisheries or by-catch in fisheries; DEHLG, 2009). Since the species is known to be broadly pelagic and oceanic in its ecology in the North-East Atlantic (Hammond *et al.*, 2008; Perrin, 2009) and current Short-beaked common dolphin distribution is very wide in its spatial and temporal occurrence, where a pressure may be regionally intensive the ranking given is one of medium importance. It should be noted that in relation to seismic exploration, which tends to occur on a local or occasionally regional scale in the waters of Ireland's EEZ and is comparatively low in coverage relative to several other member states, a robust regulatory and management regime applies in order to avoid potentially significant impacts on all species of marine mammal. This regime takes cognisance of recent scientific research and surveillance findings (e.g., Baines *et al.*, 2013; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018) and it is expected that this practice will continue into the future. There is no evidence to suggest a change in the main pressures thought to be acting on this species in the near future (i.e., threats). However surveillance of the species and the pressures potentially acting upon it will continue, while the application of strong management measures (e.g., via the statutory/regulatory process) to avoid potentially significant impacts is also expected to continue.

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*

10.2 Additional information *Optional*	Visual records of Short-beaked common dolphin in Irish waters indicate a wide and quite regular occurrence of the species in waters overlying the continental shelf and slope, and also deeper oceanic basins, off the south, west and north of Ireland in particular. Since many significant (i.e., high level) anthropogenic impacts that may affect this wide-ranging species' distribution are more localised in space and time within this extensive and diverse marine area, the Future prospects for the Range and Habitat for the species are considered to be Good. A number of pressures that could act upon this species have been identified. The effect of these pressures may operate on a temporary and/or regional scale and some are likely to continue to act as pressures into the future thereby constituting a potential threat. While the impacts on individuals or populations of Short-beaked common dolphin in Irish waters are not well understood, partly due to continuing uncertainty regarding its population trends and ecology within Ireland's marine area, ongoing threats as listed or identified into the future via surveillance will be managed appropriately in Ireland. Therefore the Future prospects for the Population are considered to be Good.

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1)/ Bad (U2) / Unknown (XX)*
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*

11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	Contemporary sightings of Short-beaked common dolphins indicate a wide occurrence of this species throughout Irish coastal and offshore waters, from those overlying the continental shelf and continental slope to deeper ocean basins (e.g., Rockall Trough, Porcupine Seabight). Hence the Range and Habitat for the species are considered to be Favourable. While robust and long-term data on Short-beaked common dolphin population size and trends in Irish waters as a whole are not available, knowledge of the species' seasonal distribution and summer abundance in western European waters has improved significantly since the Directive came into force. There has also recently been some improvement in population abundance data from a large part of the Irish EEZ, yielding new estimates and associated 95% Confidence Limits based on dedicated cetacean surveillance since 2013. While there is some uncertainty in the trajectory of North-East Atlantic populations of Short-beaked common dolphin, given the available estimates for a large part of Irish waters and the species' wide occurrence throughout the year, the Population parameter is considered to be Favourable. A number of pressures have been identified. While the effect of these pressures may act on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, none is considered to be of sufficient magnitude to be causing an adverse impact on populations of Short-beaked common dolphin in Irish waters. Ongoing threats as listed or identified into the future via surveillance will be managed appropriately. Hence the Future prospects for the species are considered to be Favourable. Based on the assessments for the Range, Population, Habitat and Future prospects parameters, the overall conclusion is that the Conservation Status of Short-beaked common dolphin in Ireland		

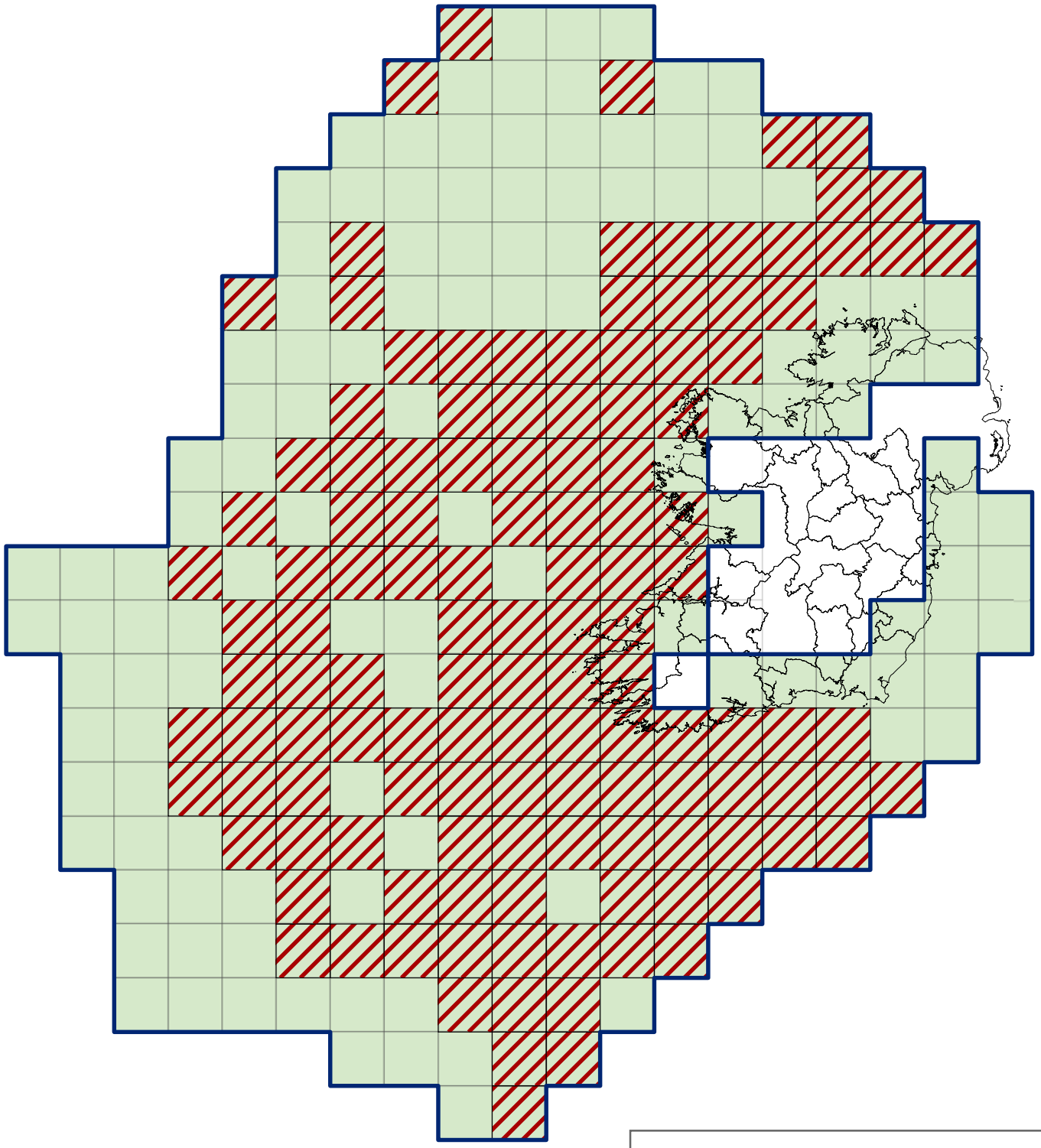
	remains Favourable. This overall result is the same as the previous Article 17 assessment.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Common dolphin
Delphinus delphis (1350)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 25 50 100 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1351***
1.3 Species scientific name	*Phocoena phocoena*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Harbour porpoise (Muc mhara)
1.6i Species description	The Harbour porpoise is the smallest cetacean species occurring in Irish waters, with adults averaging just 1.4-1.8m long. Inhabiting only the Northern Hemisphere, the species is mainly found in cold temperate and sub-polar waters, in the North-East Atlantic from Iceland and northern Norway to north-west Africa (Hammond *et al.*, 2008; Bjørge & Tolley, 2009). Harbour porpoises are the only cetaceans to regularly occur in the Baltic Sea, but do not commonly occur in the Mediterranean (Hammond *et al.*, 2008). A reproductively isolated population occurs in the Black Sea (Bjørge & Tolley, 2009). Classified by the IUCN as a species of Least Concern due to its wide occurrence and overall abundance estimates (Hammond *et al.*, 2008), the Harbour porpoise is one of the most frequently recorded cetacean species in Irish waters (e.g., Berrow *et al.*, 2010; Wall *et al.*, 2013) but is recorded with greater difficulty offshore and in the open Atlantic due to its small size and inconspicuous nature (Ó Cadhla *et al.*, 2004). Although Harbour porpoises may conduct large scale and/or seasonal movements in some regions, distinct breeding populations, or stocks, and patterns in movement/distribution by populations in western Europe are not well understood (Bjørge & Tolley, 2009; DEHLG, 2009).

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2013-2018***
2.3 Distribution map	Submitted
2.4 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*

2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	Over the last two decades there have been continuing and widespread records of Harbour porpoises in Irish coastal and offshore waters, (e.g., Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013; Kavanagh *et al.*, 2017; Rogan *et al.*, 2018). The distribution map presented for this species represents all available live sighting records during extensive scientific research and monitoring in Irish waters between 2013 and 2018. The period selected for mapping represents a period of intensive and high quality surveillance for cetaceans in Irish waters across a range of research projects and monitoring programmes. The surveillance programmes, projects and publications that contributed sighting and acoustic detection data to this distribution projection are cited as follows: Berrow & O'Brien (2013); Cronin & Barton (2014); Craig *et al.* (2016); Kavanagh *et al.* (2017), O'Brien & Berrow (2014, 2015, 2016, 2018); O'Donnell *et al.* (2017); O'Sullivan & Manning (2017); Berrow *et al.* (2018) and Rogan *et al.* (2018). Along with the results of previous visual survey effort (e.g., Hammond *et al.*, 2002; Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Berrow *et al.*, 2010; Wall *et al.*, 2013), recent extensive ship-based and aerial surveys in summer (Hammond *et al.*, 2017; Rogan *et al.*, 2018) and winter (Rogan *et al.*, 2018), these data were integrated into the development of the species range map presented under section 2.5. It should be noted that the spatial and temporal distribution of Harbour porpoises could be somewhat underestimated due to the difficulty in discriminating small and inconspicuous cetacean species from one another, particularly in the offshore Atlantic environment (e.g., see Ó Cadhla *et al.*, 2004; Wall *et al.*, 2013; Rogan *et al.*, 2018). Thus the distribution map presented does not include records where the observed species could not be distinguished, for example, from smaller members of the Family *Delphinidae* (e.g., Striped dolphin, Short-beaked common dolphin) or the *unidentified dolphin* or *unidentified small cetacean* categories often used for indeterminate sightings. The distribution of recent sightings (e.g., Cronin & Barton, 2014; Craig *et al.*, 2016; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; O'Sullivan & Manning, 2017; O'Donnell *et al.*, 2017; Rogan *et al.*, 2018) and acoustic records (Berrow *et al.*, 2018) along with regional sighting records obtained across three preceding decades (e.g., Berrow *et al.*, 2002; Hammond *et al.*, 2002; Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Berrow *et al.*, 2010; Wall *et al.*, 2013) indicate a predominant distribution in coastal waters and those overlying the continental shelf and the continental slope. They are also occasionally recorded in adjacent deeper basin waters (e.g., the Porcupine Seabight; Rogan *et al.*, 2018). While all reliable cetacean records obtained in Irish waters were not available for use in this exercise, the map drawn for this species

	provides a good sample of its observed distribution within the period given in 2.2.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic,* **Marine Atlantic**
4.2 Sources of information	Berrow, S.D. & O'Brien, J. (2013) Harbour porpoise SAC survey 2013. Report to the National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Irish Whale and Dolphin Group. pp. 37. Berrow, S.D., Whooley, P. & Ferriss, S. (2002) *Irish Whale and Dolphin Group Cetacean Sighting Review (1991-2001)*. Irish Whale and Dolphin Group, Kilrush, Co. Clare. 34 pp. Berrow, S.D., Whooley, P., O'Connell, M. & Wall, D. (2010) *Irish Cetacean Review (2000-2009).* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 60pp. Berrow, S.D., O'Brien, J., Meade, R., Delarue, J., Kowarski, K., Martin, B., Moloney, J., Wall, D., Gillespie, D., Leaper, R., Gordon, J., Lee, A. & Porter, L. (2018) *Acoustic Surveys of Cetaceans in the Irish Atlantic Margin in 2015–2016: Occurrence, distribution and abundance.* Department of Communications, Climate Action & Environment and the National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland, 348pp. Bjørge, A. & Tolley. K.A. (2009) Harbor porpoise*. Phocoena phocoena*. In W.F. Perrin, B. Würsig, J.G.M. Thewissen (eds.). *Encyclopedia of Marine Mammals* – 2nd edition. Academic Press, Elsevier Inc. p.530-533. Craig, D., Hunt, W. & Kavanagh, A. (2016) Report on line-transect surveys for cetaceans conducted during the 2016 Mackerel Egg Survey. Report to the Marine Institute and National Parks and Wildlife Service. Irish Whale and Dolphin Group and University College Cork. 20pp. Cronin, C. & Barton, C. (2014) Cetacean monitoring during the Celtic Sea Herring Acoustic Survey (CSHAS) October 2014. Report to the National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Cork Ecology, Castlefreke, Clonakilty, Co.

Cork. 24pp.

DEHLG (2009) *Conservation Plan for Cetaceans in Irish Waters.* Department of the Environment, Heritage and Local Government, Dublin. 97pp.

Hammond, P.S., Bearzi, G., Bjørge, A., Forney, K., Karczmarski, L., Kasuya, T., Perrin, W.F., Scott, M.D., Wang, J.Y., Wells, R.S. & Wilson, B. (2008) *Phocoena phocoena*. In IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. http://www.iucnredlist.org.

Hammond, P.S., Benke, H., Berggren, P., Borchers, D.L., Buckland, S.T., Collet, A., Heide-Jorgensen, M.P., Heimlich-Boran, S., Hiby, A.R., Leopold, M.F. & Øien, N. (2002) Abundance of harbour porpoise and other cetaceans in the North Sea and adjacent waters. *Journal of Applied Ecology* 39: 361-376.

Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., K Macleod, K., Ridoux, V., Santos, M.B., Scheidat, M., Teilmann, J., Vingada, J. & Øien, N. (2017) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. Final project report. University of St. Andrews, Scotland. 40pp.

Hammond, P.S., Macleod, K., Burt, L. Cañadas, A., Lens, S. Mikkelsen, B., Rogan, E., Santos, B., Uriarte, A., Van Canneyt, O. & Vázquez, J.A. (2009) Cetacean Offshore Distribution and Abundance in the European Atlantic (CODA). Final report. University of St. Andrews, Scotland.

Kavanagh, A.S., Hunt, W., Richardson, N. & Jessopp, M. (2017) Cetaceans in Irish offshore waters: Final report of the SFI-KOSMOS Project 2015-2017. MaREI Centre, University College Cork. 66pp.

Ó Cadhla, O., Mackey, M., Aguilar de Soto, N., Rogan, E. & Connolly, N. (2004) Cetaceans and Seabirds of Ireland's Atlantic Margin. Volume II - Cetacean distribution and abundance. Report on research carried out under the Irish Petroleum Infrastructure Programme (PIP): Rockall Studies Group (RSG) projects 98/6 and 00/13, Porcupine Studies Group project P00/15 and Offshore Support Group (OSG) project 99/38. 82pp.

O'Brien, J. & Berrow, S.D. (2014) Harbour porpoise surveys in Blasket Islands SAC, 2014. Report to the National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Irish Whale and Dolphin Group. 29pp.

O'Brien, J. & Berrow, S.D. (2015) Harbour porpoise surveys in Roaringwater Bay and Islands SAC, 2015. Report to the National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Irish Whale and Dolphin Group. 41pp.

O'Brien, J. & Berrow, S.D. (2016) Harbour porpoise surveys in Rockabill to Dalkey Island SAC, 2016. Report to the National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. Irish Whale and Dolphin Group. 23pp.

	O'Brien, J. & Berrow, S.D. (2018) Harbour porpoise surveys in Blasket Islands SAC, 2018. Report to the National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. Irish Whale and Dolphin Group. 23pp. O'Donnell, C., Johnston, G., Mullins, E., Keogh, N. & Power, J. (2018a) Blue Whiting Acoustic Survey Cruise Report. March 20 – April 06, 2018. FSS Survey Series: 2018/01. 31pp. O'Donnell, C., O'Malley, M., Lynch, D., Lyons, K., Keogh, N. & O'Driscoll, D. (2017) Celtic Sea Herring Acoustic Survey. Cruise Report 2017, 15 - 04 November, 2017. FSS Survey Series: 2017/04. Marine Institute, Oranmore, Co. Galway. 38pp. O'Donnell, C., O'Malley, M., Lynch, D., Mullins, E., Keogh, N., Power, J., Long, A. & Croot, P. (2018b) Western European Shelf Pelagic Acoustic Survey (WESPAS). 10 June – 24 July, 2018. FSS Survey Series: 2018/03. Marine Institute, Oranmore, Co. Galway. 65pp. O'Sullivan, C. & Manning, L. (2017) Cetacean monitoring undertaken during the Western European Shelf Pelagic Acoustic Survey (WESPAS), June - July 2017. Final report to the Marine Institute and National Parks and Wildlife Service. 38pp. Reid, J.B., Evans, P.G.H. & Northridge, S.P. (2003) *Atlas of Cetacean Distribution in North-west European Waters.* Joint Nature Conservation Committee, Peterborough. 76pp. Rogan, E., Breen, P., Mackey, M., Cañadas, A., Scheidat, M., Geelhoed, S. & Jessopp, M. (2018) *Aerial surveys of cetaceans and seabirds in Irish waters: Occurrence, distribution and abundance in 2015-2017.* Department of Communications, Climate Action & Environment and National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland. 297pp. Wall, D., Murray, C., O'Brien, J., Kavanagh, L., Wilson, C., Ryan, C., Glanville, B., Williams, D., Enlander, I., O'Connor, I., McGrath, D., Whooley, P. & Berrow, S. (2013) *Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters 2005 - 2011*. Irish Whale and Dolphin Group, Kilrush, Co. Clare. 63pp.
4.2i Additional information	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. 149pp.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***400,000 km²***
5.2 Short-term trend Period	***2007–2018***

5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994-2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 400,000 km²***	
	b) Indicate if operators were used (use these 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 range value derived from the range map referred to in 2.4 is considered to be a new baseline for this species. As there is no evidence of a decline since the Directive came into force the current range is set as the FRR.	
5.11 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*	
5.12 Additional information *Optional*	The natural range of Harbour porpoises in Irish waters, and marine waters covered by the Directive, is a small component of the species' wider North Atlantic range (Hammond *et al.*, 2008; Bjørge & Tolley (2009); DEHLG, 2009; Hammond *et al.*, 2017; Rogan *et al.*, 2018), while ongoing evidence from repeated high quality surveys (Rogan *et al.*, 2018) continues to confirm the species' occurrence in Irish waters in all seasons. The range map provided consists of the species' recorded and likely predominant natural range based on comparatively recent data (2001-2018) and expert judgement, and is partly derived from 2.3. It consists of a block of contiguous 50km x 50km grid cells distributed in Irish marine waters up to 2,000m deep, and including the Irish Sea and coastal areas. Prior to 1999-2000, survey effort targeting cetacean species in Irish offshore waters was comparatively limited in coverage, both spatially and temporally. Since 1999-2000 a number of dedicated multi-annual surveillance programmes for cetaceans have operated in Irish waters, with visual and acoustic surveys extending to the limits of Ireland's EEZ and beyond. With regard to this species it is considered that the years 2007-2018 represent an appropriate period for the evaluation of short-term trends since all survey efforts intensified further during this period. Sighting records from ongoing dedicated surveillance effort in Irish waters (e.g., Berrow *et al.*, 2010; Wall *et al.*, 2013; Cronin & Barton, 2014; Craig *et al.*, 2016; Kavanagh *et al.* 2017; O'Donnell *et al.*, 2017; O'Sullivan & Manning, 2017; O'Brien & Berrow, 2014-2018; Rogan *et al.*, 2018) provide no evidence of a decline in distribution/range in the recent past. Therefore the short-term trend for Range is considered to be stable. The long-term trend over the period 1994-2018 is considered to be uncertain for this species due to limited data availability prior to 1999-2000, as outlined above. The range value derived from the map referred to above is considered to be a revised baseline for this species. This surface area calculation is slightly greater than that reported in 2013. Since there is no evidence of a decline in range since the Directive came into force the current range is set as the FRR. There is an assumption that the current range in Irish waters is large enough (a) to encompass all of the ecological variation required by this species during its occurrences therein and (b) to contribute to the long-term survival of the species.	

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	***2013-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	***29,519***
	c) Maximum	***51,840***
	d) Best single value	
6.3 Type of estimate	*Best estimate / multi-year mean / **95% confidence interval** / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*		
6.6 Population size Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing / decreasing / **uncertain** / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	

6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / **uncertain** / unknown*	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) Population size (with unit) or*	
	***b) Operator ≈ (approximately equal to)** or*	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
6.16 Change and reason for change in population size	*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*	

6.17 Additional information *Optional*	Evidence from multi-annual surveillance programmes (e.g., Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013; Kavanagh *et al.*, 2017; Rogan *et al.*, 2018) demonstrate that Harbour porpoises occur widely in Irish waters and do so throughout the year. This is generally the case throughout continental shelf and slope habitats, though the species appears to occur much less frequently in waters over 1,000-1,500m deep. Recent and comprehensive data for the entire region of western Europe have been lacking until recently, particularly with regard to sufficient temporal (i.e., beyond one or more summer months or one year) and spatial coverage (i.e., spanning coastal, continental shelf, slope and deeper basin waters, all of which may represent Harbour porpoise habitat). Within the North-East Atlantic, based on aerial survey effort approximately 424,000 Harbour porpoises were estimated to occur in the summer of 2016 in waters off western Europe but excluding Ireland (Hammond *et al.*, 2017). A further 73,573 Harbour porpoises were estimated from ship-based survey data collected further offshore during the same period (Hammond *et al.*, 2017). Harbour porpoise data from Ireland's ObSERVE Programme (see Rogan *et al.*, 2018) have not yet been integrated into a European-wide assessment of population size for the species, although this should now be feasible given simultaneous aerial survey efforts in the summer of 2016 (Hammond *et al.*, 2017; Rogan *et al.*, 2018). In a new departure for data acquisition on Harbour porpoises in Irish offshore and inshore waters, the aerial surveys carried out under this programme were successful in enabling abundance estimates to be derived from the species sighting data acquired in summer and winter. The most comprehensive and most robust of these four seasonal estimates (i.e., those with the lowest CV = 0.22; summer 2016) has been presented in 6.2 via minimum and maximum 95% Confidence Limits. The Favourable Reference Population has been set as approximately equal to the current population to account for improved knowledge. Although the short-term trends are uncertain, this value is considered to represent the minimum necessary to ensure the long-term survival of the species.

7 Habitat for the species

7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*

7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*
7.8 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*
7.9 Additional information *Optional*	Use of the range descriptor and range surface area calculation as proxies for habitat and habitat area are judged appropriate for this wide-ranging coastal and offshore species. The species' natural range and thus habitat in Irish waters is a small component of its wider North Atlantic range (Hammond *et al.*, 2008; Bjørge & Tolley, 2009; DEHLG, 2009; Wall *et al.*, 2013; Hammond *et al.*, 2017; Rogan *et al.*, 2018). The quality of habitat for Harbour porpoise was determined by consideration of the relevant direct and indirect pressures thought to be acting on the species and/or its functional group, and its habitat within its natural environment. These pressures were evaluated in development of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009) and informed by more recent scientific surveillance (e.g., Cronin & Barton, 2014; Craig *et al.*, 2016; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; O'Sullivan & Manning, 2017; Rogan *et al.*, 2018), using available data concerning, *inter alia*, habitat use, population size, distribution and ecology, and threats to the species' protection (e.g., via natural/biological sources, human sectoral

	activities, management gaps, etc.). Harbour porpoises may be subject to a number of local and/or regional environmental pressures throughout their range in Irish waters (DEHLG, 2009). However, based on current spatial and temporal data none are considered to be of sufficient impact on the species to be causing a significant deterioration in overall habitat quality in Ireland from a status that is sufficient for long-term survival. Long-term trends in habitat for Harbour porpoise remain uncertain due to insufficient accurate data for this species prior to 1999-2000. However, with improved surveillance and numerous ongoing records of Harbour porpoises in the last 18 years, the short-term trend indicates the continued existence of sufficient quality habitat for the species.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**C09** Geotechnical surveying (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M)	**C09** Geotechnical surveying (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M)

8.2 Sources of information *Optional*	*https://www.npws.ie/marine/marine-species/cetaceans* *https://www.dccae.gov.ie/en-ie/natural-resources/topics/Oil-Gas-Exploration-Production/Pages/home.aspx* *https://www.agriculture.gov.ie/seafood/sea-fisheriespolicymanagementdivision/*
8.3 Additional information *Optional*	Harbour porpoises may be subject to a number of local and/or regional environmental pressures and threats throughout their North Atlantic range (Hammond *et al.*, 2008) and in Irish coastal/offshore waters. In the development and preparation of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009), a comprehensive review of the pressures and threats believed and/or documented to be acting on this species and/or its functional group was undertaken. The main pressures thought to be acting on this species in Irish waters are considered to involve commercial shipping-based or vessel-based activities that occur primarily on a local or regional scale and/or on a temporary or intermittent basis (e.g., impacts arising

	from geophysical seismic exploration; impacts from local/regional prey removal by fisheries or by-catch in fisheries; DEHLG, 2009). Since the species is known to be broadly pelagic in its ecology in the North-East Atlantic (Hammond *et al.*, 2008; Bjørge & Tolley, 2009) and current Harbour porpoise distribution is very wide in its spatial and temporal occurrence, where a pressure may be regionally intensive the ranking given is one of medium importance. It should be noted that in relation to seismic exploration, which tends to occur on a local or occasionally regional scale in the waters of Ireland's EEZ and is comparatively low in coverage relative to several other member states, a robust regulatory and management regime applies in order to avoid potentially significant impacts on all species of marine mammal. This regime takes cognisance of recent scientific research and surveillance findings (e.g., Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; Rogan *et al.*, 2018) and it is expected that this practice will continue into the future. There is no evidence to suggest a change in the main pressures thought to be acting on this species in the near future (i.e., threats). However surveillance of the species and the pressures potentially acting upon it will continue, while the application of strong management measures (e.g., via the statutory/regulatory process) to avoid potentially significant impacts is also expected to continue.

9 Conservation measures

To be reported only for Annex II species

9.1 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*
9.2 Main purpose of the measures taken	*Indicate the main purpose of measures taken:* ***a) Maintain the current range, population and/or habitat for the species** or* *b) Expand the current range of the species (related to 'Range') or* *c) Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population') or* *d) Restore the habitat of the species (related to 'Habitat for the species')*

9.3 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*
9.4 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 in field 9.2):* *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)*
9.5 List of main conservation measures	**CC12** Reduce/eliminate noise, light, thermal and other forms of pollution related to resource exploitation and energy production **CF09** Reduce/eliminate noise, light, heat or other forms pollution from industrial, commercial, residential and recreational areas and activities **CG05** Reduce bycatch and incidental killing of non-target species **CG09** Other measures to reduce impacts from marine aquaculture infrastructures and operation
9.6 Additional information *Optional*	All measures taken during the reporting period are designed to ensure the maintenance of harbour porpoise at a favourable conservation status in Ireland and to ensure that the conservation provisions for this species, as underpinned by Articles 6 and 12 of the Habitats Directive in particular, are robustly implemented including via national legislation (e.g., EC Birds and Natural Habitats Regulations S.I. No. 477/2011, etc.). Key ongoing actions and protection measures for the species (e.g., protection from disturbance/harassment or sectoral impacts) were also identified in the Conservation Plan for Cetaceans in Irish Waters (DEHLG, 2009) and these are being pursued.

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	Visual and acoustic records of Harbour porpoise in Irish waters indicate a wide and regular occurrence of the species in coastal waters and those overlying the continental shelf and slope, and to a lesser extent in some deeper basins. Since many significant (i.e., high level) anthropogenic impacts that may affect this wide-ranging species' distribution are more localised in space and time within this extensive and diverse marine area, the Future prospects for the Range and Habitat for the species are	

	considered to be Good. A number of pressures that could act upon this species have been identified. The effect of these pressures may operate on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, thereby constituting a potential threat. While the impacts on individuals or populations of Harbour porpoise in Irish waters are not well understood, partly due to continuing uncertainty regarding its population trends and ecology within Ireland's marine area, ongoing threats as listed or identified into the future via surveillance will be managed appropriately in Ireland. Therefore the Future prospects for the Population are considered to be Good.

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1)/ Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*

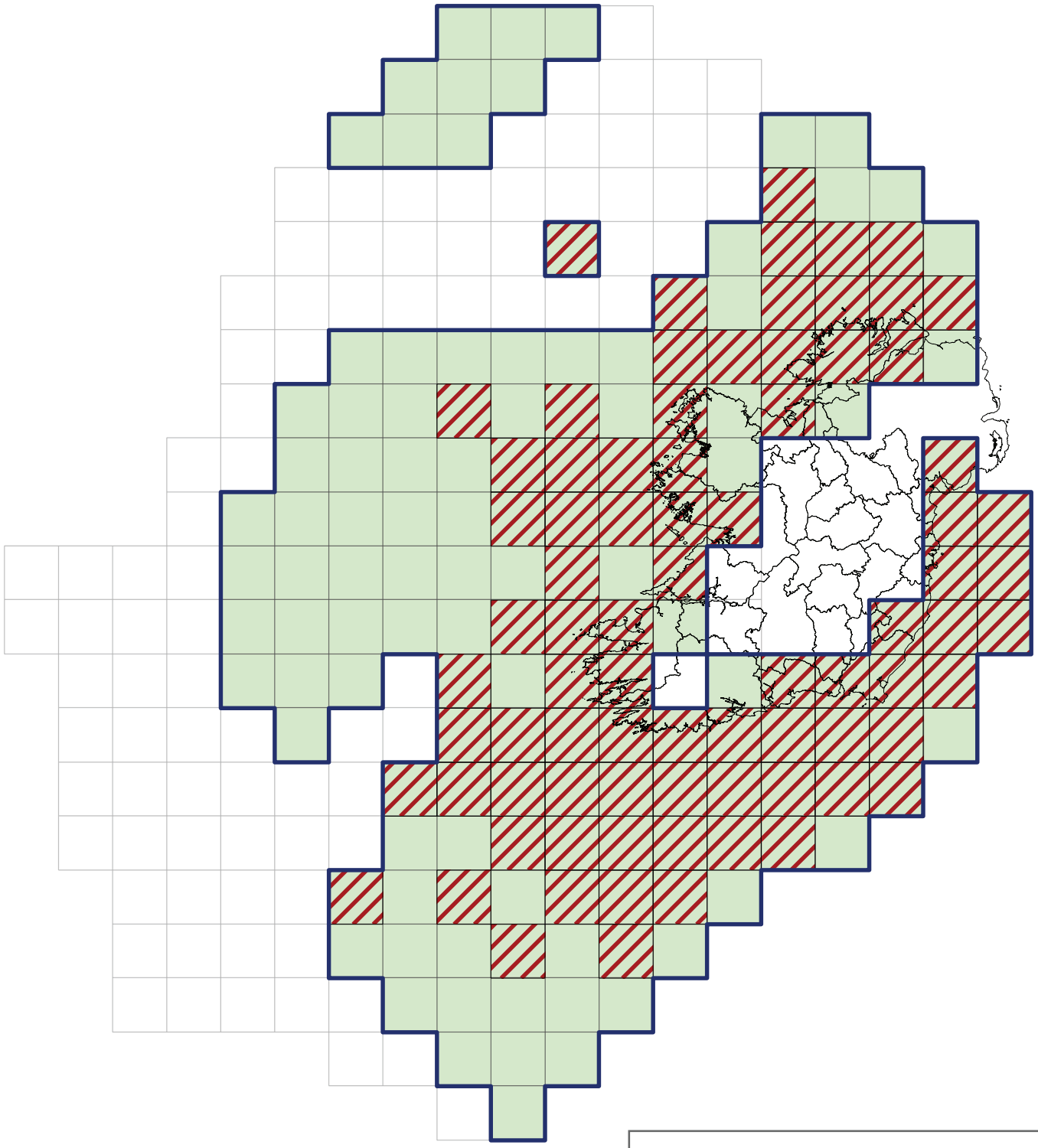
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the nature of change	*YES/NO*	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
11.8 Additional information *Optional*	Contemporary sightings of Harbour porpoises indicate a wide occurrence of this species primarily through Irish coastal waters and those overlying the continental shelf and continental slope. Hence the Range and Habitat for the species are considered to be Favourable. While robust and long-term data on Harbour porpoise population size and trends in Irish waters as a whole are not available, knowledge of the species' seasonal distribution and summer abundance in western European waters has improved significantly since the Directive came into force. There has also recently been some improvement in population abundance data from a large part of the Irish EEZ, yielding new estimates and associated 95% Confidence Limits based on dedicated cetacean surveillance since 2013. While there is some uncertainty in the trajectory of North-East Atlantic populations of Harbour porpoise, given the available estimates for a large part of Irish waters and the species' wide occurrence throughout the year, the Population parameter is considered Favourable. A number of pressures have been identified. While the effect of these pressures may act on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, none is considered to be of sufficient magnitude to be causing an adverse impact on populations of Harbour porpoise in Irish waters. Ongoing threats as listed or identified into the future via surveillance will be managed appropriately. Hence the Future prospects for the species are considered to be Favourable. Based on the assessments for the Range, Population, Habitat and Future prospects parameters, the overall conclusion is that the Conservation Status of Harbour porpoise in Ireland remains Favourable. This overall result is the same as the previous two Article 17 assessments.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species		
12.1 Population size inside the pSCIs, SCIs and SACs network *(on the biogeographical/marine level including all sites where the species is present)*	**a) Unit**	***Number of individuals***
	b) Minimum	***9,648***
	c) Maximum	***21,295***
	d) Best single value	
12.2 Type of estimate	*Best estimate / multi-year mean / **95% confidence interval** / minimum*	
12.3 Population size 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*	
12.4 Short-term trend of population size within the network Direction	*stable / increasing / decreasing / **uncertain** / unknown*	
12.5 Short-term trend of population size within 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*	

12.6 Additional information *Optional*	Attributing an accurate population size estimate for such a mobile marine species whose occurrence is variable on a daily, seasonal and inter-annual basis is a challenging task, particularly when working such figures into relatively small spatial dimensions (e.g., within Ireland's network of Natura 2000 sites) within the species' broader transnational range. The minimum and maximum population sizes given here for this highly mobile and wide-ranging small cetacean species are derived from the results of the ObSERVE Aerial project (Rogan *et al*., 2018) which succeeded in delivering four separate seasonal estimates of population size and associated 95% Confidence Intervals for Harbour porpoise within a large proportion of Ireland's EEZ. Further details concerning data considerations and the method used are given in 6.6 and 6.17. In seeking to estimate and represent Harbour porpoise population size within all SACs in Irish coastal and offshore waters, the lowest of the four abundance estimates derived from the ObSERVE Aerial line transect data is used, this being from winter 2015 and comprising the lower and upper 95% Confidence Intervals around the estimate (Rogan *et al*., 2018). Given the sizes and distribution of SACs in Irish coastal and offshore waters it is considered that these 95% CI-based estimates of population size best capture the potential use of all these sites by Harbour porpoise throughout the year. It should be noted that this measurement method is not precise and cannot be so, given the species' mobility, variability in occurrence and abundance, constraints on offshore surveillance, and limited knowledge of its life history and ecology in offshore waters.

13 Complementary information

Harbour porpoise
Phocoena phocoena (1351)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 25 50 100 km

N

Map - rscáil
V 2.0
Date áta
June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***2027***
1.3 Species scientific name	*Orcinus orca*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Killer whale (Cráin dhubh)
1.6i Species description	The killer whale is the largest of the dolphin family *Delphinidae* that occurs in Irish waters. Found mostly in temperate and sub-polar regions, its North Atlantic populations appear to range mainly from the Gulf of Mexico, north-west Africa and the Mediterranean, north to Greenland, Iceland and Norway (Ford, 2009; Reeves *et al.*, 2017). Killer whales are classified by the IUCN as a Data Deficient species due to ongoing taxonomic uncertainties. With further research globally into their ecology and recognised subspecies, it is possible that distinct species may be established in the future (Reeves *et al.*, 2017). At least three genetically distinct populations have been identified in the North Atlantic so far; this is apparently linked to the distribution of their main prey species (i.e., herring, mackerel, tuna; Foote *et al.*, 2010). With adults reaching up to 6.5-9m in length, their characteristic tall black dorsal fin and very distinctive white/near-white patches behind the eye and dorsal fin, killer whales are readily identifiable at sea. In Ireland they are recorded annually in small numbers (e.g., Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013; Rogan *et al.*, 2018), and at least some of the whales photo-identified in Ireland are known from coastal Scotland (Wall *et al.*, 2013; IWDG, 2018 – unpublished data).

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2013-2018***
2.3 Distribution map	Submitted

2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	Over the last two decades there have been regular records of killer whales in Irish offshore and coastal waters, particularly off the north, west and south of Ireland (e.g., Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013; Kavanagh *et al.*, 2017; Rogan *et al.*, 2018). The distribution map presented for this species represents all available live sighting records during extensive scientific research and monitoring in Irish waters between 2013 and 2018. The period selected for mapping represents a period of intensive and high quality surveillance for cetaceans in Irish waters across a range of research projects and monitoring programmes. The surveillance programmes, projects and publications that contributed sighting data to this distribution projection are cited as follows: Baines *et al.* (2013), Kavanagh *et al.* (2017), O'Sullivan & Manning (2017), Berrow *et al.* (2018) and Rogan *et al.* (2018). Along with the results of previous visual survey effort (e.g., Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Berrow *et al.*, 2010; Wall *et al.*, 2013), recent extensive ship-based and aerial surveys in summer (Hammond *et al.*, 2017; Rogan *et al.*, 2018) and winter (Rogan *et al.*, 2018) these data were integrated into the development of the species' range map presented under section 2.5. It should be noted that the spatial and temporal distribution of killer whales could be somewhat underestimated due to the difficulty in discriminating some larger dolphin species or small whale species from one another, particularly at distance in the offshore Atlantic environment (e.g., see Ó Cadhla *et al.*, 2004; Wall *et al.*, 2013; Rogan *et al.*, 2018). Thus the distribution map presented does not include records where the observed species could not be distinguished, for example, from other larger members of the Family *Delphinidae* (e.g., Long-finned pilot whale, False killer whale, Risso's dolphin) or the *unidentified small whale* or *unidentified cetacean* categories often used for indeterminate sightings. The distribution of recent sightings (e.g., in Baines *et al.*, 2013; Kavanagh *et al.*, 2017; O'Sullivan & Manning, 2018; Berrow *et al.*, 2018; Rogan *et al.*, 2018) along with regional sighting records obtained across three preceding decades (e.g., Berrow *et al.*, 2002; Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013) indicate a predominant distribution in waters overlying the continental shelf and continental slope, although the species' occurrence in adjacent deeper ocean waters and topographical basins (e.g., the Porcupine Seabight or Rockall Trough) is also shown. While all reliable cetacean records obtained in Irish waters were not

	available for use in this exercise, the map drawn for this species provides a good sample of its observed distribution within the period given in 2.2.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic, **Marine Atlantic***
4.2 Sources of information	Baines, M., Reichelt, M., Coles, D., Williams, A., Griffin, D. & Corkhill, O. (2013) Marine Mammal Observers' and passive acoustic monitoring operators' report during 3D seismic survey off southwest Ireland for KOSMOS. RPS Energy, Axminster, Devon, UK. 24pp. Beck, S., Foote , A.D., Kötter, S., Harries, O., Mandleberg, L., Stevick, P.T., Whooley, P. & Durban, J.W. (2014) Using opportunistic photoidentifications to detect a population decline of killer whales (*Orcinus orca*) in British and Irish waters. *J. Mar. Biol. A*ssoc. *UK* 94(6): 1327-1333. Berrow, S.D., Whooley, P. & Ferriss, S. (2002) *Irish Whale and Dolphin Group Cetacean Sighting Review (1991-2001)*. Irish Whale and Dolphin Group, Kilrush, Co. Clare. 34 pp. Berrow, S.D., Whooley, P., O'Connell, M. & Wall, D. (2010*) Irish Cetacean Review (2000-2009).* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 60pp. Berrow, S.D., O'Brien, J., Meade, R., Delarue, J., Kowarski, K., Martin, B., Moloney, J., Wall, D., Gillespie, D., Leaper, R., Gordon, J., Lee, A. & Porter, L. (2018) *Acoustic Surveys of Cetaceans in the Irish Atlantic Margin in 2015–2016: Occurrence, distribution and abundance.* Department of Communications, Climate Action & Environment and the National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland, 348pp. DEHLG (2009) *Conservation Plan for Cetaceans in Irish Waters.* Department of the Environment, Heritage and Local Government, 7 Ely Place, Dublin. 97pp. Foote, A.D.,Vilstrup, J.T., De Stephanis, R., Verborgh, P., Abel Nielsen, S.C., Deaville, R., Kleivane, L., Martín, V., Miller, P.J.O., Øien, N., Pérez-Gil, M., Rasmussen, M., Reid, R.J., Robertson, K.M., Rogan, E., Similä, T., Tejedor, M.L., Vester, H., Vikingsson, G.A.,

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Ford, J.K.B. (2009) Killer whale. *Orcinus orca*. In W.F. Perrin, B. Würsig, J.G.M. Thewissen (eds.). *Encyclopedia of Marine Mammals* – 2nd edition. Academic Press, Elsevier Inc. p.650-657.

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Jepson P.D., Deaville, R. *et al.* (2016) PCB pollution continues to impact populations of orcas and other dolphins in European waters. *Scientific Reports* 6:18573 | DOI: 10.1038/srep18573

Jepson, P.D. & Law, R.J. (2016) Persistent pollutants, persistent threats. Polychlorinated biphenyls remain a major threat to marine apex predators such as orcas. *Science* 352: 1388-1389. doi: 10.1126/science.aaf9075.

Kavanagh, A.S., Hunt, W., Richardson, N. & Jessopp, M. (2017) Cetaceans in Irish offshore waters: Final report of the SFI-KOSMOS Project 2015-2017. MaREI Centre, University College Cork. 66pp.

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Reeves, R., Pitman, R.L. & Ford, J.K.B. 2017. *Orcinus orca*. *The IUCN Red List of Threatened Species* 2017: e.T15421A50368125. http://dx.doi.org/10.2305/IUCN.UK.2017-3.RLTS.T15421A50368125.en.

Reid, J.B., Evans, P.G.H. & Northridge, S.P. (2003) *Atlas of Cetacean Distribution in North-west European Waters.* Joint Nature

	Conservation Committee, Peterborough. 76pp. Rogan, E., Breen, P., Mackey, M., Cañadas, A., Scheidat, M., Geelhoed, S. & Jessopp, M. (2018) *Aerial surveys of cetaceans and seabirds in Irish waters: Occurrence, distribution and abundance in 2015-2017.* Department of Communications, Climate Action & Environment and National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland. 297pp. Samarra, F.I.P. & Foote, A.D. (2015) Seasonal movements of killer whales between Iceland and Scotland. *Aquat. Biol.* 24: 75-79. Wall, D., Murray, C., O'Brien, J., Kavanagh, L., Wilson, C., Ryan, C., Glanville, B., Williams, D., Enlander, I., O'Connor, I., McGrath, D., Whooley, P. & Berrow, S. (2013) *Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters 2005 - 2011.* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 63pp.
4.2i Additional information	

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***440,000 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994-2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */* unknown	
5.8 Long-term trend Magnitude	**a) Minimum**	

Optional	**b) Maximum**	
5.9 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*	
5.10 Favourable reference range	***a) 440,000 km²***	
	b) Indicate if operators were used (use these 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 range value derived from the range map referred to in 2.4 is considered to be a new baseline for this species. As there is no evidence of a decline since the Directive came into force the current range is set as the FRR.	
5.11 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***	

5.12 Additional information *Optional*	The natural range of killer whales in Irish waters, and marine waters covered by the Directive, is a small component of the species' wider North Atlantic range (DEHLG, 2009; Ford, 2009), while evidence gathered over a significant time period has confirmed that the species occurs in Irish waters in all seasons (Wall *et al.*, 2013). The range map provided consists of the species' recorded and likely predominant natural range based on comparatively recent data (2001-2018) and expert judgement, and is partly derived from 2.3. It consists of a block of contiguous 50km x 50km grid cells distributed in Irish marine waters up to 2,000m deep including the eastern margin of the Rockall Bank and excluding enclosed shallow bays. Prior to 1999-2000, survey effort targeting cetacean species in Irish offshore waters was comparatively limited in coverage, both spatially and temporally. Since 1999-2000 a number of dedicated multi-annual surveillance programmes for cetaceans have operated in Irish waters, with visual and acoustic surveys extending to the limits of Ireland's EEZ and beyond. With regard to this species it is considered that the years 2007-2018 represent an appropriate period for the evaluation of short-term trends since all survey efforts intensified further during this period. Sighting records from ongoing dedicated surveillance effort in Irish waters (e.g., Berrow *et al.*, 2010; Baines *et al.* 2013; Wall *et al.*, 2013; Kavanagh *et al.* 2017; O'Sullivan & Manning, 2017; Berrow *et al.*, 2018 and Rogan *et al.*, 2018) provide no evidence of a decline in distribution/range in the recent past; therefore the short-term trend for Range is considered to be stable. The long-term trend period (1994-2018) is considered to be uncertain for this species due to limited data availability prior to 1999-2000, as outlined above. The range value derived from the map referred to above is considered to be a revised baseline for this species. This surface area calculation is slightly smaller than that reported in 2013. Since there is no evidence of a decline in range since the Directive came into force the current range is set as the FRR. There is an assumption that the current range in Irish waters is large enough (a) to encompass all of the ecological variation required by this species during its occurrences therein and (b) to contribute to the long-term survival of the species.

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2013-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	
	c) Maximum	

	d) Best single value	***100***
6.3 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*		
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing / decreasing /* ***uncertain*** */ unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain /* ***unknown***	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

<table>
<tr><td>6.14 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
<u>d) Insufficient or no data available</u></td></tr>
<tr><td rowspan="5">6.15 Favourable reference population
(using the unit in 6.2 or 6.4)</td><td colspan="2">a) Population size (with unit) or</td></tr>
<tr><td colspan="2">b) Indicate if operators were used (using symbols ≈, >, >>, <) or</td></tr>
<tr><td colspan="2"><u>c) Favourable reference population is unknown</u></td></tr>
<tr><td colspan="2">d) Indicate method used to set reference value if other than operators

Robust data on killer whale population trends in Irish waters are not available and the figure presented in 6.2 is a crude ‘best estimate’ for the number of individuals potentially occurring in Irish waters, based on sightings associated with the mackerel fishery in Irish and adjacent UK waters (Wall et al., 2013). Although a large portion of Ireland’s EEZ was recently covered in two successive summers and winters using aerial survey methods (see Rogan et al., 2018), there were comparatively few records of this species and these were insufficient to allow the estimation of population abundance. Given the substantial distances covered by free-ranging killer whales (Reeves et al., 2017), ongoing uncertainty regarding the species’ population structure and abundance in the North-East Atlantic, and the above circumstances, it is not yet possible to determine a realistic baseline value since the Directive came into force; consequently the FRP remains unknown.</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td rowspan="6">6.16 Change and reason for change in population size</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>6.17 Additional information

Optional</td><td colspan="2">Evidence from multi-annual surveillance programmes (e.g., Ó Cadhla et al., 2004; Berrow et al., 2010; Wall et al., 2013; O’Sullivan & Manning, 2017; Kavanagh et al., 2017; Berrow et al., 2018; Rogan et al., 2018) indicate that killer whales occur in comparatively small numbers in Irish waters but do so widely and throughout the year. This is the case both in continental shelf and slope habitats but also in waters up to 2,000m in depth.</td></tr>
</table>

	Recent comprehensive or internationally coordinated data for the entire region of western Europe have generally been lacking, particularly with regard to sufficient temporal (i.e., beyond one or more summer months or one year) and spatial coverage (i.e., spanning continental shelf, slope and deeper abyssal waters, all of which may represent killer whale habitat). In this regard the knowledge base around killer whales would benefit from a transnational assessment of its conservation status, particularly given its position as an apex predator within the North-East Atlantic ecosystem. Killer whale data from Ireland's ObSERVE Programme (see Berrow *et al.*, 2018; Rogan *et al.*, 2018) have not yet been integrated into a European-wide assessment of population size for this species, although this should now be feasible given simultaneous aerial and ship-based survey efforts in the summer of 2016 (Hammond *et al.*, 2017; Rogan *et al.*, 2018). In the continued absence of robust survey-based estimates for killer whale population size in Irish waters a realistic baseline value since the Directive came into force remains elusive, and the FRP remains unknown.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*
7.5 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*

7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*
7.8 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*
7.9 Additional information *Optional*	Use of the range descriptor and range surface area calculation as proxies for habitat and habitat area are judged appropriate for this wide-ranging pelagic species. The species' natural range and thus habitat in Irish waters is a small component of its wider North Atlantic range (DEHLG, 2009; Ford, 2009; Wall *et al.*, 2013; Reeves *et al.*, 2017). The quality of habitat for killer whale was determined by consideration of the relevant direct and indirect pressures thought to be acting on the species and/or its functional group, and its habitat within its natural environment. These pressures were evaluated in development of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009) and informed by more recent scientific surveillance (e.g., Baines *et al.*, 2013; O'Sullivan & Manning, 2017; Kavanagh *et al.*, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018), using available data concerning, *inter alia*, habitat use, population size, distribution and ecology, and threats to the species' protection (e.g., via natural/biological sources, human sectoral activities, management gaps, etc). Killer whales may be subject to a number of local and/or regional environmental pressures throughout their range in Irish waters (DEHLG, 2009). However, based on current spatial and temporal data none are considered to be of sufficient impact on the species to be causing a significant deterioration in overall habitat quality in Ireland from a status that is sufficient for long-term survival. Long-term trends in habitat for killer whale remain uncertain due to insufficient accurate data for this species prior to 1999-2000. However, with improved surveillance and ongoing records of killer whales in the last 18 years, the short-term trend indicates the continued existence of sufficient quality habitat for the species.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**C09** Geotechnical surveying (M) **F21** Industrial or commercial activities and structures generating marine pollution (excluding marine macro- and micro-particular pollution) (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M)	**C09** Geotechnical surveying (M) **F21** Industrial or commercial activities and structures generating marine pollution (excluding marine macro- and micro-particular pollution) (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M)
8.2 Sources of information *Optional*	*https://www.npws.ie/marine/marine-species/cetaceans* *https://www.dccae.gov.ie/en-ie/natural-resources/topics/Oil-Gas-Exploration-Production/Pages/home.aspx* *https://www.agriculture.gov.ie/seafood/sea-fisheriespolicymanagementdivision/*	
8.3 Additional information *Optional*	Killer whales may be subject to a number of local and/or regional environmental pressures and threats throughout their North Atlantic range (Reeves *et al.*, 2017) and in Irish coastal/offshore waters. In the development and preparation of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009), a comprehensive review of the pressures and threats believed and/or documented to be acting on this species and/or its functional group was undertaken. The main pressures thought to be acting on this species in Irish waters are considered to involve potential pollutant burdens from man-made Polychlorinated Biphenyl compounds (PCBs; Jepson & Law 2016; Jepson *et al.*, 2016) plus other persistent organic pollutants (POPs), and also commercial shipping-based or vessel-based activities that occur primarily on a local or regional scale and/or on a temporary or intermittent basis (e.g., impacts arising from geophysical seismic exploration; impacts from local/regional prey removal by fisheries; DEHLG, 2009). Since the species is known to be a wide-ranging predator and mainly pelagic in its ecology, at least offshore (Ford, 2009; Samarra & Foote, 2015; Reeves *et al.*, 2017), and current killer whale distribution is known to be both offshore Atlantic and also inshore/coastal around Ireland, where a pressure may be regionally intensive the ranking given is one of medium importance. It should be noted that in relation to seismic exploration, which tends to occur on a local or occasionally regional scale in the waters of Ireland's EEZ and is comparatively low in coverage relative to several	

	other member states, a robust regulatory and management regime applies in order to avoid potentially significant impacts on all species of marine mammal. This regime takes cognisance of recent scientific research and surveillance findings (e.g., Baines *et al.*, 2013; Wall *et al.*, 2013; O'Sullivan & Manning, 2017; Kavanagh *et al.*, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018) and it is expected that this practice will continue into the future. There is no evidence to suggest a change in the main pressures thought to be acting on this species in the near future (i.e., threats). However surveillance of the species and the pressures potentially acting upon it will continue, while the application of strong management measures (e.g., via the statutory/regulatory process) to avoid potentially significant impacts is also expected to continue.

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	*Good / Poor / Bad /* ***Unknown***
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	Visual records of killer whale in Irish waters indicate a wide and regular occurrence of the species in waters overlying the continental shelf and slope and also parts of some deeper oceanic basins. The species is also recorded in all coastal waters, including in the Irish Sea. However, with the exception of coastal waters where observer/public records are often repeated and consequently comparatively high in number, offshore sightings of killer whales in any year are not numerous and in general group sizes tend to be small. Furthermore the knowledge of population structure, abundance and trends remains comparatively poor in Irish waters and nearby parts of the North-East Atlantic. Since many significant (i.e., high level) anthropogenic impacts that may affect this wide-ranging species' distribution are more localised in space and time within this extensive and diverse marine area, the Future prospects for the Range and Habitat for the species are considered to be Good. A number of pressures that could act upon this species have been identified, however. The effect of these pressures may operate on a temporary and/or regional and/or international scale and some (e.g., persistent organic pollutants) are likely to continue to act as pressures into the future, thereby constituting a potential threat to	

	the species. This is particularly the case for killer whales should population abundance, reproductive success and/or genetic diversity be low within its range (e.g., in coastal/resident communities of killer whales; see Jepson *et al.*, 2016). The impacts of human-driven or naturally-driven pressures on individuals or populations of killer whale in Irish waters are not well understood, partly due to continuing uncertainty regarding the species' population size and composition, trends and ecology within Ireland's marine area. Although ongoing threats as listed or identified into the future via surveillance will be managed appropriately in Ireland, the Future prospects for the population are considered to be Unknown. Note that, although the guidelines recommend a Favourable assessment of Future prospects where prospects of one parameter are unknown and prospects of the others are good, Future prospects has been assessed as Unknown due to the paucity of information on population parameters.

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***		
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	*Favourable (FV) / Inadequate (U1)/ Bad (U2) /* ***Unknown (XX)***		
11.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating / stable /* unknown		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*

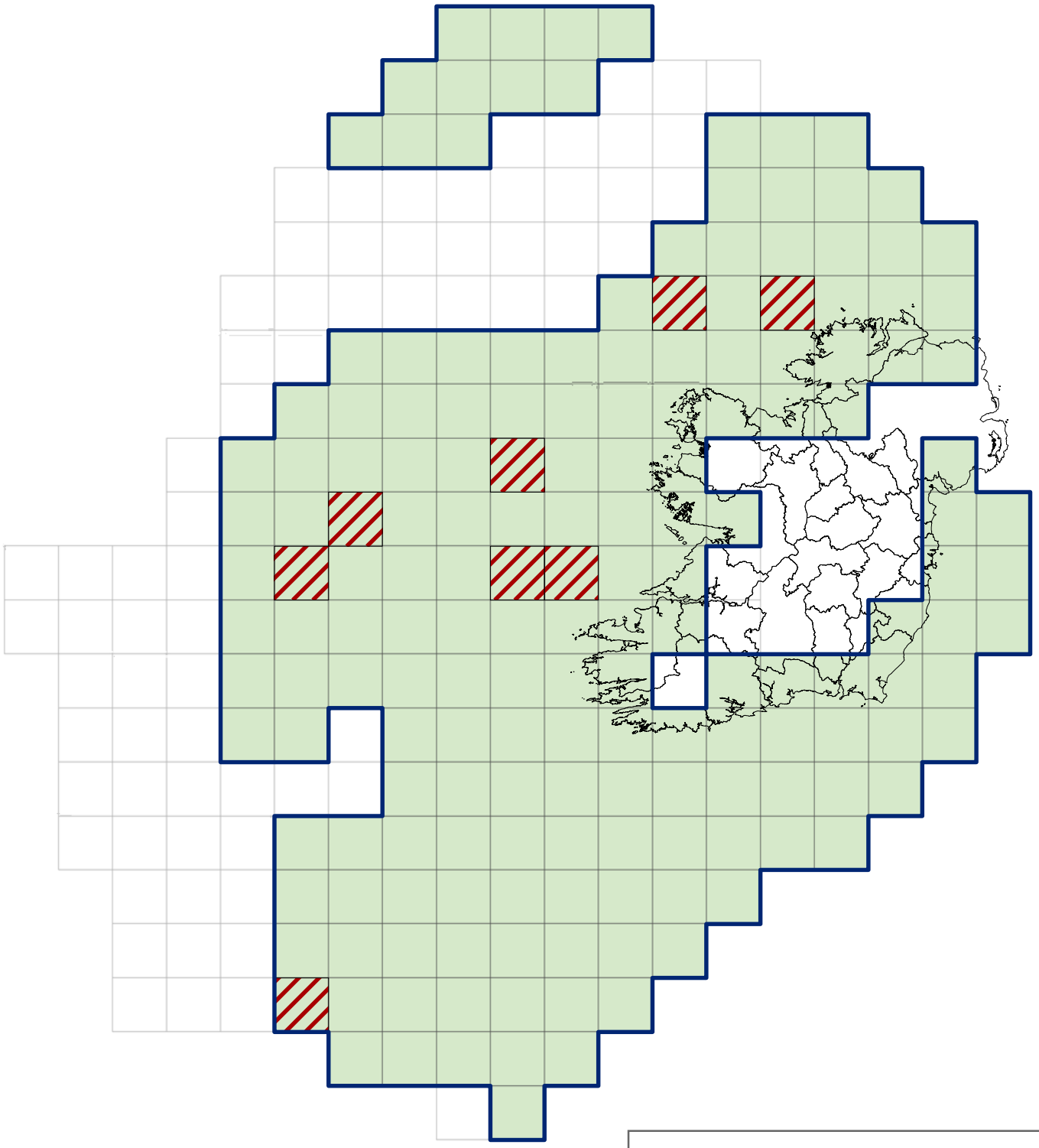
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the nature of change	*YES/NO*	*YES/NO*
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
11.8 Additional information *Optional*	Contemporary sightings of killer whales indicate the wide and regular occurrence of this species throughout Irish waters, from those overlying the continental shelf and continental slope to the margins of deeper ocean basins. Hence the Range and Habitat for the species are considered to be Favourable. However, robust and long-term data on killer whale population size and trends in Irish waters as a whole are not available, and knowledge of the species' seasonal distribution and abundance in western European waters has only marginally improved during the current reporting period. Since there is considerable uncertainty in the trajectory and structure of North-East Atlantic populations of killer whale the Population parameter continues to be considered Unknown. A number of pressures have been identified. The effect of these pressures may act on a temporary and/or regional scale and/or international scale and some are likely to continue to act as pressures into the future. With the exception of ongoing pollutant burdens in the species, which could be having a significant and wider impact in the North-East Atlantic, no other pressures are considered to be of sufficient magnitude to be causing an adverse impact on populations of killer whale in Irish waters. Although ongoing threats as listed or identified into the future via surveillance will be managed appropriately, the Future prospects for the species are considered to be Unknown, given persistent uncertainty in the population status and the potential pressure/threat posed by persistent organic pollutants. Based on the assessments for the Range, Population, Habitat and Future prospects parameters, the overall conclusion is that the Conservation Status of killer whale in Ireland remains Unknown. This overall result is the same as the previous two Article 17 assessments since there has been no significant improvement in knowledge of the species' conservation status.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Killer whale
Orcinus orca (2027)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 25 50 100 km

N

Map arscáil
V 2.0
Dat Dát
June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***2029***
1.3 Species scientific name	*Globicephala melas*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Long-finned pilot whale (Píolótach fadeiteach)
1.6i Species description	The long-finned pilot whale is one of the largest members of the dolphin family *Delphinidae* occurring in Ireland, with adults averaging up to 6m long. Found in temperate and sub-polar regions, its North Atlantic populations range from Greenland, Iceland and the Barents Sea to the Tropic of Cancer, including the western and central Mediterranean Sea (Olson, 2009; Minton *et al.*, 2018). In 2018 its IUCN status was revised to Least Concern due to abundance information and a low threat assessment for its populations (Minton *et al.*, 2008). Long-finned pilot whales are frequently recorded in offshore Atlantic waters, usually over the continental shelf and slope, and deeper ocean basins (Ó Cadhla *et al.*, 2004; Wall *et al.*, 2013; Kavanagh *et al.*, 2017; Rogan *et al.*, 2018). They are quite readily identifiable due to their body size and mainly black/dark grey colour, a notably broad-based dorsal fin and a bulbous melon (forehead) lacking an obvious beak. This highly social and mainly squid-eating species is known to be deep-diving in its foraging ecology, and it may conduct seasonal inshore movements in some areas (DEHLG, 2009). However clear patterns in population structure and breeding, or in movement by populations in the eastern North Atlantic, are not evident (Olson, 2009).

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2013-2018***
2.3 Distribution map	Submitted
2.4 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*

2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	Over the last two decades there have been numerous visual and acoustic records of long-finned pilot whales in offshore Irish waters stretching northwards from the Goban Spur region to the Porcupine Seabight and Rockall Trough, and including adjacent continental shelf waters (e.g., Aguilar de Soto *et al.*, 2004; Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Baines *et al.*, 2013; Wall *et al.*, 2013; Oudejans, 2014; Frouin-Mouy *et al.*, 2017; Kavanagh *et al.*, 2017; Berrow *et al.*, 2018; O'Donnell *et al.*, 2018a,b; Rogan *et al.*, 2018). The distribution map presented for this species represents all available live sighting records during extensive scientific research and monitoring in Irish waters between 2013 and 2018. The period selected for mapping represents a period of intensive and high quality surveillance for cetaceans in Irish waters across a range of research projects and monitoring programmes. The surveillance programmes, projects and publications that contributed sighting data to this distribution projection are cited as follows: Baines *et al.* (2013), Oudejans (2014), Craig *et al.* (2016), Kavanagh *et al.* (2017), Berrow *et al.* (2018), O'Donnell *et al.* (2018a), O'Donnell *et al.* (2018b) and Rogan *et al.* (2018). Along with the results of previous visual survey effort (i.e., Pollock *et al.*, 1997; Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Berrow *et al.*, 2010; Wall *et al.*, 2013; Rogan *et al.*, 2017), recent extensive aerial surveys in summer and winter (Rogan *et al.*, 2018) and acoustic monitoring (Aguilar de Soto *et al.*, 2004; Frouin-Mouy *et al.*, 2017; Berrow *et al.*, 2018), these data were integrated into the development of the species range map presented under section 2.5. It should be noted that the spatial and temporal distribution of long-finned pilot whales could yet be somewhat underestimated due to the difficulty in discriminating some toothed whale species from one another in the offshore Atlantic environment (e.g., see Ó Cadhla *et al.*, 2004; Wall *et al.*, 2013; Rogan *et al.*, 2018). Thus the distribution map presented does not include records where the observed species could not be distinguished, for example, from other large dark-coloured delphinids (e.g., Killer whale or false killer whale) or from *unidentified medium/small whale* categories often used for indeterminate sightings. The distribution of recent sightings (e.g., in Baines *et al.*, 2013; Oudejans, 2014; Kavanagh *et al.*, 2017; Berrow *et al.*, 2018; O'Donnell *et al.*, 2018b; Rogan *et al.*, 2018) and extensive acoustic records (e.g., Frouin-Mouy *et al.*, 2017; Berrow *et al.*, 2018) along with regional sighting and acoustic records obtained across three preceding decades (Pollock *et al.*, 1997; Reid *et al.*, 2003; Aguilar de Soto *et al.*, 2004; Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013; Rogan *et al.*, 2017) indicate a predominant distribution in Atlantic waters greater than 200m deep, including those overlying and fringing the continental slope, and deeper basin or abyssal waters. While all reliable cetacean records obtained in Irish waters were not

	available for use in this exercise, the map drawn for this species provides a good sample of its observed distribution within the period given in 2.2.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
4.2 Sources of information	Aguilar de Soto, N., Rogan, E., O Cadhla, O., Gordon, J.C.D., Mackey, M. & Connolly, N. (2004) Cetaceans and Seabirds of Ireland's Atlantic Margin. Volume III-Acoustic Surveys for Cetaceans. Report on research carried out under the Irish Petroleum Infrastructure Programme (PIP): Rockall Studies Group (RSG) projects 98/6 and 00/13, Porcupine Studies Group project P00/15 and Offshore Support Group (OSG) project 99/38. 51pp Baines, M., Reichelt, M., Coles, D., Williams, A., Griffin, D. & Corkhill, O. (2013) Marine Mammal Observers' and passive acoustic monitoring operators' report during 3D seismic survey off southwest Ireland for KOSMOS. RPS Energy, Axminster, Devon, UK. 24pp. Berrow, S.D., Whooley, P., O'Connell, M. & Wall, D. (2010) *Irish Cetacean Review (2000-2009).* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 60pp. Berrow, S.D., O'Brien, J., Meade, R., Delarue, J., Kowarski, K., Martin, B., Moloney, J., Wall, D., Gillespie, D., Leaper, R., Gordon, J., Lee, A. & Porter, L. (2018) *Acoustic Surveys of Cetaceans in the Irish Atlantic Margin in 2015–2016: Occurrence, distribution and abundance.* Department of Communications, Climate Action & Environment and the National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland, 348pp. Craig, D., Hunt, W. & Kavanagh, A. (2016) Report on line-transect surveys for cetaceans conducted during the 2016 Mackerel Egg Survey. Report to the Marine Institute and National Parks and Wildlife Service. Irish Whale & Dolphin Group and University College Cork. 20pp. DEHLG (2009) *Conservation Plan for Cetaceans in Irish Waters.* Department of the Environment, Heritage and Local Government,

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	distribution of seabirds and cetaceans in the waters around Ireland. JNCC Report No. 267. Joint Nature Conservation Committee, Peterborough. 167pp. Reid, J.B., Evans, P.G.H. & Northridge, S.P. (2003) *Atlas of Cetacean Distribution in North-west European Waters.* Joint Nature Conservation Committee, Peterborough. 76pp. Rogan, E., Cañadas, A., Macleod, K., Santos, B., Mikkelsen, B., Uriarte, A., Van Canneyt, O., Vazquez, A.J. & Hammond, P.S. (2017) Distribution, abundance and habitat use of deep diving cetaceans in the North East Atlantic. *Deep Sea Research II* 141: 8-19. doi.org/10.1016/j.dsr2.2017.03.015 Rogan, E., Breen, P., Mackey, M., Cañadas, A., Scheidat, M., Geelhoed, S. & Jessopp, M. (2018) *Aerial surveys of cetaceans and seabirds in Irish waters: Occurrence, distribution and abundance in 2015-2017.* Department of Communications, Climate Action & Environment and National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland. 297pp. Wall, D., Murray, C., O'Brien, J., Kavanagh, L., Wilson, C., Ryan, C., Glanville, B., Williams, D., Enlander, I., O'Connor, I., McGrath, D., Whooley, P. & Berrow, S. (2013) *Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters 2005 - 2011*. Irish Whale and Dolphin Group, Kilrush, Co. Clare. 63pp.
4.2i Additional information	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. 149pp.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***585,000 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	

5.5 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*	
5.6 Long-term trend Period *Optional*	***1994-2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */* unknown	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 585,000 km²***	
	b) Indicate if operators were used (use these 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 range value derived from the range map referred to in 2.4 is considered to be the baseline for this species. As there is no evidence of a decline since the Directive came into force the current range is set as the FRR.	
5.11 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***
5.12 Additional information *Optional*	The natural range of long-finned pilot whales in Irish waters, and marine waters covered by the Directive, is a small component of the species' wider North Atlantic range (DEHLG, 2009; Rogan *et al.*, 2017; Minton *et al.*, 2018). The range map provided consists of the species' recorded and likely predominant natural range based on comparatively recent data (2001-2018) and expert judgement, and is partly derived from 2.3. It consists of a block of contiguous 50km x 50km grid cells distributed in Atlantic waters to the north, west and south-west of Ireland and now includes the relevant assessment area under the Marine Strategy Framework Directive. Prior to 1999-2000, survey effort targeting cetacean species in Irish offshore waters was comparatively limited in coverage, both spatially and temporally. Since 1999-2000 a number of dedicated multi-annual surveillance programmes for cetaceans have operated in Irish waters, with visual and acoustic surveys extending to the limits of Ireland's EEZ and beyond. With regard to this species it is considered that the years 2007-2018 represent an appropriate period for the evaluation of short-term trends since all survey efforts intensified further during this period. Sighting and acoustic records from ongoing dedicated surveillance effort in Irish waters (Baines *et al.*, 2013; Oudejans, 2014; Craig *et al.*, 2016; Frouin-Mouy *et al.*, 2017; Kavanagh *et al.*, 2017; O'Donnell *et al.*, 2018a; O'Donnell *et al.*, 2018b; Berrow *et al.*, 2018; Rogan *et al.*, 2018) provide no evidence of a decline in distribution/range in the recent past; therefore the short-term trend for Range is considered to be stable. The long-term trend over the period 1994-2018 is considered to be uncertain for this species due to limited data availability prior to 1999-2000, as outlined above. The range value derived from the map referred to above is considered to be the baseline for this species. This surface area calculation is greater than that reported in 2013 due to the integration of Ireland's MSFD assessment area within the range. Since there is no evidence of a decline in range since the Directive came into force the current range is set as the FRR. There is an assumption that the current range in Irish waters is large enough (a) to encompass all of the ecological variation required by this species during its occurrences therein and (b) to contribute to the long-term survival of the species.

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2013-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	***4,894***
	c) Maximum	***16,685***
	d) Best single value	
6.3 Type of estimate	*Best estimate / multi-year mean /* ***95% confidence interval*** */ minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*		
6.6 Population size Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing / decreasing /* ***uncertain*** */ unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain /* ***unknown***	

<table>
<tr><td rowspan="3">6.13 Long-term trend Magnitude

Optional</td><td>a) Minimum</td><td></td></tr>
<tr><td>b) Maximum</td><td></td></tr>
<tr><td>c) Confidence interval</td><td></td></tr>
<tr><td>6.14 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
<u>d) Insufficient or no data available</u></td></tr>
<tr><td rowspan="4">6.15 Favourable reference population
(using the unit in 6.2 or 6.4)</td><td colspan="2">a) Population size (with unit) or</td></tr>
<tr><td colspan="2"><u>b) Operator ≈ (approximately equal to)</u> or</td></tr>
<tr><td colspan="2">c) If favourable reference population 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">6.16 Change and reason for change in population size</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>6.17 Additional information

Optional</td><td colspan="2">Evidence from acoustic monitoring (Aguilar de Soto et al., 2004; Frouin-Mouy et al., 2017; Berrow et al., 2018) and multi-annual surveillance programmes (e.g., Ó Cadhla et al., 2004; Berrow et al., 2010; Wall et al., 2013; Oudejans, 2014; Craig et al., 2016; Kavanagh et al., 2017; Rogan et al., 2017; O’Donnell et al., 2018a; O’Donnell et al., 2018b; Rogan et al., 2018) demonstrate that long-finned pilot whales occur widely in Irish offshore waters and do so throughout the year.
Within the eastern North Atlantic c.76,000-257,000 whales could be attributable to deeper waters off western Europe including those shared by Spain, France, Ireland, Britain, Iceland and the Faroe Islands (Rogan et al., 2017). Yet recent and comprehensive data for the entire region of western Europe have been lacking, particularly with regard to sufficient temporal coverage (i.e., beyond one or more summer months) and spatial coverage (i.e., spanning continental shelf, slope and deeper waters, all of which may represent long-finned pilot whale habitat).
Comparable data for western European waters, that were derived</td></tr>
</table>

	from the SCANS-III aerial surveys in the summer of 2016, delivered a population estimate of 5,121 long-finned pilot whales (95% CI=1,654-15,855; Hammond *et al.*, 2017). In addition, parallel ship-based surveys yielded a further estimate of 20,656 (95% CI=9,501-44,908; Hammond *et al.*, 2017) for deeper offshore sectors. However both of these SCANS III survey components did not include Irish waters since projects under the ObSERVE Programme (i.e., Berrow *et al.*, 2018; Rogan *et al.*, 2018) were already under way. Long-finned pilot whale data from the ObSERVE Programme have not yet been integrated into a European-wide assessment of population size for this whale species. However the aerial surveys carried out under this programme were successful in enabling four separate abundance estimates (two summer, two winter) to be derived from the sighting data acquired in inshore and offshore Irish waters. The most robust of these four seasonal estimates (i.e., those with the lowest CV = 0.32; winter 2016) has been presented in 6.2 via minimum and maximum 95% Confidence Limits. The Favourable Reference Population has been set as approximately equal to the current Population to account for improved knowledge. Although the short-term trends are uncertain, this value is considered to represent the minimum necessary to ensure the long-term survival of the species.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*
7.5 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*

7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*
7.8 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*
7.9 Additional information *Optional*	Use of the range descriptor and range surface area calculation as proxies for habitat and habitat area are judged appropriate for this wide-ranging pelagic and deep-diving species. The species' natural range and thus habitat in Irish waters is considered to be a small component of its wider North Atlantic range (DEHLG, 2009; Olson, 2009; Hammond *et al.*, 2017; Rogan *et al.*, 2017; Berrow *et al.*, 2018; Minton *et al.*, 2018). The quality of habitat for long-finned pilot whale was determined by consideration of the relevant direct and indirect pressures thought to be acting on the species and/or its functional group, and its habitat within its natural environment. These pressures were evaluated in development of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009) and informed by more recent scientific surveillance (e.g., Baines *et al.*, 2013; Oudejans, 2014; Craig *et al.*, 2016; Kavanagh *et al.*, 2017; Berrow *et al.*, 2018; O'Donnell *et al.*, 2018a; O'Donnell *et al.*, 2018b; Rogan *et al.*, 2018), using available data concerning, *inter alia*, habitat use, population size, distribution and ecology, and threats to the species' protection (e.g., via natural/biological sources, human sectoral activities, management gaps, etc.). Although, relative to principal human maritime activity in Ireland, they are demonstrated to be a more offshore species, long-finned pilot whales may be subject to a number of local and/or regional environmental pressures throughout their range (DEHLG, 2009). However, based on current spatial and temporal data none are considered to be of sufficient impact on the species to be causing a significant deterioration in overall habitat quality in Ireland from a status that is sufficient for long-term survival. Long-term trends in habitat for long-finned pilot whale remain uncertain due to insufficient accurate data for this species prior to 1999-2000. However with improved surveillance (e.g., under the ObSERVE Programme) and very numerous ongoing records of long-finned pilot whales in the last 18 years, the short-term trend indicates the continued existence of sufficient quality habitat for the species.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**C09** Geotechnical surveying (M) **E02** Shipping lanes and ferry lanes transport operations (M)	**C09** Geotechnical surveying (M) **E02** Shipping lanes and ferry lanes transport operations (M)

8.2 Sources of information *Optional*	*https://www.npws.ie/marine/marine-species/cetaceans* *https://www.dccae.gov.ie/en-ie/natural-resources/topics/Oil-Gas-Exploration-Production/Pages/home.aspx*
8.3 Additional information *Optional*	Long-finned pilot whales may be subject to local and/or regional environmental pressures and threats throughout their North Atlantic range and in Irish inshore/offshore waters. In the development and preparation of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009), a comprehensive review of the pressures and threats believed and/or documented to be acting on this species and/or its functional group was undertaken. The main pressures thought to be acting on this species in Irish waters are considered to involve commercial shipping-based or vessel-based activities that occur primarily on a local or regional scale and/or on a temporary or intermittent basis (e.g., impacts arising from shipping movements or geophysical seismic exploration; DEHLG, 2009). Since long-finned pilot whale distribution is known to be primarily offshore in the Atlantic Ocean, where there is a documented pressure that may be regionally intensive the ranking given is one of medium importance, given also some uncertainties with regard to the species' movements and population/breeding structure (Minton *et al.*, 2018). It should be noted that in relation to seismic exploration, which tends to occur on a local or occasionally regional scale in the waters of Ireland's EEZ and is comparatively low in coverage relative to several other member states, a robust regulatory and management regime applies in order to avoid potentially significant impacts on all species of marine mammal. This regime takes cognisance of recent scientific research and surveillance findings (e.g., Baines *et al.*, 2013; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; Rogan *et al.*, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018) and it is expected that this practice will continue into the future. There is no evidence to suggest a change in the main pressures

	thought to be acting on this species in the near future (i.e., threats). However surveillance of the species and the pressures potentially acting upon it will continue, while the application of strong management measures (e.g., via the statutory/regulatory process) to avoid potentially significant impacts is also expected to continue.

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	Visual and acoustic records of long-finned pilot whale in Irish waters continue to indicate a wide and frequent occurrence of the species throughout the year, in deep oceanic waters and those overlying the continental slope and also parts of the continental shelf off western and south-western Ireland. Since many significant (i.e., high level) anthropogenic impacts that may affect this wide-ranging species' distribution are more localised in space and time within this extensive and diverse marine area, the Future prospects for the Range and Habitat for the species are considered to be Good. A number of pressures that could act upon this species have been identified. The effect of these pressures may operate on a temporary and/or regional scale and some are likely to continue to act as pressures into the future thereby constituting a potential threat. While the impacts on individuals or populations of long-finned pilot whale in Irish waters are not well understood, partly due to continuing uncertainty regarding the species' population trends and ecology within Ireland's marine area, ongoing threats as listed or identified into the future via surveillance will be managed appropriately. Therefore the Future prospects for the Population are considered to be Good.	

11 Conclusions

Assessment of conservation status at end of reporting period	
11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*

<table>
<tr><td>11.5 Overall assessment of Conservation Status</td><td colspan="3"><u>Favourable (FV)</u> / Inadequate (U1) / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>11.6 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">11.7 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 (11.5)</td><td>Overall trend in conservation status (11.6)</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 data</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>d) yes, due to the use of different method (including taxonomical change or use of different thresholds)</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>e) yes, but there is no information on the 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>11.8 Additional information

Optional</td><td colspan="3">Contemporary sightings of long-finned pilot whales and recent acoustic data indicate the wide and frequent occurrence of this species in deep oceanic waters and those overlying the continental slope, and also parts of the continental shelf (e.g., western Celtic Sea, Porcupine Bank). Hence the Range and Habitat for the species are considered to be Favourable.

While robust and long-term data on the species' population size and trends in Irish waters as a whole are not available, knowledge of its seasonal distribution and summer abundance in western European waters has improved significantly since the Directive came into force.

There has also recently been a very significant improvement in population abundance data from a large part of the Irish EEZ, yielding two summer and two winter estimates and associated 95%</td></tr>
</table>

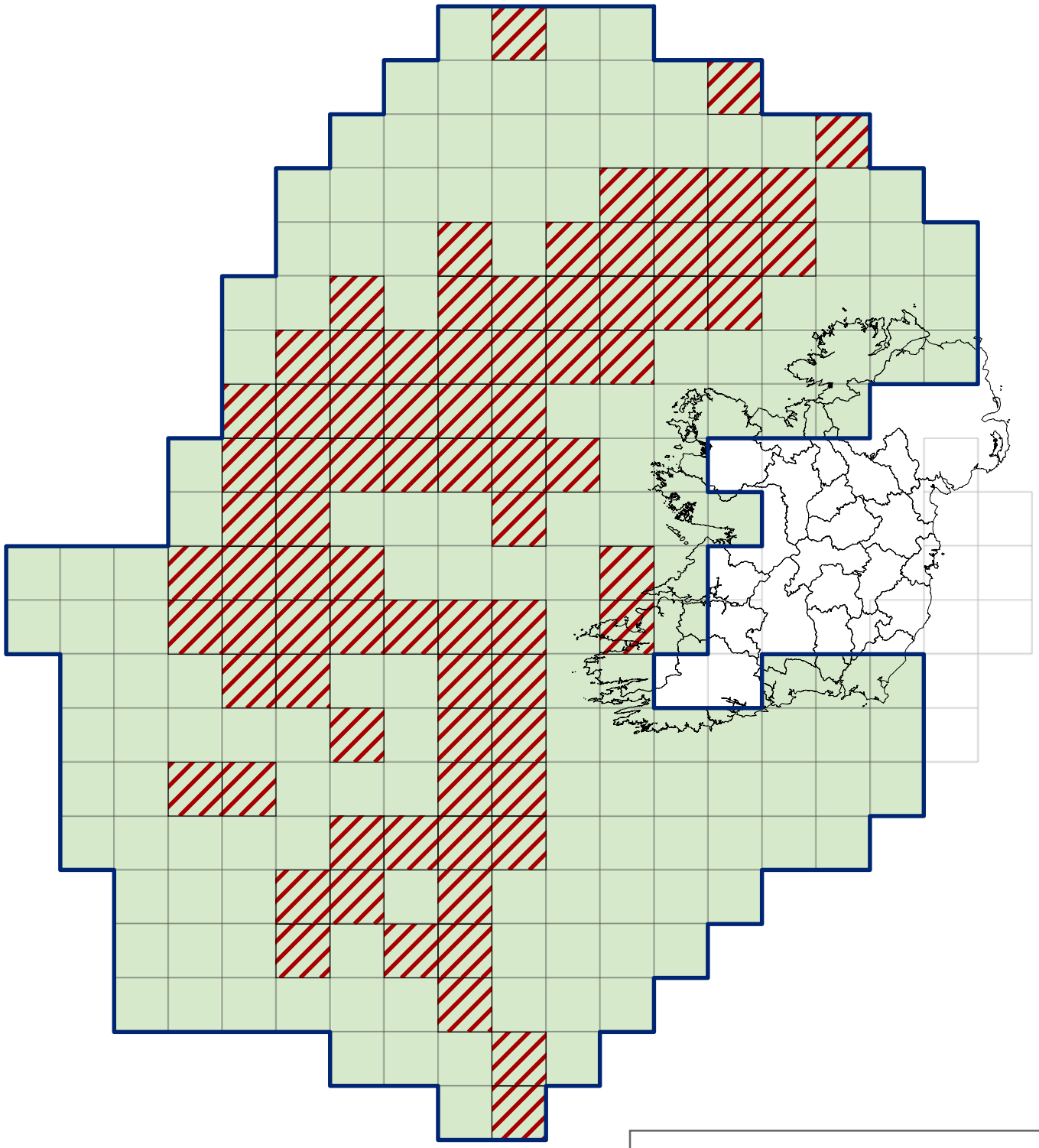
	Confidence Limits since 2014. Given available abundance estimates for a large portion of Irish waters and neighbouring parts of Europe, and the species' wide occurrence throughout the year, the Population parameter is considered to be Favourable. While there is uncertainty in the scientific understanding of northeast Atlantic populations of this species and their movements, it does not appear that human activity including targeted hunting in the Faroe Islands has brought about a significant decline at the population level (Minton *et al.*, 2018). However further research, repeated and accurate surveillance, and genetic evidence will be required to better inform this understanding. A number of pressures have been identified. While the effect of these pressures may act on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, none is considered to be of sufficient magnitude to be causing an adverse impact on populations of long-finned pilot whale in Irish waters. Ongoing threats as listed or identified into the future via surveillance will be managed appropriately. Hence the Future prospects for the species are considered to be Favourable. Based on the assessments for the Range, Population, Habitat and Future prospects parameters, the overall conclusion is that the Conservation Status of long-finned pilot whale in Ireland remains Favourable. This overall result is the same as in the previous two Article 17 assessments.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Long-finned pilot whale
Globicephala melas (2029)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 25 50 100 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***2030***
1.3 Species scientific name	*Grampus griseus*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Risso's dolphin (Deilf liath)
1.6i Species description	The Risso's dolphin is one of the larger dolphins occurring in Irish waters, its adults averaging up to 4.0m long. Found throughout the world's oceans and in the Atlantic from Norway to South Africa (Kiszka & Braulik, 2018), it is classified by the IUCN as a species of Least Concern since its global range and abundance indicate that the species is well above the thresholds for a threatened category. Risso's dolphins have historically been one of the least frequently recorded dolphin species in Ireland, especially offshore (see Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013). However records have been growing, perhaps partly due to increased or improved surveillance. They are quite readily identifiable at sea, having an unusually tall dorsal fin, no noticeable beak and with many individuals showing scarred whitened backs, especially in front of the dorsal fin. Although the species may conduct seasonal movements in some regions (DEHLG, 2009), separate breeding stocks and clear latitudinal patterns in movement by populations in the North Atlantic are not apparent (Baird, 2009). There is some evidence that western UK and Mediterranean populations may be genetically differentiated (Gaspari *et al.*, 2007), with those in the UK being less diverse genetically.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2013-2018***
2.3 Distribution map	Submitted
2.4 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*

2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	Over the last two decades there have been steadily growing records of Risso's dolphins in Irish offshore and coastal waters, particularly off the north, west and south of Ireland (e.g., Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013; Kavanagh *et al.*, 2017; Rogan *et al.*, 2018). The distribution map presented for this species represents all available live sighting records during extensive scientific research and monitoring in Irish waters between 2013 and 2018. The period selected for mapping represents a period of intensive and high quality surveillance for cetaceans in Irish waters across a range of research projects and monitoring programmes. The surveillance programmes, projects and publications that contributed sighting data to this distribution projection are cited as follows: Baines *et al.* (2013), Cronin & Barton (2014), Kavanagh *et al.* (2017), O'Donnell *et al.* (2017), O'Sullivan & Manning (2017), O'Brien & Berrow (2018), O'Donnell *et al.* (2018a), O'Donnell *et al.* (2018b) and Rogan *et al.* (2018). Along with the results of previous visual survey effort (e.g., Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Berrow *et al.*, 2010; Wall *et al.*, 2013), recent extensive ship-based and aerial surveys in summer (Hammond *et al.*, 2017; Rogan *et al.*, 2018) and winter (Rogan *et al.*, 2018), these data were integrated into the development of the species range map presented under section 2.5. It should be noted that the spatial and temporal distribution of Risso's dolphins could be somewhat underestimated due to the difficulty in discriminating many dolphin species from one another, particularly in the offshore Atlantic environment (e.g., see Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Wall *et al.*, 2013; Rogan *et al.*, 2018). Thus the distribution map presented does not include records where the observed species could not be distinguished, for example, from other members of the Family *Delphinidae* (e.g., Atlantic white-sided dolphin, Bottlenose dolphin) or the *unidentified dolphin* or *unidentified small cetacean* categories often used for indeterminate sightings. The distribution of recent sightings (e.g., in Baines *et al.*, 2013; Cronin & Barton, 2014; Kavanagh *et al.*, 2017; O'Donnell *et al.*, 2017; O'Brien & Berrow, 2018; O'Donnell *et al.*, 2018a; Rogan *et al.*, 2018) along with regional sighting records obtained across three preceding decades (e.g., Berrow *et al.*, 2002; Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013) indicate a predominant distribution in waters overlying the continental shelf and continental slope, although the species' occurrence in adjacent deeper ocean waters and topographical basins (e.g., the Porcupine Seabight and Rockall Trough) is increasingly shown. While all reliable cetacean records obtained in Irish waters were not available for use in this exercise, the map drawn for this species provides a good sample of its observed distribution within the period given in 2.2.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
4.2 Sources of information	Baines, M., Reichelt, M., Coles, D., Williams, A., Griffin, D. & Corkhill, O. (2013) Marine Mammal Observers' and passive acoustic monitoring operators' report during 3D seismic survey off southwest Ireland for KOSMOS. RPS Energy, Axminster, Devon, UK. 24pp. Baird, R.W. (2009) Risso's dolphin. *Grampus griseus*. In W.F. Perrin, B. Würsig, J.G.M. Thewissen (eds.). *Encyclopedia of Marine Mammals* – 2nd edition. Academic Press, Elsevier Inc. p.975-976.2 Berrow, S.D., Whooley, P. & Ferriss, S. (2002) *Irish Whale and Dolphin Group Cetacean Sighting Review (1991-2001)*. Irish Whale and Dolphin Group, Kilrush, Co. Clare. 34 pp. Berrow, S.D., Whooley, P., O'Connell, M. & Wall, D. (2010) *Irish Cetacean Review (2000-2009).* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 60pp. Berrow, S.D., O'Brien, J., Meade, R., Delarue, J., Kowarski, K., Martin, B., Moloney, J., Wall, D., Gillespie, D., Leaper, R., Gordon, J., Lee, A. & Porter, L. (2018) *Acoustic Surveys of Cetaceans in the Irish Atlantic Margin in 2015–2016: Occurrence, distribution and abundance.* Department of Communications, Climate Action & Environment and the National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland, 348pp. Cronin, C. & Barton, C. (2014) Cetacean monitoring during the Celtic Sea Herring Acoustic Survey (CSHAS) October 2014. Report to the National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Cork Ecology, Castlefreke, Clonakilty, Co. Cork. 24pp. DAHG (2014) *Guidance to Manage the Risk to Marine Mammals from Man-made Sound in Irish Waters*. Department of Arts, Heritage and the Gaeltacht, Dublin. 59pp. DEHLG (2009) *Conservation Plan for Cetaceans in Irish Waters.* Department of the Environment, Heritage and Local Government, 7 Ely Place, Dublin. 97pp. Hammond, P.S., Benke, H., Berggren, P., Borchers, D.L., Buckland,

S.T., Collet, A., Heide-Jorgensen, M.P., Heimlich-Boran, S., Hiby, A.R., Leopold, M.F. & Øien, N. (2002) Abundance of harbour porpoise and other cetaceans in the North Sea and adjacent waters. *Journal of Applied Ecology* 39: 361-376.

Hammond, P.S., Macleod, K., Burt, L. Cañadas, A., Lens, S. Mikkelsen, B., Rogan, E., Santos, B., Uriarte, A., Van Canneyt, O. & Vázquez, J.A. (2009) Cetacean Offshore Distribution and Abundance in the European Atlantic (CODA). Final report. University of St. Andrews, Scotland.

Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., K Macleod, K., Ridoux, V., Santos, M.B., Scheidat, M., Teilmann, J., Vingada, J. & Øien, N. (2017) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. Final project report. University of St. Andrews, Scotland. 40pp.

Kavanagh, A.S., Hunt, W., Richardson, N. & Jessopp, M. (2017) Cetaceans in Irish offshore waters: Final report of the SFI-KOSMOS Project 2015-2017. MaREI Centre, University College Cork. 66pp.

Kiszka, J. & Braulik, G. 2018. *Grampus griseus*. The IUCN Red List of Threatened Species 2018: e.T9461A50356660. http://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T9461A50356660.en.

McCauley, R.D. (2015) Offshore Irish noise logger program (March to September 2014): analysis of cetacean presence, and ambient and anthropogenic noise sources. Final project report R2015-01 to RPS MetOcean / Woodside Energy (Ireland) Pty Ltd. Project: CMST 1296. Curtin University, Western Australia. 110pp.

Ó Cadhla, O., Mackey, M., Aguilar de Soto, N., Rogan, E. & Connolly, N. (2004) Cetaceans and Seabirds of Ireland's Atlantic Margin. Volume II - Cetacean distribution and abundance. Report on research carried out under the Irish Petroleum Infrastructure Programme (PIP): Rockall Studies Group (RSG) projects 98/6 and 00/13, Porcupine Studies Group project P00/15 and Offshore Support Group (OSG) project 99/38. 82pp.

O'Brien, J. & Berrow, S.D. (2018) Harbour porpoise surveys in Blasket Islands SAC, 2018. Report to the National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. Irish Whale and Dolphin Group. 23pp.

O'Donnell, C., O'Malley, M., Lynch, D., Lyons, K., Keogh, N. & O'Driscoll, D. (2017) Celtic Sea Herring Acoustic Survey. Cruise Report 2017, 15 - 04 November, 2017. FSS Survey Series: 2017/04. Marine Institute, Oranmore, Co. Galway. 38pp.

O'Donnell, C., Johnston, G., Mullins, E., Keogh, N. & Power, J. (2018a) Blue Whiting Acoustic Survey Cruise Report. March 20 – April 06, 2018. FSS Survey Series: 2018/01. 31pp.

O'Donnell, C., O'Malley, M., Lynch, D., Mullins, E., Keogh, N., Power, J., Long, A. & Croot, P. (2018b) Western European Shelf Pelagic Acoustic Survey (WESPAS). 10 June – 24 July, 2018. FSS Survey

	Series: 2018/03. Marine Institute, Oranmore, Co. Galway. 65pp. O'Sullivan, C. & Manning, L. (2017) Cetacean monitoring undertaken during the Western European Shelf Pelagic Acoustic Survey (WESPAS), June - July 2017. Final report to the Marine Institute and National Parks and Wildlife Service. 38pp. Reid, J.B., Evans, P.G.H. & Northridge, S.P. (2003) *Atlas of Cetacean Distribution in North-west European Waters.* Joint Nature Conservation Committee, Peterborough. 76pp. Rogan, E., Breen, P., Mackey, M., Cañadas, A., Scheidat, M., Geelhoed, S. & Jessopp, M. (2018) *Aerial surveys of cetaceans and seabirds in Irish waters: Occurrence, distribution and abundance in 2015-2017.* Department of Communications, Climate Action & Environment and National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland. 297pp. Wall, D., Murray, C., O'Brien, J., Kavanagh, L., Wilson, C., Ryan, C., Glanville, B., Williams, D., Enlander, I., O'Connor, I., McGrath, D., Whooley, P. & Berrow, S. (2013) *Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters 2005 - 2011*. Irish Whale and Dolphin Group, Kilrush, Co. Clare. 63pp.
4.2i Additional information	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. 149pp.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***372,500 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	

5.6 Long-term trend Period *Optional*	***1994-2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */* unknown	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 372,500 km²***	
	b) Indicate if operators were used (use these 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 range value derived from the range map referred to in 2.4 is considered to be a new baseline for this species. As there is no evidence of a decline since the Directive came into force the current range is set as the FRR.	
5.11 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*	
5.12 Additional information *Optional*	The natural range of Risso's dolphins in Irish waters, and marine waters covered by the Directive, is a small component of the species' wider North Atlantic range (DEHLG, 2009; Baird, 2009; Hammond *et al.*, 2017; Rogan *et al.*, 2018), while recent evidence from repeated winter aerial surveys (Rogan *et al.*, 2018) has confirmed that the species occurs in Irish waters in all seasons.	

	The range map provided consists of the species' recorded and likely predominant natural range based on comparatively recent data (2001-2018) and expert judgement, and is partly derived from 2.3. It consists of a block of contiguous 50km x 50km grid cells distributed in Irish marine waters, excluding small enclosed shallow bays. Prior to 1999-2000, survey effort targeting cetacean species in Irish offshore waters was comparatively limited in coverage, both spatially and temporally. Since 1999-2000 a number of dedicated multi-annual surveillance programmes for cetaceans have operated in Irish waters, with visual and acoustic surveys extending to the limits of Ireland's EEZ and beyond. With regard to this species it is considered that the years 2007-2018 represent an appropriate period for the evaluation of short-term trends since all survey efforts intensified further during this period. Sighting records from ongoing dedicated surveillance effort in Irish waters (e.g., Berrow *et al.*, 2010; Baines *et al.* 2013; Wall *et al.*, 2013; Cronin & Barton, 2014; Kavanagh *et al.* 2017; O'Donnell *et al.*, 2017; O'Sullivan & Manning, 2017; O'Brien & Berrow, 2018; O'Donnell *et al.*, 2018a; O'Donnell *et al.*, 2018b and Rogan *et al.*, 2018) provide no evidence of a decline in distribution/range in the recent past; indeed there is evidence that the range is slightly larger than estimated in 2013, extending into deeper oceanic waters of the Rockall Trough and Porcupine Seabight. Therefore the short-term trend for Range is considered to be stable. The long-term trend over the period 1994-2018 is considered to be uncertain for this species due to limited data availability prior to 1999-2000, as outlined above. The range value derived from the map referred to above is considered to be a revised baseline for this species. This surface area calculation is slightly greater than that reported in 2013. Since there is no evidence of a decline in range since the Directive came into force the current range is set as the FRR. There is an assumption that the current range in Irish waters is large enough (a) to encompass all of the ecological variation required by this species during its occurrences therein and (b) to contribute to the long-term survival of the species.

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2013-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	***1,212***
	c) Maximum	***5,707***
	d) Best single value	

6.3 Type of estimate	*Best estimate / multi-year mean /* ***95% confidence interval*** */ minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*		
6.6 Population size Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing / decreasing /* ***uncertain*** */ unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain /* ***unknown***	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

<table>
<tr><td>6.14 Long-term trend
Method used

Optional</td><td>Select one of the following methods:

a) Complete survey or a statistically robust estimate
b) Based mainly on extrapolation from a limited amount of data
c) Based mainly on expert opinion with very limited data
<u>d) Insufficient or no data available</u></td></tr>
<tr><td rowspan="4">6.15 Favourable reference population
(using the unit in 6.2 or 6.4)</td><td>a) Population size (with unit) or</td></tr>
<tr><td>b) Indicate if operators were used (using symbols ≈, >, >>, <) or</td></tr>
<tr><td><u>c) Favourable reference population is unknown</u></td></tr>
<tr><td>d) Indicate method used to set reference value if other than operators

Robust data on Risso's dolphin population trends in Irish waters are not available and the figures presented in 6.2 are the first population size estimates for this species in Irish waters. These are based on the 95% Confidence Limits from two novel summer and winter coverages (i.e., four in total) of a large portion of Ireland's EEZ using aerial survey methods (see Rogan et al., 2018). Given substantial variability in estimates from individual seasonal coverages and the above circumstances it is not yet possible to determine a realistic baseline value since the Directive came into force; consequently the FRP remains unknown.</td></tr>
<tr><td>6.16 Change and reason for change in population size</td><td>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.

<table><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></table>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>6.17 Additional information

Optional</td><td>Evidence from multi-annual surveillance programmes (e.g., Ó Cadhla et al., 2004; Berrow et al., 2010; Wall et al., 2013; Cronin & Barton, 2014; O'Sullivan & Manning, 2016; Kavanagh et al., 2017; O'Donnell et al., 2017; O'Donnell et al., 2018a; O'Donnell et al., 2018b; Rogan et al., 2018) indicate that Risso's dolphins occur widely in Irish waters and do so throughout the year. This is particularly the case in continental shelf and slope habitats but also to a lesser degree in waters over 2,000m in depth.

However recent and comprehensive data for the entire region of western Europe have been lacking until recently, particularly with regard to sufficient temporal (i.e., beyond one or more summer months or one year) and spatial coverage (i.e., spanning continental</td></tr>
</table>

	shelf, slope and deeper abyssal waters, all of which may represent Risso's dolphin habitat). Within the North-East Atlantic, based on aerial survey effort approximately 11,000 Risso's dolphins were estimated to occur in the summer of 2016 in waters off northern and western Europe but excluding Ireland; a further 2,500 (approx.) were estimated from ship-based surveys in deeper abyssal waters to the west of France and the Bay of Biscay (Hammond *et al.*, 2017). Risso's dolphin data from Ireland's ObSERVE Programme (see Rogan *et al.*, 2018) have not yet been integrated into a European-wide assessment of population size for the species, although this should now be feasible given simultaneous aerial survey efforts in the summer of 2016 (Hammond *et al.*, 2017; Rogan *et al.*, 2018). In a new departure for data acquisition on Risso's dolphins in Ireland the aerial surveys carried out under this programme were successful in enabling four separate abundance estimates (two summer, two winter) to be derived from the sighting data acquired in inshore and offshore waters. The most robust of these four seasonal estimates (i.e., those with the lowest CV = 0.41; summer 2016) has been presented in 6.2 via minimum and maximum 95% Confidence Limits. Since the ObSERVE estimates for Risso's dolphin population size are new and variable figures depending on the season and year of coverage, and they represent the first such abundance estimates for Ireland, a realistic baseline value since the Directive came into force for the FRP remains unknown.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*

7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*
7.8 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*
7.9 Additional information *Optional*	Use of the range descriptor and range surface area calculation as proxies for habitat and habitat area are judged appropriate for this wide-ranging pelagic and deep-diving species. The species' natural range and thus habitat in Irish waters is a small component of its wider North Atlantic range (DEHLG, 2009; Baird, 2009; Wall *et al.*, 2013; Hammond *et al.*, 2017; Kiszka & Braulik, 2018; Rogan *et al.*, 2018). The quality of habitat for Risso's dolphin was determined by consideration of the relevant direct and indirect pressures thought to be acting on the species and/or its functional group, and its habitat within its natural environment. These pressures were evaluated in development of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009) and informed by more recent scientific surveillance (e.g., Baines *et al.*, 2013; Cronin & Barton, 2014; O'Sullivan & Manning, 2016; Kavanagh *et al.*, 2017; O'Donnell *et al.*, 2017; Berrow *et al.*, 2018; O'Donnell *et al.*, 2018a; O'Donnell *et al.*, 2018b; Rogan *et al.*, 2018), using available data concerning, *inter alia*, habitat use, population size, distribution and ecology, and threats to the species' protection (e.g., via natural/biological sources, human sectoral activities, management gaps, etc.). Risso's dolphins may be subject to a number of local and/or regional environmental pressures throughout their range in Irish waters (DEHLG, 2009). However, based on current spatial and temporal data none are considered to be of sufficient impact on the species to be causing a significant deterioration in overall habitat quality in Ireland from a status that is sufficient for long-term survival. Long-term trends in habitat for Risso's dolphin remain uncertain due to insufficient accurate data for this species prior to 1999-2000. However, with improved surveillance and numerous ongoing records

	of Risso's dolphins in the last 18 years, the short-term trend indicates the continued existence of sufficient quality habitat for the species.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**C09** Geotechnical surveying (M) **E02** Shipping lanes and ferry lanes transport operations (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M) **H02** Military, paramilitary or police exercises and operations in the freshwater and marine environment (M)	**C09** Geotechnical surveying (M) **E02** Shipping lanes and ferry lanes transport operations (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M) **H02** Military, paramilitary or police exercises and operations in the freshwater and marine environment (M)

8.2 Sources of information *Optional*	*https://www.npws.ie/marine/marine-species/cetaceans* *https://www.dccae.gov.ie/en-ie/natural-resources/topics/Oil-Gas-Exploration-Production/Pages/home.aspx* *https://www.agriculture.gov.ie/seafood/sea-fisheriespolicymanagementdivision/* *https://www.npws.ie/marine/best-practice-guidelines* *http://www.iwdg.ie/news/?id=2758*

8.3 Additional information *Optional*	Risso's dolphins may be subject to a number of local and/or regional environmental pressures and threats throughout their North Atlantic range (Kiszka & Braulik, 2018) and in Irish coastal/offshore waters. In the development and preparation of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009), a comprehensive review of the pressures and threats believed and/or documented to be acting on this species and/or its functional group was undertaken. The main pressures thought to be acting on this species in Irish waters are considered to involve commercial shipping-based or vessel-based activities that occur primarily on a local or regional scale and/or on a temporary or intermittent basis (e.g., impacts arising from shipping movements or geophysical seismic exploration; impacts from local/regional prey removal by fisheries; DEHLG, 2009). Among the potential pressures that may act on this species is the use of military sonars in the deeper ocean and adjacent continental margins which, while not employed by the Irish Naval Service, is known and documented to occur in the waters of Ireland's EEZ (e.g., McCauley, 2015; Berrow *et al.*, 2018). Such anthropogenic sound sources have been implicated previously in a number of stranding events involving deep-diving cetaceans (DAHG, 2014) and questions remain with regard to an unusual series of strandings of beaked whale species in western Ireland, the UK and adjacent states in August-September 2018 (DCHG, 2018 unpublished data; IWDG, 2018 unpublished data). Since the species is known to be deep-diving in its ecology, at least offshore (Baird, 2009; Kiszka & Braulik, 2018), and current Risso's dolphin distribution is known to be both offshore Atlantic and also inshore/coastal around Ireland, where a pressure may be regionally intensive the ranking given is one of medium importance. It should be noted that in relation to seismic exploration, which tends to occur on a local or occasionally regional scale in the waters of Ireland's EEZ and is comparatively low in coverage relative to several other member states, a robust regulatory and management regime applies in order to avoid potentially significant impacts on all species of marine mammal. This regime takes cognisance of recent scientific research and surveillance findings (e.g., Baines *et al.*, 2013; Cronin & Barton, 2014; O'Sullivan & Manning, 2016; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; O'Donnell *et al.*, 2017; Berrow *et al.*, 2018; O'Brien & Berrow, 2018; O'Donnell *et al.*, 2018a; O'Donnell *et al.*, 2018b; Rogan *et al.*, 2018) and it is expected that this practice will continue into the future. There is no evidence to suggest a change in the main pressures thought to be acting on this species in the near future (i.e., threats). However surveillance of the species and the pressures potentially acting upon it will continue, while the application of strong management measures (e.g., via the statutory/regulatory process) to avoid potentially significant impacts is also expected to continue.

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	*Good / Poor / Bad /* ***Unknown***
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	Visual records of Risso's dolphin in Irish waters indicate a wide and regular occurrence of the species throughout the year, in waters overlying the continental shelf and slope and also parts of some deeper oceanic basins. The species is also regularly recorded in all coastal waters, including in the Irish Sea. Since many significant (i.e., high level) anthropogenic impacts that may affect this wide-ranging species' distribution are more localised in space and time within this extensive and diverse marine area, the Future prospects for the Range and Habitat for the species are considered to be Good. A number of pressures that could act upon this species have been identified. The effect of these pressures may operate on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, thereby constituting a potential threat. The impacts on individuals or populations of Risso's dolphin in Irish waters are not well understood, partly due to continuing uncertainty regarding its population trends and ecology within Ireland's marine area. Therefore the Future prospects for the Population are considered to be Unknown.	

11 Conclusions

Assessment of conservation status at end of reporting period	
11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.2 Population	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1)/ Bad (U2) / Unknown (XX)*
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*

<table>
<tr><td rowspan="8">11.7 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 (11.5)</td><td>Overall trend in conservation status (11.6)</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 data</td><td><u>YES</u>/NO</td><td><u>YES</u>/NO</td></tr>
<tr><td>d) yes, due to the use of different method (including taxonomical change or use of different thresholds)</td><td><u>YES</u>/NO</td><td><u>YES</u>/NO</td></tr>
<tr><td>e) yes, but there is no information on the 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 / <u>improved knowledge or more accurate data</u> / 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>11.8 Additional information

Optional</td><td colspan="3">Contemporary sightings of Risso's dolphins indicate the wide and frequent occurrence of this species throughout Irish waters, from those overlying the continental shelf and continental slope to the margins of deeper ocean basins (e.g., Rockall Trough, Porcupine Seabight). Hence the Range and Habitat for the species are considered to be Favourable.

While robust and long-term data on Risso's dolphin population size and trends in Irish waters as a whole are not available, knowledge of the species' seasonal distribution and summer abundance in western European waters has improved significantly since the Directive came into force.

There has also recently been a very significant improvement in population abundance data from a large part of the Irish EEZ, yielding two summer and two winter estimates and associated 95% Confidence Limits since 2014.

However there is some uncertainty about the trajectory of northeast Atlantic populations of Risso's dolphin. Given available estimates for Irish and neighbouring European waters, which are variable and thus</td></tr>
</table>

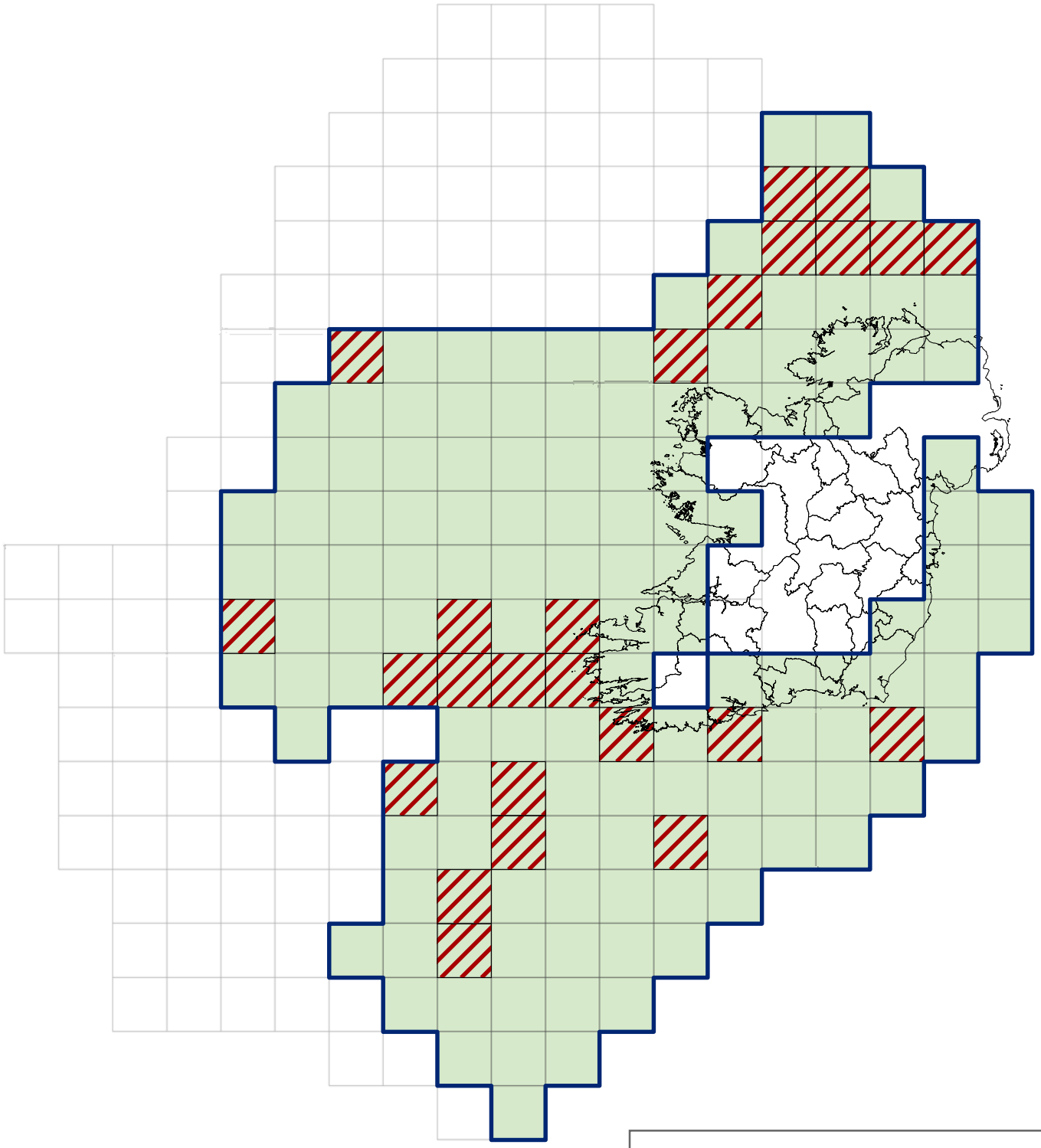
	far drawn from very different methodologies, the Population parameter is considered to be Unknown. A number of pressures have been identified. While the effect of these pressures may act on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, none is considered to be of sufficient magnitude to be causing an adverse impact on populations of Risso's dolphin in Irish waters. Ongoing threats as listed or identified into the future via surveillance will be managed appropriately. Hence the Future prospects for the species are considered to be Favourable. Based on the assessments for the Range, Population, Habitat and Future prospects parameters, the overall conclusion is that the Conservation Status of Risso's dolphin in Ireland is Favourable. This overall result is different from the previous two Article 17 assessments and it represents a significant improvement in knowledge of the species' conservation status.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Risso's dolphin
Grampus griseus (2030)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 25 50 100 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***2031***
1.3 Species scientific name	*Lagenorhynchus acutus*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Atlantic white-sided dolphin (Deilf bhánchliathánach Atlantach)
1.6i Species description	The Atlantic white-sided dolphin is one of several medium-sized dolphin species occurring in Irish waters, its adults averaging c. 2.2-2.7m in length. Like its close relative the White-beaked dolphin it is confined to the North Atlantic and mainly found in cold temperate and sub-polar waters; in the east from Iceland and northern Norway to the Iberian peninsula (Hammond *et al.*, 2008; Cipriano, 2009). Classified by the IUCN as a species of Least Concern since its broad range and abundance estimates indicate that it is well above the thresholds for a threatened category, it is quite commonly recorded in Irish Atlantic waters but less so coastally (Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013). White-sided dolphins can be difficult to distinguish at sea due to their small size, inconspicuous dorsal fin and black/dark grey dorsal colouration; they are more readily identified when breaking clear of the water, showing a characteristic short stubby beak, thick tail stock and horizontal white into sandy colour bands on the rear flanks of the body. While it is known to feed mainly on small pelagic schooling fish and squid, this species' wider population ecology in the North-East Atlantic is not well understood (Hammond *et al.*, 2008; DEHLG, 2009).

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2013-2018***
2.3 Distribution map	Submitted
2.4 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*

2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	Over the last two decades there have been continuing records of Atlantic white-sided dolphins in Irish offshore and coastal waters, particularly off the north, west and south-west of Ireland (e.g., Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013; Kavanagh *et al.*, 2017; Rogan *et al.*, 2018). The distribution map presented for this species represents all available live sighting records during extensive scientific research and monitoring in Irish waters between 2013 and 2018. The period selected for mapping represents a period of intensive and high quality surveillance for cetaceans in Irish waters across a range of research projects and monitoring programmes. The surveillance programmes, projects and publications that contributed sighting data to this distribution projection are cited as follows: Kavanagh *et al.* (2017), O'Donnell *et al.* (2018) and Rogan *et al.* (2018). Along with the results of previous visual survey effort (e.g., Hammond *et al.*, 2002; Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Berrow *et al.*, 2010; Wall *et al.*, 2013), recent extensive ship-based and aerial surveys in summer (Hammond *et al.*, 2017; Rogan *et al.*, 2018) and winter (Rogan *et al.*, 2018), these data were integrated into the development of the species range map presented under section 2.5. It should be noted that the spatial and temporal distribution of Atlantic white-sided dolphins could be somewhat underestimated due to the difficulty in discriminating many dolphin species from one another, particularly in the offshore Atlantic environment (e.g., see Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Wall *et al.*, 2013; Rogan *et al.*, 2018). Thus the distribution map presented does not include records where the observed species could not be distinguished, for example, from other members of the Family *Delphinidae* (e.g., White-beaked dolphin, Bottlenose dolphin) or the *unidentified dolphin* or *unidentified small cetacean* categories often used for indeterminate sightings. The distribution of recent sightings (e.g., Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; O'Donnell *et al.*, 2018; Rogan *et al.*, 2018) along with regional sighting records obtained across three preceding decades (e.g., Berrow *et al.*, 2002; Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Berrow *et al.*, 2010; Wall *et al.*, 2013) indicate a predominant distribution in waters overlying the outer continental shelf and the continental slope plus adjacent deeper ocean waters and topographical basins (e.g., the Porcupine Seabight and Rockall Trough). While all reliable cetacean records obtained in Irish waters were not available for use in this exercise, the map drawn for this species provides a good sample of its observed distribution within the period given in 2.2.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
4.2 Sources of information	Baines, M., Reichelt, M., Coles, D., Williams, A., Griffin, D. & Corkhill, O. (2013) Marine Mammal Observers' and passive acoustic monitoring operators' report during 3D seismic survey off southwest Ireland for KOSMOS. RPS Energy, Axminster, Devon, UK. 24pp. Berrow, S.D., Whooley, P. & Ferriss, S. (2002) *Irish Whale and Dolphin Group Cetacean Sighting Review (1991-2001)*. Irish Whale and Dolphin Group, Kilrush, Co. Clare. 34 pp. Berrow, S.D., Whooley, P., O'Connell, M. & Wall, D. (2010) *Irish Cetacean Review (2000-2009).* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 60pp. Cipriano, F. (2009) Atlantic white-sided dolphin*. Lagenorhynchus acutus.* In W.F. Perrin, B. Würsig, J.G.M. Thewissen (eds.). *Encyclopedia of Marine Mammals* – 2nd edition. Academic Press, Elsevier Inc. p.56-58. DEHLG (2009) *Conservation Plan for Cetaceans in Irish Waters.* Department of the Environment, Heritage and Local Government, 7 Ely Place, Dublin. 97pp. Hammond, P.S., Benke, H., Berggren, P., Borchers, D.L., Buckland, S.T., Collet, A., Heide-Jorgensen, M.P., Heimlich-Boran, S., Hiby, A.R., Leopold, M.F. & Øien, N. (2002) Abundance of harbour porpoise and other cetaceans in the North Sea and adjacent waters. *Journal of Applied Ecology* 39: 361-376. Hammond, P.S., Bearzi, G., Bjørge, A., Forney, K., Karczmarski, L., Kasuya, T., Perrin, W.F., Scott, M.D., Wang, J.Y., Wells, R.S. & Wilson, B. (2008) *Lagenorhynchus acutus*. In IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. http://www.iucnredlist.org. Hammond, P.S., Macleod, K., Burt, L. Cañadas, A., Lens, S. Mikkelsen, B., Rogan, E., Santos, B., Uriarte, A., Van Canneyt, O. & Vázquez, J.A. (2009) Cetacean Offshore Distribution and Abundance in the European Atlantic (CODA). Final report. University of St. Andrews, Scotland. Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., K Macleod, K., Ridoux, V., Santos, M.B., Scheidat, M., Teilmann, J., Vingada, J. & Øien, N. (2017) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the

	SCANS-III aerial and shipboard surveys. Final project report. University of St. Andrews, Scotland. 40pp. Kavanagh, A.S., Hunt, W., Richardson, N. & Jessopp, M. (2017) Cetaceans in Irish offshore waters: Final report of the SFI-KOSMOS Project 2015-2017. MaREI Centre, University College Cork. 66pp. Ó Cadhla, O., Mackey, M., Aguilar de Soto, N., Rogan, E. & Connolly, N. (2004) Cetaceans and Seabirds of Ireland's Atlantic Margin. Volume II - Cetacean distribution and abundance. Report on research carried out under the Irish Petroleum Infrastructure Programme (PIP): Rockall Studies Group (RSG) projects 98/6 and 00/13, Porcupine Studies Group project P00/15 and Offshore Support Group (OSG) project 99/38. 82pp. O'Donnell, C., O'Malley, M., Lynch, D., Mullins, E., Keogh, N., Power, J., Long, A. & Croot, P. (2018) *Western European Shelf Pelagic Acoustic Survey (WESPAS). 10 June – 24 July, 2018*. FSS Survey Series: 2018/03. Marine Institute, Oranmore, Co. Galway. 65pp. Reid, J.B., Evans, P.G.H. & Northridge, S.P. (2003) *Atlas of Cetacean Distribution in North-west European Waters.* Joint Nature Conservation Committee, Peterborough. 76pp. Rogan, E., Breen, P., Mackey, M., Cañadas, A., Scheidat, M., Geelhoed, S. & Jessopp, M. (2018) *Aerial surveys of cetaceans and seabirds in Irish waters: Occurrence, distribution and abundance in 2015-2017.* Department of Communications, Climate Action & Environment and National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland. 297pp. Wall, D., Murray, C., O'Brien, J., Kavanagh, L., Wilson, C., Ryan, C., Glanville, B., Williams, D., Enlander, I., O'Connor, I., McGrath, D., Whooley, P. & Berrow, S. (2013) *Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters 2005 - 2011.* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 63pp.
4.2i Additional information	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. 149pp.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***585,000 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend	**a) Minimum**	

Magnitude *Optional*	**b) Maximum**	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994-2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */* unknown	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 585,000 km²***	
	b) Indicate if operators were used (use these 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 range value derived from the range map referred to in 2.4 is considered to be a new baseline for this species. As there is no evidence of a decline since the Directive came into force the current range is set as the FRR.	
5.11 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*
5.12 Additional information *Optional*	The natural range of Atlantic white-sided dolphins in Irish waters, and marine waters covered by the Directive, is a small component of the species' wider North Atlantic range (Hammond *et al.*, 2008; DEHLG, 2009; Cipriano, 2009; Hammond *et al.*, 2017; Rogan *et al.*, 2018), while recent evidence from repeated winter aerial surveys (Rogan *et al.*, 2018) has confirmed that the species occurs in Irish waters in all seasons. The range map provided consists of the species' recorded and likely predominant natural range based on comparatively recent data (2001-2018) and expert judgement, and is partly derived from 2.3. It consists of a block of contiguous 50km x 50km grid cells distributed in Irish marine waters, in coastal areas excluding small enclosed shallow bays, and now includes the relevant assessment area under the Marine Strategy Framework Directive. Prior to 1999-2000, survey effort targeting cetacean species in Irish offshore waters was comparatively limited in coverage, both spatially and temporally. Since 1999-2000 a number of dedicated multi-annual surveillance programmes for cetaceans have operated in Irish waters, with visual and acoustic surveys extending to the limits of Ireland's EEZ and beyond. With regard to this species it is considered that the years 2007-2018 represent an appropriate period for the evaluation of short-term trends since all survey efforts intensified further during this period. Sighting records from ongoing dedicated surveillance effort in Irish waters (e.g., Berrow *et al.*, 2010; Wall *et al.*, 2013; Kavanagh *et al.* 2017; Rogan *et al.*, 2018) provide no evidence of a decline in distribution/range in the recent past. Therefore the short-term trend for range is considered to be stable. The long-term trend over the period 1994-2018 is considered to be uncertain for this species due to limited data availability prior to 1999-2000, as outlined above. The range value derived from the map referred to above is considered to be a revised baseline for this species. This surface area calculation is slightly greater than that reported in 2013. Since there is no evidence of a decline in range since the Directive came into force, the current range is set as the FRR. There is an assumption that the current range in Irish waters is large enough (a) to encompass all of the ecological variation required by this species during its occurrences therein and (b) to contribute to the long-term survival of the species.

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2013-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	***1,092***
	c) Maximum	***3,382***
	d) Best single value	
6.3 Type of estimate	*Best estimate / multi-year mean /* ***95% confidence interval*** */ minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*		
6.6 Population size Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing / decreasing /* ***uncertain*** */ unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain /* ***unknown***	

<table>
<tr><td rowspan="3">6.13 Long-term trend
Magnitude

Optional</td><td>a) Minimum</td><td></td></tr>
<tr><td>b) Maximum</td><td></td></tr>
<tr><td>c) Confidence interval</td><td></td></tr>
<tr><td>6.14 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
<u>d) Insufficient or no data available</u></td></tr>
<tr><td rowspan="4">6.15 Favourable reference population
(using the unit in 6.2 or 6.4)</td><td colspan="2">a) Population size (with unit) or</td></tr>
<tr><td colspan="2">b) Indicate if operators were used (using symbols ≈, >, >>, <) or</td></tr>
<tr><td colspan="2"><u>c) Favourable reference population is unknown</u></td></tr>
<tr><td colspan="2">d) Indicate method used to set reference value if other than operators
Robust data on Atlantic white-sided dolphin population trends in Irish waters are not available and the figures presented in 6.2 are only the second population size estimates for this species in Irish waters, a previous estimate having been achieved from ship-based survey data collected in the summer of 2000 (Ó Cadhla et al., 2004). The estimates presented here are based on the 95% Confidence Limits from two novel summer and winter coverages (i.e., four in total) of a large portion of Ireland's EEZ using aerial survey methods (see Rogan et al., 2018). Given variability in the above survey methods and in estimates from individual seasonal coverages by aerial means it is not yet possible to determine a realistic baseline value since the Directive came into force; consequently the FRP remains unknown.</td></tr>
<tr><td rowspan="6">6.16 Change and reason for change in population size</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>6.17 Additional information

Optional</td><td colspan="2">Evidence from multi-annual surveillance programmes (e.g., Ó Cadhla et al., 2004; Berrow et al., 2010; Wall et al., 2013; Kavanagh et al., 2017; Rogan et al., 2018) indicate that Atlantic white-sided dolphins occur widely in Irish waters and do so throughout the year. This is particularly the case in outer continental shelf and slope habitats and also in waters over 2,000m in depth.</td></tr>
</table>

	However recent and comprehensive data for the entire region of western Europe have been lacking until recently, particularly with regard to sufficient temporal (i.e., beyond one or more summer months or one year) and spatial coverage (i.e., spanning continental shelf, slope and deeper abyssal waters, all of which may represent Atlantic white-sided dolphin habitat). Within the North-East Atlantic, based on aerial survey effort approximately 2,200 Atlantic white-sided dolphins were estimated to occur in the summer of 2016 in waters off north-western Europe but excluding Ireland (Hammond *et al.*, 2017). A further 13,322 white-sided dolphins were estimated from ship-based survey data collected further offshore during the same period (Hammond *et al.*, 2017). Atlantic white-sided dolphin data from Ireland's ObSERVE Programme (see Rogan *et al.*, 2018) have not yet been integrated into a European-wide assessment of population size for the species, although this should now be feasible given simultaneous aerial survey efforts in the summer of 2016 (Hammond *et al.*, 2017; Rogan *et al.*, 2018). In a new departure for data acquisition on Atlantic white-sided dolphins in Ireland, the aerial surveys carried out under this programme were successful in enabling four separate abundance estimates to be derived from the sighting data acquired in inshore and offshore waters. The most robust of these estimates (i.e., those with the lowest CV = 0.46; combined summer 2015 + summer 2016 data) has been presented in 6.2 via minimum and maximum 95% Confidence Limits. Since the ObSERVE estimates for Atlantic white-sided dolphin population size are new in methodological terms and are variable figures depending on the season and year of coverage, and they represent the first such abundance estimates for Ireland, a realistic baseline value since the Directive came into force, the FRP, remains unknown.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***

7.4 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*
7.8 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*
7.9 Additional information *Optional*	Use of the range descriptor and range surface area calculation as proxies for habitat and habitat area are judged appropriate for this wide-ranging pelagic species. The species' natural range and thus habitat in Irish waters is a small component of its wider North Atlantic range (Hammond *et al.*, 2008; Cipriano, 2009; DEHLG, 2009; Wall *et al.*, 2013; Hammond *et al.*, 2017; Rogan *et al.*, 2018). The quality of habitat for Atlantic white-sided dolphin was determined by consideration of the relevant direct and indirect pressures thought to be acting on the species and/or its functional group, and its habitat within its natural environment. These pressures were evaluated in development of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009) and informed by more recent scientific surveillance (e.g., Baines *et al.*, 2013; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; Rogan *et al.*, 2018), using available data concerning, *inter alia*, habitat use, population size, distribution and ecology, and threats to the species' protection (e.g., via natural/biological sources, human sectoral activities, management gaps, etc.). Atlantic white-sided dolphins may be subject to a number of local and/or regional environmental pressures throughout their range in Irish waters (DEHLG, 2009). However, based on current spatial and temporal data none are considered to be of sufficient impact on the species to be causing a significant deterioration in overall habitat quality in Ireland from a status that is sufficient for long-term survival. Long-term trends in habitat for Atlantic white-sided dolphin remain uncertain due to insufficient accurate data for this species prior to

	1999-2000. However, with improved surveillance and numerous ongoing records of Atlantic white-sided dolphins in the last 18 years, the short-term trend indicates the continued existence of sufficient quality habitat for the species.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**C09** Geotechnical surveying (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M)	**C09** Geotechnical surveying (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M)

8.2 Sources of information *Optional*	*https://www.npws.ie/marine/marine-species/cetaceans* *https://www.dccae.gov.ie/en-ie/natural-resources/topics/Oil-Gas-Exploration-Production/Pages/home.aspx* *https://www.agriculture.gov.ie/seafood/sea-fisheriespolicymanagementdivision/*
8.3 Additional information *Optional*	Atlantic white-sided dolphins may be subject to a number of local and/or regional environmental pressures and threats throughout their North Atlantic range (Hammond *et al.*, 2008) and in Irish coastal/offshore waters. In the development and preparation of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009), a comprehensive review of the pressures and threats believed and/or documented to be acting on this species and/or its functional group was undertaken. The main pressures thought to be acting on this species in Irish waters are considered to involve commercial shipping-based or vessel-based activities that occur primarily on a local or regional scale and/or on a temporary or intermittent basis (e.g., impacts arising from geophysical seismic exploration; impacts from local/regional prey removal by fisheries; DEHLG, 2009). Since the species is known to be broadly pelagic in its ecology (Hammond *et al.*, 2008; Cipriano, 2009) and current Atlantic white-sided dolphin distribution is known to be both offshore Atlantic and more coastal off north-western Ireland, where a pressure may be regionally intensive the ranking given is one of medium importance. It should be noted that in relation to seismic exploration, which tends to occur on a local or occasionally regional scale in the waters of

	Ireland's EEZ and is comparatively low in coverage relative to several other member states, a robust regulatory and management regime applies in order to avoid potentially significant impacts on all species of marine mammal. This regime takes cognisance of recent scientific research and surveillance findings (e.g., Baines *et al.*, 2013; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; Rogan *et al.*, 2018) and it is expected that this practice will continue into the future. There is no evidence to suggest a change in the main pressures thought to be acting on this species in the near future (i.e., threats). However surveillance of the species and the pressures potentially acting upon it will continue, while the application of strong management measures (e.g., via the statutory/regulatory process) to avoid potentially significant impacts is also expected to continue.

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	*Good / Poor / Bad /* ***Unknown***
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	Visual records of Atlantic white-sided dolphin in Irish waters indicate a wide and quite regular occurrence of the species in waters overlying the outer continental shelf and slope, and also deeper oceanic basins. Since many significant (i.e., high level) anthropogenic impacts that may affect this wide-ranging species' distribution are more localised in space and time within this extensive and diverse marine area, the Future prospects for the Range and Habitat for the species are considered to be Good. A number of pressures that could act upon this species have been identified. The effect of these pressures may operate on a temporary and/or regional scale and some are likely to continue to act as pressures into the future thereby constituting a potential threat. While the impacts on individuals or populations of Atlantic white-sided dolphin in Irish waters are not well understood, partly due to continuing uncertainty regarding its population trends and ecology within Ireland's marine area, ongoing threats as listed or identified into the future via surveillance will be managed appropriately in Ireland. Therefore the Future prospects for the Population are considered to be Unknown.	

<table>
<tr><th colspan="4">11 Conclusions</th></tr>
<tr><td colspan="4">Assessment of conservation status at end of reporting period</td></tr>
<tr><td>11.1 Range</td><td colspan="3"><u>Favourable (FV)</u> / Inadequate (U1) / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>11.2 Population</td><td colspan="3">Favourable (FV) / Inadequate (U1) / Bad (U2) / <u>Unknown (XX)</u></td></tr>
<tr><td>11.3 Habitat for the species</td><td colspan="3"><u>Favourable (FV)</u> / Inadequate (U1) / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>11.4 Future prospects</td><td colspan="3"><u>Favourable (FV)</u> / Inadequate (U1)/ Bad (U2) / Unknown (XX)</td></tr>
<tr><td>11.5 Overall assessment of Conservation Status</td><td colspan="3"><u>Favourable (FV)</u> / Inadequate (U1) / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>11.6 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">11.7 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 (11.5)</td><td>Overall trend in conservation status (11.6)</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 data</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>d) yes, due to the use of different method (including taxonomical change or use of different thresholds)</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>e) yes, but there is no information on the 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>11.8 Additional information

Optional</td><td colspan="3">Contemporary sightings of Atlantic white-sided dolphins indicate a wide occurrence of this species throughout Irish offshore waters, from those overlying the outer continental shelf and continental slope to deeper ocean basins (e.g., Rockall Trough, Porcupine</td></tr>
</table>

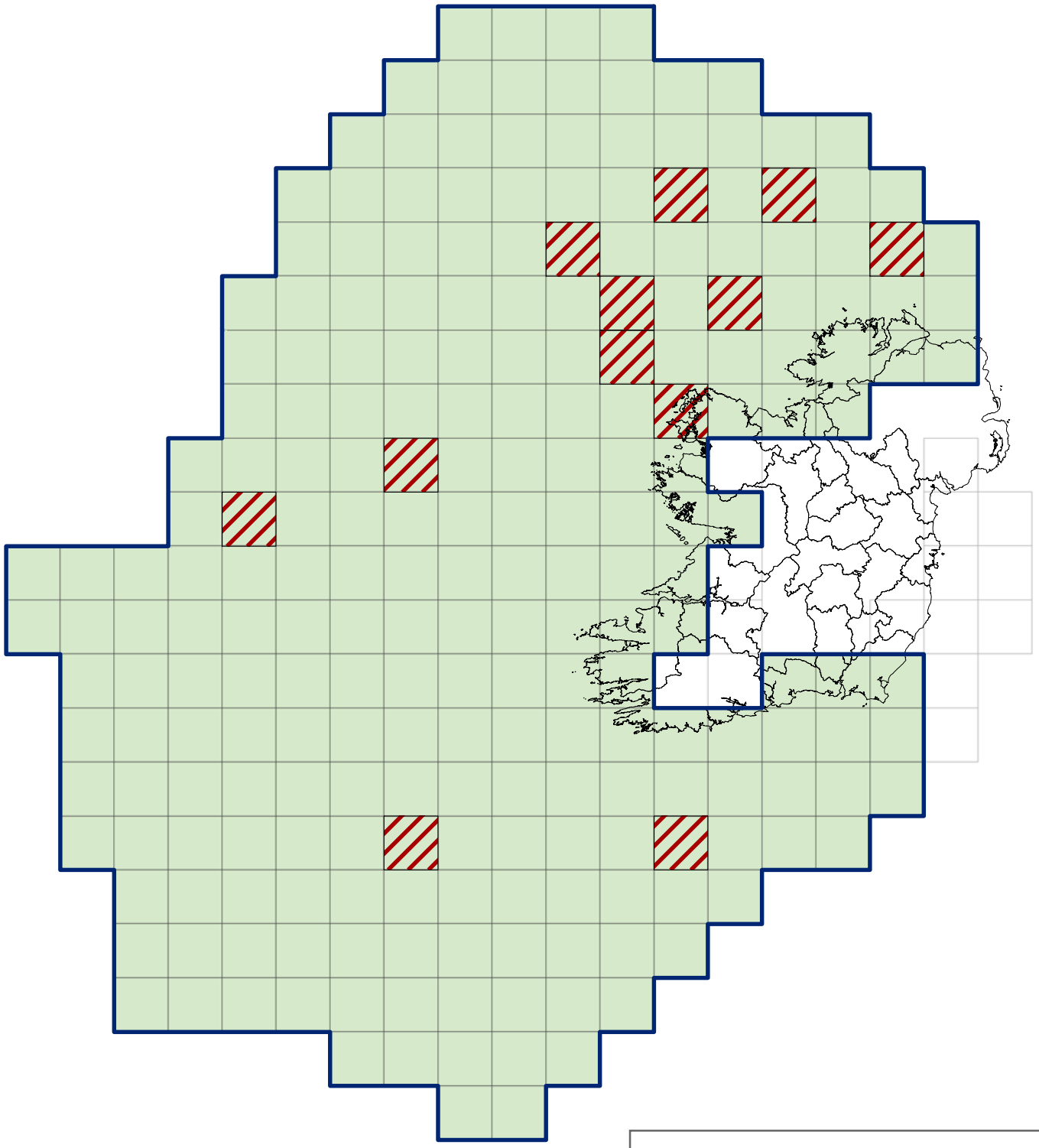
	Seabight). Hence the Range and Habitat for the species are considered to be Favourable. While robust and long-term data on Atlantic white-sided dolphin population size and trends in Irish waters as a whole are not available, knowledge of the species' seasonal distribution and summer abundance in western European waters has improved since the Directive came into force. There has also recently been an improvement in population abundance data from a large part of the Irish EEZ, yielding new estimates and associated 95% Confidence Limits based on dedicated cetacean surveillance using aerial methods since 2015. However there is some uncertainty in the trajectory of North-East Atlantic populations of Atlantic white-sided dolphin. Given available estimates for Irish waters, which are variable and thus far drawn from very different methodologies, the status of the Population parameter is considered to be Unknown. A number of pressures have been identified. While the effect of these pressures may act on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, none is considered to be of sufficient magnitude to be causing an adverse impact on Range or Habitat of Atlantic white-sided dolphin in Irish waters. Ongoing threats as listed or identified into the future via surveillance will be managed appropriately. Hence the Future prospects for the species are considered to be Favourable. Based on the assessments for the Range, Population, Habitat and Future prospects parameters, the overall conclusion is that the Conservation Status of Atlantic white-sided dolphin in Ireland remains Favourable. This overall result is the same as the previous Article 17 assessment.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

White-sided dolphin
Lagenorhynchus acutus (2031)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 25 50 100 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***2032***
1.3 Species scientific name	*Lagenorhynchus albirostris*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	White-beaked dolphin (Deilf shocbhán)
1.6i Species description	The white-beaked dolphin is one of several medium-sized dolphin species confined to the Northern Hemisphere where it is predominantly found in cold temperate and sub-polar waters. In the North-East Atlantic it occurs from Iceland and northern Norway south to the Bay of Biscay and Portugal (Kinze, 2009; Kiszka & Braulik, 2018). Classified by the IUCN as a species of Least Concern since its broad North Atlantic range, abundance and status indicate that it is well above the thresholds for a threatened category, white-beaked dolphins are regularly recorded in Irish offshore waters and coastally (e.g., Ó Cadhla *et al.*, 2004; Wall *et al.*, 2013; Kavanagh *et al.*, 2017). Although challenging to distinguish from other dolphin species at sea, white-beaked dolphins are quite readily identifiable at close range via their characteristic short stub-like white/grey beak, conspicuously tall dorsal fin relative to body size, stocky appearance and large pale white-coloured bands or patches on the flanks of the body. Known to feed on a variety of small pelagic schooling fish, squid and crustaceans, white-beaked dolphins do not currently demonstrate separate breeding stocks or clear patterns in movement in the eastern North Atlantic (DEHLG, 2009; Kinze, 2009; Kiszka & Braulik, 2018).

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2013-2018***
2.3 Distribution map	Submitted
2.4 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*

2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	Over the last two decades there have been steadily growing records of White-beaked dolphins in Irish offshore and coastal waters, particularly off the north, west and south of Ireland (e.g., Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013; Kavanagh *et al.*, 2017; Rogan *et al.*, 2018). The distribution map presented for this species represents all available live sighting records during extensive scientific research and monitoring in Irish waters between 2013 and 2018. The period selected for mapping represents a period of intensive and high quality surveillance for cetaceans in Irish waters across a range of research projects and monitoring programmes. The surveillance programmes, projects and publications that contributed sighting data to this distribution projection are cited as follows: Kavanagh *et al.* (2017) and Rogan *et al.* (2018). Along with the results of previous visual survey effort (e.g., Hammond *et al.*, 2002; Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Berrow *et al.*, 2010; Wall *et al.*, 2013), recent extensive ship-based and aerial surveys in summer (Hammond *et al.*, 2017; Rogan *et al.*, 2018) and winter (Rogan *et al.*, 2018), these data were integrated into the development of the species range map presented under section 2.5. It should be noted that the spatial and temporal distribution of White-beaked dolphins could be somewhat underestimated due to the difficulty in discriminating many dolphin species from one another, particularly in the offshore Atlantic environment (e.g., see Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Wall *et al.*, 2013; Rogan *et al.*, 2018). Thus the distribution map presented does not include records where the observed species could not be distinguished, for example, from other members of the Family *Delphinidae* (e.g., Atlantic white-sided dolphin, Bottlenose dolphin) or the *unidentified dolphin* or *unidentified small cetacean* categories often used for indeterminate sightings. The distribution of recent sightings (e.g., Kavanagh *et al.*, 2017; Rogan *et al.*, 2018) along with regional sighting records obtained across three preceding decades (e.g., Berrow *et al.*, 2002; Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013) indicate a predominant distribution in waters overlying the continental shelf and continental slope, although the species' occurrence in adjacent deeper ocean waters and topographical basins (e.g., the Porcupine Seabight and Rockall Trough) is increasingly shown. While all reliable cetacean records obtained in Irish waters were not available for use in this exercise, the map drawn for this species provides a good sample of its observed distribution within the period given in 2.2.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
4.2 Sources of information	Baines, M., Reichelt, M., Coles, D., Williams, A., Griffin, D. & Corkhill, O. (2013) Marine Mammal Observers' and passive acoustic monitoring operators' report during 3D seismic survey off southwest Ireland for KOSMOS. RPS Energy, Axminster, Devon, UK. 24pp. Berrow, S.D., Whooley, P. & Ferriss, S. (2002) *Irish Whale and Dolphin Group Cetacean Sighting Review (1991-2001)*. Irish Whale and Dolphin Group, Kilrush, Co. Clare. 34 pp. Berrow, S.D., Whooley, P., O'Connell, M. & Wall, D. (2010) *Irish Cetacean Review (2000-2009).* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 60pp. DEHLG (2009) *Conservation Plan for Cetaceans in Irish Waters.* Department of the Environment, Heritage and Local Government, Dublin. 97pp. Hammond, P.S., Benke, H., Berggren, P., Borchers, D.L., Buckland, S.T., Collet, A., Heide-Jorgensen, M.P., Heimlich-Boran, S., Hiby, A.R., Leopold, M.F. & Øien, N. (2002) Abundance of harbour porpoise and other cetaceans in the North Sea and adjacent waters. *Journal of Applied Ecology* 39: 361-376. Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., K Macleod, K., Ridoux, V., Santos, M.B., Scheidat, M., Teilmann, J., Vingada, J., & Øien, N. (2017) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. Final project report. University of St. Andrews, Scotland. 40pp. Hammond, P.S., Macleod, K., Burt, L. Cañadas, A., Lens, S. Mikkelsen, B., Rogan, E., Santos, B., Uriarte, A., Van Canneyt, O. & Vázquez, J.A. (2009) Cetacean Offshore Distribution and Abundance in the European Atlantic (CODA). Final eeport. University of St. Andrews, Scotland. Kavanagh, A.S., Hunt, W., Richardson, N. & Jessopp, M. (2017) Cetaceans in Irish offshore waters: Final report of the SFI-KOSMOS Project 2015-2017. MaREI Centre, University College Cork. 66pp. Kinze, C.C. (2009) White-beaked dolphin. *Lagenorhynchus albirostris*. In W.F. Perrin, B. Würsig, J.G.M. Thewissen (eds.). *Encyclopedia of Marine Mammals* – 2nd edition. Academic Press, Elsevier Inc. p.1255-1258. Kiszka, J. & Braulik, G. (2018) *Lagenorhynchus albirostris*. The IUCN

	Red List of Threatened Species 2018: e.T11142A50361346. http://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T11142A50361346.en. Ó Cadhla, O., Mackey, M., Aguilar de Soto, N., Rogan, E. & Connolly, N. (2004) Cetaceans and Seabirds of Ireland's Atlantic Margin. Volume II - Cetacean distribution and abundance. Report on research carried out under the Irish Petroleum Infrastructure Programme (PIP): Rockall Studies Group (RSG) projects 98/6 and 00/13, Porcupine Studies Group project P00/15 and Offshore Support Group (OSG) project 99/38. 82pp. Reid, J.B., Evans, P.G.H. & Northridge, S.P. (2003) *Atlas of Cetacean Distribution in North-west European Waters.* Joint Nature Conservation Committee, Peterborough. 76pp. Rogan, E., Breen, P., Mackey, M., Cañadas, A., Scheidat, M., Geelhoed, S. & Jessopp, M. (2018) *Aerial surveys of cetaceans and seabirds in Irish waters: Occurrence, distribution and abundance in 2015-2017.* Department of Communications, Climate Action & Environment and National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland. 297pp. Wall, D., Murray, C., O'Brien, J., Kavanagh, L., Wilson, C., Ryan, C., Glanville, B., Williams, D., Enlander, I., O'Connor, I., McGrath, D., Whooley, P. & Berrow, S. (2013) *Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters 2005 - 2011.* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 63pp.
4.3i Additional information	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. 149pp.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***455,000 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	

5.5 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*	
5.6 Long-term trend Period *Optional*	***1994-2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 455,000 km²***	
	b) Indicate if operators were used (use these 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 range value derived from the range map referred to in 2.4 is considered to be a new baseline for this species. As there is no evidence of a decline since the Directive came into force the current range is set as the FRR.	
5.11 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*	

5.12 Additional information *Optional*	The natural range of White-beaked dolphins in Irish waters, and marine waters covered by the Directive, is a small component of the species' wider North Atlantic range (DEHLG, 2009; Kinze, 2009; Hammond *et al.*, 2017; Kiszka & Braulik, 2018; Rogan *et al.*, 2018), while recent evidence from repeated winter aerial surveys (Rogan *et al.*, 2018) has confirmed that the species occurs in Irish waters in all seasons. The range map provided consists of the species' recorded and likely predominant natural range based on comparatively recent data (2001-2018) and expert judgement, and is partly derived from 2.3. It consists of a block of contiguous 50km x 50km grid cells distributed in Irish marine waters up to 2,500-3,000m deep, in coastal areas excluding small enclosed shallow bays. Prior to 1999-2000, survey effort targeting cetacean species in Irish offshore waters was comparatively limited in coverage, both spatially and temporally. Since 1999-2000 a number of dedicated multi-annual surveillance programmes for cetaceans have operated in Irish waters, with visual and acoustic surveys extending to the limits of Ireland's EEZ and beyond. With regard to this species it is considered that the years 2007-2018 represent an appropriate period for the evaluation of short-term trends since all survey efforts intensified further during this period. Sighting records from ongoing dedicated surveillance effort in Irish waters (e.g., Berrow *et al.*, 2010; Wall *et al.*, 2013; Kavanagh *et al.* 2017; Rogan *et al.*, 2018) provide no evidence of a decline in distribution/range in the recent past; indeed there is evidence that the range is slightly larger than estimated in 2013, extending into deeper oceanic waters of the Rockall Trough and Porcupine Seabight. Therefore the short-term trend for range is considered to be stable. The long-term trend over the period 1994-2018 is considered to be uncertain for this species due to limited data availability prior to 1999-2000, as outlined above. The range value derived from the map referred to above is considered to be a revised baseline for this species. This surface area calculation is slightly greater than that reported in 2013. Since there is no evidence of a decline in range since the Directive came into force the current range is set as the FRR. There is an assumption that the current range in Irish waters is large enough (a) to encompass all of the ecological variation required by this species during its occurrences therein and (b) to contribute to the long-term survival of the species.

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2013-2018***	
6.2 Population size	**a) Unit**	***Number of individuals***

(*in reporting unit)*	**b) Minimum**	***4,128***
	c) Maximum	***12,178***
	d) Best single value	
6.3 Type of estimate	*Best estimate / multi-year mean / **95% confidence interval** / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*		
6.6 Population size Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing / decreasing / **uncertain** / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / **unknown***	
6.13 Long-term trend Magnitude	**a) Minimum**	
	b) Maximum	

Optional	**c) Confidence interval**	
6.14 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***	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) Population size (with unit) or*	
	b) Operator ≈ (approximately equal to) *or*	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information *Optional*	Evidence from multi-annual surveillance programmes (e.g., Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013; Kavanagh *et al.*, 2017; Rogan *et al.*, 2018) indicate that White-beaked dolphins occur widely in Irish waters and do so throughout the year. This is particularly the case in continental shelf and slope habitats but also to a lesser degree in waters over 2,000m in depth. However, recent and comprehensive data for the entire region of western Europe have been lacking until recently, particularly with regard to sufficient temporal (i.e., beyond one or more summer months or one year) and spatial coverage (i.e., spanning continental shelf, slope and deeper abyssal waters, all of which may represent White-beaked dolphin habitat). Within the North-East Atlantic, based on aerial survey effort approximately 36,300 White-beaked dolphins were estimated to occur in the summer of 2016 in waters off northern and western Europe but excluding Ireland (Hammond *et al.*, 2017). White-beaked dolphin data from Ireland's ObSERVE Programme (see Rogan *et al.*, 2018) have not yet been integrated into a European-wide assessment of population size for the species, although this should now be feasible given simultaneous aerial survey efforts in the	

	summer of 2016 (Hammond *et al.*, 2017; Rogan *et al.*, 2018). In a new departure for data acquisition on White-beaked dolphins in Ireland the aerial surveys carried out under this programme were successful in enabling three separate abundance estimates (two summer, one winter) to be derived from the sighting data acquired in inshore and offshore waters. The most robust of these seasonal estimates (i.e., those with the lowest CV = 0.44; summer 2015) has been presented in 6.2 via minimum and maximum 95% Confidence Limits. The Favourable Reference Population has been set as approximately equal to the current population to account for improved knowledge. Although the short-term trends are uncertain, this value is considered to represent the minimum necessary to ensure the long-term survival of the species.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)?* ***YES****/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*

7.8 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*
7.9 Additional information *Optional*	Use of the range descriptor and range surface area calculation as proxies for habitat and habitat area are judged appropriate for this wide-ranging pelagic species. The species' natural range and thus habitat in Irish waters is a small component of its wider North Atlantic range (DEHLG, 2009; Kinze, 2009; Wall *et al.*, 2013; Hammond *et al.*, 2017; Kiszka & Braulik, 2018; Rogan *et al.*, 2018). The quality of habitat for White-beaked dolphin was determined by consideration of the relevant direct and indirect pressures thought to be acting on the species and/or its functional group, and its habitat within its natural environment. These pressures were evaluated in development of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009) and informed by more recent scientific surveillance (e.g., Baines *et al.*, 2013; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; Rogan *et al.*, 2018), using available data concerning, *inter alia*, habitat use, population size, distribution and ecology, and threats to the species' protection (e.g., via natural/biological sources, human sectoral activities, management gaps, etc.). White-beaked dolphins may be subject to a number of local and/or regional environmental pressures throughout their range in Irish waters (DEHLG, 2009). However, based on current spatial and temporal data none are considered to be of sufficient impact on the species to be causing a significant deterioration in overall habitat quality in Ireland from a status that is sufficient for long-term survival. Long-term trends in habitat for White-beaked dolphin remain uncertain due to insufficient accurate data for this species prior to 1999-2000. However, with improved surveillance and numerous ongoing records of White-beaked dolphins in the last 18 years, the short-term trend indicates the continued existence of sufficient quality habitat for the species.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**C09** Geotechnical surveying (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M)	**C09** Geotechnical surveying (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M)
8.2 Sources of information *Optional*	*https://www.npws.ie/marine/marine-species/cetaceans* *https://www.dccae.gov.ie/en-ie/natural-resources/topics/Oil-Gas-Exploration-Production/Pages/home.aspx* *https://www.agriculture.gov.ie/seafood/sea-fisheriespolicymanagementdivision/*	
8.3 Additional information *Optional*	White-beaked dolphins may be subject to a number of local and/or regional environmental pressures and threats throughout their North Atlantic range (Kiszka & Braulik, 2018) and in Irish coastal/offshore waters. In the development and preparation of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009), a comprehensive review of the pressures and threats believed and/or documented to be acting on this species and/or its functional group was undertaken. The main pressures thought to be acting on this species in Irish waters are considered to involve commercial shipping-based or vessel-based activities that occur primarily on a local or regional scale and/or on a temporary or intermittent basis (e.g., impacts arising from geophysical seismic exploration; impacts from local/regional prey removal by fisheries; DEHLG, 2009). Since the species is known to be pelagic and potentially deep-diving in its ecology, at least offshore (Kinze, 2009; Kiszka & Braulik, 2018), and current White-beaked dolphin distribution is known to be both offshore Atlantic and also inshore/coastal around Ireland, where a pressure may be regionally intensive the ranking given is one of medium importance. It should be noted that in relation to seismic exploration, which tends to occur on a local or occasionally regional scale in the waters of Ireland's EEZ and is comparatively low in coverage relative to several other member states, a robust regulatory and management regime applies in order to avoid potentially significant impacts on all species of marine mammal. This regime takes cognisance of recent scientific research and surveillance findings (e.g., Baines *et al.*, 2013; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; Rogan *et al.*, 2018) and it is expected that this practice will continue into the future. There is no evidence to suggest a change in the main pressures thought to be acting on this species in the near future (i.e., threats). However surveillance of the species and the pressures potentially acting upon it will continue, while the application of strong management measures (e.g., via the statutory/regulatory process) to avoid potentially significant impacts is also expected to continue.	

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	Visual records of White-beaked dolphin in Irish waters indicate a wide and regular occurrence of the species throughout the year, in waters overlying the continental shelf and slope and also parts of some deeper oceanic basins. The species is also regularly recorded in all coastal waters, including occasionally in the Irish Sea. Since many significant (i.e., high level) anthropogenic impacts that may affect this wide-ranging species' distribution are more localised in space and time within this extensive and diverse marine area, the Future prospects for the Range and Habitat for the species are considered to be Good. A number of pressures that could act upon this species have been identified. The effect of these pressures may operate on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, thereby constituting a potential threat. While the impacts on individuals or populations of White-beaked dolphin in Irish waters are not well understood, partly due to continuing uncertainty regarding its population trends and ecology within Ireland's marine area, ongoing threats as listed or identified into the future via surveillance will be managed appropriately in Ireland. Therefore the Future prospects for the Population are considered to be Good.	

11 Conclusions

Assessment of conservation status at end of reporting period	
11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1)/ Bad (U2) / Unknown (XX)*
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*

<table>
<tr><td rowspan="8">11.7 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 (11.5)</td><td>Overall trend in conservation status (11.6)</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 data</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>d) yes, due to the use of different method (including taxonomical change or use of different thresholds)</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>e) yes, but there is no information on the 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>11.8 Additional information

Optional</td><td colspan="2">Contemporary sightings of White-beaked dolphins indicate the wide and frequent occurrence of this species throughout Irish waters, from those overlying the continental shelf and continental slope to the margins of deeper ocean basins (e.g., Rockall Trough, Porcupine Seabight). Hence the Range and Habitat for the species are considered to be Favourable.

While robust and long-term data on White-beaked dolphin population size and trends in Irish waters as a whole are not available, knowledge of the species' seasonal distribution and summer abundance in western European waters has improved significantly since the Directive came into force.

There has also recently been a very significant improvement in population abundance data from a large part of the Irish EEZ, yielding two summer and one winter estimate and associated 95% Confidence Limits since 2014.

While there is some uncertainty in the trajectory of North-East Atlantic populations of White-beaked dolphin, given the available estimates for a large part of Irish waters and the species' wide and</td></tr>
</table>

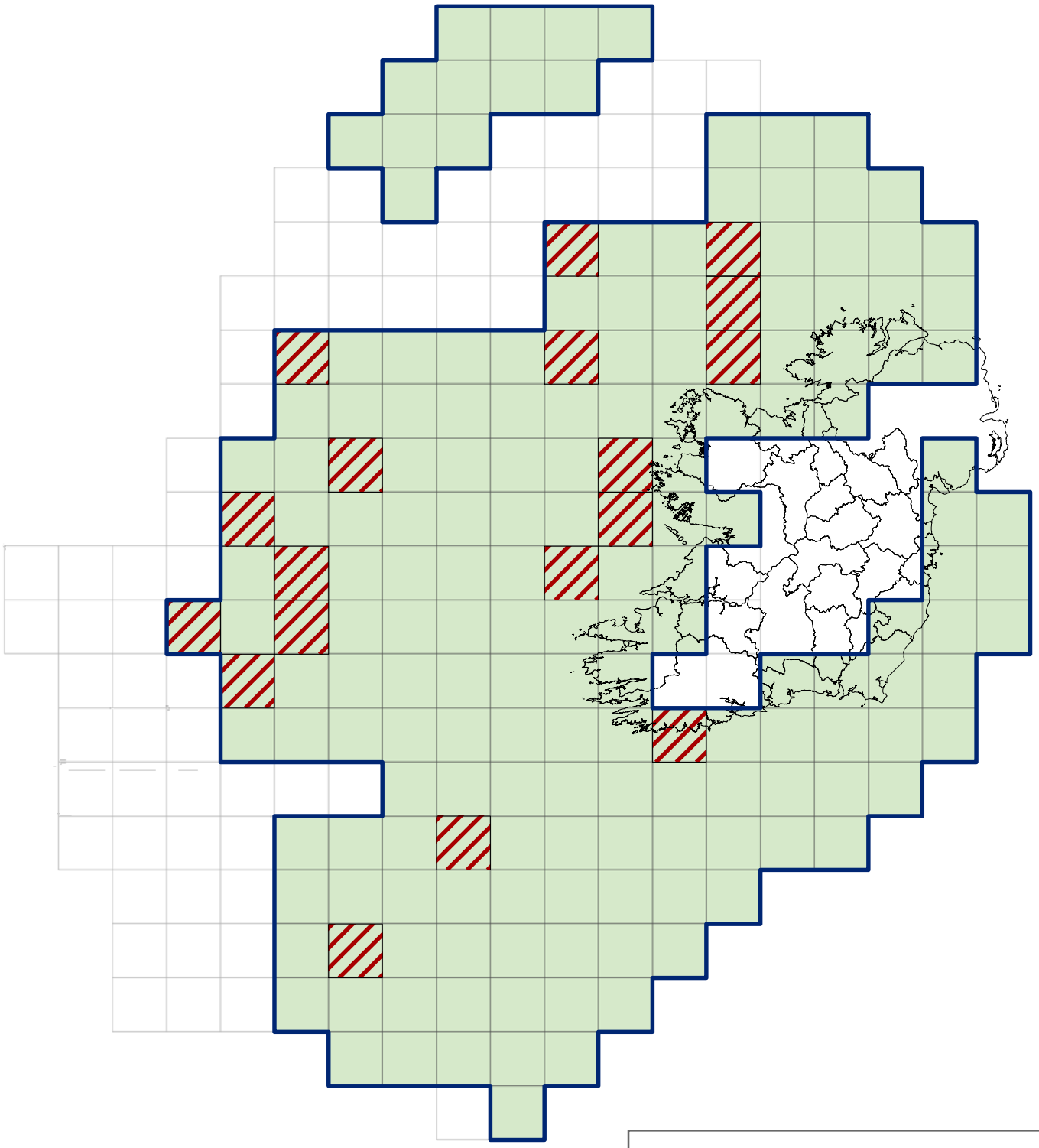
	frequent occurrence, the Population parameter is considered Favourable. A number of pressures have been identified. While the effect of these pressures may act on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, none is considered to be of sufficient magnitude to be causing an adverse impact on populations of White-beaked dolphin in Irish waters. Ongoing threats as listed or identified into the future via surveillance will be managed appropriately. Hence the Future prospects for the species are considered to be Favourable. Based on the assessments for the Range, Population, Habitat and Future prospects parameters, the overall conclusion is that the Conservation Status of White-beaked dolphin in Ireland remains Favourable. This overall result is the same as the previous Article 17 assessment.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

White-beaked dolphin
Lagenorhynchus albirostris (2032)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 25 50 100 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***2034***
1.3 Species scientific name	*Stenella coeruleoalba*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Striped dolphin (Deilf stríocach)
1.6i Species description	The striped dolphin is one of the smallest dolphin species occurring in Ireland, its adults averaging just 1.8-2.5m in length. Found globally in tropical and warm temperate waters, in the North-East Atlantic it is mainly recorded from the Faroe Islands to South Africa with a notable prevalence in the Mediterranean (Archer, 2009). There are indications that such populations may be genetically distinct from those in the Atlantic (Hammond *et al.*, 2008). Classified by the IUCN as a species of Least Concern due to its global distribution, abundance information and to limited threats to populations in the open ocean, each year striped dolphins are recorded in small numbers in Irish waters (e.g., Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013; Berrow *et al.*, 2018). However they can be difficult to distinguish at sea due to their size and traits shared with many dolphin species, particularly short-beaked common dolphins (Rogan *et al.*, 2018). They are more easily identified at close range when their characteristic pale flanks and white ventral surface, and narrow grey/black stripes extending laterally from the eye, can be observed. Comparatively little is known of the species' population ecology or movements in the North Atlantic (DEHLG, 2009).

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2013-2018***
2.3 Distribution map	Submitted
2.4 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*

2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	Over the last two decades there have been continuing records of Striped dolphins in Irish waters, particularly far offshore to the south-west and west of Ireland (e.g., Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013; Kavanagh *et al.*, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018). The distribution map presented for this species represents all available live sighting records during extensive scientific research and monitoring in Irish waters between 2013 and 2018. The period selected for mapping represents a period of intensive and high quality surveillance for cetaceans in Irish waters across a range of research projects and monitoring programmes. The surveillance programmes, projects and publications that contributed sighting data to this distribution projection are cited as follows: Baines *et al.* (2013); Kavanagh *et al.* (2017), Berrow *et al.* (2018) and Rogan *et al.* (2018). Along with the results of previous visual survey effort (e.g., Hammond *et al.*, 2002; Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Berrow *et al.*, 2010; Wall *et al.*, 2013), recent extensive ship-based and aerial surveys in summer (Hammond *et al.*, 2017; Rogan *et al.*, 2018) and winter (Rogan *et al.*, 2018), these data were integrated into the development of the species range map presented under section 2.5. It should be noted that the spatial and temporal distribution of Striped dolphins could be somewhat underestimated due to the difficulty in discriminating many dolphin species from one another, particularly in the offshore Atlantic environment (e.g., see Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Wall *et al.*, 2013; O'Donnell *et al.*, 2018; Rogan *et al.*, 2018). Thus the distribution map presented does not include records where the observed species could not be distinguished, for example, from other smaller members of the Family *Delphinidae* (e.g., Short-beaked common dolphin, Atlantic white-sided dolphin) or the *unidentified dolphin* or *unidentified small cetacean* categories often used for indeterminate sightings. The distribution of recent sightings (e.g., Craig *et al.*, 2016; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; Berrow *et al.*, 2018; O'Donnell *et al.*, 2018; Rogan *et al.*, 2018) along with regional sighting records obtained across three preceding decades (e.g., Berrow *et al.*, 2002; Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Berrow *et al.*, 2010; Wall *et al.*, 2013) indicate a predominant distribution in waters overlying the outer continental shelf and the continental slope plus adjacent deeper ocean waters and topographical basins (e.g., the Porcupine Seabight and Rockall Trough). While all reliable cetacean records obtained in Irish waters were not available for use in this exercise, the map drawn for this species provides a good sample of its observed distribution within the period given in 2.2.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
4.2 Sources of information	Archer, II, F.I. (2009) Striped dolphin. *Stenella coeruleoalba*. In W.F. Perrin, B. Würsig, J.G.M. Thewissen (eds.). *Encyclopedia of Marine Mammals* – 2nd edition. Academic Press, Elsevier Inc. p.1127-1129. Baines, M., Reichelt, M., Coles, D., Williams, A., Griffin, D. & Corkhill, O. (2013) Marine Mammal Observers' and passive acoustic monitoring operators' report during 3D seismic survey off southwest Ireland for KOSMOS. RPS Energy, Axminster, Devon, UK. 24pp. Berrow, S.D., O'Brien, J., Meade, R., Delarue, J., Kowarski, K., Martin, B., Moloney, J., Wall, D., Gillespie, D., Leaper, R., Gordon, J., Lee, A. & Porter, L. (2018) *Acoustic Surveys of Cetaceans in the Irish Atlantic Margin in 2015–2016: Occurrence, distribution and abundance.* Department of Communications, Climate Action & Environment and the National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland, 348pp. Berrow, S.D., Whooley, P. & Ferriss, S. (2002) *Irish Whale and Dolphin Group Cetacean Sighting Review (1991-2001)*. Irish Whale and Dolphin Group, Kilrush, Co. Clare. 34 pp. Berrow, S.D., Whooley, P., O'Connell, M. & Wall, D. (2010) *Irish Cetacean Review (2000-2009).* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 60pp. Craig, D., Hunt, W. & Kavanagh, A. (2016) Report on line-transect surveys for cetaceans conducted during the 2016 Mackerel Egg Survey. Report to the Marine Institute and National Parks and Wildlife Service. Irish Whale and Dolphin Group and University College Cork. 20pp. DEHLG (2009) *Conservation Plan for Cetaceans in Irish Waters.* Department of the Environment, Heritage and Local Government, Dublin. 97pp. Hammond, P.S., Bearzi, G., Bjørge, A., Forney, K., Karczmarski, L., Kasuya, T., Perrin, W.F., Scott, M.D., Wang, J.Y., Wells, R.S. & Wilson, B. (2008) *Stenella coeruleoalba*. In IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2.

http://www.iucnredlist.org.

Hammond, P.S., Benke, H., Berggren, P., Borchers, D.L., Buckland, S.T., Collet, A., Heide-Jorgensen, M.P., Heimlich-Boran, S., Hiby, A.R., Leopold, M.F. & Øien, N. (2002) Abundance of harbour porpoise and other cetaceans in the North Sea and adjacent waters. *Journal of Applied Ecology* 39: 361-376.

Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., K Macleod, K., Ridoux, V., Santos, M.B., Scheidat, M., Teilmann, J., Vingada, J. & Øien, N. (2017) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. Final project report. University of St. Andrews, Scotland. 40pp.

Hammond, P.S., Macleod, K., Burt, L. Cañadas, A., Lens, S. Mikkelsen, B., Rogan, E., Santos, B., Uriarte, A., Van Canneyt, O. & Vázquez, J.A. (2009) Cetacean Offshore Distribution and Abundance in the European Atlantic (CODA). Final report. University of St. Andrews, Scotland.

Kavanagh, A.S., Hunt, W., Richardson, N. & Jessopp, M. (2017) Cetaceans in Irish offshore waters: Final report of the SFI-KOSMOS Project 2015-2017. MaREI Centre, University College Cork. 66pp.

Ó Cadhla, O., Mackey, M., Aguilar de Soto, N., Rogan, E. & Connolly, N. (2004) Cetaceans and Seabirds of Ireland's Atlantic Margin. Volume II - Cetacean distribution and abundance. Report on research carried out under the Irish Petroleum Infrastructure Programme (PIP): Rockall Studies Group (RSG) projects 98/6 and 00/13, Porcupine Studies Group project P00/15 and Offshore Support Group (OSG) project 99/38. 82pp.

O'Donnell, C., O'Malley, M., Lynch, D., Mullins, E., Keogh, N., Power, J., Long, A. & Croot, P. (2018) Western European Shelf Pelagic Acoustic Survey (WESPAS). 10 June – 24 July, 2018. FSS Survey Series: 2018/03. Marine Institute, Oranmore, Co. Galway. 65pp.

Reid, J.B., Evans, P.G.H. & Northridge, S.P. (2003) *Atlas of Cetacean Distribution in North-west European Waters.* Joint Nature Conservation Committee, Peterborough. 76pp.

Rogan, E., Breen, P., Mackey, M., Cañadas, A., Scheidat, M., Geelhoed, S. & Jessopp, M. (2018) *Aerial surveys of cetaceans and seabirds in Irish waters: Occurrence, distribution and abundance in 2015-2017.* Department of Communications, Climate Action & Environment and National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland. 297pp.

Wall, D., Murray, C., O'Brien, J., Kavanagh, L., Wilson, C., Ryan, C., Glanville, B., Williams, D., Enlander, I., O'Connor, I., McGrath, D., Whooley, P. & Berrow, S. (2013) *Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters 2005 - 2011.* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 63pp.

4.2i Additional information	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. 149pp.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***587,500 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994-2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 587,500 km²***	
	b) Indicate if operators were used (use these 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 range value derived from the range map referred to in 2.4 is considered to be a new baseline for this species. As there is no evidence of a decline since the Directive came into force the current range is set as the FRR.</td></tr>
<tr><td rowspan="6">5.11 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>5.12 Additional information

Optional</td><td colspan="2">The natural range of Striped dolphins in Irish waters, and marine waters covered by the Directive, is a small component of the species' wider North Atlantic range (Hammond et al., 2008; Archer, 2009; DEHLG, 2009; Hammond et al., 2017; Rogan et al., 2018), while recent evidence from repeated high quality surveys (Berrow et al., 2018; Rogan et al., 2018) has confirmed that the species probably occurs in Irish waters in all seasons.

The range map provided consists of the species' recorded and likely predominant natural range based on comparatively recent data (2001-2018) and expert judgement, and is partly derived from 2.3. It consists of a block of contiguous 50km x 50km grid cells distributed in Irish marine waters excluding the Irish Sea, and in coastal areas excluding small enclosed shallow bays.

Prior to 1999-2000, survey effort targeting cetacean species in Irish offshore waters was comparatively limited in coverage, both spatially and temporally. Since 1999-2000 a number of dedicated multi-annual surveillance programmes for cetaceans have operated in Irish waters, with visual and acoustic surveys extending to the limits of Ireland's EEZ and beyond. With regard to this species it is considered that the years 2007-2018 represent an appropriate period for the evaluation of short-term trends since all survey efforts intensified further during this period.

Sighting records from ongoing dedicated surveillance effort in Irish waters (e.g., Berrow et al., 2010; Baines et al., 2013; Wall et al., 2013; Kavanagh et al. 2017; Berrow et al., 2018; Rogan et al., 2018) provide no evidence of a decline in distribution/range in the recent past. Therefore the short-term trend for Range is considered to be stable.

The long-term trend over the period 1994-2018 is considered to be uncertain for this species due to limited data availability prior to</td></tr>
</table>

	1999-2000, as outlined above. The range value derived from the map referred to above is considered to be a revised baseline for this species. This surface area calculation is slightly greater than that reported in 2013. Since there is no evidence of a decline in range since the Directive came into force the current range is set as the FRR. There is an assumption that the current range in Irish waters is large enough (a) to encompass all of the ecological variation required by this species during its occurrences therein and (b) to contribute to the long-term survival of the species.

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2013-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	***6,562***
	c) Maximum	***21,424***
	d) Best single value	
6.3 Type of estimate	*Best estimate / multi-year mean / **95% confidence interval** / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*		
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing / decreasing / **uncertain** / unknown*	
6.9 Short-term trend Magnitude	**a) Minimum**	
	b) Maximum	

Optional	**c) Confidence interval**	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain /* ***unknown***	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.14 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***	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) Population size (with unit) or*	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) Favourable reference population is unknown	
	d) Indicate method used to set reference value if other than operators Robust data on Striped dolphin population trends in Irish waters are not available. The figures presented in 6.2 are the first population size estimates for this species in Irish waters and they require a measure of caution in their interpretation. The estimates presented here are based on the 95% Confidence Limits from two novel summer and winter coverages (i.e., four in total) of a large portion of Ireland's EEZ using aerial survey methods (see Rogan *et al.*, 2018). However they comprise a subset of records of Striped dolphin and Short-beaked common dolphin where the species could not be distinguished precisely from one another. Given this feature and the variability in estimates from individual seasonal coverages by aerial means it is not yet possible to determine a realistic baseline value since the Directive came into force; consequently the FRP remains unknown.	

<table>
<tr><td rowspan="6">6.16 Change and reason for change in population size</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>6.17 Additional information

Optional</td><td colspan="2">Evidence from multi-annual surveillance programmes (e.g., Ó Cadhla et al., 2004; Berrow et al., 2010; Wall et al., 2013; Kavanagh et al., 2017; Rogan et al., 2018) indicate that Striped dolphins occur widely in south-western and western Irish waters at least, and do so throughout the year. This is particularly the case in outer continental shelf and slope habitats and also in waters over 2,000m in depth.

However recent and comprehensive data for the entire region of western Europe have been lacking until recently, particularly with regard to sufficient temporal (i.e., beyond one or more summer months or one year) and spatial coverage (i.e., spanning continental shelf, slope and deeper abyssal waters, all of which may represent Striped dolphin habitat).

Within the North-East Atlantic, based on aerial survey effort approximately 19,250 Striped dolphins were estimated to occur in the summer of 2016 in waters off western Europe but excluding Ireland (Hammond et al., 2017). A further 353,087 Striped dolphins were estimated from ship-based survey data collected further offshore, in deep oceanic waters to the west and north of Spain, during the same period (Hammond et al., 2017).

Striped dolphin data from Ireland's ObSERVE Programme (see Berrow et al., 2018 and Rogan et al., 2018) have not yet been integrated into a European-wide assessment of population size for the species, although this should now be feasible given simultaneous aerial survey efforts in the summer of 2016 (Hammond et al., 2017; Rogan et al., 2018).

In a new departure for data acquisition on Striped dolphins in Ireland the aerial surveys carried out under this programme were quite successful in enabling abundance estimates to be derived from the sighting data on small dolphin species. However due to difficulties distinguishing visual records of this species from other smaller dolphins, particularly Short-beaked common dolphins, it was necessary to fold estimates for Striped dolphin into a combined data category (i.e., common dolphin + common/striped dolphin; Rogan et al., 2018).

In seeking to assess and present Striped dolphin population estimates</td></tr>
</table>

	from these wider figures for Irish waters, only the summer estimates from 2015 and 2016 were used, since their sighting distributions better reflected the spatial occurrence of confirmed records of this species (Baines *et al.*, 2013; Kavanagh *et al.*, 2017; Hammond *et al.*, 2017; Berrow *et al.*, 2018; O'Donnell *et al.*, 2018; Rogan *et al.*, 2018). The lower and upper 95% Confidence Limits for combined Common/Striped dolphin only (less Common dolphin) have been extracted and presented in 6.2. This represents the best current approximation for Striped dolphins in Irish waters that could be achieved with information collected within the 2013-2018 reporting period. Since the ObSERVE-based estimates for Striped dolphin population size are new in methodological terms, raise a number of caveats and assumptions regarding combination of datasets, and represent the first such abundance estimates for Ireland, a realistic baseline value since the Directive came into force (i.e., the FRP) remains unknown.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*

7.8 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*
7.9 Additional information *Optional*	Use of the range descriptor and range surface area calculation as proxies for habitat and habitat area are judged appropriate for this wide-ranging pelagic and oceanic species. The species' natural range and thus habitat in Irish waters is a small component of its wider North Atlantic range (Hammond *et al.*, 2008; Archer, 2009; DEHLG, 2009; Wall *et al.*, 2013; Hammond *et al.*, 2017; Rogan *et al.*, 2018). The quality of habitat for Striped dolphin was determined by consideration of the relevant direct and indirect pressures thought to be acting on the species and/or its functional group, and its habitat within its natural environment. These pressures were evaluated in development of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009) and informed by more recent scientific surveillance (e.g., Baines *et al.*, 2013; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; Rogan *et al.*, 2018), using available data concerning, *inter alia*, habitat use, population size, distribution and ecology, and threats to the species' protection (e.g., via natural/biological sources, human sectoral activities, management gaps, etc.). Striped dolphins may be subject to a number of local and/or regional environmental pressures throughout their range in Irish waters (DEHLG, 2009). However, based on current spatial and temporal data none are considered to be of sufficient impact on the species to be causing a significant deterioration in overall habitat quality in Ireland from a status that is sufficient for long-term survival. Long-term trends in habitat for Striped dolphin remain uncertain due to insufficient accurate data for this species prior to 1999-2000. However, with improved surveillance and numerous ongoing records of Striped dolphins in the last 18 years, the short-term trend indicates the continued existence of sufficient quality habitat for the species.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**C09** Geotechnical surveying (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M)	**C09** Geotechnical surveying (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M)
8.2 Sources of information *Optional*	*https://www.npws.ie/marine/marine-species/cetaceans* *https://www.dccae.gov.ie/en-ie/natural-resources/topics/Oil-Gas-Exploration-Production/Pages/home.aspx* *https://www.agriculture.gov.ie/seafood/sea-fisheriespolicymanagementdivision/*	
8.3 Additional information *Optional*	Striped dolphins may be subject to a number of local and/or regional environmental pressures and threats throughout their North Atlantic range (Hammond *et al.*, 2008) and in Irish coastal/offshore waters. In the development and preparation of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009), a comprehensive review of the pressures and threats believed and/or documented to be acting on this species and/or its functional group was undertaken. The main pressures thought to be acting on this species in Irish waters are considered to involve commercial shipping-based or vessel-based activities that occur primarily on a local or regional scale and/or on a temporary or intermittent basis (e.g., impacts arising from geophysical seismic exploration; impacts from local/regional prey removal by fisheries; DEHLG, 2009). Since the species is known to be broadly pelagic and oceanic in its ecology in the North-East Atlantic (Hammond *et al.*, 2008; Archer, 2009) and current Striped dolphin distribution is known to be more offshore Atlantic in its occurrence, where a pressure may be regionally intensive the ranking given is one of medium importance. It should be noted that in relation to seismic exploration, which tends to occur on a local or occasionally regional scale in the waters of Ireland's EEZ and is comparatively low in coverage relative to several other member states, a robust regulatory and management regime applies in order to avoid potentially significant impacts on all species of marine mammal. This regime takes cognisance of recent scientific research and surveillance findings (e.g., Baines *et al.*, 2013; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018) and it is expected that this practice will continue into the future. There is no evidence to suggest a change in the main pressures thought to be acting on this species in the near future (i.e., threats). However surveillance of the species and the pressures potentially acting upon it will continue, while the application of strong management measures (e.g., via the statutory/regulatory process) to avoid potentially significant impacts is also expected to continue.	

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	*Good / Poor / Bad /* ***Unknown***
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	Visual records of Striped dolphin in Irish waters indicate a wide and quite regular occurrence of the species in waters overlying the outer continental shelf and slope, and also deeper oceanic basins, off south-western and western Ireland in particular. Since many significant (i.e., high level) anthropogenic impacts that may affect this wide-ranging species' distribution are more localised in space and time within this extensive and diverse marine area, the Future prospects for the Range and Habitat for the species are considered to be Good. A number of pressures that could act upon this species have been identified. The effect of these pressures may operate on a temporary and/or regional scale and some are likely to continue to act as pressures into the future thereby constituting a potential threat. The impacts on individuals or populations of Striped dolphin in Irish waters are not well understood, partly due to continuing uncertainty regarding its population trends and ecology within Ireland's marine area. Therefore the Future Prospects for the Population are considered to be Unknown.	

11 Conclusions

Assessment of conservation status at end of reporting period	
11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.2 Population	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1)/ Bad (U2) / Unknown (XX)*
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	Contemporary sightings of Striped dolphins indicate a wide occurrence of this species through Irish offshore waters, from those overlying the outer continental shelf and continental slope to deeper ocean basins (e.g., Rockall Trough, Porcupine Seabight). Hence the Range and Habitat for the species are considered to be Favourable. While robust and long-term data on Striped dolphin population size and trends in Irish waters as a whole are not available, knowledge of the species' seasonal distribution and summer abundance in western European waters has improved significantly since the Directive came into force. There has also recently been an improvement in population abundance data from a large part of the Irish EEZ, yielding new estimates and associated 95% Confidence Limits based on dedicated cetacean surveillance using aerial methods since 2015. However the population estimates presented here for Irish waters are somewhat uncertain (see 6.17), while available abundance figures for western European waters are also variable with survey season and year and, so far, drawn from different methodologies. Given these features and also that there is some uncertainty in the trajectory of North-East Atlantic populations of Striped dolphin, it is concluded that the Population parameter should be reported as Unknown.		

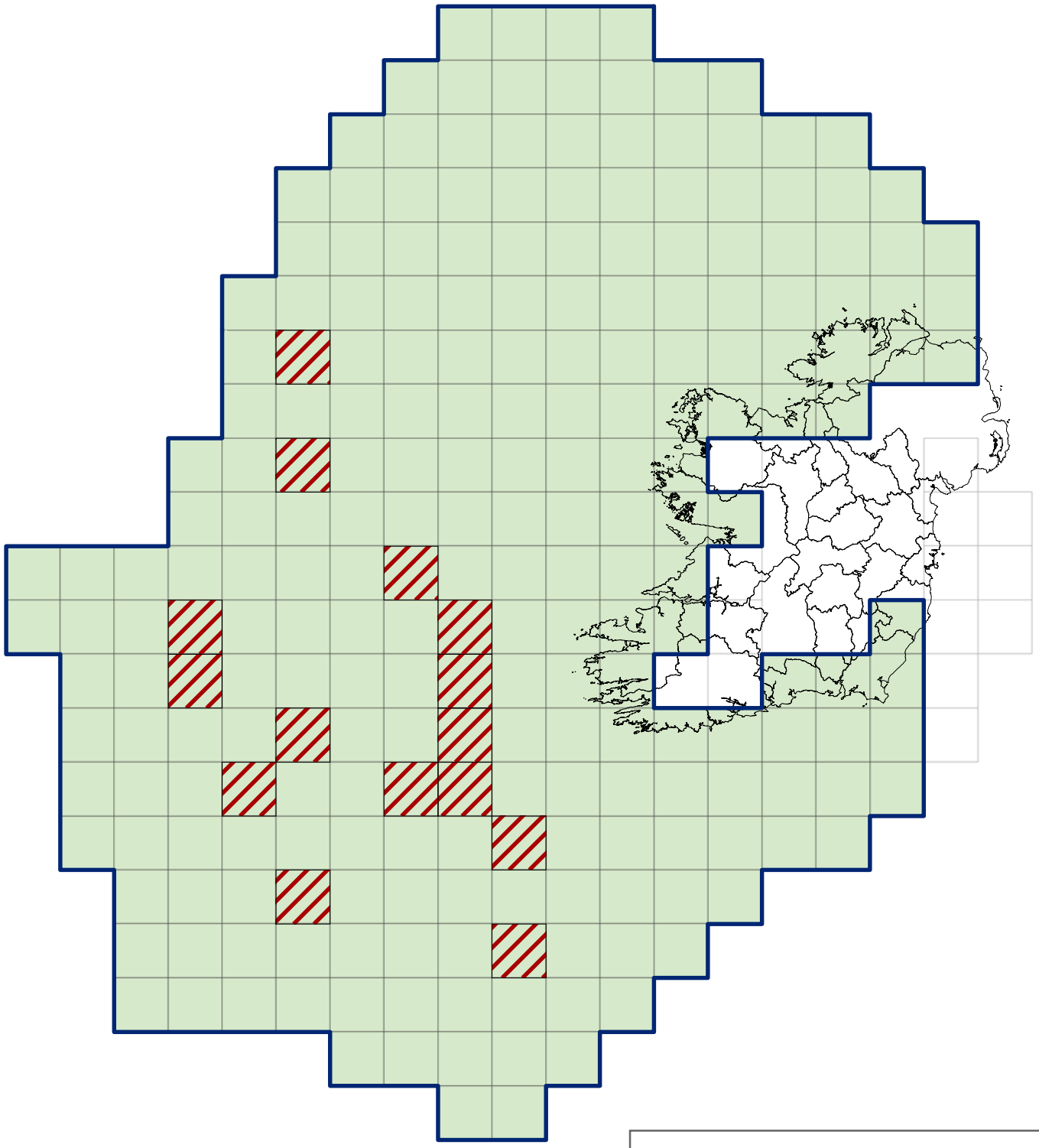
	A number of pressures have been identified. While the effect of these pressures may act on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, none is considered to be of sufficient magnitude to be causing an adverse impact on populations of Striped dolphin in Irish waters. Ongoing threats as listed or identified into the future via surveillance will be managed appropriately. Hence the Future prospects for the species are considered to be Favourable. Based on the assessments for the Range, Population, Habitat and Future prospects parameters, the overall conclusion is that the Conservation Status of Striped dolphin in Ireland remains Favourable. This overall result is the same as the previous Article 17 assessment.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Striped dolphin
Stenella coeruleoalba (2034)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 25 50 100 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***2035***
1.3 Species scientific name	*Ziphius cavirostris*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Cuvier's beaked whale (Míol mór socach Cuvier)
1.6i Species description	The Cuvier's beaked whale is a distinctive short-beaked toothed whale measuring up to 5.5-6.5m in length and found in all of the world's oceans except polar regions (Taylor *et al.*, 2008; Heyning & Mead, 2009). Its range in the eastern Atlantic extends from Iceland and Norway to waters off southern Africa. It is the only beaked whale species commonly occurring in the Mediterranean (Taylor *et al.*, 2008). Cuvier's beaked whales can be difficult to identify in the open sea due, for example, to elusive or evasive behaviour in the presence of vessels and the absence of many features observable at long range. They may be identified more readily at close range due to their distinctive skin colouration/scarring, a short prominent blunt beak, a small curved dorsal fin about two-thirds of the way along the back, and the absence of a central notch in the tail flukes (Heyning & Mead, 2009). Live records of this species in Irish waters have been infrequent until recently (e.g., see Ó Cadhla *et al.*, 2004; DEHLG, 2009; Wall *et al.*, 2013) although it is the most frequently stranded beaked whale around Ireland (Berrow *et al.*, 2010). Knowledge of its population structure or seasonal movements remains limited due to the historical scarcity of data; however information has improved since 2015.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2013-2018***
2.3 Distribution map	Submitted
2.4 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*

2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	Over the last two decades there have been increasing visual and acoustic records of Cuvier's beaked whales, albeit off a very low base. These have occurred in deep offshore Irish waters stretching northwards from the Goban Spur region to the Porcupine Seabight and Rockall Trough (e.g., Aguilar de Soto *et al.*, 2004; Ó Cadhla *et al.*, 2004; Frouin-Mouy *et al.*, 2017; Kavanagh *et al.*, 2017; Berrow *et al.*, 2018; O'Donnell *et al.*, 2018; Rogan *et al.*, 2018). The distribution map presented for this species represents all available live sighting records during extensive scientific research and monitoring in Irish waters between 2013 and 2018. The period selected for mapping represents a period of intensive and high quality surveillance for cetaceans in Irish waters across a range of research projects and monitoring programmes. The surveillance programmes, projects and publications that contributed sighting data to this distribution projection are cited as follows: Kavanagh *et al.* (2017), Berrow *et al.* (2018), O'Donnell *et al.* (2018) and Rogan *et al.* (2018). Along with the results of previous visual survey effort (i.e., Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Berrow *et al.*, 2010; Wall *et al.*, 2013; Rogan *et al.*, 2017), recent extensive aerial surveys in summer and winter (Rogan *et al.*, 2018) and acoustic monitoring (Aguilar de Soto *et al.*, 2004; Frouin-Mouy *et al.*, 2017; Berrow *et al.*, 2018), these data were integrated into the development of the species range map presented under section 2.5. It should be noted that the spatial and temporal distribution of Cuvier's beaked whales could yet be somewhat underestimated due to the difficulty in discriminating small- to medium-sized whale species from one another in the offshore Atlantic environment (e.g., see Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Wall *et al.*, 2013; Hammond *et al.*, 2017; Rogan *et al.*, 2017; Rogan *et al.*, 2018). Thus the distribution map presented does not include records where the observed species could not be distinguished, for example, from other members of the Family *Ziphiidae* (i.e., beaked whales, such as Northern bottlenose whale or Sowerby's beaked whale) or from *unidentified whale* or *unidentified medium whale* categories often used for indeterminate sightings. The distribution of recent sightings (e.g., in Kavanagh *et al.*, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018) and extensive acoustic records (e.g., Frouin-Mouy *et al.*, 2017; Berrow *et al.*, 2018) along with regional sighting and acoustic records obtained across three preceding decades (Reid *et al.*, 2003; Aguilar de Soto *et al.*, 2004; Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013) indicate a predominant distribution in Atlantic waters greater than 500-1,000m deep, including those overlying and fringing the continental slope. While all reliable cetacean records obtained in Irish waters were not available for use in this exercise, the map drawn for this species provides a good sample of its observed distribution within the period

	given in 2.2.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
4.2 Sources of information	Aguilar de Soto, N., Rogan, E., O Cadhla, O., Gordon, J.C.D., Mackey, M. & Connolly, N. (2004) Cetaceans and Seabirds of Ireland's Atlantic Margin. Volume III-Acoustic Surveys for Cetaceans. Report on research carried out under the Irish Petroleum Infrastructure Programme (PIP): Rockall Studies Group (RSG) projects 98/6 and 00/13, Porcupine Studies Group project P00/15 and Offshore Support Group (OSG) project 99/38. 51pp Baines, M., Reichelt, M., Coles, D., Williams, A., Griffin, D. & Corkhill, O. (2013) Marine Mammal Observers' and passive acoustic monitoring operators' report during 3D seismic survey off southwest Ireland for KOSMOS. RPS Energy, Axminster, Devon, UK. 24pp. Berrow, S.D., O'Brien, J., Meade, R., Delarue, J., Kowarski, K., Martin, B., Moloney, J., Wall, D., Gillespie, D., Leaper, R., Gordon, J., Lee, A. & Porter, L. (2018) *Acoustic Surveys of Cetaceans in the Irish Atlantic Margin in 2015–2016: Occurrence, distribution and abundance.* Department of Communications, Climate Action & Environment and the National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland, 348pp. Berrow, S.D., Whooley, P., O'Connell, M. & Wall, D. (2010) *Irish Cetacean Review (2000-2009).* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 60pp. DAHG (2014) *Guidance to Manage the Risk to Marine Mammals from Man-made Sound in Irish Waters.* Department of Arts, Heritage and the Gaeltacht, Dublin. 59pp. DEHLG (2009) *Conservation Plan for Cetaceans in Irish Waters.* Department of the Environment, Heritage and Local Government, Dublin. 97pp. Frouin-Mouy, H., Hipsey, S., Denes, S. & Burns, R. (2017) Soundscape Characterisation and Cetacean Presence in the Porcupine Basin: June to November 2016. Document 01320, Version 1.0. Technical

report by JASCO Applied Sciences for Woodside Energy (Ireland) Pty Ltd. 109pp.

Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., K Macleod, K., Ridoux, V., Santos, M.B., Scheidat, M., Teilmann, J., Vingada, J. & Øien, N. (2017) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. Final project report. University of St. Andrews. 40pp.

Hammond, P.S., Macleod, K., Burt, L. Cañadas, A., Lens, S. Mikkelsen, B., Rogan, E., Santos, B., Uriarte, A., Van Canneyt, O. & Vázquez, J.A. (2009) Cetacean Offshore Distribution and Abundance in the European Atlantic (CODA). Final report. University of St. Andrews, Scotland.

Heyning, J.E. & Mead, J.G. (2009) Cuvier's beaked whale. *Ziphius cavirostris.* In W.F. Perrin, B. Würsig, J.G.M. Thewissen (eds.). *Encyclopedia of Marine Mammals* – 2nd edition. Academic Press, Elsevier Inc. p.294-295.

Kavanagh, A.S., Hunt, W., Richardson, N. & Jessopp, M. (2017) Cetaceans in Irish offshore waters: Final report of the SFI-KOSMOS Project 2015-2017. MaREI Centre, University College Cork. 66pp.

McCauley, R.D. (2015) Offshore Irish noise logger program (March to September 2014): analysis of cetacean presence, and ambient and anthropogenic noise sources. Final project report R2015-01 to RPS MetOcean / Woodside Energy (Ireland) Pty Ltd. Project: CMST 1296. Curtin University, Western Australia. 110pp.

Ó Cadhla, O., Mackey, M., Aguilar de Soto, N., Rogan, E. & Connolly, N. (2004) Cetaceans and Seabirds of Ireland's Atlantic Margin. Volume II - Cetacean distribution and abundance. Report on research carried out under the Irish Petroleum Infrastructure Programme (PIP): Rockall Studies Group (RSG) projects 98/6 and 00/13, Porcupine Studies Group project P00/15 and Offshore Support Group (OSG) project 99/38. 82pp.

O'Donnell, C., Johnston, G., Mullins, E., Keogh, N. & Power, J. (2018) Blue Whiting Acoustic Survey Cruise Report. March 20 – April 06, 2018. FSS Survey Series: 2018/01. 31pp.

Reid, J.B., Evans, P.G.H. & Northridge, S.P. (2003) *Atlas of Cetacean Distribution in North-west European Waters.* Joint Nature Conservation Committee, Peterborough. 76pp.

Rogan, E., Cañadas, A., Macleod, K., Santos, B., Mikkelsen, B., Uriarte, A., Van Canneyt, O., Vazquez, A.J. & Hammond, P.S. (2017) Distribution, abundance and habitat use of deep diving cetaceans in the North East Atlantic. *Deep Sea Research II* 141: 8-19. doi.org/10.1016/j.dsr2.2017.03.015.

Rogan, E., Breen, P., Mackey, M., Cañadas, A., Scheidat, M., Geelhoed, S. & Jessopp, M. (2018) *Aerial surveys of cetaceans and seabirds in Irish waters: Occurrence, distribution and abundance in 2015-2017.* Department of Communications, Climate Action & Environment and National Parks and Wildlife

	Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland. 297pp. Taylor, B.L., Baird, R., Barlow, J., Dawson, S.M., Ford, J., Mead, J.G., Notarbartolo di Sciara, G., Wade, P. & Pitman, R.L. (2008) *Ziphius cavirostris*. In IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. http://www.iucnredlist.org. Wall, D., Murray, C., O'Brien, J., Kavanagh, L., Wilson, C., Ryan, C., Glanville, B., Williams, D., Enlander, I., O'Connor, I., McGrath, D., Whooley, P. & Berrow, S. (2013) *Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters 2005 - 2011*. Irish Whale and Dolphin Group, Kilrush, Co. Clare. 63pp.
4.2i Additional information	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. 149pp.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***397,500 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994-2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	

<table>
<tr><td>5.9 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">5.10 Favourable reference range</td><td colspan="2">a) 397,500 km²</td></tr>
<tr><td colspan="2">b) Indicate if operators were used (use these 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 range value derived from the range map referred to in 2.4 is considered to be the baseline for this species. As there is no evidence of a decline since the Directive came into force the current range is set as the FRR.</td></tr>
<tr><td rowspan="6">5.11 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>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>
</table>

5.12 Additional information *Optional*	The natural range of Cuvier's beaked whales in Irish waters, and marine waters covered by the Directive, is a small component of the species' wider North Atlantic range (DEHLG, 2009; Heyning & Mead, 2009; Rogan *et al.*, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018). The range map provided consists of the species' recorded and likely predominant natural range based on comparatively recent data (2001-2018) and expert judgement, and is partly derived from 2.3. It consists of a block of contiguous 50km x 50km grid cells distributed in Irish marine waters of 500m depth or greater, and now includes the relevant assessment area under the Marine Strategy Framework Directive. Prior to 1999-2000, survey effort targeting cetacean species in Irish offshore waters was comparatively limited in coverage, both spatially and temporally. Since 1999-2000 a number of dedicated multi-annual surveillance programmes for cetaceans have operated in Irish waters, with visual and acoustic surveys extending to the limits of Ireland's EEZ and beyond. With regard to this species it is considered that the years 2007-2018 represent an appropriate period for the evaluation of short-term trends since all survey efforts intensified further during this period. Sighting and acoustic records from ongoing dedicated surveillance effort in Irish waters (Frouin-Mouy *et al.*, 2017; Kavanagh *et al.*, 2017; O'Donnell *et al.*, 2018; Berrow *et al.*, 2018; Rogan *et al.*, 2018) provide no evidence of a decline in distribution/range in the recent past; therefore the short-term trend for Range is considered to be stable. The long-term trend period (1994-2018) is considered to be uncertain for this species due to limited data availability prior to 1999-2000, as outlined above. The range value derived from the map referred to above is considered to be the baseline for this species. This surface area calculation is greater than that reported in 2013 due to the integration of Ireland's MSFD assessment area within the range. Since there is no evidence of a decline in range since the Directive came into force the current range is set as the FRR. There is an assumption that the current range in Irish waters is large enough (a) to encompass all of the ecological variation required by this species during its occurrences therein and (b) to contribute to the long-term survival of the species.

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2013-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	***142***

	c) Maximum	***1,221***
	d) Best single value	
6.3 Type of estimate	*Best estimate / multi-year mean / **95% confidence interval** / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*		
6.6 Population size Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing / decreasing / **uncertain** / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / **unknown***	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

<table>
<tr><td>6.14 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
<u>d) Insufficient or no data available</u></td></tr>
<tr><td rowspan="4">6.15 Favourable reference population
(using the unit in 6.2 or 6.4)</td><td colspan="2">a) Population size (with unit) or</td></tr>
<tr><td colspan="2">b) Indicate if operators were used (using symbols ≈, >, >>, <) or</td></tr>
<tr><td colspan="2"><u>c) Favourable reference population is unknown</u></td></tr>
<tr><td colspan="2">d) Indicate method used to set reference value if other than operators
Robust data on Cuvier's beaked whale population trends in Irish waters are not available and the figures presented in 6.2 are the first population size estimates for this species that can be attributed to Irish waters. These estimates are based on lower and upper 95% Confidence Intervals from two novel summer and winter coverages (i.e., four in total) of a large portion of Ireland's EEZ using aerial survey methods (see Rogan et al., 2018). Previous estimates from this part of the North Atlantic (e.g., in Hammond et al., 2009; Rogan et al., 2017) were based mainly on conventional sightings from ships in summer only, and these were international/high seas in spatial coverage; consequently the estimates they generated were considerably higher. Given the variability in estimates generated from seasonal aerial surveys (Rogan et al., 2018) and the above circumstances, it is not yet possible to determine a realistic baseline value since the Directive came into force; consequently the FRP remains unknown.</td></tr>
<tr><td rowspan="6">6.16 Change and reason for change in population size</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>6.17 Additional information

Optional</td><td colspan="2">Evidence from deep water acoustic monitoring (Aguilar de Soto et al., 2004; Frouin-Mouy et al., 2017; Berrow et al., 2018) and multi-annual surveillance programmes (e.g., Ó Cadhla et al., 2004; Berrow et al., 2010; Wall et al., 2013; Kavanagh et al., 2017; Rogan et al., 2017; O'Donnell et al., 2018; Rogan et al., 2018) now demonstrate that Cuvier's beaked whales occur widely in deeper offshore waters to the west and south-west of Ireland and do so throughout the year.</td></tr>
</table>

	The relationship between Cuvier's beaked whales occurring in Ireland and those elsewhere in the eastern North Atlantic (e.g., Bay of Biscay) is unknown, however. Due to the relative scarcity of confirmed records and abundance estimates of this species, the accurate determination of population trends, either in the short or long term, remains fraught with difficulty. Furthermore, the extent of movements or regional residency by communities of the species are poorly understood, partly due to the animals' occurrence in exposed environments far from shore and to their deep oceanic ecology, which combine to make their study both difficult and logistically demanding. Within the North-East Atlantic in summer, recent work by Hammond *et al.* (2017) indicates that some 11,394 beaked whales (95% C.I: 4,494-28,888) could be attributed to deeper waters off northern Spain, western France and the UK. Yet comprehensive and methodologically comparable data for the entire region of western Europe are lacking, particularly with regard to sufficient temporal coverage (i.e., beyond one or more summer months separated by many years) and spatial coverage (i.e., spanning outer continental shelf, slope and deeper abyssal waters, all of which may represent Cuvier's beaked whale habitat). New Cuvier's beaked whale data from Ireland's ObSERVE Programme (see Berrow *et al.*, 2018 and Rogan *et al.*, 2018) have not yet been integrated into an Atlantic- or Europe-wide assessment of population size/density for this species. Since the new estimates derived for Cuvier's beaked whale population size are variable depending on the survey block, season and year of coverage (Rogan *et al.*, 2018) and they represent the first such abundance estimates for Ireland, it is not yet possible to determine a realistic baseline value since the Directive came into force; consequently the FRP remains unknown.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*

7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*
7.8 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*
7.9 Additional information *Optional*	Use of the range descriptor and range surface area calculation as proxies for habitat and habitat area are judged appropriate for this wide-ranging pelagic and deep-diving species. The species' natural range and thus habitat in Irish waters is considered to be a small component of its wider North Atlantic range (Taylor *et al.*, 2008; Heyning & Mead, 2009; DEHLG, 2009; Hammond *et al.*, 2017; Rogan *et al.*, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018). The quality of habitat for Cuvier's beaked whale was determined by consideration of the relevant direct and indirect pressures thought to be acting on the species and/or its functional group, and its habitat within its natural environment. These pressures were evaluated in development of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009) and informed by more recent scientific surveillance (e.g., Baines *et al.*, 2013; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; O'Donnell *et al.*, 2018; Berrow *et al.*, 2018; Rogan *et al.*, 2018), using available data concerning, *inter alia*, habitat use, population size, distribution and ecology, and threats to the species' protection (e.g., via natural/biological sources, human sectoral activities, management gaps, etc.). Although, relative to principal human maritime activity in Ireland, they are demonstrated to be a more remote offshore species, Cuvier's beaked whales may be subject to a number of local and/or regional environmental pressures throughout their range (DEHLG, 2009). However, based on current spatial and temporal data none are considered to be of sufficient impact on the species to be causing a significant deterioration in overall habitat quality in Ireland from a status that is sufficient for long-term survival. Long-term trends in habitat for Cuvier's beaked whale remain uncertain due to insufficient accurate data for this species prior to

	1999-2000. However with improved surveillance (e.g., under the ObSERVE Programme) and an improving number of records of Cuvier's beaked whales in the last 18 years, the short-term trend indicates the continued existence of sufficient quality habitat for the species.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**C09** Geotechnical surveying (M) **E02** Shipping lanes and ferry lanes transport operations (M) **H02** Military, paramilitary or police exercises and operations in the freshwater and marine environment (M)	**C09** Geotechnical surveying (M) **E02** Shipping lanes and ferry lanes transport operations (M) **H02** Military, paramilitary or police exercises and operations in the freshwater and marine environment (M)

8.2 Sources of information *Optional*	*https://www.npws.ie/marine/marine-species/cetaceans* *https://www.dccae.gov.ie/en-ie/natural-resources/topics/Oil-Gas-Exploration-Production/Pages/home.aspx* *https://www.npws.ie/marine/best-practice-guidelines* *http://www.iwdg.ie/news/?id=2758*
8.3 Additional information *Optional*	Cuvier's beaked whales may be subject to local and/or regional environmental pressures and threats throughout their North Atlantic range and in Irish inshore/offshore waters. In the development and preparation of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009), a comprehensive review of the pressures and threats believed and/or documented to be acting on this species and/or its functional group was undertaken. The main pressures thought to be acting on this species in Irish waters are considered to involve commercial shipping-based or vessel-based activities that occur primarily on a local or regional scale and/or on a temporary or intermittent basis (e.g., impacts arising from shipping movements or geophysical seismic exploration; DEHLG, 2009). Among the potential pressures that may act on this species is the use of military sonars in the deeper ocean and adjacent continental margins which, while not employed by the Irish Naval Service, is known and documented to occur in the waters of Ireland's EEZ (e.g., McCauley, 2015; Berrow *et al.*, 2018). Such anthropogenic sound sources have been implicated previously in a number of beaked

	whale stranding events (DAHG, 2014) and questions remain with regard to an unusual series of strandings of this and other beaked whale species in western Ireland, the UK and adjacent states in August-September 2018 (DCHG, 2018 unpublished data; IWDG, 2018 unpublished data). Since Cuvier's beaked whale distribution is known to be primarily offshore in the deeper Atlantic Ocean, where there is a documented pressure that may be regionally intensive the ranking given is one of medium importance, given relatively low population estimates for the species (Rogan *et al.*, 2018; see also 6.2 above) and also uncertainty with regard to the species' movements and population/breeding structure (Taylor *et al.*, 2008). It should be noted that in relation to seismic exploration, which tends to occur on a local or occasionally regional scale in the waters of Ireland's EEZ and is comparatively low in coverage relative to several other member states, a robust regulatory and management regime applies in order to avoid potentially significant impacts on all species of marine mammal. This regime takes cognisance of recent scientific research and surveillance findings (e.g., Baines *et al.*, 2013; McCauley, 2015; Frouin-Mouy *et al.*, 2017; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; Rogan *et al.*, 2017; O'Donnell *et al.*, 2018; Berrow *et al.*, 2018; Rogan *et al.*, 2018) and it is expected that this practice will continue into the future. There is no evidence to suggest a change in the main pressures thought to be acting on this species in the near future (i.e., threats). However surveillance of the species and the pressures potentially acting upon it will continue, while the application of strong management measures (e.g., via the statutory/regulatory process) to avoid potentially significant impacts is also expected to continue.

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	*Good / Poor / Bad /* ***Unknown***
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*

10.2 Additional information *Optional*	Visual and acoustic records of Cuvier's beaked whale in Irish waters indicate a wide and prevailing occurrence of the species throughout the year, in deep oceanic waters and those overlying the continental slope and also some parts of outer continental shelf. Since many significant (i.e., high level) anthropogenic impacts that may affect this wide-ranging species' distribution are more localised in space and time within this extensive and diverse marine area, the Future prospects for the Range and Habitat for the species are considered to be Good. A number of pressures that could act upon this species have been identified. The effect of these pressures may operate on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, thereby constituting a potential threat. The impacts on individuals or populations of Cuvier's beaked whale in Irish waters are not well understood, partly due to the species' recorded occurrence in comparatively small numbers and to continuing uncertainty regarding its population trends and ecology within Ireland's marine area. Therefore the Future prospects for the Population are considered to be Unknown.

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***		
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	**YES**/*NO*	**YES**/*NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	**YES**/*NO*	**YES**/*NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	Numerous contemporary sightings of Cuvier's beaked whales and extensive acoustic data demonstrate the wide and frequent occurrence of this species in deep oceanic waters, those overlying the continental slope, and also the margin of the continental shelf (e.g., around the Porcupine Seabight, the Porcupine Bank and eastern Rockall Trough). Hence the Range and Habitat for the species are considered to be Favourable. While robust and long-term data on Cuvier's beaked whale population size and trends in Irish waters as a whole are not available, knowledge of the species' seasonal distribution, abundance and density in the offshore waters of western Europe has improved significantly since the Directive came into force. There has also recently been a very significant improvement in population abundance data from a significant deep water component of the Irish EEZ, yielding the first density/abundance estimates and associated 95% Confidence Intervals for this region, both in the summer and winter seasons. However there is considerable uncertainty about the trajectory of northeast Atlantic populations of Cuvier's beaked whale. Given available estimates for Irish and neighbouring European waters, which are variable and thus far drawn from very different methodologies, the Population parameter is considered to be Unknown. A number of potentially significant pressures have been identified. While the effect of these pressures may act on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, none is considered to be of sufficient magnitude to be causing an adverse impact on populations of Cuvier's beaked whale in Irish waters. Ongoing threats as listed or identified into the future via surveillance will be managed appropriately. Hence the Future prospects for the species are considered to be Favourable.		

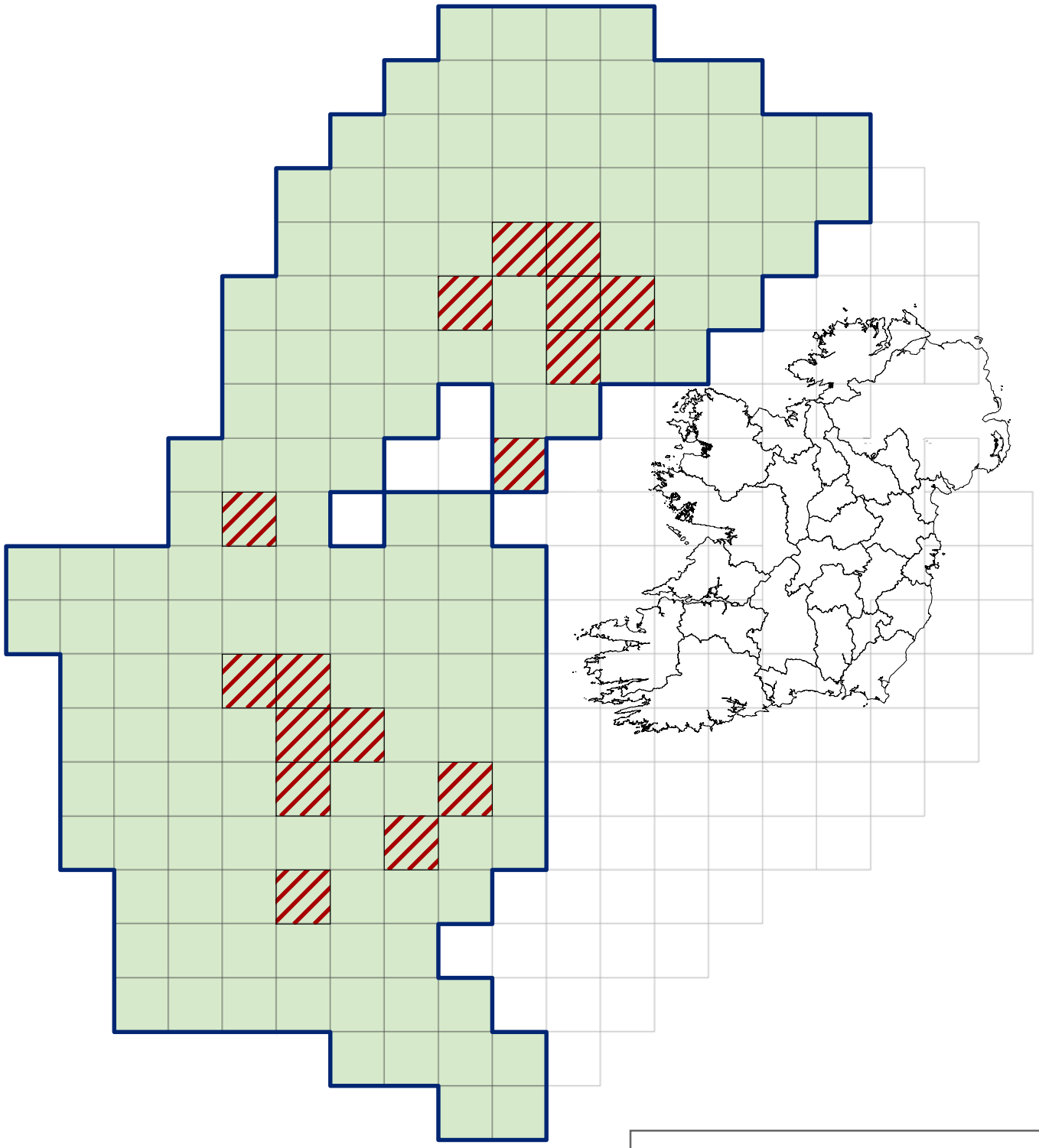
	Based on the assessments for the Range, Population, Habitat and Future prospects parameters, the overall conclusion is that the Conservation Status of Cuvier's beaked whale in Ireland is Favourable. This overall result is different from the previous two Article 17 assessments, due to improved knowledge and higher quality data, and to new methods proven to be effective for use in the assessment of the species' status.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Cuvier's beaked whale
Ziphius cavirostris (2035)
Article 17 (2013 - 2018) Assessment



Current Distribution (16 cells)
Current Range (159 cells)
Favourable Reference Range (159 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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 25 50 100 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***2038***
1.3 Species scientific name	*Mesoplodon bidens*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Sowerby's beaked whale (Míol mór socach Sowerby)
1.6i Species description	The Sowerby's beaked whale is a smaller member of the beaked whale family (*Ziphiidae*) averaging up to 5-6m in adult body length and found only in the North Atlantic, where it occurs in temperate and sub-polar regions. One of at least three *Mesoplodon* species to occur in Ireland (DEHLG, 2009; Berrow *et al.*, 2010), its range in the eastern Atlantic extends from Iceland and Norway to the Azores and Canary Islands, and excludes the Mediterranean and Baltic Seas (Taylor *et al.*, 2008). While it is classified by the IUCN as a Data Deficient species whose population status and trends remain uncertain, Sowerby's beaked whales are quite readily identifiable in the field. This is due to their long slender beak which is often clearly visible when the animal surfaces (e.g., Berrow *et al.*, 2018), to the absence of a central notch in the tail flukes, and its skin colouration which tends to be dark grey on the dorsal surface and often contains elongated scarring on the flanks. Live records in Irish waters have been infrequent until recently (e.g., see Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013) although individuals occasionally strand around the coast. Knowledge of population structure or movements remains limited due to the historical scarcity of data; but information has improved since 2015.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2013-2018***
2.3 Distribution map	Submitted
2.4 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*

2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	Over the last two decades there have been increasing visual and acoustic records of Sowerby's beaked whales, albeit off a very low base. These have occurred in deep offshore Irish waters stretching northwards from the Porcupine Seabight and western Porcupine Shelf to the Rockall Trough (e.g., Ó Cadhla *et al.*, 2004; Frouin-Mouy *et al.*, 2017; Kavanagh *et al.*, 2017; Rogan *et al.*, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018). The distribution map presented for this species represents all available live sighting records during extensive scientific research and monitoring in Irish waters between 2013 and 2018. The period selected for mapping represents a period of intensive and high quality surveillance for cetaceans in Irish waters across a range of research projects and monitoring programmes. The surveillance programmes, projects and publications that contributed sighting data to this distribution projection are cited as follows: Kavanagh *et al.* (2017), Berrow *et al.* (2018) and Rogan *et al.* (2018). Along with the results of previous visual survey effort (i.e., Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Berrow *et al.*, 2010; Wall *et al.*, 2013; Rogan *et al.*, 2017), recent extensive aerial and ship-based surveys in summer (Hammond *et al.*, 2017; Rogan *et al.*, 2018) and winter (Rogan *et al.*, 2018) and acoustic monitoring (Frouin-Mouy *et al.*, 2017; Berrow *et al.*, 2018), these data were integrated into the development of the species range map presented under section 2.5. It should be noted that the spatial and temporal distribution of Sowerby's beaked whales is likely to be underestimated due to the difficulty in discriminating small- to medium-sized whale species from one another in the offshore Atlantic environment (e.g., see Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Wall *et al.*, 2013; Hammond *et al.*, 2017; Rogan *et al.*, 2017; Rogan *et al.*, 2018). With regard to Sowerby's beaked whales there is also a difficulty in distinguishing different *Mesoplodon* species from one another in the wild, leading many records to contain confident identification of the genus only. Thus the distribution map presented does not include records where the observed species could not be distinguished, for example, from other *Mesoplodon* species or members of the Family *Ziphiidae* (i.e., beaked whales, such as Northern bottlenose whale or Cuvier's beaked whale) or from *unidentified whale* or *unidentified medium whale* categories often used for indeterminate sightings. The distribution of recent sightings (e.g., in Kavanagh *et al.*, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018) and extensive acoustic records (e.g., Frouin-Mouy *et al.*, 2017; Berrow *et al.*, 2018) along with regional sighting and acoustic records obtained across three preceding decades (Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Wall *et al.*, 2013; Rogan *et al.*, 2017) indicate a predominant distribution in Atlantic waters greater than 500-1,000m deep, including those overlying and

	fringing the continental slope. While all reliable cetacean records obtained in Irish waters were not available for use in this exercise, the map drawn for this species provides a good sample of its observed distribution within the period given in 2.2.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
4.2 Sources of information	Baines, M., Reichelt, M., Coles, D., Williams, A., Griffin, D. & Corkhill, O. (2013) Marine Mammal Observers' and passive acoustic monitoring operators' report during 3D seismic survey off southwest Ireland for KOSMOS. RPS Energy, Axminster, Devon, UK. 24pp. Berrow, S.D., Whooley, P., O'Connell, M. & Wall, D. (2010) *Irish Cetacean Review (2000-2009).* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 60pp. Berrow, S.D., O'Brien, J., Meade, R., Delarue, J., Kowarski, K., Martin, B., Moloney, J., Wall, D., Gillespie, D., Leaper, R., Gordon, J., Lee, A. & Porter, L. (2018) *Acoustic Surveys of Cetaceans in the Irish Atlantic Margin in 2015–2016: Occurrence, distribution and abundance.* Department of Communications, Climate Action & Environment and the National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland, 348pp. DAHG (2014) *Guidance to Manage the Risk to Marine Mammals from Man-made Sound in Irish Waters.* Department of Arts, Heritage and the Gaeltacht, Dublin. 59pp. DEHLG (2009) *Conservation Plan for Cetaceans in Irish Waters.* Department of the Environment, Heritage and Local Government, Dublin. 97pp. Frouin-Mouy, H., Hipsey, S., Denes, S. & Burns, R. (2017) Soundscape Characterisation and Cetacean Presence in the Porcupine Basin: June to November 2016. Document 01320, Version 1.0. Technical report by JASCO Applied Sciences for Woodside Energy (Ireland) Pty Ltd. 109pp. Hammond, P.S., Macleod, K., Burt, L. Cañadas, A., Lens, S. Mikkelsen,

B., Rogan, E., Santos, B., Uriarte, A., Van Canneyt, O. & Vázquez, J.A. (2009) Cetacean Offshore Distribution and Abundance in the European Atlantic (CODA). Final report. University of St. Andrews, Scotland.

Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., K Macleod, K., Ridoux, V., Santos, M.B., Scheidat, M., Teilmann, J., Vingada, J. & Øien, N. (2017) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. Final project report. University of St. Andrews, Scotland. 40pp.

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5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***395,000 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994-2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	

<table>
<tr><td>5.9 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">5.10 Favourable reference range</td><td colspan="2">a) 395,000 km²</td></tr>
<tr><td colspan="2">b) Indicate if operators were used (use these 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 range value derived from the range map referred to in 2.4 is considered to be the baseline for this species. As there is no evidence of a decline since the Directive came into force the current range is set as the FRR.</td></tr>
<tr><td rowspan="6">5.11 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>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>5.12 Additional information

Optional</td><td colspan="2">The natural range of Sowerby's beaked whales in Irish waters, and marine waters covered by the Directive, is a small component of the species' wider North Atlantic range (Taylor et al., 2008; DEHLG, 2009; Hammond et al., 2017; Rogan et al., 2017; Berrow et al., 2018; Rogan et al., 2018).
The range map provided consists of the species' recorded and likely predominant natural range based on comparatively recent data (2001-2018) and expert judgement, and is partly derived from 2.3. It consists of a block of contiguous 50km x 50km grid cells distributed in Irish marine waters of 500m depth or greater, and now includes the relevant assessment area under the Marine Strategy Framework Directive.
Prior to 1999-2000, survey effort targeting cetacean species in Irish offshore waters was comparatively limited in coverage, both spatially and temporally. Since 1999-2000 a number of dedicated multi-annual surveillance programmes for cetaceans have operated in Irish waters, with visual and acoustic surveys extending to the limits of Ireland's EEZ and beyond. With regard to this species it is considered that the</td></tr>
</table>

	years 2007-2018 represent an appropriate period for the evaluation of short-term trends since all survey efforts intensified further during this period. Sighting and acoustic records from ongoing dedicated surveillance effort in Irish waters (Frouin-Mouy *et al.*, 2017; Kavanagh *et al.*, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018) provide no evidence of a decline in distribution/range in the recent past; therefore the short-term trend for Range is considered to be stable. The long-term trend over the period 1994-2018 is considered to be uncertain for this species due to limited data availability prior to 1999-2000, as outlined above. The range value derived from the map referred to above is considered to be the baseline for this species. This surface area calculation is greater than that reported in 2013 due to the integration of Ireland's MSFD assessment area within the range. Since there is no evidence of a decline in range since the Directive came into force the current range is set as the FRR. There is an assumption that the current range in Irish waters is large enough (a) to encompass all of the ecological variation required by this species during its occurrences therein and (b) to contribute to the long-term survival of the species.

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	***2013-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	***652***
	c) Maximum	***7,716***
	d) Best single value	
6.3 Type of estimate	*Best estimate / multi-year mean / **95% confidence interval** / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*		

6.6 Population size **Method used**	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend **Period**	***2007–2018***	
6.8 Short-term trend **Direction**	*stable / increasing / decreasing /* ***uncertain*** */ unknown*	
6.9 Short-term trend **Magnitude** *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend **Period** *Optional*	***1994–2018***	
6.12 Long-term trend **Direction** *Optional*	*stable / increasing / decreasing / uncertain /* ***unknown***	
6.13 Long-term trend **Magnitude** *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.14 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***	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) Population size (with unit) or*	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) Favourable reference population is unknown	

<table>
<tr><td></td><td colspan="2">d) Indicate method used to set reference value if other than operators

Robust data on Sowerby's beaked whale population trends in Irish waters are not available and the figures presented in 6.2 are the first population size estimates for all Mesoplodon species that can been attributed to Irish waters. The assignment of these estimates to Sowerby's beaked whale is based on an assumption that most, if not all, Mesoplodon sightings used in the analysis and estimation process are likely to comprise this species. This approach is partly supported by Irish stranding records (Berrow et al., 2010; McGovern et al., 2016) which indicate M. bidens to be the predominant Mesoplodon whale in Irish waters. It is also supported by new sighting and acoustic records from 2015-2017 (Berrow et al., 2018; Rogan et al., 2018) whereby numerous records of Sowerby's beaked whales were widely obtained offshore but no other Mesoplodon species was positively identified.

The population estimates presented here represent the lower and upper 95% Confidence Intervals from two novel summer and winter coverages (i.e., four in total) of a large portion of Ireland's EEZ using aerial survey methods (see Rogan et al., 2018). Previous estimates from this part of the North Atlantic (e.g., in Hammond et al., 2009; Rogan et al., 2017) were based mainly on conventional sightings from ships in summer only, and these were international/high seas in spatial coverage; consequently the estimates they generated were considerably higher. Given the variability in estimates generated from seasonal aerial surveys (Rogan et al., 2018) and the above circumstances it is not yet possible to determine a realistic baseline value since the Directive came into force; consequently the FRP remains unknown.</td></tr>
<tr><td>6.16 Change and reason for change in population size</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>
</table>

6.17 Additional information *Optional*	Evidence from deep water acoustic monitoring (Frouin-Mouy *et al.*, 2017; Berrow *et al.*, 2018) and multi-annual surveillance programmes (e.g., Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013; Kavanagh *et al.*, 2017; Rogan *et al.*, 2017; Rogan *et al.*, 2018) now demonstrate that Sowerby's beaked whales occur widely in deeper offshore waters to the north, west and south-west of Ireland and do so throughout the year. The relationship between Sowerby's beaked whales occurring in Ireland and those elsewhere in the eastern North Atlantic (e.g., Bay of Biscay, northern UK waters) is unknown, however. Due to the relative scarcity of confirmed records and abundance estimates of this species, the accurate determination of population trends, either in the short or long term, remains fraught with difficulty. Furthermore, the extent of movements or regional residency by communities of the species are poorly understood, partly due to the animals' occurrence in exposed environments far from shore and to their deep oceanic ecology which combine to make their study both difficult and logistically demanding. Within the North-East Atlantic in summer, recent work by Hammond *et al.* (2017) indicates that some 11,394 beaked whales (95% C.I: 4,494-28,888) could be attributed to deeper waters off northern Spain, western France and the UK. Yet comprehensive and methodologically comparable data for the entire region of western Europe are lacking, particularly with regard to sufficient temporal coverage (i.e., beyond one or more summer months separated by many years) and spatial coverage (i.e., spanning outer continental shelf, slope and deeper abyssal waters, all of which may represent Sowerby's beaked whale habitat). New Sowerby's beaked whale data from Ireland's ObSERVE Programme (see Berrow *et al.*, 2018 and Rogan *et al.*, 2018) have not yet been integrated into an Atlantic- or Europe-wide assessment of population size/density for this species. Since the new estimates derived for Sowerby's beaked whale population size are variable depending on the survey block, season and year of coverage (Rogan *et al.*, 2018) and they represent the first such abundance estimates for Ireland, it is not yet possible to determine a realistic baseline value since the Directive came into force; consequently the FRP remains unknown.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*

7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*
7.8 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*
7.9 Additional information *Optional*	Use of the range descriptor and range surface area calculation as proxies for habitat and habitat area are judged appropriate for this wide-ranging pelagic and deep-diving species. The species' natural range and thus habitat in Irish waters is considered to be a small component of its wider North Atlantic range (Taylor *et al.*, 2008; DEHLG, 2009; Hammond *et al.*, 2017; Rogan *et al.*, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018). The quality of habitat for Sowerby's beaked whale was determined by consideration of the relevant direct and indirect pressures thought to be acting on the species and/or its functional group, and its habitat within its natural environment. These pressures were evaluated in development of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009) and informed by more recent scientific surveillance (e.g., Baines *et al.*, 2013; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; O'Donnell *et al.*, 2018; Berrow *et al.*, 2018; Rogan *et al.*, 2018), using available data concerning, *inter alia*, habitat use, population size, distribution and ecology, and threats to the species' protection (e.g., via natural/biological sources, human

	sectoral activities, management gaps, etc.). Although, relative to principal human maritime activity in Ireland, they are demonstrated to be a more remote offshore species, Sowerby's beaked whales may be subject to a number of local and/or regional environmental pressures throughout their range (DEHLG, 2009). However, based on current spatial and temporal data none are considered to be of sufficient impact on the species to be causing a significant deterioration in overall habitat quality in Ireland from a status that is sufficient for long-term survival. Long-term trends in habitat for Sowerby's beaked whale remain uncertain due to insufficient accurate data for this species prior to 1999-2000. However with improved surveillance (e.g., under the ObSERVE Programme) and an improving number of records of Sowerby's beaked whales in the last 18 years, the short-term trend indicates the continued existence of sufficient quality habitat for the species.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**C09** Geotechnical surveying (M) **E02** Shipping lanes and ferry lanes transport operations (M) **H02** Military, paramilitary or police exercises and operations in the freshwater and marine environment (M)	**C09** Geotechnical surveying (M) **E02** Shipping lanes and ferry lanes transport operations (M) **H02** Military, paramilitary or police exercises and operations in the freshwater and marine environment (M)

8.2 Sources of information *Optional*	*https://www.npws.ie/marine/marine-species/cetaceans* *https://www.dccae.gov.ie/en-ie/natural-resources/topics/Oil-Gas-Exploration-Production/Pages/home.aspx* *https://www.npws.ie/marine/best-practice-guidelines* *http://www.iwdg.ie/news/?id=2758*
8.3 Additional information *Optional*	Sowerby's beaked whales may be subject to local and/or regional environmental pressures and threats throughout their North Atlantic range and in Irish inshore/offshore waters. In the development and preparation of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009), a comprehensive review of the pressures and threats believed and/or documented to be acting on this species and/or its functional group was undertaken.

	The main pressures thought to be acting on this species in Irish waters are considered to involve commercial shipping-based or vessel-based activities that occur primarily on a local or regional scale and/or on a temporary or intermittent basis (e.g., impacts arising from shipping movements or geophysical seismic exploration; DEHLG, 2009). Among the potential pressures that may act on this species is the use of military sonars in the deeper ocean and adjacent continental margins which, while not employed by the Irish Naval Service, is known and documented to occur in the waters of Ireland's EEZ (e.g., McCauley, 2015; Berrow *et al.*, 2018). Such anthropogenic sound sources have been implicated previously in a number of beaked whale stranding events (DAHG, 2014) and questions remain with regard to an unusual series of strandings of this and other beaked whale species in western Ireland, the UK and adjacent states in August-September 2018 (DCHG, 2018 unpublished data; IWDG, 2018 unpublished data). Since Sowerby's beaked whale distribution is known to be primarily offshore in the deeper Atlantic Ocean, where there is a documented pressure that may be regionally intensive the ranking given is one of medium importance, given relatively low population estimates for the species (Rogan *et al.*, 2017; Rogan *et al.*, 2018; see also 6.2 above) and also uncertainty with regard to the species' movements and population/breeding structure (Taylor *et al.*, 2008). It should be noted that in relation to seismic exploration, which tends to occur on a local or occasionally regional scale in the waters of Ireland's EEZ and is comparatively low in coverage relative to several other member states, a robust regulatory and management regime applies in order to avoid potentially significant impacts on all species of marine mammal. This regime takes cognisance of recent scientific research and surveillance findings (e.g., Baines *et al.*, 2013; McCauley, 2015; Frouin-Mouy *et al.*, 2017; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; Rogan *et al.*, 2017; O'Donnell *et al.*, 2018; Berrow *et al.*, 2018; Rogan *et al.*, 2018) and it is expected that this practice will continue into the future. There is no evidence to suggest a change in the main pressures thought to be acting on this species in the near future (i.e., threats). However surveillance of the species and the pressures potentially acting upon it will continue, while the application of strong management measures (e.g., via the statutory/regulatory process) to avoid potentially significant impacts is also expected to continue.

9 Conservation measures

To be reported only for Annex II species

10 Future prospects		
10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	*Good / Poor / Bad /* ***Unknown***
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	Visual and acoustic records of Sowerby's beaked whale in Irish waters indicate a wide and prevailing occurrence of the species throughout the year, in deep oceanic waters and those overlying the continental slope and also some parts of the outer continental shelf. Since many significant (i.e., high level) anthropogenic impacts that may affect this wide-ranging species' distribution are more localised in space and time within this extensive and diverse marine area, the Future prospects for the Range and Habitat for the species are considered to be Good. A number of pressures that could act upon this species have been identified. The effect of these pressures may operate on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, thereby constituting a potential threat. The impacts on individuals or populations of Sowerby's beaked whale in Irish waters are not well understood, partly due to the species' recorded occurrence in comparatively small numbers and to continuing uncertainty regarding its population trends and ecology within Ireland's marine area. Therefore the Future prospects for the Population are considered to be Unknown.	

11 Conclusions			
Assessment of conservation status at end of reporting period			
11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***		
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***

	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 data	***YES**/NO*	***YES**/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	***YES**/NO*	***YES**/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	Numerous contemporary sightings of Sowerby's beaked whales and extensive acoustic data demonstrate the wide and frequent occurrence of this species in deep oceanic waters, those overlying the continental slope, and also the margin of the continental shelf (e.g., around the Porcupine Seabight, the Porcupine Bank and eastern Rockall Trough). Hence the Range and Habitat for the species are considered to be Favourable. While robust and long-term data on Sowerby's beaked whale population size and trends in Irish waters as a whole are not available, knowledge of the species' seasonal distribution, abundance and density in the offshore waters of western Europe has improved significantly since the Directive came into force. There has also recently been a very significant improvement in *Mesoplodon* population abundance data from a significant deep water component of the Irish EEZ, yielding tentative density/abundance estimates and associated 95% Confidence Intervals for this region, both in the summer and winter seasons. However there is considerable uncertainty about the trajectory of northeast Atlantic populations of Sowerby's beaked whale. Given available estimates for Irish and neighbouring European waters, which are variable and thus far drawn from very different methodologies, the Population parameter is considered to be Unknown. A number of potentially significant pressures have been identified. While the effect of these pressures may act on a temporary and/or regional scale and some are likely to continue to act as pressures into		

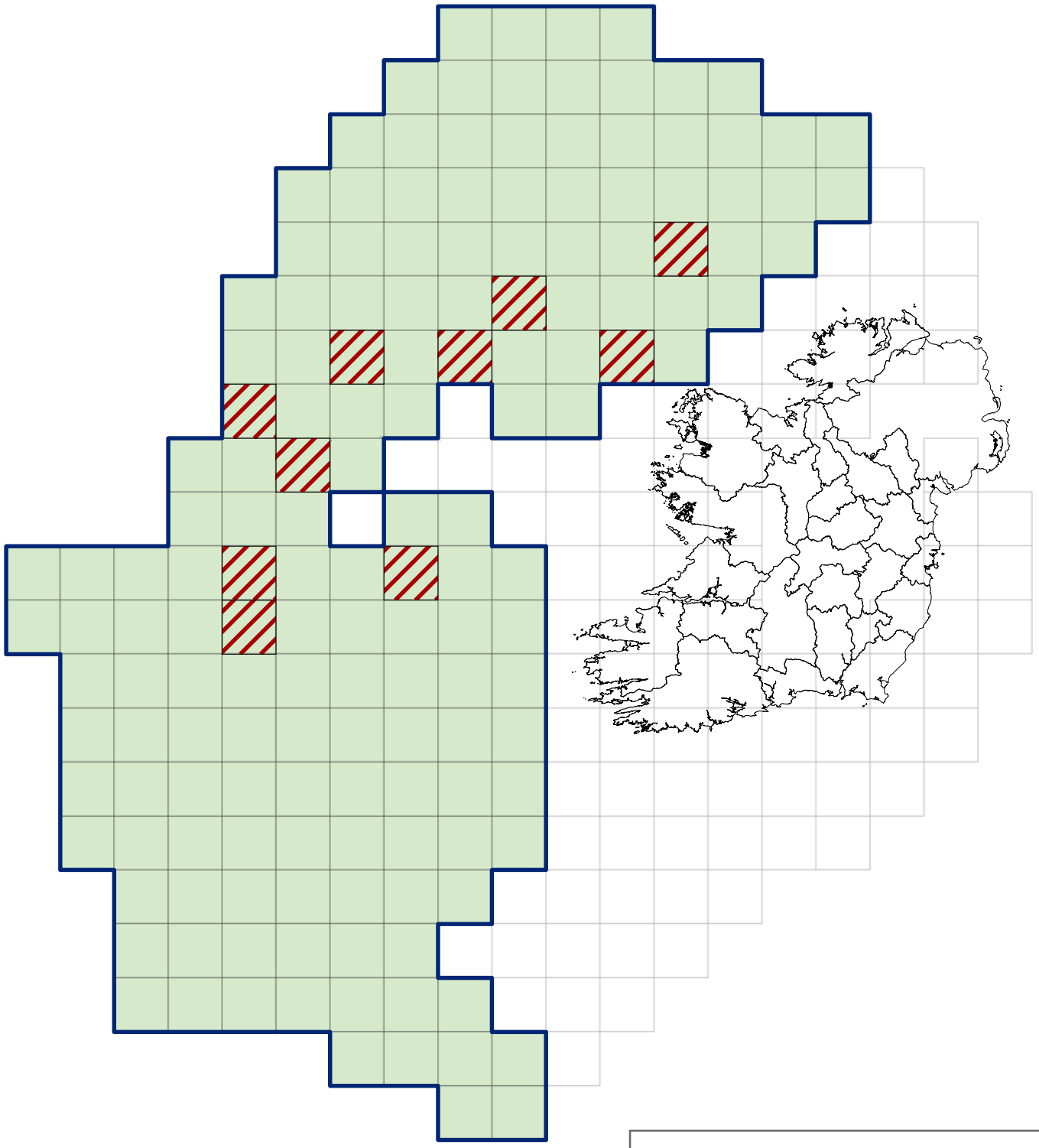
	the future, none is considered to be of sufficient magnitude to be causing an adverse impact on populations of Sowerby's beaked whale in Irish waters. Ongoing threats as listed or identified into the future via surveillance will be managed appropriately. Hence the Future prospects for the species are considered to be Favourable. Based on the assessments for the Range, Population, Habitat and Future prospects parameters, the overall conclusion is that the Conservation Status of Sowerby's beaked whale in Ireland is Favourable. This overall result is different from the previous two Article 17 assessments, due to improved knowledge and higher quality data, and to new methods proven to be effective for use in the assessment of the species' status.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Sowerby's beaked whale
Mesoplodon bidens (2038)
Article 17 (2013 - 2018) Assessment



Current Distribution (10 cells)
Current Range (158 cells)
Favourable Reference Range (158 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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 25 50 100 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***2618***
1.3 Species scientific name	*Balaenoptera acutorostrata*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Minke whale (Droimeiteach beag)
1.6i Species description	The minke whale is the smallest baleen whale species occurring in Irish waters, with adults averaging to just 8.5m in body length. Found only in the Northern Hemisphere the species is recorded more frequently in Irish waters than its larger *Baleanopterid* relatives the blue whale, fin whale and sei whale; although this may be partly due to a greater tendency to occupy shallower coastal and continental shelf waters. Minke whales have been observed all around Ireland's coast and offshore in deep ocean basins as well as over the continental shelf and slope. Known also to enter coastal bays or to be seen close to headlands, individual whales may approach slow-moving boats and other vessels. As well as their size difference and the absence of a distinct tall exhalation blow when surfacing, the species' characteristic pointed snout and broad white patches on the pectoral fins are striking and useful in its identification. Minke whales are thought to prey on small fish and swimming crustaceans and it is thought that they undertake some migratory movement to warmer waters in the winter. In Ireland minke whales are seen in all seasons, however, usually as single individuals or in loose associations of up to ten animals linked to localised feeding activity.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2013-2018***
2.3 Distribution map	Submitted

2.4 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*
2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	Over the last two decades there have been numerous records of minke whales in Irish offshore and coastal waters, particularly off the southwest and south coasts, in the Celtic Sea and Irish Sea (e.g., Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Baines *et al.*, 2013; Berrow & O'Brien, 2013; Wall *et al.*, 2013; Cronin & Barton, 2014; O'Brien & Berrow, 2015; Kavanagh *et al.*, 2017; O'Donnell *et al.*, 2017; O'Brien & Berrow, 2018; O'Donnell *et al.*, 2018a,b; Rogan *et al.*, 2018). The distribution map presented for this species represents all available live sighting records during extensive scientific research and monitoring in Irish waters between 2013 and 2018. The period selected for mapping represents a period of intensive and high quality surveillance for cetaceans in Irish waters across a range of research projects and monitoring programmes. The surveillance programmes, projects and publications that contributed sighting data to this distribution projection are cited as follows: Baines *et al.* (2013), Berrow & O'Brien (2013), Cronin & Barton (2014), O'Brien & Berrow (2014), O'Brien & Berrow (2015), Craig *et al.* (2016), Kavanagh *et al.* (2017), O'Brien & Berrow (2018), O'Donnell *et al.* (2017), O'Donnell *et al.* (2018a,b), O'Sullivan & Manning (2017), Berrow *et al.* (2018) and Rogan *et al.* (2018). Along with the results of previous visual survey effort (i.e., Pollock *et al.*, 1997; Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Berrow *et al.*, 2010; Hammond *et al.*, 2011; Wall *et al.*, 2013), recent extensive aerial surveys in summer and winter (Rogan *et al.*, 2018) and acoustic monitoring (Berrow *et al.*, 2018), these data were integrated into the development of the species' range map presented under section 2.5. It should be noted that the spatial and temporal distribution of minke whales could be somewhat underestimated due to the difficulty in discriminating smaller baleen whale species from other small or juvenile whales, particularly in the offshore Atlantic environment (e.g., see Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Wall *et al.*, 2013; Rogan *et al.*, 2018). Thus the distribution map presented does not include records where the observed species could not be distinguished, for example, from other members of the Family *Balaenopteridae* (e.g., the *blue/fin/sei whale* category) or the *unidentified whale* or *unidentified medium sized whale* categories often used for indeterminate sightings. The distribution of recent sightings (e.g., in Baines *et al.*, 2013; Cronin & Barton, 2014; Kavanagh *et al.*, 2017; O'Donnell *et al.*, 2017; O'Brien & Berrow, 2018; O'Donnell *et al.*, 2018a,b; Rogan *et al.*, 2018) and acoustic records (Berrow *et al.*, 2018) along with regional sighting

	records obtained across three preceding decades (Berrow *et al.*, 2002; Hammond *et al.*, 2002; Reid *et al.*, 2003; SCANS-II, 2008; Wall *et al.*, 2013) indicate a predominant distribution in waters overlying the continental shelf and continental slope, although the species' occurrence in deeper ocean basins (e.g., Porcupine Seabight) is increasingly shown. While all reliable cetacean records obtained in Irish waters were not available for use in this exercise, the map drawn for this species provides a good sample of its observed distribution within the period given in 2.2.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
4.2 Sources of information	Baines, M., Reichelt, M., Coles, D., Williams, A., Griffin, D. & Corkhill, O. (2013) Marine Mammal Observers' and passive acoustic monitoring operators' report during 3D seismic survey off southwest Ireland for KOSMOS. RPS Energy, Axminster, Devon, UK. 24pp. Berrow, S.D. & O'Brien, J. (2013) Harbour porpoise SAC survey 2013. Report to the National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Irish Whale and Dolphin Group. pp. 37. Berrow, S.D., O'Brien, J., Meade, R., Delarue, J., Kowarski, K., Martin, B., Moloney, J., Wall, D., Gillespie, D., Leaper, R., Gordon, J., Lee, A. & Porter, L. (2018) *Acoustic Surveys of Cetaceans in the Irish Atlantic Margin in 2015–2016: Occurrence, distribution and abundance.* Department of Communications, Climate Action & Environment and the National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland, 348pp. Berrow, S.D., Whooley, P. & Ferriss, S. (2002) *Irish Whale and Dolphin Group Cetacean Sighting Review (1991-2001)*. Irish Whale and Dolphin Group, Kilrush, Co. Clare. 34 pp. Berrow, S.D., Whooley, P., O'Connell, M. & Wall, D. (2010) *Irish Cetacean Review (2000-2009).* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 60pp.

Craig, D., Hunt, W. & Kavanagh, A. (2016) Report on line-transect surveys for cetaceans conducted during the 2016 Mackerel Egg Survey. Report to the Marine Institute and National Parks & and Wildlife Service. Irish Whale & and Dolphin Group and University College Cork. 20pp.

Cronin, C. & Barton, C. (2014) Cetacean monitoring during the Celtic Sea Herring Acoustic Survey (CSHAS) October 2014. Report to the National Parks & and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Cork Ecology, Castlefreke, Clonakilty, Co. Cork. 24pp.

DEHLG (2009) *Conservation Plan for Cetaceans in Irish Waters.* Department of the Environment, Heritage and Local Government, 7 Ely Place, Dublin. 97pp.

Hammond, P.S., Benke, H., Berggren, P., Borchers, D.L., Buckland, S.T., Collet, A., Heide-Jorgensen, M.P., Heimlich-Boran, S., Hiby, A.R., Leopold, M.F. & Øien, N. (2002) Abundance of harbour porpoise and other cetaceans in the North Sea and adjacent waters. *Journal of Applied Ecology* 39: 361-376.

Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., K Macleod, K., Ridoux, V., Santos, M.B., Scheidat, M., Teilmann, J., Vingada, J. & Øien, N. (2017) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. Final project report. University of St. Andrews, Scotland. 40pp.

Hammond, P.S., Macleod, K., Burt, L. Cañadas, A., Lens, S. Mikkelsen, B., Rogan, E., Santos, B., Uriarte, A., Van Canneyt, O. & Vázquez, J.A. (2009) Cetacean Offshore Distribution and Abundance in the European Atlantic (CODA). Final report. University of St. Andrews, Scotland.

Hammond, P.S., Macleod, K., Burt, L., Cañadas, A., Lens, S., Mikkelsen, B., Rogan, E., Santos, B., Uriarte, A., Van Canneyt, O., & Antonio Vázquez, J. (2011) Abundance of baleen whales in the European Atlantic. Report to the Scientific Committee of the International Whaling Commission, Cambridge. SC/63/RMP24. 22pp.

Kavanagh, A.S., Hunt, W., Richardson, N. & Jessopp, M. (2017) Cetaceans in Irish offshore waters: Final report of the SFI-KOSMOS Project 2015-2017. MaREI Centre, University College Cork. 66pp.

Ó Cadhla, O., Mackey, M., Aguilar de Soto, N., Rogan, E. & Connolly, N. (2004) *Cetaceans and Seabirds of Ireland's Atlantic Margin. Volume II - Cetacean distribution and abundance.* Report on research carried out under the Irish Petroleum Infrastructure Programme (PIP): Rockall Studies Group (RSG) projects 98/6 and 00/13, Porcupine Studies Group project P00/15 and Offshore Support Group (OSG) project 99/38. 82pp.

O'Brien, J. & Berrow, S.D. (2014) Harbour porpoise surveys in Blasket Islands SAC, 2014. Report to the National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Irish

Whale and Dolphin Group. pp. 29.

O'Brien, J. & Berrow, S.D. (2015) Harbour porpoise surveys in Roaringwater Bay and Islands SAC, 2015. Report to the National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Irish Whale and Dolphin Group. pp. 41.

O'Brien, J. & Berrow, S.D. (2018) Harbour porpoise surveys in Blasket Islands SAC, 2018. Report to the National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht. Irish Whale and Dolphin Group. pp. 23.

O'Donnell, C., Johnston, G., Mullins, E., Keogh, N. & Power, J. (2018a) Blue Whiting Acoustic Survey Cruise Report. March 20 – April 06, 2018. FSS Survey Series: 2018/01. 31pp.

O'Donnell, C., O'Malley, M., Lynch, D., Lyons, K., Keogh, N. & O'Driscoll, D. (2017) Celtic Sea Herring Acoustic Survey. Cruise Report 2017, 15 - 04 November, 2017. FSS Survey Series: 2017/04. Marine Institute, Oranmore, Co. Galway. 38pp.

O'Donnell, C., O'Malley, M., Lynch, D., Mullins, E., Keogh, N., Power, J., Long, A. & Croot, P. (2018b) Western European Shelf Pelagic Acoustic Survey (WESPAS). 10 June – 24 July, 2018. FSS Survey Series: 2018/03. Marine Institute, Oranmore, Co. Galway. 65pp.

O'Sullivan, C. & Manning, L. (2017) Cetacean monitoring undertaken during the Western European Shelf Pelagic Acoustic Survey (WESPAS), June - July 2017. Final rReport to the Marine Institute and National Parks & and Wildlife Service. 38pp.

Perrin, W.F. & Brownell Jr., R.L. (2009) Minke whales. *Balaenoptera acutorostrata* and *B.bonaerensis*. In W.F. Perrin, B. Würsig, J.G.M. Thewissen (eds.). *Encyclopedia of Marine Mammals* – 2nd edition. Academic Press, Elsevier Inc. p.733-735.

Pollock, C.M., Reid, J.R., Webb, A. & Tasker, M.L. (1997) The distribution of seabirds and cetaceans in the waters around Ireland. JNCC Report No. 267. Joint Nature Conservation Committee, Peterborough. 167pp.

Reid, J.B., Evans, P.G.H. & Northridge, S.P. (2003) *Atlas of Cetacean Distribution in North-west European Waters.* Joint Nature Conservation Committee, Peterborough. 76pp.

Reilly, S.B., Bannister, J.L., Best, P.B., Brown, M., Brownell Jr., R.L., Butterworth, D.S., Clapham, P.J., Cooke, J., Donovan, G.P., Urbán, J. & Zerbini, A.N. (2008) *Balaenoptera acutorostrata*. In IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. www.iucnredlist.org .

Rogan, E., Breen, P., Mackey, M., Cañadas, A., Scheidat, M., Geelhoed, S. & Jessopp, M. (2018) *Aerial surveys of cetaceans and seabirds in Irish waters: Occurrence, distribution and abundance in 2015-2017.* Department of Communications, Climate Action & Environment and National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland. 297pp.

SCANS-II (2008) Small Cetaceans in the European Atlantic and North Sea. Final report to the European Commission under project

	LIFE04NAT/GB/000245. Sea Mammal Research Unit, Gatty Marine Laboratory, University of St. Andrews, Scotland. Wall, D., Murray, C., O'Brien, J., Kavanagh, L., Wilson, C., Ryan, C., Glanville, B., Williams, D., Enlander, I., O'Connor, I., McGrath, D., Whooley, P. & Berrow, S. (2013) *Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters 2005 - 2011.* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 63pp.
4.2i Additional information	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. 149pp.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***460,000 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994-2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */* unknown	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	

5.9 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*	
5.10 Favourable reference range	***a) 460,000 km²***	
	b) Indicate if operators were used (use these 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 range value derived from the range map referred to in 2.4 is considered to be a new baseline for this species. As there is no evidence of a decline since the Directive came into force the current range is set as the FRR.	
5.11 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*	
5.12 Additional information *Optional*	The natural range of minke whales in Irish waters, and marine waters covered by the Directive, is a small component of its wider North Atlantic range (DEHLG, 2009; Perrin & Brownell Jr, 2009; Rogan *et al.*, 2018). A distinct migratory movement by the species from cold higher latitude feeding areas to warm tropical breeding areas may not occur for all individuals, since minke whales have recently been widely recorded in Irish waters in the winter months (Rogan *et al.*, 2018) coincident with the annual breeding season. The range map provided consists of the species' recorded and likely predominant natural range based on comparatively recent data (2001-2018) and expert judgement, and is partly derived from 2.3. It consists of a block of contiguous 50km x 50km grid cells distributed in Irish marine waters, excluding small enclosed shallow bays. Prior to 1999-2000, survey effort targeting cetacean species in Irish offshore waters was comparatively limited in coverage, both spatially and temporally. Since 1999-2000 a number of dedicated multi-annual surveillance programmes for cetaceans have operated in Irish waters, with visual and acoustic surveys extending to the limits of Ireland's	

	EEZ and beyond. With regard to this species it is considered that the years 2007-2018 represent an appropriate period for the evaluation of short-term trends since all survey efforts intensified further during this period. Sighting and acoustic records from ongoing dedicated surveillance effort in Irish waters (e.g., Berrow *et al.*, 2010; Baines *et al.* 2013; Wall *et al.*, 2013; Cronin & Barton, 2014; Craig *et al.*, 2016; Kavanagh *et al.* 2017; O'Donnell *et al.*, 2017; O'Sullivan & Manning, 2017; Berrow *et al.*, 2018; O'Brien & Berrow, 2018; O'Donnell *et al.*, 2018a,b and Rogan *et al.*, 2018) provide no evidence of a decline in distribution/range in the recent past; indeed there is evidence that the range is somewhat larger than estimated in 2013, extending into deeper oceanic waters of the Rockall Trough and Porcupine Seabight. Therefore the short-term trend for Range is considered to be stable. The long-term trend over the period 1994-2018 is considered to be uncertain for this species due to limited data availability prior to 1999-2000, as outlined above. The range value derived from the map referred to above is considered to be a revised baseline for this species. This surface area calculation is slightly greater than that reported in 2013. Since there is no evidence of a decline in range since the Directive came into force the current range remains set as the FRR. There is an assumption that the current range in Irish waters is large enough (a) to encompass all of the ecological variation required by this species during its occurrences therein and (b) to contribute to the long-term survival of the species.

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2013-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	***3,639***
	c) Maximum	***12,264***
	d) Best single value	
6.3 Type of estimate	*Best estimate / multi-year mean /* ***95% confidence interval*** */ minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	

6.5 Type of estimate *Optional*		
6.6 Population size Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing / decreasing /* ***uncertain*** */ unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain /* ***unknown***	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.14 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***	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) Population size (with unit) or*	
	b) Operator ≈ (approximately equal to) *or*	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	

<table>
<tr><td rowspan="6">6.16 Change and reason for change in population size</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>6.17 Additional information

Optional</td><td colspan="2">Evidence from deep water acoustic monitoring (Berrow et al., 2018) and multi-annual surveillance programmes (e.g., Ó Cadhla et al., 2004; Berrow et al., 2010; Wall et al., 2013; Cronin & Barton, 2014; Kavanagh et al., 2017; O'Donnell et al., 2017; O'Donnell et al., 2018a,b; Rogan et al., 2018) indicate that minke whales occur widely in Irish waters and do so throughout the year. This is particularly the case in continental shelf and slope habitats but also to a lesser degree in waters over 2,000m in depth.

Within the North Atlantic some 80,000 whales could be attributable to waters off northern and western Europe (DEHLG, 2009). Yet recent and comprehensive data for the entire region of western Europe have been lacking, particularly with regard to sufficient temporal (i.e., beyond one or more summer months or one year) and spatial coverage (i.e., spanning continental shelf, slope and deeper waters, all of which may represent minke whale habitat).

Comparable data for western European waters from the SCANS-II (2005) and CODA (2007) summer surveys were however combined to deliver a population estimate of 30,410 minke whales (95% CL=15,961-57,940; Hammond et al., 2011).

New survey efforts have since been under way through the SCANS-III aerial and shipboard survey programme of 2016 (Hammond et al., 2017) to address spatial gaps in data collection and to integrate international survey effort targeting cetacean abundance estimation in inshore and offshore European waters.

Minke whale data from Ireland's ObSERVE Programme (see Rogan et al., 2018) have not yet been integrated into a European-wide assessment of population size for this whale species. However the aerial surveys carried out under this programme were successful in enabling four separate abundance estimates (two summer, two winter) to be derived from the sighting data acquired in inshore and offshore Irish waters.

The most robust of these four seasonal estimates (i.e., those with the lowest CV = 0.50; summer 2015) has been presented in 6.2 via minimum and maximum 95% Confidence Limits.</td></tr>
</table>

	The Favourable Reference Population has been set as approximately equal to the current population to account for improved knowledge. Although the short-term trends are uncertain, this value is considered to represent the minimum necessary to ensure the long-term survival of the species.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / **uncertain** / unknown*
7.8 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*
7.9 Additional information *Optional*	Use of the range descriptor and range surface area calculation as proxies for habitat and habitat area are judged appropriate for this wide-ranging pelagic species. The species' natural range and thus habitat in Irish waters is a small component of its wider North

	Atlantic range (Reilly *et al.*, 2008; DEHLG, 2009; Perrin & Brownell Jr, 2009; Wall *et al.*, 2013; Rogan *et al.*, 2018). The quality of habitat for minke whale was determined by consideration of the relevant direct and indirect pressures thought to be acting on the species and/or its functional group, and its habitat within its natural environment. These pressures were evaluated in development of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009) and informed by more recent scientific surveillance (e.g., Baines *et al.*, 2013; Berrow & O'Brien, 2013; Cronin & Barton, 2014; O'Brien & Berrow, 2014; O'Brien & Berrow, 2015; Craig *et al.*, 2016; Kavanagh *et al.*, 2017; O'Donnell *et al.*, 2017; O'Sullivan & Manning, 2017; Berrow *et al.*, 2018; O'Brien & Berrow, 2018; O'Donnell *et al.*, 2018a,b; Rogan *et al.*, 2018), using available data concerning, *inter alia*, habitat use, population size, distribution and ecology, and threats to the species' protection (e.g., via natural/biological sources, human sectoral activities, management gaps, etc.). Minke whales may be subject to a number of local and/or regional environmental pressures throughout their range in Irish waters (DEHLG, 2009). However, based on current spatial and temporal data none are considered to be of sufficient impact on the species to be causing a significant deterioration in overall habitat quality in Ireland from a status that is sufficient for long-term survival. Long-term trends in habitat for minke whale remain uncertain due to insufficient accurate data for this species prior to 1999-2000. However, with improved surveillance and numerous ongoing records of minke whales in the last 18 years, the short-term trend indicates the continued existence of sufficient quality habitat for the species.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**C09** Geotechnical surveying (M) **E02** Shipping lanes and ferry lanes transport operations (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M)	**C09** Geotechnical surveying (M) **E02** Shipping lanes and ferry lanes transport operations (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M)

8.2 Sources of information *Optional*	https://www.npws.ie/marine/marine-species/cetaceans https://www.dccae.gov.ie/en-ie/natural-resources/topics/Oil-Gas-Exploration-Production/Pages/home.aspx https://www.agriculture.gov.ie/seafood/sea-fisheriespolicymanagementdivision/
8.3 Additional information *Optional*	Minke whales may be subject to a number of local and/or regional environmental pressures and threats throughout their North Atlantic range and in Irish coastal/offshore waters. In the development and preparation of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009), a comprehensive review of the pressures and threats believed and/or documented to be acting on this species and/or its functional group was undertaken. The main pressures thought to be acting on this species in Irish waters are considered to involve commercial shipping-based or vessel-based activities that occur primarily on a local or regional scale and/or on a temporary or intermittent basis (e.g., impacts arising from shipping movements or geophysical seismic exploration; impacts from local/regional prey removal by fisheries; DEHLG, 2009). Since current minke whale distribution is known to be both offshore Atlantic and also inshore/coastal around Ireland, where a pressure may be regionally intensive the ranking given is one of medium importance. It should be noted that in relation to seismic exploration, which tends to occur on a local or occasionally regional scale in the waters of Ireland's EEZ and is comparatively low in coverage relative to several other member states, a robust regulatory and management regime applies in order to avoid potentially significant impacts on all species of marine mammal. This regime takes cognisance of recent scientific research and surveillance findings (e.g., Baines *et al.*, 2013; Berrow & O'Brien, 2013; Cronin & Barton, 2014; O'Brien & Berrow, 2014; Kavanagh *et al.*, 2017; O'Donnell *et al.*, 2017; O'Donnell *et al.*, 2018a,b; O'Sullivan & Manning, 2017; Berrow *et al.*, 2018; O'Brien & Berrow, 2018; Rogan *et al.*, 2018) and it is expected that this practice will continue into the future. There is no evidence to suggest a change in the main pressures thought to be acting on this species in the near future (i.e., threats). However surveillance of the species and the pressures potentially acting upon it will continue, while the application of strong management measures (e.g., via the statutory/regulatory process) to avoid potentially significant impacts is also expected to continue.

9 Conservation measures

To be reported only for Annex II species

10 Future prospects		
10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	Visual and acoustic records of minke whale in Irish waters indicate a wide and regular occurrence of the species throughout the year, in waters overlying the continental shelf and slope and also parts of some deeper oceanic basins. The species is also very regularly recorded in all coastal waters, including in the Irish Sea. Since many significant (i.e., high level) anthropogenic impacts that may affect this wide-ranging species' distribution are more localised in space and time within this extensive and diverse marine area, the Future prospects for the Range and Habitat for the species are considered to be Good. A number of pressures that could act upon this species have been identified. The effect of these pressures may operate on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, thereby constituting a potential threat. While the impacts on individuals or populations of minke whale in Irish waters are not well understood, partly due to continuing uncertainty regarding its population trends and ecology within Ireland's marine area, ongoing threats as listed or identified into the future via surveillance will be managed appropriately in Ireland. Therefore the Future prospects for the Population are considered to be Good.	

11 Conclusions	
Assessment of conservation status at end of reporting period	
11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1)/ Bad (U2) / Unknown (XX)*
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	Contemporary sightings of minke whales and recent acoustic data indicate the wide and frequent occurrence of this species throughout Irish waters, from those overlying the continental shelf and continental slope to deeper ocean basins (e.g., Rockall Trough, Porcupine Seabight). Hence the Range and Habitat for the species are considered to be Favourable. While robust and long-term data on minke whale population size and trends in Irish waters as a whole are not available, knowledge of the species' seasonal distribution and summer abundance in western European waters has improved significantly since the Directive came into force. There has also recently been a very significant improvement in population abundance data from a large part of the Irish EEZ, yielding two summer and two winter estimates and associated 95% Confidence Limits since 2014. While there is some uncertainty in the trajectory of northeast Atlantic populations of minke whale since a reduction in commercial whaling and legal protection of the species in EU waters, given the available estimates for a large part of Irish waters and the species' wide and frequent occurrence, the Population parameter is considered Favourable. A number of pressures have been identified. While the effect of		

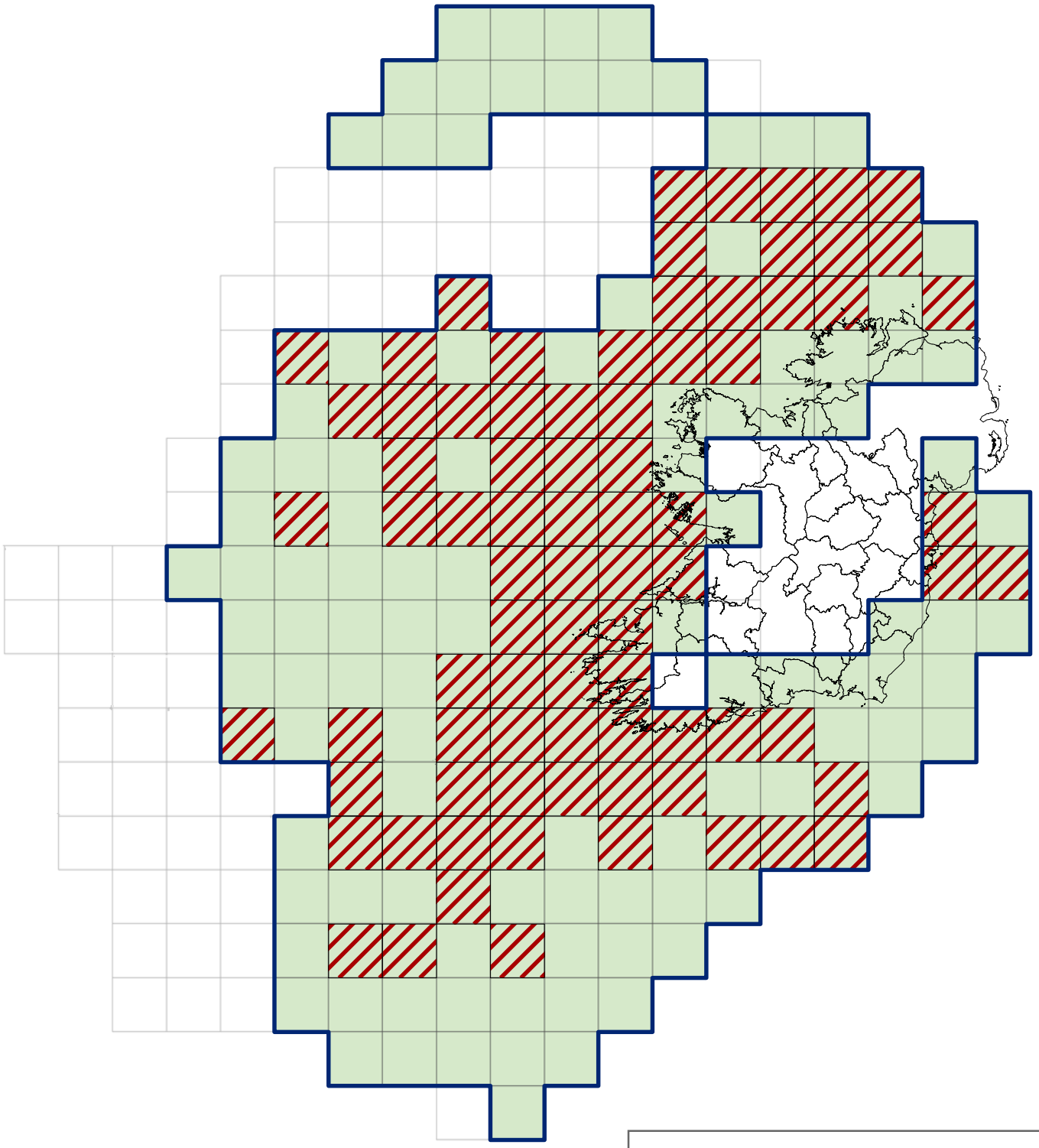
	these pressures may act on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, none is considered to be of sufficient magnitude to be causing an adverse impact on populations of minke whale in Irish waters. Ongoing threats as listed or identified into the future via surveillance will be managed appropriately. Hence the Future prospects for the species are considered to be Favourable. Based on the assessments for the Range, Population, Habitat and Future prospects parameters, the overall conclusion is that the Conservation Status of minke whale in Ireland remains Favourable. This overall result is the same as in the previous two Article 17 assessments.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Minke whale
Balaenoptera acutorostrata (2618)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 25 50 100 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***2621***
1.3 Species scientific name	*Balaenoptera physalus*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Fin whale (Míol mór eiteach)
1.6i Species description	The fin whale is the second largest whale species in the world. It is the most frequently recorded large whale species in Irish waters, being seen more often than either of its close relatives of similar size, the blue whale and sei whale. Once hunted intensively throughout the North Atlantic in the late 19th and early 20th centuries, fin whales are recorded in all Irish waters from deep ocean basins to continental slope and shelf areas, and even seasonally in inshore waters off the southwest, south and southeast coasts. Over the last 15-20 years, the annual occurrence of numerous whales off the Cork, Waterford and Wexford coasts has enabled a growing whale-watching industry and led to several ecological studies. While fin whales can be difficult to distinguish at sea from other whales, their asymmetrical light grey to white skin pigmentation in the right jaw and head area is striking and useful for identification. Fin whales are usually observed in small numbers of 1-3 individuals or in loose associations of up to twenty animals linked to localised feeding activity. This species preys mainly on small fish, swimming crustaceans and zooplankton, and though it is often considered to be a migratory species, in Ireland fin whales are recorded in all seasons.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2013-2018***
2.3 Distribution map	Submitted
2.4 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*

2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	Over the last two decades there have been numerous and possibly increasing sighting records of fin whales in Irish offshore and coastal waters, particularly off the southwest, south and southeast coasts, and in the Celtic Sea (e.g., Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Whooley *et al.*, 2011; Wall *et al.*, 2013; Cronin & Barton, 2014; O'Donnell *et al.*, 2017). The distribution map presented for this species represents all available live sighting records during extensive scientific research and monitoring in Irish waters between 2013 and 2018. The period selected for mapping represents a period of intensive and high quality surveillance for cetaceans in Irish waters across a range of research projects and monitoring programmes. The surveillance programmes, projects and publications that contributed sighting data to this distribution projection are cited as follows: Baines *et al.* (2013); Cronin & Barton (2014), Craig *et al.* (2016), Baines *et al.* (2017), Kavanagh *et al.* (2017), O'Donnell *et al.* (2017), O'Sullivan & Manning (2017), Berrow *et al.* (2018) and Rogan *et al.* (2018). Along with the results of previous visual survey effort (i.e., Pollock *et al.*, 1997; Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Berrow *et al.*, 2010; Hammond *et al.*, 2011; Wall *et al.*, 2013), recent extensive aerial surveys in summer and winter (Rogan *et al.*, 2018) and acoustic monitoring (Charif & Clark, 2009; McCauley, 2015; Frouin-Mouy *et al.*, 2017; Berrow *et al.*, 2018), these data were integrated into the development of the species range map presented under section 2.5. It should be noted that the spatial and temporal distribution of fin whales could yet be somewhat underestimated due to the difficulty in discriminating large baleen whale species from one another in the offshore Atlantic environment (e.g., see Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Wall *et al.*, 2013; Rogan *et al.*, 2018). Thus the distribution map presented does not include records where the observed species could not be distinguished, for example, from other members of the Family *Balaenopteridae* (e.g., the *blue/fin/sei whale* category) or the *unidentified whale* or *unidentified large whale* categories often used for indeterminate sightings. The distribution of recent sightings (e.g., in Cronin & Barton, 2014; Baines *et al.*, 2017; Kavanagh *et al.*, 2017; Rogan *et al.*, 2018) and acoustic records (e.g., Frouin-Mouy *et al.*, 2017; Berrow *et al.*, 2018) along with regional sighting and acoustic records obtained across three preceding decades (Berrow *et al.*, 2002; Reid *et al.*, 2003; Charif & Clark, 2009; Wall *et al.*, 2013) indicate a predominant distribution in deeper Atlantic waters including those overlying and fringing the continental slope, although the species' occurrence in the Celtic Sea and occasionally the Irish Sea are well documented. While all reliable cetacean records obtained in Irish waters were not available for use in this exercise, the map drawn for this species provides a good sample of its observed distribution within the period

	given in 2.2.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
4.2 Sources of information	Aguilar, A. (2009) Fin whale. *Balaenoptera physalus*. In W.F. Perrin, B. Würsig, J.G.M. Thewissen (eds.). *Encyclopedia of Marine Mammals* – 2nd edition. Academic Press, Elsevier Inc. p.433-439. Baines, M., Reichelt, M., Coles, D., Williams, A., Griffin, D. & Corkhill, O. (2013) Marine Mammal Observers' and passive acoustic monitoring operators' report during 3D seismic survey off southwest Ireland for KOSMOS. RPS Energy, Axminster, Devon, UK. 24pp. Baines, M., Reichelt, M. & Griffin, D. (2017) An autumn aggregation of fin (*Balaenoptera physalus*) and blue whales (*B. musculus*) in the Porcupine Seabight, southwest of Ireland. *Deep Sea Research Part II: Topical Studies in Oceanography* 141: 168-177. Berrow, S.D., Whooley, P., O'Connell, M. & Wall, D. (2010) *Irish Cetacean Review (2000-2009).* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 60pp. Berrow, S.D., O'Brien, J., Meade, R., Delarue, J., Kowarski, K., Martin, B., Moloney, J., Wall, D., Gillespie, D., Leaper, R., Gordon, J., Lee, A. & Porter, L. (2018) *Acoustic Surveys of Cetaceans in the Irish Atlantic Margin in 2015–2016: Occurrence, distribution and abundance.* Department of Communications, Climate Action & Environment and the National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland, 348pp. Charif, R.A. & Clark, C.W. (2009) *Acoustic monitoring of large whales in deep waters north and west of the British Isles: 1996-2005*. Technical Report 08-07 for the UK DECC. Cornell University Bioacoustics Research Program, Laboratory of Ornithology, Cornell University, New York. 40pp. Craig, D., Hunt, W. & Kavanagh, A. (2016) Report on line-transect surveys for cetaceans conducted during the 2016 Mackerel Egg Survey. Report to the Marine Institute and National Parks and Wildlife Service. Irish Whale and Dolphin Group and University

College Cork. 20pp.

Cronin, C. & Barton, C. (2014) Cetacean monitoring during the Celtic Sea Herring Acoustic Survey (CSHAS) October 2014. Report to the National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Cork Ecology, Castlefreke, Clonakilty, Co. Cork. 24pp.

DEHLG (2009) *Conservation Plan for Cetaceans in Irish Waters.* Department of the Environment, Heritage and Local Government, Dublin. 97pp.

Frouin-Mouy, H., Hipsey, S., Denes, S. & Burns, R. (2017) Soundscape Characterisation and Cetacean Presence in the Porcupine Basin: June to November 2016. Document 01320, Version 1.0. Technical report by JASCO Applied Sciences for Woodside Energy (Ireland) Pty Ltd. 109pp.

Hammond, P.S., Macleod, K., Burt, L. Cañadas, A., Lens, S. Mikkelsen, B., Rogan, E., Santos, B., Uriarte, A., Van Canneyt, O. & Vázquez, J.A. (2009) Cetacean Offshore Distribution and Abundance in the European Atlantic (CODA). Final report. University of St. Andrews, Scotland.

Hammond, P.S., Macleod, K., Burt, L., Cañadas, A., Lens, S., Mikkelsen, B., Rogan, E., Santos, B., Uriarte, A., Van Canneyt, O., & Antonio Vázquez, J. (2011) Abundance of baleen whales in the European Atlantic. Report to the Scientific Committee of the International Whaling Commission, Cambridge. SC/63/RMP24. 22pp.

Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., K Macleod, K., Ridoux, V., Santos, M.B., Scheidat, M., Teilmann, J., Vingada, J. & Øien, N. (2017) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. Final project report. University of St. Andrews, Scotland. 40pp.

Kavanagh, A.S., Hunt, W., Richardson, N. & Jessopp, M. (2017) Cetaceans in Irish offshore waters: Final report of the SFI-KOSMOS Project 2015-2017. MaREI Centre, University College Cork. 66pp.

McCauley, R.D. (2015) Offshore Irish noise logger program (March to September 2014): analysis of cetacean presence, and ambient and anthropogenic noise sources. Final project report R2015-01 to RPS MetOcean / Woodside Energy (Ireland) Pty Ltd. Project: CMST 1296. Curtin University, Western Australia. 110pp.

Ó Cadhla, O., Mackey, M., Aguilar de Soto, N., Rogan, E. & Connolly, N. (2004) Cetaceans and Seabirds of Ireland's Atlantic Margin. Volume II - Cetacean distribution and abundance. Report on research carried out under the Irish Petroleum Infrastructure Programme (PIP): Rockall Studies Group (RSG) projects 98/6 and 00/13, Porcupine Studies Group project P00/15 and Offshore Support Group (OSG) project 99/38. 82pp.

O'Donnell, C., O'Malley, M., Lynch, D., Lyons, K., Keogh, N. & O'Driscoll, D. (2017) Celtic Sea Herring Acoustic Survey. Cruise

	Report 2017, 15 - 04 November, 2017. FSS Survey Series: 2017/04. Marine Institute, Oranmore, Co. Galway. 38pp. O'Sullivan, C. & Manning, L. (2017) Cetacean monitoring undertaken during the Western European Shelf Pelagic Acoustic Survey (WESPAS), June - July 2017. Final report to the Marine Institute and National Parks and Wildlife Service. 38pp. Pollock, C.M., Reid, J.R., Webb, A. & Tasker, M.L. (1997) The distribution of seabirds and cetaceans in the waters around Ireland. JNCC Report No. 267. Joint Nature Conservation Committee, Peterborough. 167pp. Reid, J.B., Evans, P.G.H. & Northridge, S.P. (2003) *Atlas of Cetacean Distribution in North-west European Waters.* Joint Nature Conservation Committee, Peterborough. 76pp. Reilly, S.B., Bannister, J.L., Best, P.B., Brown, M., Brownell Jr., R.L., Butterworth, D.S., Clapham, P.J., Cooke, J., Donovan, G.P., Urbán, J. & Zerbini, A.N. (2013) *Balaenoptera physalus*. The IUCN Red List of Threatened Species 2013: e.T2478A44210520. www.iucnredlist.org. Rogan, E., Breen, P., Mackey, M., Cañadas, A., Scheidat, M., Geelhoed, S. & Jessopp, M. (2018) *Aerial surveys of cetaceans and seabirds in Irish waters: Occurrence, distribution and abundance in 2015-2017.* Department of Communications, Climate Action & Environment and National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland. 297pp. Ryan, C.G. (2012) On the ecology of rorqual whales (Balaenopteridae) in Irish waters using intrinsic markers. Unpublished PhD. thesis submitted to the Higher Education and Training Awards Council. Galway-Mayo Institute of Technology. 227pp. Wall, D., Murray, C., O'Brien, J., Kavanagh, L., Wilson, C., Ryan, C., Glanville, B., Williams, D., Enlander, I., O'Connor, I., McGrath, D., Whooley, P. & Berrow, S. (2013) *Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters 2005 - 2011.* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 63pp. Whooley, P., Berrow, S. & Barnes, C. (2011) Photo-identification of fin whales (*Balaenoptera physalus* L.) off the south coast of Ireland. *Marine Biodiversity Records of the Marine Biological Association (UK)* Vol.4, e8.
4.2i Additional information	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. 149pp.

5 Range

Range within the biogeographical/marine region concerned.		
5.1 Surface area	***610,000 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	**stable** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994-2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */* unknown	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 610,000 km²***	
	b) Indicate if operators were used (use these 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 range value derived from the range map referred to in 2.4 is considered to be the baseline for this species. As there is no evidence of a decline since the Directive came into force the current range is set as the FRR.	
5.11 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***	
5.12 Additional information *Optional*	The natural range of fin whales in Irish waters, and marine waters covered by the Directive, is a small component of its wider North Atlantic range (Aguilar, 2009; DEHLG, 2009; Berrow *et al.*, 2018) although distinct migratory movement from cold high latitude feeding areas to warm tropical breeding areas may not occur throughout the northeast Atlantic (Reilly *et al.*, 2013). The range map provided consists of the species' recorded and likely predominant natural range based on comparatively recent data (2001-2018) and expert judgement, and is partly derived from 2.3. It consists of a block of contiguous 50km x 50km grid cells distributed in Irish marine waters, excluding enclosed shallow bays, and now includes the relevant assessment area under the Marine Strategy Framework Directive. Prior to 1999-2000, survey effort targeting cetacean species in Irish offshore waters was comparatively limited in coverage, both spatially and temporally. Since 1999-2000 a number of dedicated multi-annual surveillance programmes for cetaceans have operated in Irish waters, with visual and acoustic surveys extending to the limits of Ireland's EEZ and beyond. With regard to this species it is considered that the years 2007-2018 represent an appropriate period for the evaluation of short-term trends since all survey efforts intensified further during this period. Sighting and acoustic records from ongoing dedicated surveillance effort in Irish waters (Berrow *et al.*, 2010; Baines *et al.* 2013; Wall *et al.*, 2013; Cronin & Barton, 2014; Craig *et al.*, 2016; Kavanagh *et al.* 2017; O'Donnell *et al.*, 2017; O'Sullivan & Manning, 2017; Berrow *et al.*, 2018 and Rogan *et al.*, 2018) provide no evidence of a decline in distribution/range in the recent past; therefore the short-term trend for range is considered to be stable. The long-term trend over the period 1994-2018 is considered to be uncertain for this species due to limited data availability prior to 1999-2000, as outlined above. The range value derived from the map referred to above is considered to be the baseline for this species. This surface area calculation is identical to that reported in 2013. Since there is no evidence of a decline in range since the Directive came into force the current range remains set as the FRR. There is an assumption that the current range in Irish waters is large	

	enough (a) to encompass all of the ecological variation required by this species during its occurrences therein and (b) to contribute to the long-term survival of the species.

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	***2013-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	***374***
	c) Maximum	***1,628***
	d) Best single value	
6.3 Type of estimate	*Best estimate / multi-year mean / **95% confidence interval** / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*		
6.6 Population size Method used	*Select one of the following methods:* ***a) Complete survey or a statistically robust estimate*** *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing / decreasing / **uncertain** / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain /* ***unknown***	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.14 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***	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) Population size (with unit) or*	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) Favourable reference population is unknown	
	d) Indicate method used to set reference value if other than operators Robust data on fin whale population trends in Irish waters are not available and the figures presented in 6.2 are the first population size estimates for this species in Irish waters. These are based on the 95% Confidence Limits from two novel summer and winter coverages (i.e., four in total) of a large portion of Ireland's EEZ using aerial survey methods (see Rogan *et al.*, 2018). Given the variability in estimates from individual seasonal coverages and the above circumstances it is not yet possible to determine a realistic baseline value since the Directive came into force; consequently the FRP remains unknown.	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information *Optional*	Evidence from deep water acoustic monitoring (Charif & Clark, 2009; Berrow *et al.*, 2018) and multi-annual surveillance programmes (e.g., Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013; Cronin & Barton, 2014; Kavanagh *et al.*, 2017; O'Donnell *et al.*, 2017; Rogan *et al.*, 2018) indicate that fin whales occur widely in Irish waters and do so throughout the year. Within the North Atlantic some 17,000-17,500 whales could be attributable to deeper oceanic waters off western Europe including those shared by Spain, Portugal, Ireland and Britain (Reilly *et al.*, 2013). Yet recent and comprehensive data for this entire region of western Europe have been lacking, particularly with regard to sufficient temporal coverage (i.e., beyond one or more summer months or one year) and spatial coverage (i.e., spanning continental shelf, slope and deeper waters, all of which may represent fin whale habitat). Comparable data for western European waters as a whole, that were derived from the SCANS-II (2005) and CODA (2007) summer surveys, were combined to deliver a higher population estimate of 19,354 fin whales (95% CL=12,217-30,659; Hammond *et al.*, 2011). New survey efforts have since been under way through the SCANS-III aerial and shipboard survey programme of 2016 (Hammond *et al.*, 2017) to address spatial gaps in data collection and to integrate international survey effort targeting cetacean abundance estimation in inshore and offshore European waters. Fin whale data from Ireland's ObSERVE Programme (see Rogan *et al.*, 2018) have not yet been integrated into a European-wide assessment of population size for this whale species. However the aerial surveys carried out under this programme were successful in enabling four separate abundance estimates (two summer, two winter) to be derived from the sighting data acquired in inshore and offshore Irish waters. The most robust of these four seasonal estimates (i.e., those with the lowest CV = 0.38; winter 2016) has been presented in 6.2 via minimum and maximum 95% Confidence Limits. Since the ObSERVE estimates for fin whale population size are new and variable figures depending on the season and year of coverage, and they represent the first such abundance estimates for Ireland, a realistic baseline value since the Directive came into force (i.e., the FRP) remains unknown.	

7 Habitat for the species

7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / **uncertain** / unknown*
7.8 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*
7.9 Additional information *Optional*	Use of the range descriptor and range surface area calculation as proxies for habitat and habitat area are judged appropriate for this wide-ranging pelagic species. The species' natural range and thus habitat in Irish waters is a small component of its wider North Atlantic range (Aguilar, 2009; DEHLG, 2009; Reilly *et al.*, 2013; Berrow *et al.*, 2018; Rogan *et al.*, 2018). The quality of habitat for fin whale was determined by consideration of the relevant direct and indirect pressures thought to be acting on the species and/or its functional group, and its habitat within its natural environment. These pressures were evaluated in development of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009) and informed by more recent scientific surveillance (e.g., Cronin & Barton, 2014; Craig *et al.*, 2016; Kavanagh *et al.*, 2017;

	O'Donnell *et al.*, 2017; O'Sullivan & Manning, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018), using available data concerning, *inter alia*, habitat use, population size, distribution and ecology, and threats to the species' protection (e.g., via natural/biological sources, human sectoral activities, management gaps, etc.). Fin whales may be subject to a number of local and/or regional environmental pressures throughout their range in Irish waters (DEHLG, 2009). However, based on current spatial and temporal data none are considered to be of sufficient impact on the species to be causing a significant deterioration in overall habitat quality in Ireland from a status that is sufficient for long-term survival. Long-term trends in habitat for fin whale remain uncertain due to insufficient accurate data for this species prior to 1999-2000. However, with improved surveillance and numerous ongoing records of fin whales in the last 18 years, the short-term trend indicates the continued existence of sufficient quality habitat for the species.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**C09** Geotechnical surveying (M) **E02** Shipping lanes and ferry lanes transport operations (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M)	**C09** Geotechnical surveying (M) **E02** Shipping lanes and ferry lanes transport operations (M) **G01** Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (M)
8.2 Sources of information *Optional*	*https://www.npws.ie/marine/marine-species/cetaceans* *https://www.dccae.gov.ie/en-ie/natural-resources/topics/Oil-Gas-Exploration-Production/Pages/home.aspx* *https://www.agriculture.gov.ie/seafood/sea-fisheriespolicymanagementdivision/*	

8.3 Additional information *Optional*	Fin whales may be subject to a number of local and/or regional environmental pressures and threats throughout their North Atlantic range and in Irish inshore/offshore waters. In the development and preparation of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009), a comprehensive review of the pressures and threats believed and/or documented to be acting on this species and/or its functional group was undertaken. The main pressures thought to be acting on this species in Irish waters are considered to involve commercial shipping-based or vessel-based activities that occur primarily on a local or regional scale and/or on a temporary or intermittent basis (e.g., impacts arising from shipping movements or geophysical seismic exploration; impacts from local/regional prey removal by fisheries; DEHLG, 2009). Since current fin whale distribution is known to be both offshore Atlantic and also inshore/coastal in the Celtic Sea, where a pressure may be regionally intensive the ranking given is one of medium importance given also the species' continued Endangered status (Reilly *et al.*, 2013). It should be noted that in relation to seismic exploration, which tends to occur on a local or occasionally regional scale in the waters of Ireland's EEZ and is comparatively low in coverage relative to several other member states, a robust regulatory and management regime applies in order to avoid potentially significant impacts on all species of marine mammal. This regime takes cognisance of recent scientific research and surveillance findings (e.g., Ryan, 2012; Cronin & Barton, 2014; Kavanagh *et al.*, 2017; O'Donnell *et al.*, 2017; O'Sullivan & Manning, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018) and it is expected that this practice will continue into the future. There is no evidence to suggest a change in the main pressures thought to be acting on this species in the near future (i.e., threats). However surveillance of the species and the pressures potentially acting upon it will continue, while the application of strong management measures (e.g., via the statutory/regulatory process) to avoid potentially significant impacts is also expected to continue.

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	*Good / Poor / Bad /* ***Unknown***
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*

10.2 Additional information *Optional*	Visual and acoustic records of fin whale in Irish waters continue to indicate a wide and frequent occurrence of the species throughout the year, in deep oceanic waters and those overlying the continental slope and also some parts of the continental shelf. The species also appears to be increasingly recorded in coastal waters off the southwest, south and southeast of Ireland and in the Celtic Sea. Since many significant (i.e., high level) anthropogenic impacts that may affect this wide-ranging species' distribution are more localised in space and time within this extensive and diverse marine area, the Future prospects for the Range and Habitat for the species are considered to be Good. A number of pressures that could act upon this species have been identified. The effect of these pressures may operate on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, thereby constituting a potential threat. The impacts on individuals or populations of fin whale in Irish waters are not well understood, partly due to the species' recorded occurrence in comparatively small numbers and to continuing uncertainty regarding its population trends and ecology within Ireland's marine area. Therefore the Future prospects for the Population are considered to be Unknown.

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.2 Population	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	Contemporary sightings of fin whales and recent acoustic data indicate the wide and frequent occurrence of this species in deep oceanic waters and those overlying the continental slope, and also significant parts of the continental shelf (e.g., Celtic Sea, Porcupine Bank). Hence the Range and Habitat for the species are considered to be Favourable. While robust and long-term data on fin whale population size and trends in Irish waters as a whole are not available, knowledge of the species' seasonal distribution and summer abundance in western European waters has improved significantly since the Directive came into force. There has also recently been a very significant improvement in population abundance data from a large part of the Irish EEZ, yielding two summer and two winter estimates and associated 95% Confidence Limits since 2014. However there is some uncertainty in the trajectory of northeast Atlantic populations of fin whale since the cessation of whaling. Given these circumstances and estimates to date for Irish and neighbouring European waters, which are variable and thus far drawn from very different methodologies, the Population parameter is considered to be Unknown. A number of pressures have been identified. While the effect of these pressures may act on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, none is considered to be of sufficient magnitude to be causing an adverse impact on populations of fin whale in Irish waters. Ongoing threats as listed or identified into the future via surveillance will be managed appropriately. Hence the Future prospects for the species are considered to be Favourable.		

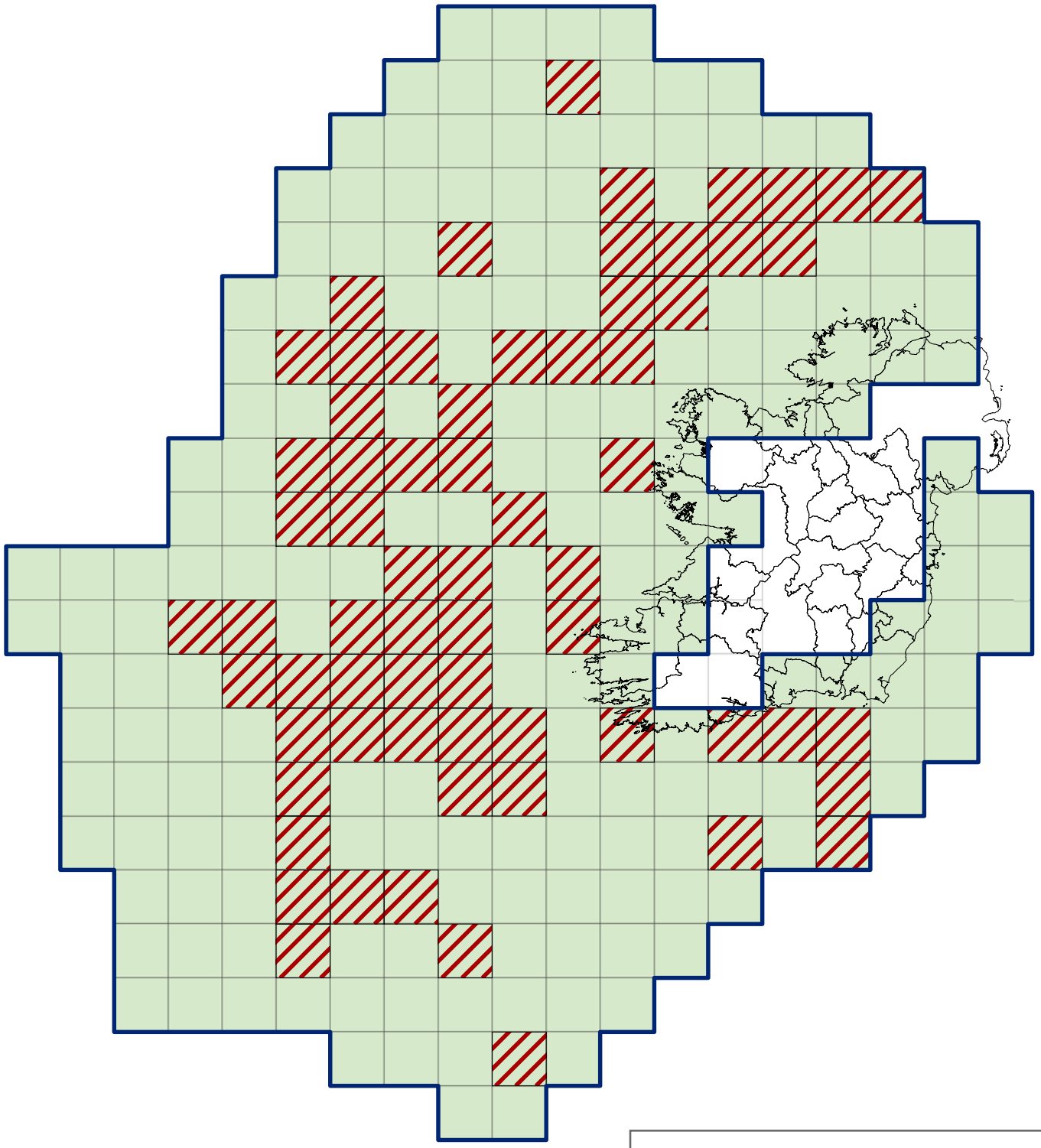
	Based on the assessments for the Range, Population, Habitat and Future prospects parameters, the overall conclusion is that the Conservation Status of fin whale in Ireland remains Favourable. This overall result is the same as in the previous two Article 17 assessments.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Fin whale
Balaenoptera physalus (2621)
Article 17 (2013 - 2018) Assessment



Current Distribution (66 cells)
Current Range (244 cells)
Favourable Reference Range (244 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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 25 50 100 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***5020***
1.3 Species scientific name	*Balaenoptera musculus*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Blue whale (Míol mór gorm)
1.6i Species description	The blue whale is the world's largest animal species, measuring up to 30m in length, but it remains one of the most rarely observed cetaceans in Irish waters. This is probably due to severe population depletion as a result of intensive hunting throughout its North Atlantic range, as well as a mainly oceanic and temporary occurrence. Blue whales commonly migrate between cold, high-latitude feeding grounds in summer and warm temperate or tropical waters in winter, during which calving and mating occurs. Individual blue whales can be identified at sea by their sheer body size and other diagnostic features, including a characteristically tall column-shaped blow often extending more than 10m high, a very small triangular dorsal fin, and blue-grey skin colouration with lighter-coloured blotches or patches. The species feeds on swimming crustaceans and zooplankton in oceanic, continental slope and even shelf waters. Records from Ireland remain limited, usually consisting of 1-2 animals in deep waters far off the west and southwest coasts. While information on the species' true occurrence and ecology remains patchy there is some growing evidence of animals migrating through Irish waters in the autumn and early winter, and also of active foraging during such transits.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2013-2018***
2.3 Distribution map	Submitted
2.4 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*

2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	The distribution map presented for this species represents all available live sighting records during extensive scientific research and monitoring in Irish waters between 2013 and 2018. The period selected for mapping represents a period of intensive and high quality surveillance for cetaceans in Irish waters across a range of research projects and monitoring programmes. It should be noted that the spatial and temporal distribution of this species could be underestimated due to the difficulty in discriminating large baleen whale species from one another in the offshore Atlantic environment (e.g., see Baines *et al.*, 2017). This distribution map does not include records where the observed species could not be distinguished from other members of the Family *Balaenopteridae* (e.g., the *blue/fin/sei whale* category, *fin/sei whale* category) or *unidentified large whale* category often used for indeterminate sightings. Live observations of this historically depleted migratory species in Irish waters have remained comparatively rare and sporadic over the last century but new records have emerged, simultaneous to more rigorous surveillance in the last 20-25 years. The surveillance programmes, projects and publications that contributed sighting data to this distribution projection are Baines *et al.* (2013) and Baines *et al.* (2017). Along with the results of previous visual survey effort (i.e., Pollock *et al.*, 1997; Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Wall *et al.*, 2009; Berrow *et al.*, 2010; Wall *et al.*, 2013; Kavanagh *et al.*, 2017), recent extensive aerial surveys in summer and winter (Rogan *et al.*, 2018) and acoustic monitoring (Charif & Clark, 2009; McCauley, 2015; Frouin-Mouy *et al.*, 2017; Berrow *et al.*, 2018), these data were integrated into the development of the species' range map presented under section 2.5. The available scientific information indicates a predominant distribution in deep Atlantic Ocean waters to the west and southwest of Ireland, including waters overlying the continental slope. While all reliable cetacean records obtained in Irish waters were not available for use in this exercise, the map drawn for this species provides a good sample of its observed distribution within the period given in 2.2.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic, **Marine Atlantic***
4.2 Sources of information	Baines, M., Reichelt, M. & Griffin, D. (2017) An autumn aggregation of fin (*Balaenoptera physalus*) and blue whales (*B. musculus*) in the Porcupine Seabight, southwest of Ireland. *Deep Sea Research Part II: Topical Studies in Oceanography* 141: 168-177. Baines, M., Reichelt, M., Coles, D., Williams, A., Griffin, D. & Corkhill, O. (2013) Marine Mammal Observers' and passive acoustic monitoring operators' report during 3D seismic survey off southwest Ireland for KOSMOS. RPS Energy, Axminster, Devon, UK. 24pp. Berrow, S.D., Whooley, P., O'Connell, M. & Wall, D. (2010) *Irish Cetacean Review (2000-2009).* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 60pp. Berrow, S.D., O'Brien, J., Meade, R., Delarue, J., Kowarski, K., Martin, B., Moloney, J., Wall, D., Gillespie, D., Leaper, R., Gordon, J., Lee, A. & Porter, L. (2018) *Acoustic Surveys of Cetaceans in the Irish Atlantic Margin in 2015–2016: Occurrence, distribution and abundance.* Department of Communications, Climate Action & Environment and the National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland, 348pp. Charif, R.A. & Clark, C.W. (2009) Acoustic monitoring of large whales in deep waters north and west of the British Isles: 1996-2005. Technical Report 08-07 for the UK DECC. Cornell University Bioacoustics Research Program, Laboratory of Ornithology, Cornell University, New York. 40pp. DEHLG (2009) *Conservation Plan for Cetaceans in Irish Waters.* Department of the Environment, Heritage and Local Government, 7 Ely Place, Dublin. 97pp. Frouin-Mouy, H., Hipsey, S., Denes, S. & R. Burns. (2017) Soundscape Characterisation and Cetacean Presence in the Porcupine Basin: June to November 2016. Document 01320, Version 1.0. Technical report by JASCO Applied Sciences for Woodside Energy (Ireland) Pty Ltd. 109pp. Hammond, P.S., Macleod, K., Burt, L. Cañadas, A., Lens, S. Mikkelsen, B., Rogan, E., Santos, B., Uriarte, A., Van Canneyt, O. & Vázquez, J.A. (2009) Cetacean Offshore Distribution and Abundance in the European Atlantic (CODA). Final Report. University of St Andrews, Scotland. Kavanagh, A.S., Hunt, W., Richardson, N. & Jessopp, M. (2017) Cetaceans in Irish offshore waters: Final report of the SFI-KOSMOS Project 2015-2017. MaREI Centre for Marine and Renewable Energy, University College Cork. 66pp. McCauley, R.D. (2015) Offshore Irish noise logger program (March to September 2014): analysis of cetacean presence, and ambient and anthropogenic noise sources. Final project report R2015-01 to RPS MetOcean / Woodside Energy (Ireland) Pty Ltd. Project:

CMST 1296. Curtin University, Western Australia. 110pp.

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. 149pp.

Ó Cadhla, O., Mackey, M., Aguilar de Soto, N., Rogan, E. & Connolly, N. (2004) Cetaceans and Seabirds of Ireland's Atlantic Margin. Volume II - Cetacean distribution and abundance. Report on research carried out under the Irish Petroleum Infrastructure Programme (PIP): Rockall Studies Group (RSG) projects 98/6 and 00/13, Porcupine Studies Group project P00/15 and Offshore Support Group (OSG) project 99/38. 82pp.

Pike, D.G., Víkingsson, G.A., Gunnlaugsson, Th. & Øien, N. (2009) A note on the distribution and abundance of blue whales (*Balaenoptera musculus*) in the Central and Northeast North Atlantic. *NAMMCO Scientific Publications 7*: 19–29.

Pollock, C.M., Reid, J.R., Webb, A. & Tasker, M.L. (1997) The distribution of seabirds and cetaceans in the waters around Ireland. JNCC Report No. 267. Joint Nature Conservation Committee, Peterborough. 167pp.

Reid, J.B., Evans, P.G.H. & Northridge, S.P. (2003) *Atlas of Cetacean Distribution in North-west European Waters.* Joint Nature Conservation Committee, Peterborough. 76pp.

Reilly, S.B., Bannister, J.L., Best, P.B., Brown, M., Brownell Jr., R.L., Butterworth, D.S., Clapham, P.J., Cooke, J., Donovan, G.P., Urbán, J. & Zerbini, A.N. (2008) *Balaenoptera musculus*. In IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. http://www.iucnredlist.org.

Rogan, E., Breen, P., Mackey, M., Cañadas, A., Scheidat, M., Geelhoed, S. & Jessopp, M. (2018) *Aerial surveys of cetaceans and seabirds in Irish waters: Occurrence, distribution and abundance in 2015-2017.* Department of Communications, Climate Action & Environment and National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland. 297pp.

Sears, R. & Perrin, W.F. (2009) Blue whale*. Balaenoptera musculus*. In W.F. Perrin, B. Würsig, J.G.M. Thewissen (eds.). *Encyclopedia of Marine Mammals* – 2nd edition. Academic Press, Elsevier Inc. p.120-124.

Visser, F., Hartman, K.L., Pierce, G.J., Valavanis, V.D. & Huisman, J. (2011) Timing of migratory baleen whales at the Azores in relation to the north Atlantic spring bloom. *Marine Ecology Progress Series* 440: 267–279.

Wall, D., O'Kelly, I., Whooley, P. & Tyndall, P. (2009) New records of blue whales (*Balaenoptera musculus*) with evidence of possible feeding behaviour from the continental shelf slopes to the west of Ireland. *Marine Biodiversity Records*: *2*.

Wall, D., Murray, C., O'Brien, J., Kavanagh, L., Wilson, C., Ryan, C., Glanville, B., Williams, D., Enlander, I., O'Connor, I., McGrath, D.,

	Whooley, P. & Berrow, S. (2013) *Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters 2005 - 2011.* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 63pp.
4.2i Additional information	

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***395,000 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994-2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */* unknown	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 395,000 km²***	
	b) Indicate if operators were used (use these symbols ≈, >, >>) or	

<table>
<tr><td></td><td colspan="2">c) If favourable reference range 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

The range value derived from the range map referred to in 2.4 is still considered to be the baseline for this species. As there is no evidence of a decline since the Directive came into force the current range remains set as the FRR.</td></tr>
<tr><td rowspan="6">5.11 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>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>5.12 Additional information

Optional</td><td colspan="2">The species’ natural range in Irish waters, and marine waters covered by the Directive, is a small component of its wider North Atlantic migratory range (DEHLG, 2009; Sears & Perrin, 2009).
The range map provided consists of its recorded and likely natural range based on comparatively recent data (2001-2018) and expert judgement, and is partly derived from 2.3. It consists of a block of contiguous 50km x 50km grid cells distributed in Irish marine waters of 500m depth or greater and now includes the relevant assessment area under the Marine Strategy Framework Directive.
Prior to 1999-2000, survey effort targeting cetacean species in Irish offshore waters was comparatively limited in coverage, both spatially and temporally. Since 1999-2000 a number of dedicated multi-annual surveillance programmes for cetaceans have operated in Irish waters, with visual and acoustic surveys extending to the limits of Ireland's EEZ and beyond. With regard to this species it is considered that the years 2007-2018 represent an appropriate period for the evaluation of short-term trends since all survey efforts intensified further during this period.
Sighting and acoustic records from dedicated surveillance effort in Irish waters (Berrow et al., 2010; Baines et al., 2013; Wall et al., 2013; Baines et al., 2017; Kavanagh et al., 2017; Berrow et al., 2018) provide no evidence of a decline in distribution/range in the recent past; therefore the short-term trend for range is considered to be stable.
The long-term trend over the period 1994-2018 is considered to be uncertain for this species due to limited data availability prior to 1999-2000, as outlined above.
The FRR value derived from the range map referred to above is</td></tr>
</table>

	considered to be the baseline for this species. Since there is no evidence of a decline since the Directive came into force the current range remains set as the FRR. There is an assumption that the current range in Irish waters is large enough (a) to encompass all of the ecological variation required by this species during its occurrences therein and (b) to contribute to the long-term survival of the species.

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	***2013-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	***16***
	c) Maximum	***1,500***
	d) Best single value	
6.3 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*		
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing / decreasing / uncertain /* ***unknown***	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	

6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) Population size (with unit) or*	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) Favourable reference population is unknown	
	d) Indicate method used to set reference value if other than operators Robust data on blue whale population size and trends in Irish waters are not available, mirroring continued uncertainty regarding this historically depleted species throughout its North Atlantic range. Since it has not been possible to determine a realistic baseline value since the Directive came into force, the FRP is unknown.	
6.16 Change and reason for change in population size	*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*
6.17 Additional information *Optional*	Evidence from deep water acoustic surveillance (Charif & Clark, 2009; Berrow *et al.*, 2018) and sporadic sighting records indicate that the species occurs annually in small numbers in Irish waters, most likely during seasonal migratory passage. The number of blue whales recorded visually has commonly been 1-2 animals (e.g., Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Wall *et al.*, 2009; Wall *et al.*, 2013). More recently a combined estimate of 16 individuals was observed offshore through the autumn of 2013 (Baines *et al.*, 2013; Baines *et al.*, 2017), providing a rudimentary figure for the minimum population size within Irish waters. A precise figure for the maximum population size cannot be provided due to data limitations, including the scarcity of positive records in Ireland. Instead a provisional maximum figure is given based on approximate population estimates for the species in the North Atlantic (Reilly *et al.*, 2008; Sears & Perrin, 2009), although there is some evidence indicating a degree of subdivision into central/eastern and western North Atlantic components. While there are indications that the North Atlantic population, at least in its central/eastern component, is increasing following the cessation of whaling (Reilly *et al.*, 2008; IWDG, 2018 – unpublished data) the origin/stock identity of blue whales occurring in Irish waters is not well known at present. Considering this key data gap and a continued scarcity of positive sighting records from Irish waters, there is insufficient evidence to reliably determine the short-term population trend for the species. Robust data on population size and trends in Irish waters are not available, mirroring continued uncertainty regarding this depleted species, particularly in the northeast Atlantic. Since it has not been possible to determine a realistic baseline value since the Directive came into force, the FRP is unknown.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*

7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*
7.8 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*
7.9 Additional information *Optional*	Use of the range descriptor and range surface area calculation as proxies for habitat and habitat area are judged appropriate for this wide-ranging pelagic species. The species' natural range and thus habitat in Irish waters is a small component of its wider North Atlantic migratory range (DEHLG, 2009; Sears & Perrin, 2009). The quality of habitat for this species was determined by consideration of the relevant direct and indirect pressures thought to be acting on the species and/or its functional group, and its habitat within its natural environment. These pressures were evaluated in development of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009) and informed by more recent scientific surveillance (e.g., Baines *et al.*, 2017; Kavanagh *et al.*, 2017; Berrow *et al.*, 2018), using available data concerning, *inter alia*, habitat use, population size, distribution and ecology, and threats to the species' protection (e.g., via natural/biological sources, human sectoral activities, management gaps, etc). Blue whales may be subject to a number of local and/or regional environmental pressures throughout their range in Irish waters (DEHLG, 2009). However, based on current spatial and temporal data none are considered to be of sufficient impact on the species to be causing a significant deterioration in overall habitat quality in Ireland from a status that is sufficient for long-term survival. Long-term trends in habitat for the species remain uncertain due to insufficient accurate data for this species prior to 1999-2000.

	However, with improved surveillance and ongoing (if low incidence) records of blue whales in the last 18 years, the short-term trend indicates the continued existence of sufficient quality habitat for the species.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**C09** Geotechnical surveying (M) **E02** Shipping lanes and ferry lanes transport operations (M)	**C09** Geotechnical surveying (M) **E02** Shipping lanes and ferry lanes transport operations (M)

8.2 Sources of information *Optional*	*https://www.npws.ie/marine/marine-species/cetaceans* *https://www.dccae.gov.ie/en-ie/natural-resources/topics/Oil-Gas-Exploration-Production/Pages/home.aspx*
8.3 Additional information *Optional*	Blue whales may be subject to a number of local and/or regional environmental pressures and threats throughout their North Atlantic range and in Irish offshore waters. In the development and preparation of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009), a comprehensive review of the pressures and threats believed and/or documented to be acting on this species and/or its functional group was undertaken. The main pressures thought to be acting on this species in Irish waters are considered to involve commercial shipping-based activities that occur primarily on a local or regional scale and/or on a temporary or intermittent basis (e.g., impacts arising from shipping movements or geophysical seismic exploration; DEHLG, 2009). Since current blue whale distribution is likely to be offshore Atlantic in nature, where a pressure may be regionally intensive the ranking given is one of medium importance due also to the species' depleted population status. It should be noted that in relation to seismic exploration, which tends to occur on a local or occasionally regional scale in the waters of Ireland's EEZ and is comparatively low in coverage relative to several other member states, a robust regulatory and management regime applies in order to avoid potentially significant impacts on all species of marine mammal. This regime takes cognisance of recent scientific research and surveillance findings (e.g., Berrow *et al.*, 2018; Rogan *et al.*, 2018) and it is expected that this practice will continue into the future.

	There is no evidence to suggest a change in the main pressures thought to be acting on this species in the near future (i.e., threats). However surveillance of the species and the pressures potentially acting upon it will continue, while the application of strong management measures (e.g., via the statutory/regulatory process) to avoid potentially significant impacts is also expected to continue.

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	*Good / Poor / Bad /* ***Unknown***
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	Visual records of blue whale in Irish waters have remained comparatively rare. Contemporary sightings and increasing acoustic data nevertheless indicate a wide occurrence in deep oceanic waters and those overlying the continental slope. Since this represents an extensive offshore area far removed from human centres of population and from many significant (i.e., high level) anthropogenic impacts that may affect this wide-ranging species' distribution, the Future prospects for Range and Habitat for the species in Ireland are considered to be Good. A number of pressures that could act upon this species in Irish waters have been identified. The effect of these pressures may operate on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, thereby constituting a potential threat. However the impacts of such pressures on individuals or populations of blue whale in Irish waters are not well understood. This is partly due to the species' apparently seasonal occurrence far offshore and to continuing limited or uncertain information on its numbers, ecology and behaviour during its occurrence in Ireland's marine area. A further confounding factor is the extensive transnational nature of blue whale life history and movements in the North Atlantic, both within and outside the marine jurisdictions of many states in which the species may be subject to a range of pressures. While ongoing threats as listed or identified into the future via surveillance in Ireland will be managed appropriately, the Future prospects for this large scale migratory population are considered to be Unknown since the significance of the main pressures and threats, and the species' long-term viability remain uncertain. Although the guidelines recommend a Favourable assessment of Future prospects where prospects of one parameter are unknown	

	and prospects of the others are good, Future prospects has been assessed as Unknown due to the paucity of information on population parameters.

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.2 Population	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.4 Future prospects	*Favourable (FV) / Inadequate (U1)/ Bad (U2) /* ***Unknown (XX)***
11.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating / stable /* unknown
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
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 data	*YES/NO*	*YES/NO*
d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
e) yes, but there is no information on the nature of change	*YES/NO*	*YES/NO*

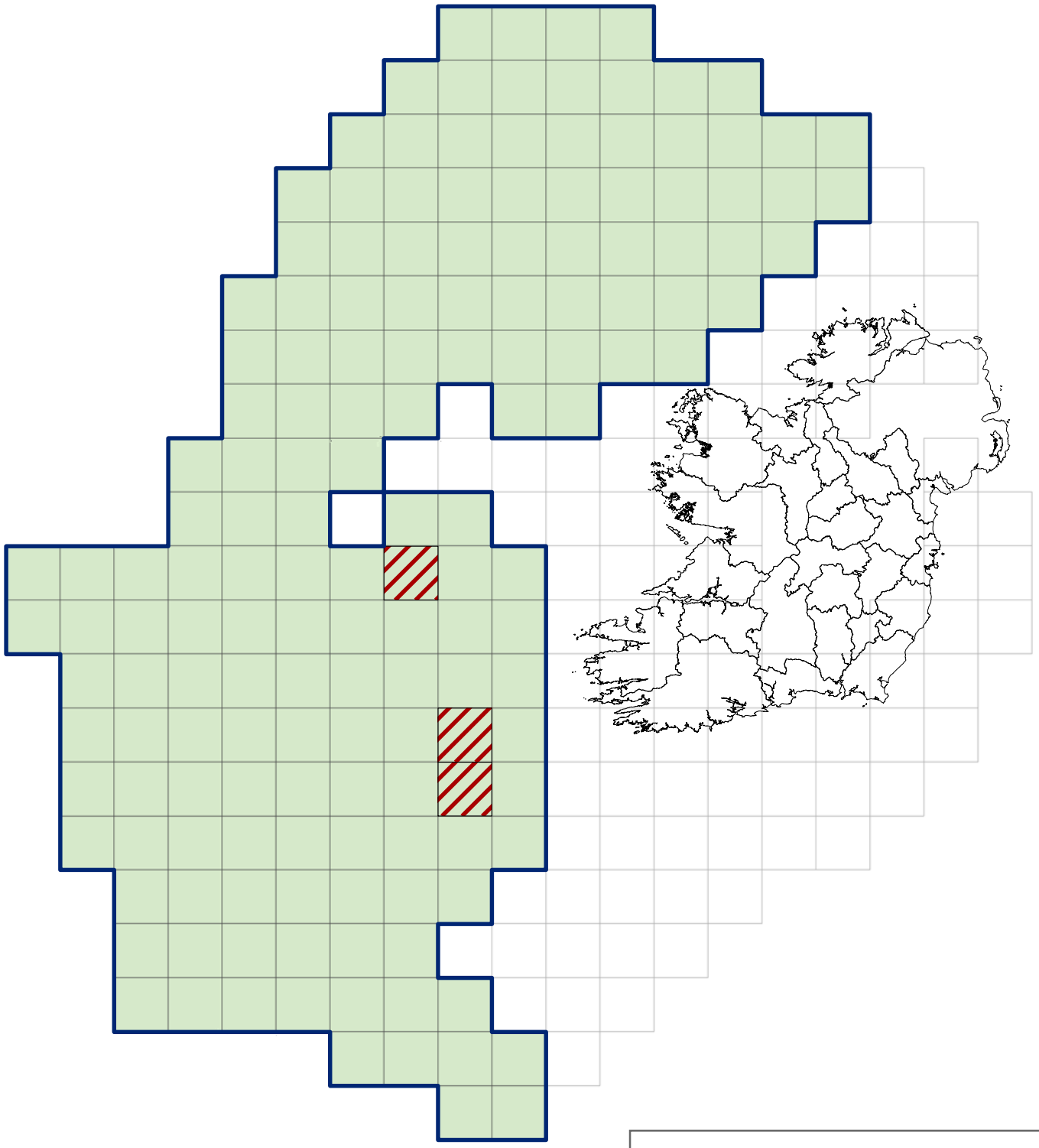
	The change is mainly due to (select one of the reasons above):	*genuine change / improved knowledge or more accurate data / the use of a different method*	*genuine change / improved knowledge or more accurate data / the use of a different method*
11.8 Additional information *Optional*	Contemporary sightings and increasing acoustic data indicate a wide but comparatively low level of occurrence in deep oceanic waters and those overlying the continental slope. Hence the Range and Habitat for the species are considered to be Favourable. While there are some indications that the North Atlantic blue whale population, at least in its central/eastern component, could be increasing following the cessation of whaling, the origin/stock identity of whales occurring in Irish waters is not known at present. Considering this key data gap and ongoing limited positive sighting records from Irish waters, the Population parameter is considered to be Unknown. Based on the assessments for the Range, Population, Habitat and Future prospects parameters, the overall conclusion is that the Conservation Status of blue whale in Ireland remains Unknown. Nevertheless the trend in Conservation Status is considered to be stable. No improvements are reported in the assessments for the Population or Future prospects parameters, due to uncertainty regarding population numbers and trends for this severely depleted species. This overall result is the same as in the previous two Article 17 assessments due to limited ongoing information on the species' occurrence and population ecology in Irish waters.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Blue whale
Balaenoptera musculus (5020)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 25 50 100 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***2624***
1.3 Species scientific name	*Physeter macrocephalus*
1.4 Alternative species scientific name *Optional*	*Physeter catodon*
1.5 Common name *Optional*	Sperm whale (Caisealóid)
1.6i Species description	The sperm whale is the largest toothed cetacean occurring in Irish waters. Mature males measure up to 16-18m in body length while females are smaller (c. 10-12m) (Whitehead, 2009). This familiar deep-diving species is widely found from equatorial to polar regions and has been regularly recorded during oceanic surveys to the west of Ireland (e.g., Aguilar de Soto *et al.*, 2004; Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Wall *et al.*, 2013; Kavanagh *et al.*, 2017; Berrow *et al.*, 2018). Sperm whales are quite readily identified due to their body size, their notably blunt forehead and low bushy exhalation blow, and their characteristic low bump-like dorsal fin that can be difficult to observe at sea. Some populations are known to make seasonal movements but clear latitudinal migrations are not commonly described. However the segregation of adults is well described with only males occupying cold temperate and sub-polar latitudes (Whitehead, 2009). Records of females or calves stranding in Ireland are rare (Berrow *et al.*, 2010). Ireland is one of a few EU member states inhabited by this predominantly squid-eating species, which remains classified as Vulnerable due to numbers being reduced by industrial hunting on a wide spatial and temporal scale (Taylor *et al.*, 2008; Whitehead, 2009).

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2013-2018***
2.3 Distribution map	Submitted
2.4 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*

2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	Over the last two decades there have been numerous visual and acoustic records of sperm whales in deep offshore Irish waters stretching northwards from the Goban Spur region to the Porcupine Seabight and Rockall Trough (e.g., Aguilar de Soto *et al.*, 2004; Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Baines *et al.*, 2013; Wall *et al.*, 2013; McCauley, 2015; Frouin-Mouy *et al.*, 2017; Kavanagh *et al.*, 2017; Berrow *et al.*, 2018; O'Donnell *et al.*, 2018; Rogan *et al.*, 2018). The distribution map presented for this species represents all available live sighting records during extensive scientific research and monitoring in Irish waters between 2013 and 2018. The period selected for mapping represents a period of intensive and high quality surveillance for cetaceans in Irish waters across a range of research projects and monitoring programmes. The surveillance programmes, projects and publications that contributed sighting data to this distribution projection are cited as follows: Baines *et al.* (2013), Kavanagh *et al.* (2017), Berrow *et al.* (2018), O'Donnell *et al.* (2018) and Rogan *et al.* (2018). Along with the results of previous visual survey effort (i.e., Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Berrow *et al.*, 2010; Wall *et al.*, 2013; Rogan *et al.*, 2017), recent extensive aerial surveys in summer and winter (Rogan *et al.*, 2018) and acoustic monitoring (Aguilar de Soto *et al.*, 2004; McCauley, 2015; Frouin-Mouy *et al.*, 2017; Berrow *et al.*, 2018) these data were integrated into the development of the species' range map presented under section 2.5. It should be noted that the spatial and temporal distribution of sperm whales could yet be somewhat underestimated due to the difficulty in discriminating whale species from one another in the offshore Atlantic environment (e.g., see Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Wall *et al.*, 2013; Rogan *et al.*, 2018). Thus the distribution map presented does not include records where the observed species could not be distinguished, for example, from members of the Family *Balaenopteridae* (e.g., blue/fin/sei whale, humpback whale) or from *unidentified whale* or *unidentified large whale* categories often used for indeterminate sightings. The distribution of recent sightings (e.g., in Baines *et al.*, 2013; Kavanagh *et al.*, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018) and extensive acoustic records (e.g., Frouin-Mouy *et al.*, 2017; Berrow *et al.*, 2018) along with regional sighting and acoustic records obtained across three preceding decades (Reid *et al.*, 2003; Aguilar de Soto *et al.*, 2004; Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013; Rogan *et al.*, 2017) indicate a predominant distribution in Atlantic waters greater than 500-1,000m deep, including those overlying and fringing the continental slope. While all reliable cetacean records obtained in Irish waters were not available for use in this exercise, the map drawn for this species provides a good sample of its observed distribution within the period given in 2.2.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
4.2 Sources of information	Aguilar de Soto, N., Rogan, E., O Cadhla, O., Gordon, J.C.D., Mackey, M. & Connolly, N. (2004) Cetaceans and Seabirds of Ireland's Atlantic Margin. Volume III-Acoustic Surveys for Cetaceans. Report on research carried out under the Irish Petroleum Infrastructure Programme (PIP): Rockall Studies Group (RSG) projects 98/6 and 00/13, Porcupine Studies Group project P00/15 and Offshore Support Group (OSG) project 99/38. 51pp Baines, M., Reichelt, M., Coles, D., Williams, A., Griffin, D. & Corkhill, O. (2013) Marine Mammal Observers' and passive acoustic monitoring operators' report during 3D seismic survey off southwest Ireland for KOSMOS. RPS Energy, Axminster, Devon, UK. 24pp. Berrow, S.D., Whooley, P., O'Connell, M. & Wall, D. (2010) *Irish Cetacean Review (2000-2009).* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 60pp. Berrow, S.D., O'Brien, J., Meade, R., Delarue, J., Kowarski, K., Martin, B., Moloney, J., Wall, D., Gillespie, D., Leaper, R., Gordon, J., Lee, A. & Porter, L. (2018) *Acoustic Surveys of Cetaceans in the Irish Atlantic Margin in 2015–2016: Occurrence, distribution and abundance.* Department of Communications, Climate Action & Environment and the National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland, 348pp. Frouin-Mouy, H., Hipsey, S., Denes, S. & R. Burns. (2017) Soundscape Characterisation and Cetacean Presence in the Porcupine Basin: June to November 2016. Document 01320, Version 1.0. Technical report by JASCO Applied Sciences for Woodside Energy (Ireland) Pty Ltd. 109pp. Hammond, P.S., Macleod, K., Burt, L. Cañadas, A., Lens, S. Mikkelsen, B., Rogan, E., Santos, B., Uriarte, A., Van Canneyt, O. & Vázquez, J.A. (2009) Cetacean Offshore Distribution and Abundance in the European Atlantic (CODA). Final report. University of St. Andrews, Scotland. Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr,

	H., K Macleod, K., Ridoux, V., Santos, M.B., Scheidat, M., Teilmann, J., Vingada, J. & Øien, N. (2017) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. Final project report. University of St. Andrews. 40pp. Kavanagh, A.S., Hunt, W., Richardson, N. & Jessopp, M. (2017) Cetaceans in Irish offshore waters: Final report of the SFI-KOSMOS Project 2015-2017. MaREI Centre, University College Cork. 66pp. McCauley, R.D. (2015) Offshore Irish noise logger program (March to September 2014): analysis of cetacean presence, and ambient and anthropogenic noise sources. Final project report R2015-01 to RPS MetOcean / Woodside Energy (Ireland) Pty Ltd. Project: CMST 1296. Curtin University, Western Australia. 110pp. Ó Cadhla, O., Mackey, M., Aguilar de Soto, N., Rogan, E. & Connolly, N. (2004) Cetaceans and Seabirds of Ireland's Atlantic Margin. Volume II - Cetacean distribution and abundance. Report on research carried out under the Irish Petroleum Infrastructure Programme (PIP): Rockall Studies Group (RSG) projects 98/6 and 00/13, Porcupine Studies Group project P00/15 and Offshore Support Group (OSG) project 99/38. 82pp. O'Donnell, C., Johnston, G., Mullins, E., Keogh, N. & Power, J. (2018) Blue Whiting Acoustic Survey Cruise Report. March 20 – April 06, 2018. FSS Survey Series: 2018/01. 31pp. Reid, J.B., Evans, P.G.H. & Northridge, S.P. (2003) *Atlas of Cetacean Distribution in North-west European Waters.* Joint Nature Conservation Committee, Peterborough. 76pp. Rogan, E., Cañadas, A., Macleod, K., Santos, B., Mikkelsen, B., Uriarte, A., Van Canneyt, O., Vazquez, A.J. & Hammond, P.S. (2017) Distribution, abundance and habitat use of deep diving cetaceans in the North East Atlantic. *Deep Sea Research II* 141: 8-19. doi.org/10.1016/j.dsr2.2017.03.015. Rogan, E., Breen, P., Mackey, M., Cañadas, A., Scheidat, M., Geelhoed, S. & Jessopp, M. (2018) *Aerial surveys of cetaceans and seabirds in Irish waters: Occurrence, distribution and abundance in 2015-2017.* Department of Communications, Climate Action & Environment and National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland. 297pp. Taylor, B.L., Baird, R., Barlow, J., Dawson, S.M., Ford, J., Mead, J.G., Notarbartolo di Sciara, G., Wade, P. & Pitman, R.L. (2008) *Physeter macrocephalus*. In IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. http://www.iucnredlist.org. Wall, D., Murray, C., O'Brien, J., Kavanagh, L., Wilson, C., Ryan, C., Glanville, B., Williams, D., Enlander, I., O'Connor, I., McGrath, D., Whooley, P. & Berrow, S. (2013) *Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters 2005 - 2011*. Irish Whale and Dolphin Group, Kilrush, Co. Clare. 63pp.

	Whitehead, H. (2009) Sperm whale. *Physeter macrocephalus*. In W.F. Perrin, B. Würsig, J.G.M. Thewissen (eds.). *Encyclopedia of Marine Mammals* – 2nd edition. Academic Press, Elsevier Inc. p. 1091-1097.
4.2i Additional information	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. 149pp.

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***400,000 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** / *increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994-2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	

<table>
<tr><td rowspan="6">5.10 Favourable reference range</td><td colspan="2">a) 400,000 km²</td></tr>
<tr><td colspan="2">b) Indicate if operators were used (use these 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 range value derived from the range map referred to in 2.4 is considered to be the baseline for this species. As there is no evidence of a decline since the Directive came into force the current range is set as the FRR.</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td colspan="2"></td></tr>
<tr><td rowspan="7">5.11 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>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 colspan="2"></td></tr>
<tr><td>5.12 Additional information

Optional</td><td colspan="2">The natural range of sperm whales in Irish waters, and marine waters covered by the Directive, is a small component of the species’ wider North Atlantic range (DEHLG, 2009; Whitehead, 2009; Berrow et al., 2018) although distinct migratory movement from colder higher latitude feeding areas to warmer sub-tropical or tropical breeding areas does not appear to occur in the northeast Atlantic Ocean.

The range map provided consists of the species’ recorded and likely predominant natural range based on comparatively recent data (2001-2018) and expert judgement, and is partly derived from 2.3. It consists of a block of contiguous 50km x 50km grid cells distributed in Irish marine waters of 500m depth or greater and now includes the relevant assessment area under the Marine Strategy Framework Directive.

Prior to 1999-2000, survey effort targeting cetacean species in Irish offshore waters was comparatively limited in coverage, both spatially and temporally. Since 1999-2000 a number of dedicated multi-annual surveillance programmes for cetaceans have operated in Irish waters, with visual and acoustic surveys extending to the limits of Ireland’s EEZ and beyond. With regard to this species it is considered that the years 2007-2018 represent an appropriate period for the evaluation of short-term trends since all survey efforts intensified further during this period.

Sighting and acoustic records from ongoing dedicated surveillance effort in Irish waters (Baines et al., 2013; McCauley, 2015; Frouin-Mouy et al., 2017; Kavanagh et al., 2017; O’Donnell et al., 2018;</td></tr>
</table>

	Berrow *et al.*, 2018; Rogan *et al.*, 2018) provide no evidence of a decline in distribution/range in the recent past; therefore the short-term trend for Range is considered to be stable. The long-term trend over the period 1994-2018 is considered to be uncertain for this species due to limited data availability prior to 1999-2000, as outlined above. The range value derived from the map referred to above is considered to be the baseline for this species. This surface area calculation is greater than that reported in 2013 due to the integration of Ireland's MSFD assessment area within the range. Since there is no evidence of a decline in range since the Directive came into force the current range is set as the FRR. There is an assumption that the current range in Irish waters is large enough (a) to encompass all of the ecological variation required by this species during its occurrences therein and (b) to contribute to the long-term survival of the species.

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2013-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	***270***
	c) Maximum	***539***
	d) Best single value	
6.3 Type of estimate	*Best estimate / multi-year mean / **95% confidence interval** / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*		
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* ***b) Based mainly on extrapolation from a limited amount of data*** *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing / decreasing / **uncertain** / unknown*	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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*	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / **unknown***	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.14 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***	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) Population size (with unit) or*	
	***b) Operator ≈ (approximately equal to)** or*	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information *Optional*	Evidence from deep water acoustic monitoring (Aguilar de Soto *et al.*, 2004; McCauley, 2015; Frouin-Mouy *et al.*, 2017; Berrow *et al.*, 2018) and multi-annual surveillance programmes (e.g., Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013; Kavanagh *et al.*, 2017; Rogan *et al.*, 2017; O'Donnell *et al.*, 2018; Rogan *et al.*, 2018) demonstrate that sperm whales occur widely in Irish offshore waters and do so throughout the year. The relationship between sperm whales occurring in Ireland and those elsewhere in the North Atlantic is poorly known, however. There is little evidence of growth or decline in the global population since the cessation of large scale whaling (Taylor *et al.*, 2008) and in the North Atlantic the extent of movements or residency by communities of the species are not well understood, partly due to the animals' occurrence in exposed environments far from shore and to their deep oceanic ecology which combine to make their study both difficult and logistically demanding. Within the North-East Atlantic in summer, recent work by Hammond *et al.* (2017) indicates that some 13,500 sperm whales (95% C.I: 6,161-29,563) could be attributed to deeper waters off northern Spain, western France and the UK. Yet comprehensive and methodologically comparable data for the entire region of western Europe are lacking, particularly with regard to sufficient temporal coverage (i.e., beyond one or more summer months separated by many years) and spatial coverage (i.e., spanning outer continental shelf, slope and deeper abyssal waters, all of which may represent sperm whale habitat). New sperm whale data from Ireland's ObSERVE Programme (see Berrow *et al.*, 2018 and Rogan *et al.*, 2018) have not yet been integrated into an Atlantic- or Europe-wide assessment of population size/density for this whale species. The population estimates presented here are based on lower and upper 95% Confidence Intervals pooled together from an analysis of 6 individual survey coverages (i.e., spring, summer and autumn seasons in 2015 and 2016). These were generated using acoustic survey and analytical methods developed specifically for this deep-diving species (Berrow *et al.*, 2018). They also collectively targeted a significant portion of deep oceanic waters within Ireland's EEZ. While the combination of density and associated 95% C.I. measures from individual surveys across two survey years is a relatively imprecise method of estimation, particularly since the density estimates and associated coefficients of variation (CVs) actually fluctuated in space and time, the method did yield abundance and density estimates from the extensive detection data acquired in	

	offshore Irish waters (Berrow *et al.*, 2018). The Favourable Reference Population has been set as approximately equal to the current population to account for improved knowledge. Although the short-term trends are uncertain, this value is considered to represent the minimum necessary to ensure the long-term survival of the species.

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable** / increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / **uncertain** / unknown*
7.8 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*
7.9 Additional information	Use of the range descriptor and range surface area calculation as proxies for habitat and habitat area are judged appropriate for this wide-ranging pelagic and deep-diving species. The species' natural

Optional	range and thus habitat in Irish waters is considered to be a small component of its wider North Atlantic range (Taylor *et al.*, 2008; Whitehead, 2009; DEHLG, 2009; Hammond *et al.*, 2017; Rogan *et al.*, 2017; Berrow *et al.*, 2018). The quality of habitat for sperm whale was determined by consideration of the relevant direct and indirect pressures thought to be acting on the species and/or its functional group, and its habitat within its natural environment. These pressures were evaluated in development of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009) and informed by more recent scientific surveillance (e.g., Baines *et al.*, 2013; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; O'Donnell *et al.*, 2018; Berrow *et al.*, 2018; Rogan *et al.*, 2018), using available data concerning, *inter alia*, habitat use, population size, distribution and ecology, and threats to the species' protection (e.g., via natural/biological sources, human sectoral activities, management gaps, etc.). Although, relative to principal human maritime activity in Ireland, they are demonstrated to be a more remote offshore species, sperm whales may be subject to a number of local and/or regional environmental pressures throughout their range (DEHLG, 2009). However, based on current spatial and temporal data none are considered to be of sufficient impact on the species to be causing a significant deterioration in overall habitat quality in Ireland from a status that is sufficient for long-term survival. Long-term trends in habitat for sperm whale remain uncertain due to insufficient accurate data for this species prior to 1999-2000. However with improved surveillance (e.g., under the ObSERVE Programme) and numerous ongoing records of sperm whales in the last 18 years, the short-term trend indicates the continued existence of sufficient quality habitat for the species.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**C09** Geotechnical surveying (M) **E02** Shipping lanes and ferry lanes transport operations (M)	**C09** Geotechnical surveying (M) **E02** Shipping lanes and ferry lanes transport operations (M)

8.2 Sources of information *Optional*	https://www.npws.ie/marine/marine-species/cetaceans https://www.dccae.gov.ie/en-ie/natural-resources/topics/Oil-Gas-Exploration-Production/Pages/home.aspx

8.3 Additional information *Optional*	Sperm whales may be subject to local and/or regional environmental pressures and threats throughout their North Atlantic range and in Irish inshore/offshore waters. In the development and preparation of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009), a comprehensive review of the pressures and threats believed and/or documented to be acting on this species and/or its functional group was undertaken. The main pressures thought to be acting on this species in Irish waters are considered to involve commercial shipping-based or vessel-based activities that occur primarily on a local or regional scale and/or on a temporary or intermittent basis (e.g., impacts arising from shipping movements or geophysical seismic exploration; DEHLG, 2009). Since sperm whale distribution is known to be primarily offshore in the deeper Atlantic Ocean, where there is a documented pressure that may be regionally intensive the ranking given is one of medium importance, given also the species' continued Vulnerable status (Taylor *et al.*, 2008). It should be noted that in relation to seismic exploration, which tends to occur on a local or occasionally regional scale in the waters of Ireland's EEZ and is comparatively low in coverage relative to several other member states, a robust regulatory and management regime applies in order to avoid potentially significant impacts on all species of marine mammal. This regime takes cognisance of recent scientific research and surveillance findings (e.g., Baines *et al.*, 2013; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; Rogan *et al.*, 2017; O'Donnell *et al.*, 2018; Berrow *et al.*, 2018; Rogan *et al.*, 2018) and it is expected that this practice will continue into the future. There is no evidence to suggest a change in the main pressures thought to be acting on this species in the near future (i.e., threats). However surveillance of the species and the pressures potentially acting upon it will continue, while the application of strong management measures (e.g., via the statutory/regulatory process) to avoid potentially significant impacts is also expected to continue.

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	***Good*** */ Poor / Bad / Unknown*
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*

10.2 Additional information *Optional*	Visual and acoustic records of sperm whale in Irish waters continue to indicate a wide and frequent occurrence of the species throughout the year, in deep oceanic waters and those overlying the continental slope and also some parts of the outer continental shelf. Since many significant (i.e., high level) anthropogenic impacts that may affect this wide-ranging species' distribution are more localised in space and time within this extensive and diverse marine area, the Future prospects for the Range and Habitat for the species are considered to be Good. A number of pressures that could act upon this species have been identified. The effect of these pressures may operate on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, thereby constituting a potential threat. While the impacts on individuals or populations of sperm whale in Irish waters are not well understood, partly due to the species' recorded occurrence in comparatively small numbers and to continuing uncertainty regarding its population trends and ecology within Ireland's marine area, ongoing threats as listed or identified into the future via surveillance will be managed appropriately. Therefore the Future prospects for the Population are considered to be Good.

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating /* ***stable*** */ unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	***YES**/NO*	***YES**/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	***YES**/NO*	***YES**/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	Contemporary sightings of sperm whales and extensive acoustic data demonstrate the wide and frequent occurrence of this species in deep oceanic waters, those overlying the continental slope, and also the margin of the continental shelf (e.g., around the Porcupine Seabight and Porcupine Bank). Hence the Range and Habitat for the species are considered to be Favourable. While robust and long-term data on sperm whale population size and trends in Irish waters as a whole are not available, knowledge of the species' seasonal distribution, abundance and density in the offshore waters of western Europe has improved significantly since the Directive came into force. There has also recently been a very significant improvement in population abundance data from a significant deep water component of the Irish EEZ, yielding the first density/abundance estimates and associated 95% Confidence Intervals for this region. While there is continued uncertainty in the trajectory of northeast Atlantic populations of sperm whale since the cessation of whaling, given the newly available estimates for Irish waters in comparison with other areas of importance for sperm whale (Berrow *et al.*, 2018) and the species' wide and frequent occurrence, the Population parameter is considered to be Favourable. A number of potentially significant pressures have been identified. While the effect of these pressures may act on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, none is considered to be of sufficient magnitude to be causing an adverse impact on populations of sperm whale in Irish waters. Ongoing threats as listed or identified into the future via surveillance will be managed appropriately. Hence the Future prospects for the species are considered to be Favourable.		

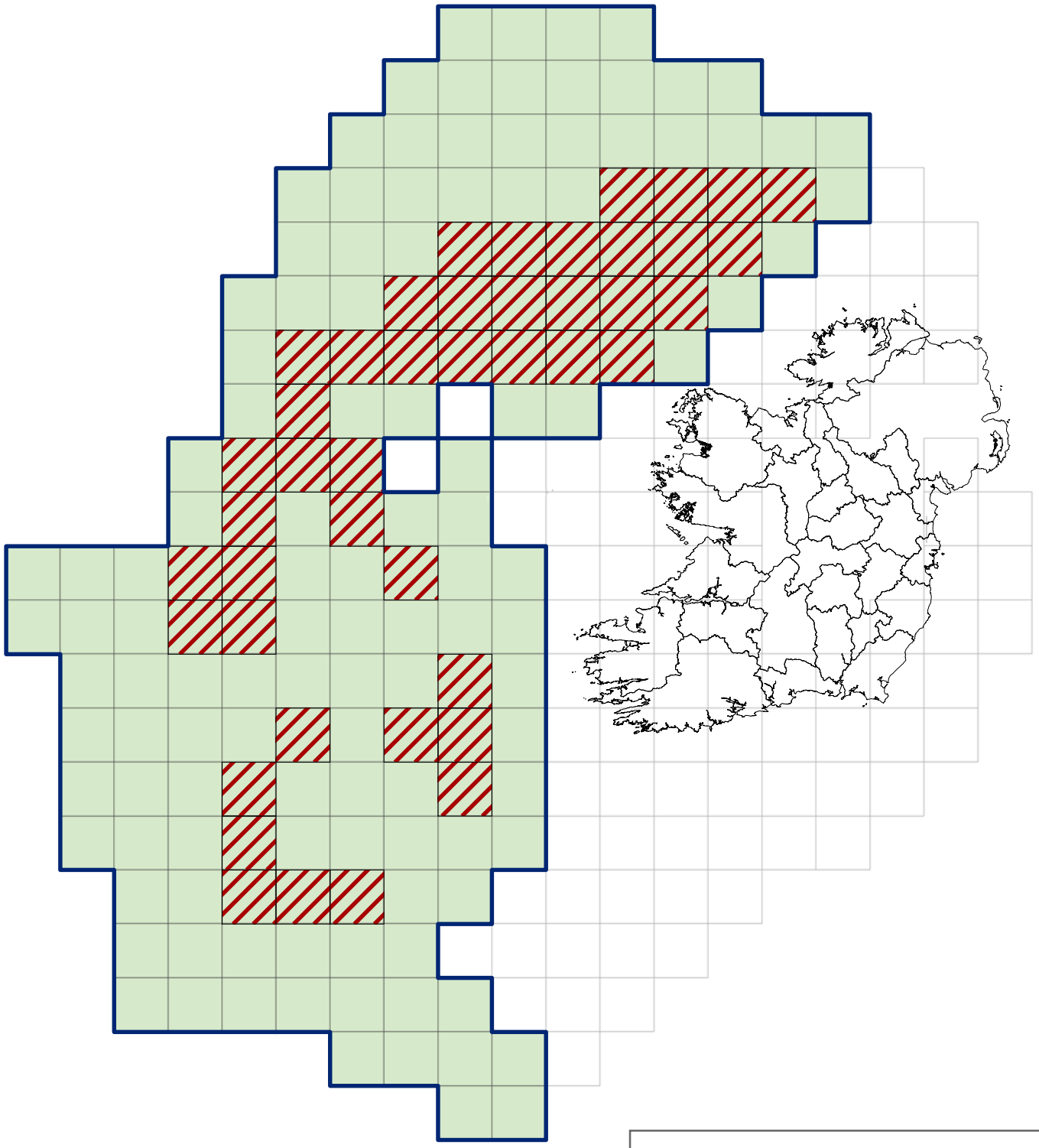
	Based on the assessments for the Range, Population, Habitat and Future prospects parameters, the overall conclusion is that the Conservation Status of sperm whale in Ireland is Favourable. This overall result is different from the previous two Article 17 assessments, due to improved knowledge and higher quality data, and to new methods proven to be effective for use in the assessment of the species' status.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Sperm whale
Physeter macrocephalus (2624)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 25 50 100 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***5033***
1.3 Species scientific name	*Hyperoodon ampullatus*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Northern bottlenose whale (Míol mór bolgshrónach)
1.6i Species description	The Northern bottlenose whale is the largest of the beaked whale family (*Ziphiidae*) occurring in Ireland, its adults averaging up to 7-9m long. Found only in the North Atlantic, mainly in temperate and sub-polar regions, in the east its range stretches from Greenland and northern Norway to the Azores and north-west Africa but excluding the Mediterranean and Baltic Seas (Taylor *et al.*, 2008; Gowans, 2009). Classified by the IUCN as a Data Deficient species whose population status and trends remain uncertain after depletion through intensive whaling (Taylor *et al.*, 2008; Whitehead & Hooker, 2012), Northern bottlenose whales are quite readily identifiable in the field. This is due to their large body length for a toothed cetacean, their characteristic bulbous melon (forehead) and prominent but short rounded beak. Northern bottlenose whales are generally found in deep oceanic habitats. Records from Irish waters have been infrequent and sporadic with the occasional coastal occurrence (e.g., see Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Kavanagh *et al.*, 2017). Knowledge of this deep-diving species' population structure, breeding habits and movements remains very limited (Whitehead & Hooker, 2012) due to the historical scarcity of data; but information has improved somewhat since 2015.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2013-2018***
2.3 Distribution map	Submitted
2.4 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*

2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	Over the last two decades there have been intermittent visual and acoustic records of Northern bottlenose whales. These have mainly occurred in deep offshore Irish waters stretching northwards from the Porcupine Seabight and western Porcupine Shelf to the Rockall Trough but occasionally extending to inshore waters (e.g., Ó Cadhla *et al.*, 2004; Kavanagh *et al.*, 2017; Rogan *et al.*, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018). The distribution map presented for this species represents all available live sighting records during extensive scientific research and monitoring in Irish waters between 2013 and 2018. The period selected for mapping represents a period of intensive and high quality surveillance for cetaceans in Irish waters across a range of research projects and monitoring programmes. The surveillance programmes and publications that contributed sighting data to this distribution projection are cited as follows: Kavanagh *et al.* (2017) and Rogan *et al.* (2018). Along with the results of previous visual survey effort (i.e., Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Berrow *et al.*, 2010; Rogan *et al.*, 2017), recent extensive ship-based and aerial surveys in summer (Hammond *et al.*, 2017; Rogan *et al.*, 2018) and aerial surveys in winter (Rogan *et al.*, 2018) and acoustic monitoring (Berrow *et al.*, 2018), these data were integrated into the development of the species' range map presented under section 2.5. It should be noted that the spatial and temporal distribution of Northern bottlenose whales is likely to be underestimated due to the difficulty in discriminating medium-sized whale species from one another in the offshore Atlantic environment (e.g., see Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Wall *et al.*, 2013; Rogan *et al.*, 2018). Thus the distribution map presented does not include records where the observed species could not be distinguished, for example, from other members of the Family *Ziphiidae* (i.e., beaked whales, such as Sowerby's beaked whale) or from *unidentified whale* or *unidentified medium whale* categories often used for indeterminate sightings. The distribution of recent sightings (Kavanagh *et al.*, 2017; Rogan *et al.*, 2018) and acoustic records (Berrow *et al.*, 2018) along with regional sighting records obtained across three preceding decades (Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Rogan *et al.*, 2017) indicate a predominant distribution in Atlantic waters greater than 500-1,000m deep, including those overlying and fringing the continental slope, but also apparently extending into continental shelf waters to some degree. While all reliable cetacean records obtained in Irish waters were not available for use in this exercise, the map drawn for this species provides a good sample of its observed distribution within the period given in 2.2.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
4.2 Sources of information	Baines, M., Reichelt, M., Coles, D., Williams, A., Griffin, D. & Corkhill, O. (2013) Marine Mammal Observers' and passive acoustic monitoring operators' report during 3D seismic survey off southwest Ireland for KOSMOS. RPS Energy, Axminster, Devon, UK. 24pp. Berrow, S.D., Whooley, P., O'Connell, M. & Wall, D. (2010) *Irish Cetacean Review (2000-2009).* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 60pp. Berrow, S.D., O'Brien, J., Meade, R., Delarue, J., Kowarski, K., Martin, B., Moloney, J., Wall, D., Gillespie, D., Leaper, R., Gordon, J., Lee, A. & Porter, L. (2018). *Acoustic Surveys of Cetaceans in the Irish Atlantic Margin in 2015–2016: Occurrence, distribution and abundance.* Department of Communications, Climate Action & Environment and the National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland, 348pp. Cañadas, A., Macleod, K., Mikkelsen, B., Rogan, E., Uriarte, A., Antonio Vázquez, J., Van Canneyt, O. & Hammond, P.S. (2011) Abundance and distribution of beaked whales in the European Atlantic. Report to the Scientific Committee of the International Whaling Commission, Cambridge. SC/63/SM13. 16pp. DAHG (2014) *Guidance to Manage the Risk to Marine Mammals from Man-made Sound in Irish Waters.* Department of Arts, Heritage and the Gaeltacht, Dublin. 59pp. DEHLG (2009) *Conservation Plan for Cetaceans in Irish Waters.* Department of the Environment, Heritage and Local Government, 7 Ely Place, Dublin. 97pp. Frouin-Mouy, H., Hipsey, S., Denes, S. & R. Burns. (2017) Soundscape Characterisation and Cetacean Presence in the Porcupine Basin: June to November 2016. Document 01320, Version 1.0. Technical report by JASCO Applied Sciences for Woodside Energy (Ireland) Pty Ltd. 109pp. Gowans, S. (2009) Bottlenose whales. *Hyperoodon ampullatus and H.planifrons.* In W.F. Perrin, B. Würsig, J.G.M. Thewissen (eds.). *Encyclopedia of Marine Mammals* – 2nd edition. Academic Press, Elsevier Inc. p.129-131. Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr,

H., K Macleod, K., Ridoux, V., Santos, M.B., Scheidat, M., Teilmann, J., Vingada, J. & Øien, N. (2017) Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. Final project report. University of St. Andrews, Scotland. 40pp.

Hammond, P.S., Macleod, K., Burt, L. Cañadas, A., Lens, S. Mikkelsen, B., Rogan, E., Santos, B., Uriarte, A., Van Canneyt, O. & Vázquez, J.A. (2009) Cetacean Offshore Distribution and Abundance in the European Atlantic (CODA). Final report. University of St. Andrews, Scotland.

Kavanagh, A.S., Hunt, W., Richardson, N. & Jessopp, M. (2017) Cetaceans in Irish offshore waters: Final report of the SFI-KOSMOS Project 2015-2017. MaREI Centre, University College Cork. 66pp.

McCauley, R.D. (2015) Offshore Irish noise logger program (March to September 2014): analysis of cetacean presence, and ambient and anthropogenic noise sources. Final project report R2015-01 to RPS MetOcean / Woodside Energy (Ireland) Pty Ltd. Project: CMST 1296. Curtin University, Western Australia. 110pp.

McGovern, B., Culloch, R., O'Connell, M. & Berrow, S. (2016) Temporal and spatial trends in stranding records of cetaceans on the Irish coast, 2002–2014. *J. Mar. Biol. Assoc. UK*. doi.org/10.1017/S0025315416001594.

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. 149pp.

Ó Cadhla, O., Mackey, M., Aguilar de Soto, N., Rogan, E. & Connolly, N. (2004) Cetaceans and Seabirds of Ireland's Atlantic Margin. Volume II - Cetacean distribution and abundance. Report on research carried out under the Irish Petroleum Infrastructure Programme (PIP): Rockall Studies Group (RSG) projects 98/6 and 00/13, Porcupine Studies Group project P00/15 and Offshore Support Group (OSG) project 99/38. 82pp.

O'Donnell, C., Johnston, G., Mullins, E., Keogh, N. & Power, J. (2018) Blue Whiting Acoustic Survey Cruise Report. March 20 – April 06, 2018. FSS Survey Series: 2018/01. 31pp.

Reid, J.B., Evans, P.G.H. & Northridge, S.P. (2003) *Atlas of Cetacean Distribution in North-west European Waters.* Joint Nature Conservation Committee, Peterborough. 76pp.

Rogan, E., Cañadas, A., Macleod, K., Santos, B., Mikkelsen, B., Uriarte, A., Van Canneyt, O., Vazquez, A.J. & Hammond, P.S. (2017) Distribution, abundance and habitat use of deep diving cetaceans in the North East Atlantic. *Deep Sea Research II* 141: 8-19. doi.org/10.1016/j.dsr2.2017.03.015.

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	Gaeltacht, Dublin, Ireland. 297pp. Taylor, B.L., Baird, R., Barlow, J., Dawson, S.M., Ford, J., Mead, J.G., Notarbartolo di Sciara, G., Wade, P. & Pitman, R.L. (2008) *Hyperoodon ampullatus*. In IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. http://www.iucnredlist.org. Wall, D., Murray, C., O'Brien, J., Kavanagh, L., Wilson, C., Ryan, C., Glanville, B., Williams, D., Enlander, I., O'Connor, I., McGrath, D., Whooley, P. & Berrow, S. (2013) *Atlas of the distribution and relative abundance of marine mammals in Irish offshore waters 2005 - 2011*. Irish Whale and Dolphin Group, Kilrush, Co. Clare. 63pp. Whitehead, H. & Hooker, S.K. (2012) Uncertain status of the northern bottlenose whale (*Hyperoodon ampullatus*): population fragmentation, legacy of whaling and current threats. *Endangered Species Research* 19: 47-61.
4.2i Additional information	

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	***585,000 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** / *increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994-2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*	
5.8 Long-term trend	**a) Minimum**	

Magnitude *Optional*	**b) Maximum**	
5.9 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*	
5.10 Favourable reference range	***a) 585,000 km²***	
	b) Indicate if operators were used (use these 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 range value derived from the range map referred to in 2.4 is considered to be the baseline for this species. As there is no evidence of a decline since the Directive came into force the current range is set as the FRR.	
5.11 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***	
5.12 Additional information *Optional*	The natural range of Northern bottlenose whales in Irish waters, and marine waters covered by the Directive, is a small component of the species' wider North Atlantic range (Taylor *et al.*, 2008; DEHLG, 2009; Hammond *et al.*, 2017; Rogan *et al.*, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018). The range map provided consists of the species' recorded and likely predominant natural range based on comparatively recent data (2001-2018) and expert judgement, and is partly derived from 2.3. It consists of a block of contiguous 50km x 50km grid cells distributed in Irish marine waters of 500m depth or greater and now includes the relevant assessment area under the Marine Strategy Framework Directive. Prior to 1999-2000, survey effort targeting cetacean species in Irish offshore waters was comparatively limited in coverage, both spatially	

	and temporally. Since 1999-2000 a number of dedicated multi-annual surveillance programmes for cetaceans have operated in Irish waters, with visual and acoustic surveys extending to the limits of Ireland's EEZ and beyond. With regard to this species it is considered that the years 2007-2018 represent an appropriate period for the evaluation of short-term trends since all survey efforts intensified further during this period. Sighting and acoustic records from ongoing dedicated surveillance effort in Irish waters (Kavanagh *et al.*, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018) provide no evidence of a decline in distribution/range in the recent past; therefore the short-term trend for range is considered to be stable. The long-term trend over the period 1994-2018 is considered to be uncertain for this species due to limited data availability prior to 1999-2000, as outlined above. The range value derived from the map referred to above is considered to be the baseline for this species. This surface area calculation is greater than that reported in 2013 due to the integration of Ireland's MSFD assessment area within the range. Since there is no evidence of a decline in range since the Directive came into force, the current range is set as the FRR. There is an assumption that the current range in Irish waters is large enough (a) to encompass all of the ecological variation required by this species during its occurrences therein and (b) to contribute to the long-term survival of the species.

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	***2013-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	***1,372***
	c) Maximum	***12,683***
	d) Best single value	
6.3 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	

6.5 Type of estimate *Optional*		
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing / decreasing / uncertain /* ***unknown***	
6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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***	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain /* ***unknown***	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.14 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***	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) Population size (with unit) or*	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) Favourable reference population is unknown	
	d) Indicate method used to set reference value if other than operators	

<table>
<tr><td></td><td colspan="2">Robust data on Northern bottlenose whale population size or trends in Irish waters are not available due to the ongoing scarcity of confirmed sighting records from the current and previous reporting rounds. In spite of extensive aerial survey effort in summer and winter 2015 and 2016, just three sighting records of single Northern bottlenose whales were obtained (Rogan et al., 2018). In addition, a parallel study involving deep-water acoustic monitoring recorded a relatively low occurrence of this species across a set of eight static monitoring stations, compared to significantly higher detection rates for Cuvier’s beaked whale and Sowerby’s beaked whale (Berrow et al., 2018).

Since extensive monitoring efforts for this and other offshore cetacean species over the period 2013-2018 have provided very limited data for Northern bottlenose whale, it has been necessary to rely on figures for this species that pre-date the current reporting period. Estimated summer abundance in waters overlying the western European continental slope and deeper oceanic waters numbered approximately 3,200-4,200 animals (Cañadas et al., 2011). The best estimates of population size given here are the lower and upper 95% Confidence Limits derived by Cañadas et al. (2011) and driven by data gathered in the 2007 CODA survey (Hammond et al., 2009). They assume the free ranging of animals across and within the survey regions concerned, for example from deep oceanic waters west of the Bay of Biscay to the Rockall Trough and northern UK waters.

These estimates were derived from conventional line-transect survey data from ships in summer only, and they were international/high seas in spatial coverage; consequently the population sizes are considerably higher than might be expected from Irish waters alone. Previously, Northern bottlenose whale abundance in the north-eastern Atlantic was approximated at 40,000 in the mid-1990s (Taylor et al., 2008).

Under the above circumstances it is not yet possible to determine a realistic baseline value since the Directive came into force; consequently the FRP remains unknown.</td></tr>
<tr><td rowspan="6">6.16 Change and reason for change in population size</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>
</table>

6.17 Additional information *Optional*	Evidence from deep water acoustic monitoring (Berrow *et al.*, 2018) and multi-annual surveillance programmes (e.g., Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Wall *et al.*, 2013; Kavanagh *et al.*, 2017; Rogan *et al.*, 2017; Rogan *et al.*, 2018) demonstrate that Northern bottlenose whales occur in deeper offshore waters to the north, west and south-west of Ireland and do so in all seasons. However, based on confirmed records of the species the actual numbers of these animals may be relatively small. The relationship between Northern bottlenose whales occurring in Ireland and those elsewhere in the eastern North Atlantic (e.g., the Hatton-Rockall region, Bay of Biscay, off northern Spain or northern Scotland) is unknown. Due to the relative scarcity of confirmed records and abundance estimates, the accurate determination of population trends, either in the short or long term, is not possible for this species at present. In addition the extent of movements or regional residency by communities of the species are poorly understood, partly due to infrequent records in exposed environments far from shore and to their deep oceanic ecology which combine to make their study both difficult and logistically demanding. Within the North-East Atlantic in summer, recent work by Hammond *et al.* (2017) indicates that some 11,394 beaked whales (95% C.I: 4,494-28,888) could be attributed to deeper waters off northern Spain, western France and the UK. New Northern bottlenose whale data from Ireland's ObSERVE Programme (Rogan *et al.*, 2018) have not yet been integrated into an Atlantic- or Europe-wide assessment of population size/density for this species. Considering these key data gaps and the infrequency and relative inconsistency of positive sighting records from Irish waters, there is insufficient evidence to reliably determine either the short-term or the long-term population trend for this species, mirroring continued uncertainty regarding this depleted species throughout its North Atlantic range (Whitehead & Hooker, 2012). Since it has not been possible to determine a realistic baseline value since the Directive came into force, the FRP is unknown.

7 Habitat for the species

7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*

7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*
7.8 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*
7.9 Additional information *Optional*	Use of the range descriptor and range surface area calculation as proxies for habitat and habitat area are judged appropriate for this wide-ranging pelagic and deep-diving species. The species' natural range and thus habitat in Irish waters is considered to be a small component of its wider North Atlantic range (Taylor *et al.*, 2008; DEHLG, 2009; Hammond *et al.*, 2017; Rogan *et al.*, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018). The quality of habitat for Northern bottlenose whale was determined by consideration of the relevant direct and indirect pressures thought to be acting on the species and/or its functional group, and its habitat within its natural environment. These pressures were evaluated in development of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009) and informed by more recent scientific surveillance (e.g., Baines *et al.*, 2013; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; O'Donnell *et al.*, 2018; Berrow *et al.*, 2018; Rogan *et al.*, 2018), using available data concerning, *inter alia*, habitat use, population size, distribution and ecology, and threats to the species' protection (e.g., via natural/biological sources, human

	sectoral activities, management gaps, etc.). Although, relative to principal human maritime activity in Ireland, they are demonstrated to be a more remote offshore species, Northern bottlenose whales may be subject to a number of local and/or regional environmental pressures throughout their range (DEHLG, 2009). However, based on current spatial and temporal data none are considered to be of sufficient impact on the species to be causing a significant deterioration in overall habitat quality in Ireland from a status that is sufficient for long-term survival. Long-term trends in habitat for Northern bottlenose whale remain uncertain due to insufficient accurate data for this species prior to 1999-2000. However with improved surveillance (e.g., under the ObSERVE Programme) and a slowly improving number of records of Northern bottlenose whales in the last 18 years, the short-term trend indicates the continued existence of sufficient quality habitat for the species.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**C09** Geotechnical surveying (M) **E02** Shipping lanes and ferry lanes transport operations (M) **H02** Military, paramilitary or police exercises and operations in the freshwater and marine environment (M)	**C09** Geotechnical surveying (M) **E02** Shipping lanes and ferry lanes transport operations (M) **H02** Military, paramilitary or police exercises and operations in the freshwater and marine environment (M)

8.2 Sources of information *Optional*	*https://www.npws.ie/marine/marine-species/cetaceans* *https://www.dccae.gov.ie/en-ie/natural-resources/topics/Oil-Gas-Exploration-Production/Pages/home.aspx* *https://www.npws.ie/marine/best-practice-guidelines* *http://www.iwdg.ie/news/?id=2758*
8.3 Additional information *Optional*	Northern bottlenose whales may be subject to local and/or regional environmental pressures and threats throughout their North Atlantic range and in Irish inshore/offshore waters. In the development and preparation of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009), a comprehensive review of the pressures and threats believed and/or documented to be acting on this species and/or its functional group was undertaken.

	The main pressures thought to be acting on this species in Irish waters are considered to involve commercial shipping-based or vessel-based activities that occur primarily on a local or regional scale and/or on a temporary or intermittent basis (e.g., impacts arising from shipping movements or geophysical seismic exploration; DEHLG, 2009). Among the potential pressures that may act on this species is the use of military sonars in the deeper ocean and adjacent continental margins which, while not employed by the Irish Naval Service, is known and documented to occur in the waters of Ireland's EEZ (e.g., McCauley, 2015; Berrow *et al.*, 2018). Such anthropogenic sound sources have been implicated previously in a number of beaked whale stranding events (DAHG, 2014) and questions remain with regard to an unusual series of strandings of this and other beaked whale species in western Ireland, the UK and adjacent states in August-September 2018 (DCHG, 2018 unpublished data; IWDG, 2018 unpublished data). Since Northern bottlenose whale distribution is known to be primarily offshore in the deeper Atlantic Ocean, where there is a documented pressure that may be regionally intensive the ranking given is one of medium importance, given relatively low population estimates for the species (Cañadas *et al.*, 2011; see also 6.2 above) and also uncertainty with regard to the species' movements and population/breeding structure (Taylor *et al.*, 2008). It should be noted that in relation to seismic exploration, which tends to occur on a local or occasionally regional scale in the waters of Ireland's EEZ and is comparatively low in coverage relative to several other member states, a robust regulatory and management regime applies in order to avoid potentially significant impacts on all species of marine mammal. This regime takes cognisance of recent scientific research and surveillance findings (e.g., Baines *et al.*, 2013; McCauley, 2015; Frouin-Mouy *et al.*, 2017; Hammond *et al.*, 2017; Kavanagh *et al.*, 2017; Rogan *et al.*, 2017; O'Donnell *et al.*, 2018; Berrow *et al.*, 2018; Rogan *et al.*, 2018) and it is expected that this practice will continue into the future. There is no evidence to suggest a change in the main pressures thought to be acting on this species in the near future (i.e., threats). However surveillance of the species and the pressures potentially acting upon it will continue, while the application of strong management measures (e.g., via the statutory/regulatory process) to avoid potentially significant impacts is also expected to continue.

9 Conservation measures

To be reported only for Annex II species

10 Future prospects		
10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	*Good / Poor / Bad /* ***Unknown***
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*
10.2 Additional information *Optional*	Visual records of Northern bottlenose whale in Irish waters have remained comparatively uncommon. Contemporary sightings and new acoustic data nevertheless indicate a relatively wide occurrence, possibly in low numbers, in deep oceanic waters and those overlying the continental slope at least. Since this represents an extensive offshore area far removed from human centres of population and from many significant (i.e., high level) anthropogenic impacts that may affect this species' distribution, the Future prospects for the Range and Habitat for the species are considered to be Good. A number of pressures that could act upon this species in Irish waters have been identified. The effect of these pressures may operate on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, thereby constituting a potential threat. However the impacts of such pressures on individuals or populations of Northern bottlenose whale in Irish waters are not well understood. This is partly due to the species' seasonal occurrence far offshore and to continuing limited or uncertain information on its numbers, ecology and behaviour during its occurrence in Ireland's marine area. A further confounding factor is the potentially transnational nature of Northern bottlenose whale life history and movements in the North Atlantic, both within and outside the marine jurisdictions of many states in which the species may be subject to a range of pressures. While ongoing threats as listed or identified into the future via surveillance in Ireland will be managed appropriately, the Future prospects for this population are considered to be Unknown since the significance of the main pressures and threats and the species' long-term viability after once-intensive hunting remain uncertain. Although the guidelines recommend a Favourable assessment of Future prospects where prospects of one parameter are unknown and prospects of the others are good, Future prospects has been assessed as Unknown due to the paucity of information on population parameters.	

11 Conclusions	
Assessment of conservation status at end of reporting period	
11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*

<table>
<tr><td>11.2 Population</td><td colspan="3">Favourable (FV) / Inadequate (U1) / Bad (U2) / <u>Unknown (XX)</u></td></tr>
<tr><td>11.3 Habitat for the species</td><td colspan="3"><u>Favourable (FV)</u> / Inadequate (U1) / Bad (U2) / Unknown (XX)</td></tr>
<tr><td>11.4 Future prospects</td><td colspan="3">Favourable (FV) / Inadequate (U1) / Bad (U2) / <u>Unknown (XX)</u></td></tr>
<tr><td>11.5 Overall assessment of Conservation Status</td><td colspan="3">Favourable (FV) / Inadequate (U1) / Bad (U2) / <u>Unknown (XX)</u></td></tr>
<tr><td>11.6 Overall trend in Conservation Status</td><td colspan="3">Indicate the trend (qualifier) for FV, U1 and U2:
improving / deteriorating / stable / unknown</td></tr>
<tr><td rowspan="8">11.7 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 (11.5)</td><td>Overall trend in conservation status (11.6)</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 data</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>d) yes, due to the use of different method (including taxonomical change or use of different thresholds)</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>e) yes, but there is no information on the 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>11.8 Additional information

Optional</td><td colspan="3">Contemporary sightings of Northern bottlenose whales (Rogan et al., 2018) and recent acoustic data (Berrow et al., 2018) indicate a wide but comparatively low level of occurrence in deep oceanic waters and those overlying the continental slope. Hence the Range and Habitat for the species are considered to be Favourable.
However there is currently no evidence that the North Atlantic bottlenose whale population, at least in its central/eastern component, may be increasing following the cessation of commercial</td></tr>
</table>

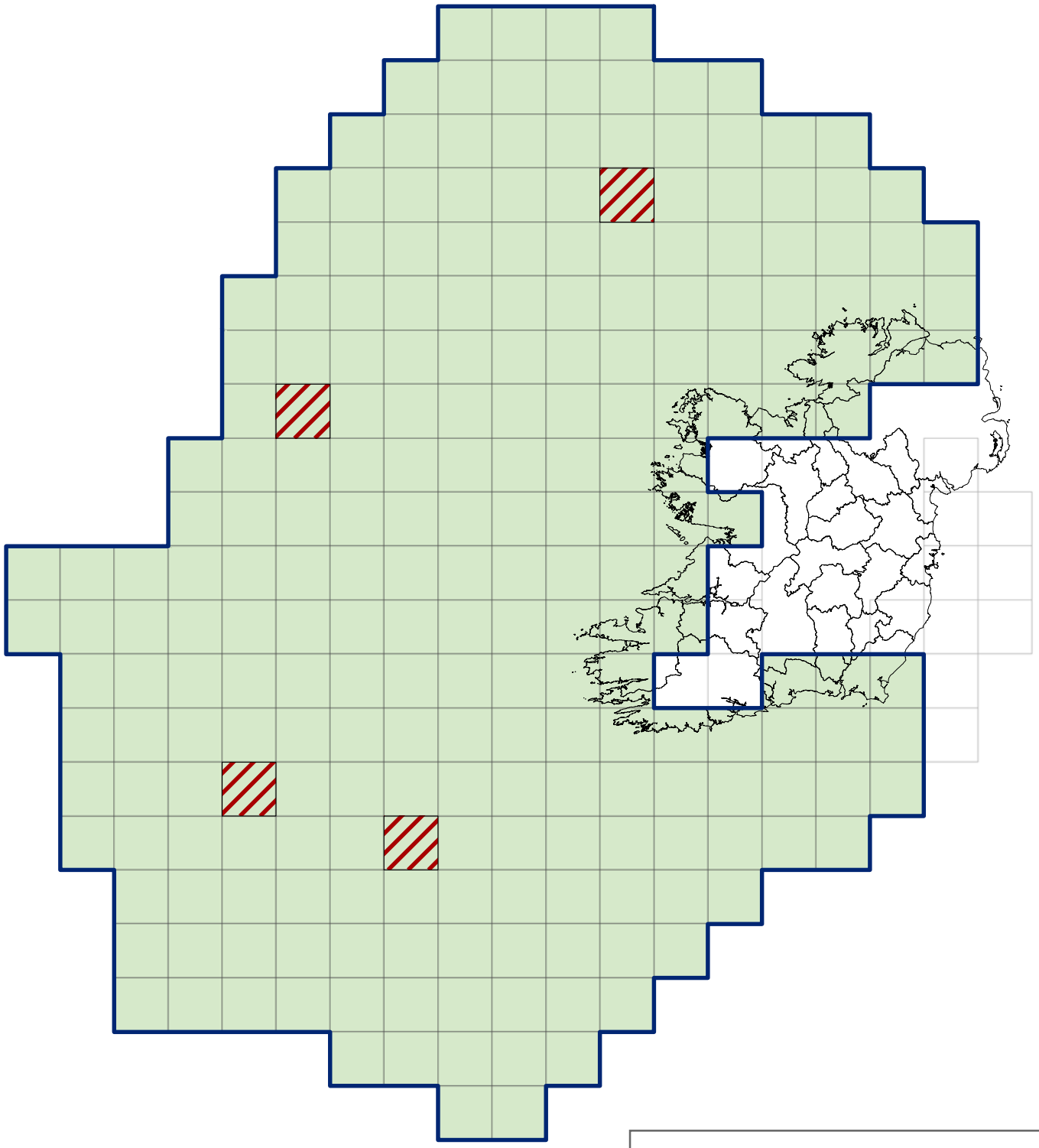
	whaling. Furthermore the origin/stock identity of whales occurring in Irish waters is not known at present. Considering these key data gaps and ongoing limited positive sighting records from Irish waters, the Population parameter is considered to be Unknown. Based on the assessments for the Range, Population, Habitat and Future prospects parameters, the overall conclusion is that the Conservation Status of Northern bottlenose whale in Ireland remains Unknown. Nevertheless the trend in Conservation Status is considered to be stable. No improvements are reported in the assessments for the Population or Future prospects parameters, due to uncertainty regarding population numbers and trends for this depleted species. This overall result is the same as in the previous Article 17 assessment due to limited ongoing information on the species' occurrence and population ecology in Irish waters.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Northern bottlenose whale
Hyperoodon ampullatus (5033)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 25 50 100 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***2619***
1.3 Species scientific name	*Balaenoptera borealis*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Sei whale (Droimeiteach na Saíán)
1.6i Species description	The sei whale is the third largest whale species found in Ireland but is one of the least frequently recorded. In addition to severe population depletion as a result of hunting, an apparently oceanic occurrence may partly explain why records remain low compared to more coastally-occurring species such as the fin and humpback whale. It is also possible that the species is somewhat under-recorded due to difficulties in distinguishing it from other large whales. Sei whales are believed to commonly move between cold high-latitude feeding grounds in summer and warm temperate or tropical waters in winter, during which calving and mating occurs. The sparse nature of Irish records makes its seasonal occurrence and distribution unclear. Individual whales are only readily identifiable in good sea conditions or within close range where diagnostic features including its surfacing behaviour, characteristic upright and comparatively tall dorsal fin and the absence of asymmetrical skin colouration can be observed. Sei whales feed mainly on small shoaling fish, swimming crustaceans and zooplankton in oceanic, continental slope and shelf waters. Having been intensively hunted into the mid-late 20th century, there is little sign of any recovery in northeast Atlantic populations.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*YES/**NO***
2.2 Year or period	***2013-2018***
2.3 Distribution map	Submitted
2.4 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*

2.5 Additional maps *Optional*	Range maps were submitted
2.6i Additional information	The distribution map presented for this species represents all available live sighting records during extensive scientific research and monitoring in Irish waters between 2013 and 2018. The period selected for mapping represents a period of intensive and high quality surveillance for cetaceans in Irish waters across a range of research projects and monitoring programmes. It should be noted that the spatial and temporal distribution of this species could be underestimated due to the difficulty in discriminating large baleen whale species from one another in the offshore Atlantic environment (e.g., see Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Wall *et al.*, 2013; Rogan *et al.*, 2018). This distribution map does not include records where the observed species could not be distinguished from other members of the Family *Balaenopteridae* (e.g., the *blue/fin/sei whale* category, *fin/sei whale* category) or *unidentified large whale* category often used for indeterminate sightings. Clearly identified observations of this depleted migratory species in Irish waters have remained comparatively rare and sporadic over the last century but new records have emerged, simultaneous to more rigorous surveillance in the last 20-25 years. The surveillance programmes, projects and publications that contributed sighting data to this distribution projection are cited as follows: Baines *et al.* (2013), Kavanagh *et al.* (2017) and Rogan *et al.* (2018). Along with the results of previous visual survey effort (i.e., Pollock *et al.*, 1997; Reid *et al.*, 2003; Ó Cadhla *et al.*, 2004; Hammond *et al.*, 2009; Berrow *et al.*, 2010; Wall *et al.*, 2013), recent extensive aerial surveys in summer and winter (Rogan *et al.*, 2018) and acoustic monitoring (Charif & Clark, 2009; Berrow *et al.*, 2018), these data were integrated into the development of the species' range map presented under section 2.5. The available scientific information indicates a predominant distribution in deep Atlantic Ocean waters to the west and southwest of Ireland, including waters overlying the continental slope and western parts of the continental shelf. While all reliable cetacean records obtained in Irish waters were not available for use in this exercise, the map drawn for this species provides a good sample of its observed distribution within the period given in 2.2.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions	
4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
4.2 Sources of information	Baines, M., Reichelt, M., Coles, D., Williams, A., Griffin, D. & Corkhill, O. (2013) Marine Mammal Observers' and passive acoustic monitoring operators' report during 3D seismic survey off southwest Ireland for KOSMOS. RPS Energy, Axminster, Devon, UK. 24pp. Berrow, S.D., Whooley, P., O'Connell, M. & Wall, D. (2010) *Irish Cetacean Review (2000-2009).* Irish Whale and Dolphin Group, Kilrush, Co. Clare. 60pp. Berrow, S.D., O'Brien, J., Meade, R., Delarue, J., Kowarski, K., Martin, B., Moloney, J., Wall, D., Gillespie, D., Leaper, R., Gordon, J., Lee, A. & Porter, L. (2018) *Acoustic Surveys of Cetaceans in the Irish Atlantic Margin in 2015–2016: Occurrence, distribution and abundance.* Department of Communications, Climate Action & Environment and the National Parks and Wildlife Service (NPWS), Department of Culture, Heritage and the Gaeltacht, Dublin, Ireland, 348pp. Charif, R.A. & Clark, C.W. (2009) Acoustic monitoring of large whales in deep waters north and west of the British Isles: 1996-2005. Technical Report 08-07 for the UK DECC. Cornell University Bioacoustics Research Program, Laboratory of Ornithology, Cornell University, New York. 40pp. DEHLG (2009) *Conservation Plan for Cetaceans in Irish Waters.* Department of the Environment, Heritage and Local Government, 7 Ely Place, Dublin. 97pp. Hammond, P.S., Macleod, K., Burt, L. Cañadas, A., Lens, S. Mikkelsen, B., Rogan, E., Santos, B., Uriarte, A., Van Canneyt, O. & Vázquez, J.A. (2009) Cetacean Offshore Distribution and Abundance in the European Atlantic (CODA). Final Report. University of St. Andrews, Scotland. Hammond, P.S., Macleod, K., Burt, L., Cañadas, A., Lens, S., Mikkelsen, B., Rogan, E., Santos, B., Uriarte, A., Van Canneyt, O., & Antonio Vázquez, J. (2011) Abundance of baleen whales in the European Atlantic. Report to the Scientific Committee of the International Whaling Commission, Cambridge. SC/63/RMP24. 22pp. Horwood, J. (2009) Sei whale. *Balaenoptera borealis*. In W.F. Perrin, B. Würsig, J.G.M. Thewissen (eds.). *Encyclopedia of Marine Mammals* – 2nd edition. Academic Press, Elsevier Inc. p.1001-1003. Huijser, L.A.E., Berube, M., Cabrera, A.A., Prieto, R., Silva, M.A., Robbins, J., Kanda, N., Pastene, L.A., Goto, M., Yoshida, H., Vikingsson, G.A. & Palsboll, P.J. (2018) Population structure of North Atlantic and North Pacific sei whales (*Balaenoptera borealis*) inferred from mitochondrial control region DNA sequences and microsatellite genotypes. *Conservation Genetics*

https://doi.org/10.1007/s10592-018-1076-5.

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4.2i Additional information	

5 Range		
Range within the biogeographical/marine region concerned.		
5.1 Surface area	***395,000 km²***	
5.2 Short-term trend Period	***2007–2018***	
5.3 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.5 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*	
5.6 Long-term trend Period *Optional*	***1994-2018***	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */* unknown	
5.8 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
5.9 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*	
5.10 Favourable reference range	***a) 395,000 km²***	
	b) Indicate if operators were used (use these 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 range value derived from the range map referred to in 2.4 is considered to be the baseline for this species. As there is no evidence of a decline since the Directive came into force the current range is set as the FRR.</td></tr>
<tr><td rowspan="6">5.11 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>5.12 Additional information

Optional</td><td colspan="2">The species' natural range in Irish waters, and marine waters covered by the Directive, is a small component of its wider North Atlantic migratory range (DEHLG, 2009; Horwood, 2009; Prieto et al., 2012; Huijser et al., 2018).
The range map provided consists of its recorded and likely predominant natural range based on comparatively recent data (2001-2018) and expert judgement, and is partly derived from 2.3. It consists of a block of contiguous 50km x 50km grid cells distributed in Irish marine waters of 500m depth or greater and now includes the relevant assessment area under the Marine Strategy Framework Directive.
Prior to 1999-2000, survey effort targeting cetacean species in Irish offshore waters was comparatively limited in coverage, both spatially and temporally. Since 1999-2000 a number of dedicated multi-annual surveillance programmes for cetaceans have operated in Irish waters, with visual and acoustic surveys extending to the limits of Ireland's EEZ and beyond. With regard to this species it is considered that the years 2007-2018 represent an appropriate period for the evaluation of short-term trends since all survey efforts intensified further during this period.
Sighting and acoustic records from dedicated surveillance effort in Irish waters (Berrow et al., 2010; Baines et al., 2013; Wall et al., 2013; Kavanagh et al., 2017; Berrow et al., 2018; Rogan et al., 2018) provide no evidence of a decline in distribution/range in the recent past; therefore the short-term trend for range is considered to be stable.
The long-term trend over the period 1994-2018 is considered to be uncertain for this species due to limited data availability prior to 1999-2000, as outlined above.
The range value derived from the map referred to above is</td></tr>
</table>

	considered to be the baseline for this species. This surface area calculation is substantially reduced from that reported in 2013. This is due to some improved information on sei whale population ecology in the North Atlantic (e.g., Prieto *et al.*, 2012; Huijser *et al.*, 2018) and recent extensive visual survey effort (Baines *et al.*, 2013; Kavanagh *et al.*, 2017; Rogan *et al.*, 2018) that has not detected or confirmed the species in shallower continental shelf or coastal waters. Since there is no evidence of an actual decline in range since the Directive came into force the current range is set as the FRR. There is an assumption that the current range in Irish waters is large enough (a) to encompass all of the ecological variation required by this species during its occurrences therein and (b) to contribute to the long-term survival of the species.

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	***2013-2018***	
6.2 Population size (*in reporting unit)*	**a) Unit**	***Number of individuals***
	b) Minimum	***6***
	c) Maximum	***1,164***
	d) Best single value	
6.3 Type of estimate	***Best estimate*** */ multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	**a) Unit**	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate *Optional*		
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* ***c) Based mainly on expert opinion with very limited data*** *d) Insufficient or no data available*	
6.7 Short-term trend Period	***2007–2018***	
6.8 Short-term trend Direction	*stable / increasing / decreasing / uncertain /* ***unknown***	

6.9 Short-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.10 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***	
6.11 Long-term trend Period *Optional*	***1994–2018***	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain /* ***unknown***	
6.13 Long-term trend Magnitude *Optional*	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
6.14 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***	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) Population size (with unit) or*	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) Favourable reference population is unknown	
	d) Indicate method used to set reference value if other than operators Robust data on sei whale population size and trends in Irish waters are not available, mirroring continued uncertainty regarding this depleted species throughout its North Atlantic range. Since it has not been possible to determine a realistic baseline value since the Directive came into force the FRP is unknown.	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information *Optional*	Sightings of sei whales have been infrequent in Irish waters. Where they have occurred the number of whales recorded has commonly been 1-3 animals with up to five individuals on occasions (Ó Cadhla *et al.*, 2004; Berrow *et al.*, 2010; Baines *et al.*, 2013; Kavanagh *et al.*, 2017; Rogan *et al.*, 2018). Hammond *et al.* (2011) estimated sei whale abundance in the 2005 SCANS-II continental shelf and 2007 CODA oceanic survey areas at 29 whales (95%CL = 6-152) and 590 whales (95%CL = 299-1164) respectively. It is noteworthy that all sightings confirmed during the CODA survey were located in the 'NW Iberia' survey block; however significant numbers of large whales could not be identified to species level (Hammond *et al.*, 2009; Hammond *et al.*, 2011), as highlighted earlier. While precise figures for sei whale population size in Irish waters can therefore not be provided due to ongoing data limitations, continued provisional minimum and maximum figures are given. These are based on the lower and upper 95% Confidence Limits (CL) generated by Hammond *et al.* (2011). They assume the free ranging of animals across and within the regions concerned, for example from northwest Iberian waters to the Porcupine Seabight, Porcupine shelf and the Rockall Trough off western Ireland. There is little sign of any recovery in northeast Atlantic populations of sei whale since the cessation of whaling just 3-4 decades ago (IWDG, 2018 – unpublished data). In addition the origin/stock identity of those whales occurring in Irish waters and off the Iberian peninsula is not known (Reilly *et al.*, 2008; Huijser *et al.*, 2018). Considering these key data gaps and the infrequency and relative inconsistency of positive sighting records from Irish waters, there is insufficient evidence to reliably determine either the short-term or the long-term population trend for this species, mirroring continued uncertainty regarding this depleted species throughout its North Atlantic range. Since it has not been possible to determine a realistic baseline value since the Directive came into force, the FRP is unknown.	

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? **YES**/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*

7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	***2007–2018***
7.4 Short-term trend Direction	***stable*** */ increasing / decreasing / uncertain / unknown*
7.5 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*
7.6 Long-term trend Period *Optional*	***1994–2018***
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing /* ***uncertain*** */ unknown*
7.8 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*

7.9 Additional information *Optional*	Use of the range descriptor and range surface area calculation as proxies for habitat and habitat area are judged appropriate for this wide-ranging pelagic species. The species' natural range and thus habitat in Irish waters is a small component of its wider North Atlantic migratory range (DEHLG, 2009; Horwood, 2009; Prieto *et al.*, 2012). The quality of habitat for sei whale was determined by consideration of the relevant direct and indirect pressures thought to be acting on the species and/or its functional group, and its habitat within its natural environment. These pressures were evaluated in development of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009) and informed by more recent scientific surveillance (e.g., Baines *et al.*, 2013; Kavanagh *et al.*, 2017; Berrow *et al.*, 2018; Rogan *et al.*, 2018), using available data concerning, *inter alia*, habitat use, population size, distribution and ecology, and threats to the species' protection (e.g., via natural/biological sources, human sectoral activities, management gaps, etc). Sei whales may be subject to a number of local and/or regional environmental pressures throughout their range in Irish waters (DEHLG, 2009). However, based on current spatial and temporal data none are considered to be of sufficient impact on the species to be causing a significant deterioration in overall habitat quality in Ireland from a status that is sufficient for long-term survival. Long-term trends in habitat for sei whale remain uncertain due to insufficient accurate data for this species prior to 1999-2000. However, with improved surveillance and ongoing (if low incidence) records of sei whales in the last 18 years, the short-term trend indicates the continued existence of sufficient quality habitat for the species.

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	**b) Ranking of pressure/threat** *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal	**C09** Geotechnical surveying (M) **E02** Shipping lanes and ferry lanes transport operations (M)	**C09** Geotechnical surveying (M) **E02** Shipping lanes and ferry lanes transport operations (M)

8.2 Sources of information *Optional*	*https://www.npws.ie/marine/marine-species/cetaceans* *https://www.dccae.gov.ie/en-ie/natural-resources/topics/Oil-Gas-Exploration-Production/Pages/home.aspx*

8.3 Additional information *Optional*	Sei whales may be subject to a number of local and/or regional environmental pressures and threats throughout their North Atlantic range and in Irish offshore waters. In the development and preparation of the Conservation Plan for Cetaceans in Irish waters (DEHLG, 2009), a comprehensive review of the pressures and threats believed and/or documented to be acting on this species and/or its functional group was undertaken. The main pressures thought to be acting on this species in Irish waters are considered to involve commercial shipping-based activities that occur primarily on a local or regional scale and/or on a temporary or intermittent basis (e.g., impacts arising from shipping movements or geophysical seismic exploration; DEHLG, 2009). Since current sei whale distribution is likely to be offshore Atlantic in nature, where a pressure may be regionally intensive the ranking given is one of medium importance due also to the species' depleted population status. It should be noted that in relation to seismic exploration, which tends to occur on a local or occasionally regional scale in the waters of Ireland's EEZ and is comparatively low in coverage relative to several other member states, a robust regulatory and management regime applies in order to avoid potentially significant impacts on all species of marine mammal. This regime takes cognisance of recent scientific research and surveillance findings (e.g., Baines *et al.*, 2013; Berrow *et al.*, 2018; Rogan *et al.*, 2018) and it is expected that this practice will continue into the future. There is no evidence to suggest a change in the main pressures thought to be acting on this species in the near future (i.e., threats). However surveillance of the species and the pressures potentially acting upon it will continue, while the application of strong management measures (e.g., via the statutory/regulatory process) to avoid potentially significant impacts is also expected to continue.

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	***Good*** */ Poor / Bad / Unknown*
	b) Population	*Good / Poor / Bad /* ***Unknown***
	c) Habitat of the species	***Good*** */ Poor / Bad / Unknown*

10.2 Additional information *Optional*	Visual records of sei whale in Irish waters have remained comparatively uncommon. Contemporary sightings and increasing acoustic data nevertheless indicate a wide occurrence in deep oceanic waters and those overlying the continental slope. Since this represents an extensive offshore area far removed from human centres of population and from many significant (i.e., high level) anthropogenic impacts that may affect this wide-ranging species' distribution, the Future prospects for the Range and Habitat for the species are considered to be Good. A number of pressures that could act upon this species in Irish waters have been identified. The effect of these pressures may operate on a temporary and/or regional scale and some are likely to continue to act as pressures into the future, thereby constituting a potential threat. However the impacts of such pressures on individuals or populations of sei whale in Irish waters are not well understood. This is partly due to the species' possibly seasonal occurrence far offshore and to continuing limited or uncertain information on its numbers, ecology and behaviour during its occurrence in Ireland's marine area. A further confounding factor is the potentially transnational nature of sei whale life history and movements in the North Atlantic, both within and outside the marine jurisdictions of many states in which the species may be subject to a range of pressures. While ongoing threats as listed or identified into the future via surveillance in Ireland will be managed appropriately, the Future prospects for this population are considered to be Unknown since the significance of the main pressures and threats, and the species' long-term viability remain uncertain. Although the guidelines recommend a Favourable assessment of Future prospects where prospects of one parameter are unknown and prospects of the others are good, Future prospects has been assessed as Unknown due to the paucity of information on population parameters.

11 Conclusions

Assessment of conservation status at end of reporting period	
11.1 Range	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.2 Population	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***
11.3 Habitat for the species	***Favourable (FV)*** */ Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.4 Future prospects	*Favourable (FV) / Inadequate (U1)/ Bad (U2) /* ***Unknown (XX)***
11.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***

<table>
<tr><td>11.6 Overall trend in Conservation Status</td><td colspan="3">Indicate the trend (qualifier) for FV, U1 and U2:

improving / deteriorating / stable / unknown</td></tr>
<tr><td rowspan="8">11.7 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 (11.5)</td><td>Overall trend in conservation status (11.6)</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 data</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>d) yes, due to the use of different method (including taxonomical change or use of different thresholds)</td><td>YES/NO</td><td>YES/NO</td></tr>
<tr><td>e) yes, but there is no information on the 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>11.8 Additional information

Optional</td><td colspan="3">Contemporary sightings of sei whales and some recent acoustic data indicate a wide but comparatively low level of occurrence in deep oceanic waters and those overlying the continental slope. Hence the Range and Habitat for the species are considered to be Favourable.

However there is currently no evidence that the North Atlantic sei whale population, at least in its central/eastern component, may be increasing following the cessation of commercial whaling. Furthermore the origin/stock identity of whales occurring in Irish waters is not known at present. Considering these key data gaps and ongoing limited positive sighting records from Irish waters, the Population parameter is considered to be Unknown.

Based on the assessments for the Range, Population, Habitat and Future prospects parameters, the overall conclusion is that the Conservation Status of sei whale in Ireland remains Unknown. Nevertheless the trend in Conservation Status is considered to be</td></tr>
</table>

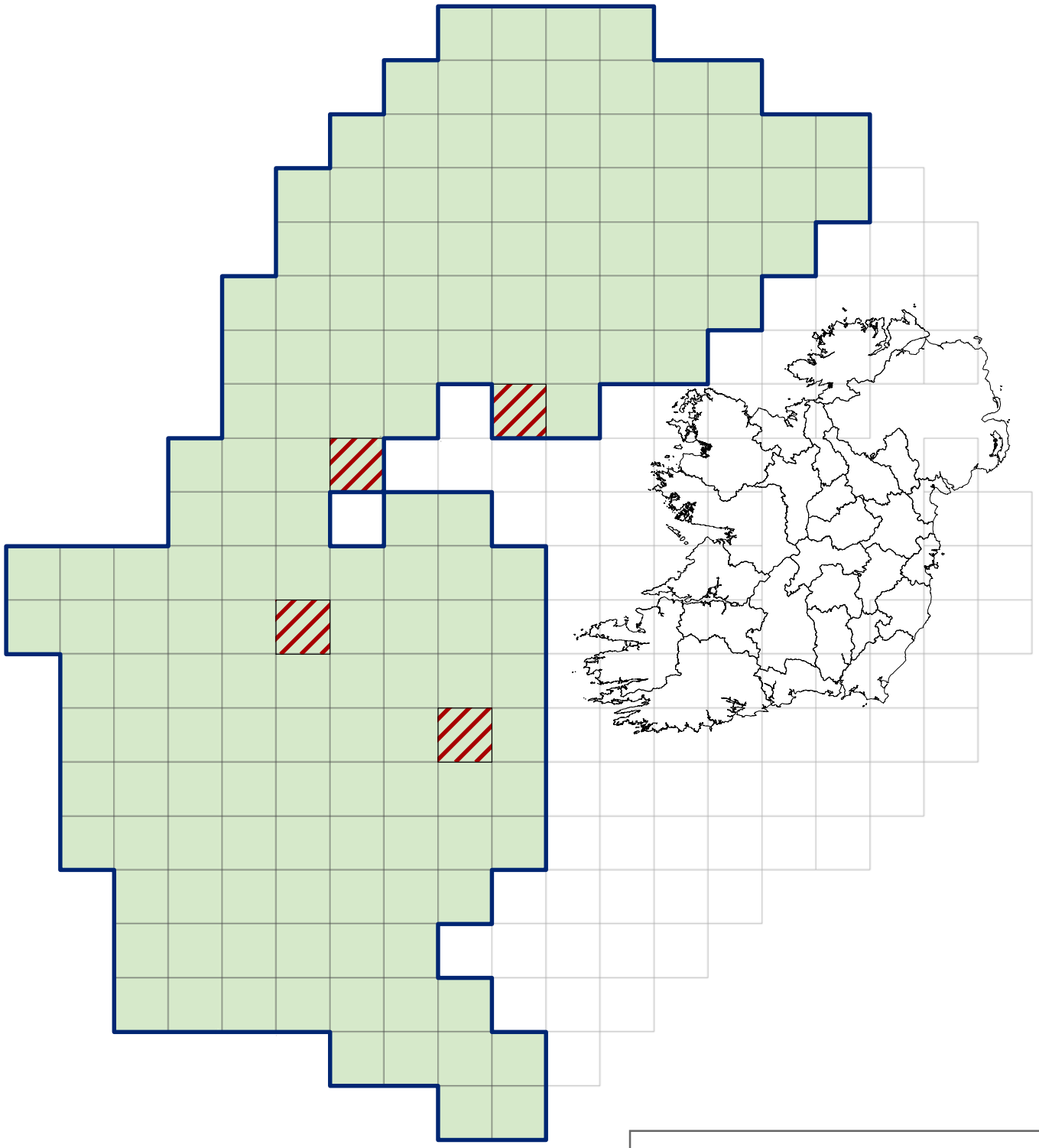
	stable. No improvements are reported in the assessments for the Population or Future prospects parameters, due to uncertainty regarding population numbers and trends for this severely depleted species. This overall result is the same as in the previous two Article 17 assessments due to limited ongoing information on the species' occurrence and population ecology in Irish waters.

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

Sei whale
Balaenoptera borealis (2619)
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

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Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. OSI-NMA-014)

Scale - Scála
0 25 50 100 km

N

Map arscáil V 2.0
Dat Dát June 2019

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1348***
1.3 Species scientific name	*Eubalaena glacialis*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Northern right whale (Míol mór an oighir; Ceartmhíol mór an tuaiscirt)
1.6i Species description	The Northern right whale (*Eubalaena glacialis*) is one of six species of cetacean (i.e., whales, dolphins and porpoises) that have been very rarely recorded in Irish waters and are therefore termed vagrant species. Distinctive by its v-shaped exhalation blow, the complete absence of a dorsal fin and the presence of white encrusted lumps on the head area known as "callosities", this slow-swimming baleen whale species was once hunted intensively throughout its North Atlantic range including off the north-west of Ireland in the early 1900s. Little is now known about the occurrence or ecology of this species in the North-East Atlantic, while remnant populations inhabiting North American waters remain extremely vulnerable to ongoing human impacts and potential extinction. The overall status of Northern right whale is considered to be Unknown since no live records have been confirmed from Irish waters in recent decades. In the last 50 years sightings have occurred very occasionally off the European continental shelf and in the mid-Atlantic.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*The spatial information provided relates to a species (or subspecies) to be treated as 'sensitive' YES/NO*
2.2 Year or period	*Year or period when the distribution data were collected*
2.3 Distribution map	*Submit a map together with relevant metadata following the technical specifications in the Explanatory Notes & Guidelines. The standard for species distribution is 10x10km ETRS grid cells, projection ETRS LAEA 5210*

2.4 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*
2.5 Additional maps *Optional*	*MS can submit an additional map, deviating from standard submission map under 2.3 and/or a range map*
2.6i Additional information	No live records of this species have been obtained from Ireland within the current reporting round or since the Directive came into force.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic, **Marine Atlantic***
4.2 Sources of information	
4.2i Additional information	

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	*Total surface area of the range within biogeographical/marine region concerned in km²*	
5.2 Short-term trend Period	*2007–2018 (rolling 12-year time window) or period as close as possible to that. The short-term trend should be used for the assessment of range*	
5.3 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude	a) Minimum	*Percentage change over the period indicated in the field 5.2. If a precise value is known provide the same value under both minimum and maximum*

Optional	b) Maximum	*Percentage change over the period indicated in the field 5.2. If a precise value is known provide the same value under both minimum and maximum*
5.5 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*	
5.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude	a) Minimum	*Percentage change over the period indicated in the field 5.6. If a precise value is known provide the same value under both minimum and maximum*
Optional	b) Maximum	*Percentage change over the period indicated in the field 5.6. If a precise value is known provide the same value under both minimum and maximum*
5.9 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*	
5.10 Favourable reference range	*a) In km² or*	
	b) Indicate if operators were used (use these 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 *Free text*	
5.11 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*	
5.12 Additional information *Optional*	*Other relevant information, complementary to the data requested under fields 5.1–5.11*	

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	*Year or period when data for population size was recorded*	
6.2 Population size (*in reporting unit)*	a) Unit	*Individuals or 1 x 1 km grids or other unit (for species occurring only in one Member State). Use unit according to check list in the Reference portal*
	b) Minimum	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value(d)*
	c) Maximum	*Number (raw, i.e. not rounded) Provide either interval (b and c) and/or best single value (d)*
	d) Best single value	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value (d)*
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	a) Unit	*Use unit according to list in the Reference portal*
	b) Minimum	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value (d)*
	c) Maximum	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value (d)*
	d) Best single value	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value (d)*
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

6.7 Short-term trend Period	*2007–2018 (rolling 12-year time window) or period as close as possible to it. The short-term trend should be used for the assessment of population*	
6.8 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude	a) Minimum	*Percentage change over the period indicated in the field 6.7. 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 6.7. 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 sampling scheme is used*
6.10 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*	
6.11 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude	a) Minimum	*Percentage change over the period indicated in the field 6.11. 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 6.11. 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 sampling scheme is used*
6.14 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*	
6.15 Favourable reference	*a) Population size (with unit) or*	

population *(using the unit in 6.2 or 6.4)*	*b) Indicate if operators were used (using symbols ≈, >, >>, <) or*	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators Free text	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information *Optional*	*Other relevant information, complementary to the data requested under fields 6.1–6.16*	

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? YES/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	*2007–2018 (rolling 12-year time window) or period as close as possible to it. The short-term trend should be used for the assessment of habitat for species*
7.4 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*

7.5 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*
7.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	*Other relevant information, complementary to the data requested under fields 7.1–7.8*

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal		
8.2 Sources of information *Optional*	*If available, provide sources of information (URL, metadata) supporting evidence of pressures reported as 'High'*	
8.3 Additional information *Optional*	*Other relevant information, complementary to the data requested under field 8.1*	

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	a) Range	*Good / Poor / Bad / Unknown*
	b) Population	*Good / Poor / Bad / Unknown*
	c) Habitat of the species	*Good / Poor / Bad / Unknown*
10.2 Additional information *Optional*	*Other relevant information, complementary to the data requested under field 10.1*	

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.3 Habitat for the species	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	*Favourable (FV) / Inadequate (U1)/ Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating / stable / unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*

	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	Since no live records of this species have been obtained within the current reporting round or since the Directive came into force, the conservation status of this vagrant species is assessed as Unknown.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

NATIONAL LEVEL

1 General information

1.1 Member State	***IE***
1.2 Species code	***2028***
1.3 Species scientific name	*Pseudorca crassidens*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	False killer whale (Cráin dhubh bhréige)
1.6i Species description	False killer whale (*Pseudorca crassidens*) is one of six species of cetacean (i.e., whales, dolphins and porpoises) that have been very rarely recorded in Irish waters and are therefore termed vagrant species. Distinctive by its resemblance to the larger, stockier killer whale, particularly due to its length and the shape of its dorsal fin, this species is completely black in colouration and more slender in appearance, with a more rounded or blunt head-shape also notable. Little is known about the occurrence or ecology of this species in the North-East Atlantic but it is assumed to be a tropical, sub-tropical and warm temperate deep water species that feeds on fish and squid and which very occasionally occurs in offshore Irish waters. In the last 50 years rare sightings have occurred off the European continental shelf and in the mid-Atlantic, while only a few sporadic live records have been confirmed from Irish waters in the last 15-20 years. Overall, the conservation status of the False killer whale is considered to be Unknown due to the rarity of sighting and/or stranding records.

2 Maps

Distribution of the species within the Member State concerned.

2.1 Sensitive species	*The spatial information provided relates to a species (or subspecies) to be treated as 'sensitive' YES/NO*
2.2 Year or period	*Year or period when the distribution data were collected*
2.3 Distribution map	*Submit a map together with relevant metadata following the technical specifications in the Explanatory Notes & Guidelines. The standard for species distribution is 10x10km ETRS grid cells, projection ETRS LAEA 5210*

2.4 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*
2.5 Additional maps *Optional*	*MS can submit an additional map, deviating from standard submission map under 2.3 and/or a range map*
2.6i Additional information	Few live sighting records of this species have been obtained from Ireland since the Directive came into force. Three offshore sightings were recorded within the current reporting round.

3 Information related to Annex V species (Art. 14)

BIOGEOGRAPHICAL LEVEL	
Complete for each biogeographical region or marine region concerned.	
4 Biogeographical and marine regions	
4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
4.2 Sources of information	
4.2i Additional information	

5 Range		
Range within the biogeographical/marine region concerned.		
5.1 Surface area	*Total surface area of the range within biogeographical/marine region concerned in km²*	
5.2 Short-term trend Period	*2007–2018 (rolling 12-year time window) or period as close as possible to that. The short-term trend should be used for the assessment of range*	
5.3 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude	a) Minimum	*Percentage change over the period indicated in the field 5.2. If a precise value is known provide the same value under both minimum and maximum*

Optional	b) Maximum	*Percentage change over the period indicated in the field 5.2. If a precise value is known provide the same value under both minimum and maximum*
5.5 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*	
5.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude	a) Minimum	*Percentage change over the period indicated in the field 5.6. If a precise value is known provide the same value under both minimum and maximum*
Optional	b) Maximum	*Percentage change over the period indicated in the field 5.6. If a precise value is known provide the same value under both minimum and maximum*
5.9 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*	
5.10 Favourable reference range	*a) In km² or*	
	b) Indicate if operators were used (use these 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 *Free text*	
5.11 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*	
5.12 Additional information *Optional*	*Other relevant information, complementary to the data requested under fields 5.1–5.11*	

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	*Year or period when data for population size was recorded*	
6.2 Population size (*in reporting unit)*	a) Unit	*Individuals or 1 x 1 km grids or other unit (for species occurring only in one Member State). Use unit according to check list in the Reference portal*
	b) Minimum	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value(d)*
	c) Maximum	*Number (raw, i.e. not rounded) Provide either interval (b and c) and/or best single value (d)*
	d) Best single value	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value (d)*
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	a) Unit	*Use unit according to list in the Reference portal*
	b) Minimum	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value (d)*
	c) Maximum	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value (d)*
	d) Best single value	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value (d)*
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

6.7 Short-term trend Period	*2007–2018 (rolling 12-year time window) or period as close as possible to it. The short-term trend should be used for the assessment of population*	
6.8 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude	a) Minimum	*Percentage change over the period indicated in the field 6.7. 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 6.7. 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 sampling scheme is used*
6.10 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*	
6.11 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude	a) Minimum	*Percentage change over the period indicated in the field 6.11. 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 6.11. 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 sampling scheme is used*
6.14 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*	
6.15 Favourable reference	*a) Population size (with unit) or*	

population *(using the unit in 6.2 or 6.4)*	*b) Indicate if operators were used (using symbols ≈, >, >>, <) or*	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators Free text	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information *Optional*	*Other relevant information, complementary to the data requested under fields 6.1–6.16*	

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? YES/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	*2007–2018 (rolling 12-year time window) or period as close as possible to it. The short-term trend should be used for the assessment of habitat for species*
7.4 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*

7.5 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*
7.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	*Other relevant information, complementary to the data requested under fields 7.1–7.8*

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal		
8.2 Sources of information *Optional*	*If available, provide sources of information (URL, metadata) supporting evidence of pressures reported as 'High'*	
8.3 Additional information *Optional*	*Other relevant information, complementary to the data requested under field 8.1*	

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	a) Range	*Good / Poor / Bad / Unknown*
	b) Population	*Good / Poor / Bad / Unknown*
	c) Habitat of the species	*Good / Poor / Bad / Unknown*
10.2 Additional information *Optional*	*Other relevant information, complementary to the data requested under field 10.1*	

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.3 Habitat for the species	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	*Favourable (FV) / Inadequate (U1)/ Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating / stable / unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*

	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	Since few records of this species have been obtained from Ireland since the Directive came into force, and in the current reporting round, the conservation status of this vagrant species continues to be assessed as Unknown.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

13 Complementary information

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***2037***
1.3 Species scientific name	*Mesoplodon mirus*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	True's beaked whale (Míol mór socach brae)
1.6i Species description	True's beaked whale (*Mesoplodon mirus*) is one of six species of cetacean (i.e., whales, dolphins and porpoises) that have been very rarely recorded in Irish waters and are therefore termed vagrant species. Difficult to identify in the open ocean, like many beaked whale species its presence and identifying features can be elusive in the field. True's beaked whales are also tricky to separate from their close relatives the Gervais' beaked whale but both are identifiable by a distinct medium-sized beak and adult male True's beaked whales have two prominent teeth at the tip of the lower jaw. Little is known about the occurrence or ecology of this species in the North-East Atlantic but it is assumed to be a deep water species that feeds on squid and possibly fish, and which according to stranding records occasionally occurs off the west or southwest of Ireland. The overall status of True's beaked whale is considered to be Unknown.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*The spatial information provided relates to a species (or subspecies) to be treated as 'sensitive' YES/NO*
2.2 Year or period	*Year or period when the distribution data were collected*
2.3 Distribution map	*Submit a map together with relevant metadata following the technical specifications in the Explanatory Notes & Guidelines. The standard for species distribution is 10x10km ETRS grid cells, projection ETRS LAEA 5210*
2.4 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*

2.5 Additional maps *Optional*	*MS can submit an additional map, deviating from standard submission map under 2.3 and/or a range map*
2.6i Additional information	No live records of this species have been obtained from Ireland within the current reporting round. A single sighting record in Irish offshore waters in 2001 was concluded to be of this species.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
4.2 Sources of information	
4.2i Additional information	

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	*Total surface area of the range within biogeographical/marine region concerned in km²*	
5.2 Short-term trend Period	*2007–2018 (rolling 12-year time window) or period as close as possible to that. The short-term trend should be used for the assessment of range*	
5.3 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	a) Minimum	*Percentage change over the period indicated in the field 5.2. 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 5.2. If a precise value is known provide the same value under both minimum and maximum*

5.5 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*	
5.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	a) Minimum	*Percentage change over the period indicated in the field 5.6. 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 5.6. If a precise value is known provide the same value under both minimum and maximum*
5.9 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*	
5.10 Favourable reference range	*a) In km² or*	
	b) Indicate if operators were used (use these 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 *Free text*	
5.11 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*
5.12 Additional information *Optional*	*Other relevant information, complementary to the data requested under fields 5.1–5.11*

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	*Year or period when data for population size was recorded*	
6.2 Population size (*in reporting unit)*	a) Unit	*Individuals or 1 x 1 km grids or other unit (for species occurring only in one Member State). Use unit according to check list in the Reference portal*
	b) Minimum	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value(d)*
	c) Maximum	*Number (raw, i.e. not rounded) Provide either interval (b and c) and/or best single value (d)*
	d) Best single value	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value (d)*
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)*	a) Unit	*Use unit according to list in the Reference portal*
	b) Minimum	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value (d)*
	c) Maximum	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value (d)*
Optional	d) Best single value	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value (d)*
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	*2007–2018 (rolling 12-year time window) or period as close as possible to it. The short-term trend should be used for the assessment of population*	

6.8 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude	a) Minimum	*Percentage change over the period indicated in the field 6.7. 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 6.7. 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 sampling scheme is used*
6.10 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*	
6.11 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude	a) Minimum	*Percentage change over the period indicated in the field 6.11. 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 6.11. 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 sampling scheme is used*
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) Population size (with unit) or*	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) If favourable reference population is unknown indicate by using 'x'	

	d) Indicate method used to set reference value if other than operators Free text	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information *Optional*	*Other relevant information, complementary to the data requested under fields 6.1–6.16*	

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? YES/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	*2007–2018 (rolling 12-year time window) or period as close as possible to it. The short-term trend should be used for the assessment of habitat for species*
7.4 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*
7.5 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*

7.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	*Other relevant information, complementary to the data requested under fields 7.1–7.8*

8 Main pressures and threats

8.1 Characterisation of pressures/threats		
a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal		
8.2 Sources of information *Optional*	*If available, provide sources of information (URL, metadata) supporting evidence of pressures reported as 'High'*	
8.3 Additional information *Optional*	*Other relevant information, complementary to the data requested under field 8.1*	

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	**a) Range**	*Good / Poor / Bad / Unknown*
	b) Population	*Good / Poor / Bad / Unknown*
	c) Habitat of the species	*Good / Poor / Bad / Unknown*
10.2 Additional information *Optional*	*Other relevant information, complementary to the data requested under field 10.1*	

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.3 Habitat for the species	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	*Favourable (FV) / Inadequate (U1)/ Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating / stable / unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	Since no live records of this species have been obtained from Ireland within the current reporting round the conservation status of this vagrant species is assessed as Unknown.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***2622***
1.3 Species scientific name	*Kogia breviceps*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Pygmy sperm whale (Caisealóid bheag)
1.6i Species description	Pygmy sperm whale (*Kogia breviceps*) is one of six species of cetacean (i.e., whales, dolphins and porpoises) that have been very rarely recorded in Irish waters and are therefore termed vagrant species. It is distinctive by its small size (up to 3.5m in length) and blunt head shape containing a pale 'false gill' line between the eyes and the pectoral fins. Also, unlike cetaceans of similar size its small dorsal fin is located about two-thirds of the way along its back. Little is known about the population distribution or ecology of this species in the North-East Atlantic but it is considered to be a deep water species that feeds on squid and octopus, and which may occasionally occur in offshore Irish waters. Since only one live record has emerged so far from oceanic waters very far from shore, most information on the species in Ireland has come from the isolated and rare stranding of individual animals. The overall status of the Pygmy sperm whale is considered to be Unknown since no live records of this species have been confirmed from Irish waters in recent decades.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*The spatial information provided relates to a species (or subspecies) to be treated as 'sensitive' YES/NO*
2.2 Year or period	*Year or period when the distribution data were collected*
2.3 Distribution map	*Submit a map together with relevant metadata following the technical specifications in the Explanatory Notes & Guidelines. The standard for species distribution is 10x10km ETRS grid cells, projection ETRS LAEA 5210*

2.4 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*
2.5 Additional maps *Optional*	*MS can submit an additional map, deviating from standard submission map under 2.3 and/or a range map*
2.6i Additional information	No live records of this species have been obtained from Ireland within the current reporting round or since the Directive came into force.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
4.2 Sources of information	
4.2i Additional information	

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	*Total surface area of the range within biogeographical/marine region concerned in km²*	
5.2 Short-term trend Period	*2007–2018 (rolling 12-year time window) or period as close as possible to that. The short-term trend should be used for the assessment of range*	
5.3 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude	a) Minimum	*Percentage change over the period indicated in the field 5.2. If a precise value is known provide the same value under both minimum and maximum*

Optional	b) Maximum	*Percentage change over the period indicated in the field 5.2. If a precise value is known provide the same value under both minimum and maximum*
5.5 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*	
5.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude	a) Minimum	*Percentage change over the period indicated in the field 5.6. If a precise value is known provide the same value under both minimum and maximum*
Optional	b) Maximum	*Percentage change over the period indicated in the field 5.6. If a precise value is known provide the same value under both minimum and maximum*
5.9 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*	
5.10 Favourable reference range	*a) In km² or*	
	b) Indicate if operators were used (use these 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 *Free text*	
5.11 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*	
5.12 Additional information *Optional*	*Other relevant information, complementary to the data requested under fields 5.1–5.11*	

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	*Year or period when data for population size was recorded*	
6.2 Population size (*in reporting unit)*	a) Unit	*Individuals or 1 x 1 km grids or other unit (for species occurring only in one Member State). Use unit according to check list in the Reference portal*
	b) Minimum	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value(d)*
	c) Maximum	*Number (raw, i.e. not rounded) Provide either interval (b and c) and/or best single value (d)*
	d) Best single value	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value (d)*
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	a) Unit	*Use unit according to list in the Reference portal*
	b) Minimum	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value (d)*
	c) Maximum	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value (d)*
	d) Best single value	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value (d)*
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

6.7 Short-term trend Period	*2007–2018 (rolling 12-year time window) or period as close as possible to it. The short-term trend should be used for the assessment of population*	
6.8 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude	a) Minimum	*Percentage change over the period indicated in the field 6.7. 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 6.7. 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 sampling scheme is used*
6.10 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*	
6.11 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude	a) Minimum	*Percentage change over the period indicated in the field 6.11. 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 6.11. 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 sampling scheme is used*
6.14 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*	
6.15 Favourable reference	*a) Population size (with unit) or*	

population *(using the unit in 6.2 or 6.4)*	*b) Indicate if operators were used (using symbols ≈, >, >>, <) or*	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators Free text	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information *Optional*	*Other relevant information, complementary to the data requested under fields 6.1–6.16*	

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? YES/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	*2007–2018 (rolling 12-year time window) or period as close as possible to it. The short-term trend should be used for the assessment of habitat for species*
7.4 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*

7.5 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*
7.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	*Other relevant information, complementary to the data requested under fields 7.1–7.8*

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal		
8.2 Sources of information *Optional*	*If available, provide sources of information (URL, metadata) supporting evidence of pressures reported as 'High'*	
8.3 Additional information *Optional*	*Other relevant information, complementary to the data requested under field 8.1*	

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	a) Range	*Good / Poor / Bad / Unknown*
	b) Population	*Good / Poor / Bad / Unknown*
	c) Habitat of the species	*Good / Poor / Bad / Unknown*
10.2 Additional information *Optional*	*Other relevant information, complementary to the data requested under field 10.1*	

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.2 Population	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.3 Habitat for the species	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*
11.4 Future prospects	*Favourable (FV) / Inadequate (U1)/ Bad (U2) / Unknown (XX)*
11.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating / stable / unknown*
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
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 data	*YES/NO*	*YES/NO*

	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	Since no live records of this species have been obtained within the current reporting round or since the Directive came into force, the conservation status of this vagrant species is assessed as Unknown.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***5029***
1.3 Species scientific name	*Delphinapterus leucas*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Beluga / White whale (Míol mór bán)
1.6i Species description	Beluga or White whale (*Delphinapterus leucas*) is one of six species of cetacean (i.e., whales, dolphins and porpoises) that have been very rarely recorded in Irish waters and are therefore termed vagrant species. A large dolphin species that is very distinctive due to its completely white/ivory skin colouration, its rounded bulbous melon (forehead) and the absence of a dorsal fin, it is not easily confused with other cetacean species. Little is known about the occurrence or ecology of this species in the North-East Atlantic. It is normally a polar or sub-polar species found in Arctic regions where it feeds on fish and crustaceans. Prior to the Directive's introduction just two live records had been confirmed from Ireland, one from County Mayo and another from County Cork. A third sighting record for Ireland, comprising three individuals, was obtained far offshore during an aerial survey in December 2015. Overall, the conservation status of the Beluga/White whale is considered to be Unknown due to the rarity of sighting and/or stranding records.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*The spatial information provided relates to a species (or subspecies) to be treated as 'sensitive' YES/NO*
2.2 Year or period	*Year or period when the distribution data were collected*
2.3 Distribution map	
2.4 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*

2.5 Additional maps *Optional*	
2.6i Additional information	Only one live sighting record of this species has been obtained from Ireland since the Directive came into force. This occurred within the current reporting round.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
4.2 Sources of information	
4.2i Additional information	

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	*Total surface area of the range within biogeographical/marine region concerned in km²*	
5.2 Short-term trend Period	*2007–2018 (rolling 12-year time window) or period as close as possible to that. The short-term trend should be used for the assessment of range*	
5.3 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude *Optional*	a) Minimum	*Percentage change over the period indicated in the field 5.2. 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 5.2. If a precise value is known provide the same value under both minimum and maximum*

5.5 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*	
5.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude *Optional*	a) Minimum	*Percentage change over the period indicated in the field 5.6. 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 5.6. If a precise value is known provide the same value under both minimum and maximum*
5.9 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*	
5.10 Favourable reference range	*a) In km² or*	
	b) Indicate if operators were used (use these 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 *Free text*	
5.11 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*
5.12 Additional information *Optional*	*Other relevant information, complementary to the data requested under fields 5.1–5.11*

6 Population

Population within the biogeographical/marine region concerned.

6.1 Year or period	*Year or period when data for population size was recorded*	
6.2 Population size (*in reporting unit)*	a) Unit	*Individuals or 1 x 1 km grids or other unit (for species occurring only in one Member State). Use unit according to check list in the Reference portal*
	b) Minimum	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value(d)*
	c) Maximum	*Number (raw, i.e. not rounded) Provide either interval (b and c) and/or best single value (d)*
	d) Best single value	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value (d)*
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)*	a) Unit	*Use unit according to list in the Reference portal*
	b) Minimum	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value (d)*
	c) Maximum	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value (d)*
Optional	d) Best single value	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value (d)*
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	
6.7 Short-term trend Period	*2007–2018 (rolling 12-year time window) or period as close as possible to it. The short-term trend should be used for the assessment of population*	

6.8 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude	a) Minimum	*Percentage change over the period indicated in the field 6.7. 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 6.7. 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 sampling scheme is used*
6.10 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*	
6.11 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude	a) Minimum	*Percentage change over the period indicated in the field 6.11. 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 6.11. 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 sampling scheme is used*
6.14 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*	
6.15 Favourable reference population *(using the unit in 6.2 or 6.4)*	*a) Population size (with unit) or*	
	b) Indicate if operators were used (using symbols ≈, >, >>, <) or	
	c) If favourable reference population is unknown indicate by using 'x'	

	d) Indicate method used to set reference value if other than operators Free text	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information *Optional*	*Other relevant information, complementary to the data requested under fields 6.1–6.16*	

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? YES/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	*2007–2018 (rolling 12-year time window) or period as close as possible to it. The short-term trend should be used for the assessment of habitat for species*
7.4 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*
7.5 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*

7.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	*Other relevant information, complementary to the data requested under fields 7.1–7.8*

8 Main pressures and threats

8.1 Characterisation of pressures/threats		
a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal		
8.2 Sources of information *Optional*	*If available, provide sources of information (URL, metadata) supporting evidence of pressures reported as 'High'*	
8.3 Additional information *Optional*	*Other relevant information, complementary to the data requested under field 8.*	

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	a) Range	*Good / Poor / Bad / Unknown*
	b) Population	*Good / Poor / Bad / Unknown*
	c) Habitat of the species	*Good / Poor / Bad / Unknown*
10.2 Additional information *Optional*		

11 Conclusions

Assessment of conservation status at end of reporting period			
11.1 Range	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.3 Habitat for the species	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	*Favourable (FV) / Inadequate (U1)/ Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* **Unknown (XX)**		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating / stable / unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*
	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	Since only one live record of this species has been obtained from Ireland since the Directive came into force the conservation status of this vagrant species is assessed as Unknown.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***5034***
1.3 Species scientific name	*Mesoplodon europaeus*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Gervais' beaked whale (Míol mór socach an tSrutha)
1.6i Species description	Gervais' beaked whale is one of six species of cetacean (i.e., whales, dolphins and porpoises) that have been very rarely recorded in Irish waters and are therefore termed vagrant species. Difficult to identify in the open ocean, like many beaked whale species its presence and identifying features can be elusive in the field. Gervais' beaked whales are also tricky to separate from their close relatives the True's beaked whale but both are identifiable by a distinct medium-sized beak and adult male Gervais' beaked whales have two prominent teeth positioned about a quarter of the way back along the lower jaw. Little is known about the occurrence or ecology of this species in the North-East Atlantic but it is assumed to be a warm temperate or sub-tropical deep water species that feeds on squid and possibly fish. Only one record is available from Ireland so far, that being from a stranding in County Sligo. The overall status of Gervais' beaked whale is considered to be Unknown.

2 Maps	
Distribution of the species within the Member State concerned.	
2.1 Sensitive species	*The spatial information provided relates to a species (or subspecies) to be treated as 'sensitive' YES/NO*
2.2 Year or period	*Year or period when the distribution data were collected*
2.3 Distribution map	*Submit a map together with relevant metadata following the technical specifications in the Explanatory Notes & Guidelines. The standard for species distribution is 10x10km ETRS grid cells, projection ETRS LAEA 5210*

2.4 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*
2.5 Additional maps *Optional*	*MS can submit an additional map, deviating from standard submission map under 2.3 and/or a range map*
2.6i Additional information	No live records of this species have been obtained from Ireland within the current reporting round or since the Directive came into force.

3 Information related to Annex V species (Art. 14)

N/A

BIOGEOGRAPHICAL LEVEL

Complete for each biogeographical region or marine region concerned.

4 Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	*Choose one of the following:* *Atlantic,* ***Marine Atlantic***
4.2 Sources of information	
4.3i Additional information	

5 Range

Range within the biogeographical/marine region concerned.

5.1 Surface area	*Total surface area of the range within biogeographical/marine region concerned in km²*	
5.2 Short-term trend Period	*2007–2018 (rolling 12-year time window) or period as close as possible to that. The short-term trend should be used for the assessment of range*	
5.3 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*	
5.4 Short-term trend Magnitude	a) Minimum	*Percentage change over the period indicated in the field 5.2. If a precise value is known provide the same value under both minimum and maximum*

Optional	b) Maximum	*Percentage change over the period indicated in the field 5.2. If a precise value is known provide the same value under both minimum and maximum*
5.5 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*	
5.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
5.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
5.8 Long-term trend Magnitude	a) Minimum	*Percentage change over the period indicated in the field 5.6. If a precise value is known provide the same value under both minimum and maximum*
Optional	b) Maximum	*Percentage change over the period indicated in the field 5.6. If a precise value is known provide the same value under both minimum and maximum*
5.9 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*	
5.10 Favourable reference range	*a) In km² or*	
	b) Indicate if operators were used (use these 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 *Free text*	
5.11 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*	
5.12 Additional information *Optional*	*Other relevant information, complementary to the data requested under fields 5.1–5.11*	

6 Population		
Population within the biogeographical/marine region concerned.		
6.1 Year or period	*Year or period when data for population size was recorded*	
6.2 Population size (*in reporting unit)*	a) Unit	*Individuals or 1 x 1 km grids or other unit (for species occurring only in one Member State). Use unit according to check list in the Reference portal*
	b) Minimum	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value(d)*
	c) Maximum	*Number (raw, i.e. not rounded) Provide either interval (b and c) and/or best single value (d)*
	d) Best single value	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value (d)*
6.3 Type of estimate	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.4 Additional population size *(using population unit other than reporting unit)* *Optional*	a) Unit	*Use unit according to list in the Reference portal*
	b) Minimum	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value (d)*
	c) Maximum	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value (d)*
	d) Best single value	*Number (raw, i.e. not rounded). Provide either interval (b and c) and/or best single value (d)*
6.5 Type of estimate *Optional*	*Best estimate / multi-year mean / 95% confidence interval / minimum*	
6.6 Population size Method used	*Select one of the following methods:* *a) Complete survey or a statistically robust estimate* *b) Based mainly on extrapolation from a limited amount of data* *c) Based mainly on expert opinion with very limited data* *d) Insufficient or no data available*	

6.7 Short-term trend Period	*2007–2018 (rolling 12-year time window) or period as close as possible to it. The short-term trend should be used for the assessment of population*	
6.8 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*	
6.9 Short-term trend Magnitude	a) Minimum	*Percentage change over the period indicated in the field 6.7. 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 6.7. 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 sampling scheme is used*
6.10 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*	
6.11 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*	
6.12 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*	
6.13 Long-term trend Magnitude	a) Minimum	*Percentage change over the period indicated in the field 6.11. 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 6.11. 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 sampling scheme is used*
6.14 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*	
6.15 Favourable reference	*a) Population size (with unit) or*	

population *(using the unit in 6.2 or 6.4)*	*b) Indicate if operators were used (using symbols ≈, >, >>, <) or*	
	c) If favourable reference population is unknown indicate by using 'x'	
	d) Indicate method used to set reference value if other than operators Free text	
6.16 Change and reason for change in population size	*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*	
6.17 Additional information *Optional*	*Other relevant information, complementary to the data requested under fields 6.1–6.16*	

7 Habitat for the species	
7.1 Sufficiency of area and quality of occupied habitat	*a) Are area and quality of occupied habitat sufficient (for long-term survival)? YES/NO/Unknown* *b) If NO, is there a sufficiently large area of unoccupied habitat of suitable quality (for long-term survival)? YES/NO/Unknown*
7.2 Sufficiency of area and quality of occupied 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*
7.3 Short-term trend Period	*2007–2018 (rolling 12-year time window) or period as close as possible to it. The short-term trend should be used for the assessment of habitat for species*
7.4 Short-term trend Direction	*stable / increasing / decreasing / uncertain / unknown*

7.5 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*
7.6 Long-term trend Period *Optional*	*A trend calculated over 24 years (1994–2018)*
7.7 Long-term trend Direction *Optional*	*stable / increasing / decreasing / uncertain / unknown*
7.8 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*
7.9 Additional information *Optional*	*Other relevant information, complementary to the data requested under fields 7.1–7.8*

8 Main pressures and threats

8.1 Characterisation of pressures/threats

a) Pressure/threat	b) Ranking of pressure/threat *Indicate whether the pressure/threat is of:* *H = high importance (maximum of 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 in the Reference portal		

8.2 Sources of information *Optional*	*If available, provide sources of information (URL, metadata) supporting evidence of pressures reported as 'High'*
8.3 Additional information *Optional*	*Other relevant information, complementary to the data requested under field 8.1*

9 Conservation measures

To be reported only for Annex II species

10 Future prospects

10.1 Future prospects of parameters	a) Range	*Good / Poor / Bad / Unknown*
	b) Population	*Good / Poor / Bad / Unknown*
	c) Habitat of the species	*Good / Poor / Bad / Unknown*
10.2 Additional information *Optional*	*Other relevant information, complementary to the data requested under field 10.1*	

11 Conclusions

Assessment of conservation status at end of reporting period

11.1 Range	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.2 Population	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.3 Habitat for the species	*Favourable (FV) / Inadequate (U1) / Bad (U2) / Unknown (XX)*		
11.4 Future prospects	*Favourable (FV) / Inadequate (U1)/ Bad (U2) / Unknown (XX)*		
11.5 Overall assessment of Conservation Status	*Favourable (FV) / Inadequate (U1) / Bad (U2) /* ***Unknown (XX)***		
11.6 Overall trend in Conservation Status	*Indicate the trend (qualifier) for FV, U1 and U2:* *improving / deteriorating / stable / unknown*		
11.7 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 (11.5)	***Overall trend in conservation status (11.6)***
	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 data	*YES/NO*	*YES/NO*

	d) yes, due to the use of different method (including taxonomical change or use of different thresholds)	*YES/NO*	*YES/NO*
	e) yes, but there is no information on the 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*
11.8 Additional information *Optional*	Since no live records of this species have been obtained within the current reporting round or since the Directive came into force, the conservation status of this vagrant species is assessed as Unknown.		

12 Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

N/A

13 Complementary information

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1102***
1.3 Species scientific name	*Alosa alosa*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Allis shad
1.6i Species description	The Allis shad (*Alosa alosa*) is a large member of the herring family. It spends much of its life in coastal waters and samples of marine-caught Allis shad have been collected off the south-east coast. This species enters freshwater to breed, with significant penetration of large rivers reported on the continent. There is some evidence of Allis shad entering Irish rivers, with one fish recorded some 40 km from the sea on the Slaney. Nonetheless, only a small number of Allis shad have ever been recovered from Irish freshwaters and while there is good evidence of the presence of breeding populations of Twaite shad in Irish rivers, the only evidence of breeding by Allis shad is the presence of Allis-Twaite hybrids. No juvenile Allis shad have been found during survey work of Irish river systems. Overall it would appear that the Allis shad is an opportunistic spawner in Irish waters. Until evidence of an established breeding population is found, Allis shad is considered a vagrant.

NATIONAL LEVEL	
1 General information	
1.1 Member State	***IE***
1.2 Species code	***1320***
1.3 Species scientific name	*Myotis brandtii*
1.4 Alternative species scientific name *Optional*	
1.5 Common name *Optional*	Brandt's bat
1.6i Species description	Brandt's bat (*Myotis brandtii*) is a cryptic species, requiring genetic determination to separate it from the whiskered bat (*M. mystacinus*). Following the initial confirmation of a specimen of Brandt's bat in Wicklow in 2006, further records were expected. However, extensive survey work at potential roosts and swarming sites since then has failed to locate any. The species is now considered a vagrant and was not assessed in the current report.



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