

National Parks and Wildlife Service

Conservation Objectives Series

River Boyne and River Blackwater SAC 002299



An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage

**National Parks and Wildlife Service,
Department of Housing, Local Government and Heritage,
90 King Street North, Dublin 7, D07 N7CV, Ireland.
Web: www.npws.ie
E-mail: natureconservation@housing.gov.ie**

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Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

Qualifying Interests

* indicates a priority habitat under the Habitats Directive

002299	River Boyne and River Blackwater SAC
1099	River Lamprey <i>Lampetra fluviatilis</i>
1106	Salmon <i>Salmo salar</i>
1355	Otter <i>Lutra lutra</i>
7230	Alkaline fens
91E0	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)*

Please note that this SAC overlaps with Boyne Estuary SPA (004080) and River Boyne and River Blackwater SPA (004232). The SAC is also adjacent to Boyne Coast and Estuary SAC (001957). See map 2. The conservation objectives for this site should be used in conjunction with those for the overlapping and adjacent sites as appropriate.

Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: www.npws.ie/Publications

NPWS Documents

Year :	2006
Title :	Otter survey of Ireland 2004/2005
Author :	Bailey, M.; Rochford, J.
Series :	Irish Wildlife Manuals, No. 23
Year :	2006
Title :	A baseline survey of juvenile lamprey populations in the Boyne catchment
Author :	O'Connor, W.
Series :	Irish Wildlife Manuals, No. 24
Year :	2007
Title :	Supporting documentation for the Habitats Directive Conservation Status Assessment - backing documents. Article 17 forms and supporting maps
Author :	NPWS
Series :	Unpublished report to NPWS
Year :	2008
Title :	National survey of native woodlands 2003-2008
Author :	Perrin, P.M.; Martin, J.; Barron, S.; O'Neill, F.H.; McNutt, K.E.; Delaney, A.
Series :	Unpublished report to NPWS
Year :	2009
Title :	Ireland Red List No. 2: Non-marine molluscs
Author :	Byrne, A.; Moorkens, E.A.; Anderson, R.; Killeen, I.J.; Regan, E.C.
Series :	Ireland Red List series, NPWS
Year :	2010
Title :	A provisional inventory of ancient and long-established woodland in Ireland
Author :	Perrin, P.M.; Daly, O.H.
Series :	Irish Wildlife Manuals, No. 46
Year :	2010
Title :	Ireland Red List No. 4: Butterflies
Author :	Regan, E.C.; Nelson, B.; Aldwell, B.; Bertrand, C.; Bond, K.; Harding, J.; Nash, D.; Nixon, D.; Wilson, C.J.
Series :	Ireland Red List series, NPWS
Year :	2012
Title :	Ireland Red List No. 8: Bryophytes
Author :	Lockhart, N.; Hodgetts, N.; Holyoak, D.
Series :	Ireland Red List series, NPWS
Year :	2013
Title :	National otter survey of Ireland 2010/12
Author :	Reid, N.; Hayden, B.; Lundy, M.G.; Pietravalle, S.; McDonald, R.A.; Montgomery, W.I.
Series :	Irish Wildlife Manuals, No. 76
Year :	2013
Title :	Results of a monitoring survey of old sessile oak woods and alluvial forests
Author :	O'Neill, F.H.; Barron, S.J.
Series :	Irish Wildlife Manuals, No. 71

Year : 2013
Title : The status of EU protected habitats and species in Ireland. Volume 2. Habitats assessments
Author : NPWS
Series : Conservation assessments

Year : 2016
Title : Ireland Red List No. 10: Vascular Plants
Author : Wyse Jackson, M.; FitzPatrick, Ú.; Cole, E.; Jebb, M.; McFerran, D.; Sheehy Skeffington, M.; Wright, M.
Series : Ireland Red Lists series, NPWS

Year : in prep.
Title : The monitoring and assessment of four EU Habitats Directive Annex I woodland habitats
Author : Daly, O.H.; O'Neill, F.H.; Barron, S.J.
Series : Irish Wildlife Manuals

Year : in prep.
Title : Scoping study and pilot survey of fens
Author : O'Neill, F.H.; Perrin, P.M.; Denyer, J.; Martin, J.R.; Daly, O.H.; Brophy, J.T.
Series : Irish Wildlife Manuals

Other References

Year : 1982
Title : Otter survey of Ireland
Author : Chapman, P.J.; Chapman, L.L.
Series : Unpublished report to Vincent Wildlife Trust

Year : 1991
Title : The spatial organization of otters (*Lutra lutra*) in Shetland
Author : Kruuk, H.; Moorhouse, A.
Series : Journal of Zoology, 224: 41-57

Year : 2002
Title : Reversing the habitat fragmentation of British woodlands
Author : Peterken, G.
Series : WWF-UK, London

Year : 2006
Title : Otters - ecology, behaviour and conservation
Author : Kruuk, H.
Series : Oxford University Press

Year : 2010
Title : Otter tracking study of Roaringwater Bay
Author : De Jongh, A.; O'Neill, L.
Series : Unpublished draft report to NPWS

Year : 2011
Title : Comparison of field- and GIS-based assessments of barriers to Atlantic salmon migration: a case study in the Nore Catchment, Republic of Ireland
Author : Gargan, P.G.; Roche, W.K.; Keane, S.; King, J.J.; Cullagh, A.; Mills, P.; O'Keeffe, J.
Series : Journal of Applied Ichthyology, 27 (Suppl. 3): 66-72

Year :	2011
Title :	Review and revision of empirical critical loads and dose-response relationships. Proceedings of an expert workshop, Noordwijkerhout, 23-25 June 2010
Author :	Bobbink, R.; Hettelingh, J.P.
Series :	RIVM report 680359002, Coordination Centre for Effects, National Institute for Public Health and the Environment (RIVM)
Year :	2011
Title :	The Fen Management Handbook
Author :	McBride, A.; Diack, I.; Droy, N.; Hamill, B.; Jones, P.; Schutten, J.; Skinner, A.; Street, M. (eds.)
Series :	Scottish Natural Heritage, Perth
Year :	2015
Title :	Behaviour of sea lamprey (<i>Petromyzon marinus</i> L.) at man-made obstacles during upriver spawning migration: use of telemetry to access efficacy of weir modifications for improved passage
Author :	Rooney, S.M.; Wightman, G.D.; O Conchuir, R.; King, J.J.
Series :	Biology and Environment: Proceedings of the Royal Irish Academy, 115B: 1-12
Year :	2015
Title :	Common standards monitoring guidance for freshwater fauna. Version October 2015
Author :	JNCC
Series :	Joint Nature Conservation Committee, Peterborough
Year :	2016
Title :	Irish Vegetation Classification: Technical Progress Report No. 2
Author :	Perrin, P.
Series :	Report submitted to National Biodiversity Data Centre
Year :	2016
Title :	National Programme: Habitats Directive and Red Data Book Species Summary Report 2015
Author :	Gallagher, T.; O'Gorman, N.M.; Rooney, S.M.; Coghlan, B.; King, J.J.
Series :	IFI/2016/1-4344. Inland Fisheries Ireland
Year :	2018
Title :	Irish Vegetation Classification: Technical Progress Report No. 4
Author :	Perrin, P.
Series :	Report submitted to National Biodiversity Data Centre
Year :	2021
Title :	The Status of Irish Salmon Stocks in 2020 with Catch Advice for 2021
Author :	Gargan, P.; Fitzgerald, C.; Kennedy, R.; Maxwell, H.; McLean, S.; Millane, M.
Series :	Report of the Technical Expert Group on Salmon (TEGOS) to the North-South Standing Scientific Committee for Inland Fisheries

Spatial data sources

Year : Revision 2010
Title : National Survey of Native Woodlands 2003-2008. Version 1
GIS Operations : QIs selected; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For : 91E0 (map 3)

Year : 2018
Title : Woodland Monitoring Survey 2017-2018
GIS Operations : QIs selected; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For : 91E0 (map 3)

Conservation Objectives for : River Boyne and River Blackwater SAC [002299]

7230 Alkaline fens

To maintain the favourable conservation condition of Alkaline fens in River Boyne and River Blackwater SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Alkaline fen has not been mapped in detail for River Boyne and River Blackwater SAC and thus the exact total current area of the qualifying habitat in the SAC is currently unknown. The main areas of alkaline fen in the SAC are documented to occur in the vicinity of Lough Shesk, Freekan Lough, Newtown Lough in the upper reaches of the Stonyford River. At Lough Shesk, the habitat is particularly well-represented and there is a good example of succession from open water to fen-type habitat (NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See the notes for habitat area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil pH and nutrient status within natural ranges	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat in NPWS (2013). See also Bobbink and Hettelingh (2011). Increased nutrients can lead to changes in plant and invertebrate species through competition and subsequent structural changes to micro-habitat. These nutrients favour growth of grasses rather than forbs and mosses and leads to a higher and denser sward
Ecosystem function: peat formation	Percentage cover of peat-forming vegetation and water table levels	Maintain active peat formation, where appropriate	In order for peat to form, water levels need to be slightly below or above the soil surface for c.90% of the time
Ecosystem function: hydrology - groundwater levels	Water levels (centimetres); duration of levels; hydraulic gradients; water supply levels	Maintain, or where necessary restore, appropriate natural hydrological regimes necessary to support the natural structure and functioning of the habitat	Fen habitats require high groundwater levels (i.e. water levels at or above the ground surface) for a large proportion of the calendar year (i.e. duration of mean groundwater level). Fen groundwater levels are controlled by regional groundwater levels in the contributing catchment area (which sustain the hydraulic gradients of the fen groundwater table). Regional abstraction of groundwater may affect fen groundwater levels
Ecosystem function: hydrology - surface water flow	Drain density and form	Maintain, or where necessary restore, as close as possible to natural or semi-natural, drainage conditions	Drainage, either within or surrounding the fen habitat, can result in the drawdown of the groundwater table. The depth, geometry and density of drainage (hydromorphology) will indicate the scale and impact on fen hydrology. Drainage can result in loss of characteristic species and transition to drier habitats
Ecosystem function: water quality	Various	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of the habitat	Fens receive natural levels of nutrients (e.g. iron, magnesium and calcium) from water sources. However, they are generally poor in nitrogen and phosphorus, with the latter tending to be the limiting nutrient under natural conditions. Water supply should be also relatively calcium-rich
Vegetation composition: community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	The entire diversity of alkaline fen vegetation communities present in the SAC is currently unknown. Information on the vegetation communities associated with alkaline fens is provided by O'Neill et al. (in prep.). See also the Irish Vegetation Classification (Perrin, 2018; www.biodiversityireland.ie/projects/ivc-classification-explorer)

Vegetation composition: typical brown mosses	Percentage cover at a representative number of monitoring stops	Maintain adequate cover of typical brown moss species	For lists of typical bryophyte species, including high quality indicator species, see O'Neill et al. (in prep.). Species recorded at Lough Shesk and Newtown Lough include: <i>Calliergon giganteum</i> , <i>Scorpidium scorpioides</i> , <i>Campyllum stellatum</i> , <i>Bryum pseudotriquetrum</i> , <i>Fissidens adianthoides</i> , <i>Scorpidium scorpioides</i> , <i>Calliergonella cuspidata</i> and <i>Ctenidium molluscum</i> (NPWS internal files)
Vegetation composition: typical vascular plants	Percentage cover at a representative number of monitoring stops	Maintain adequate cover of typical vascular plant species	For lists of typical vascular plant species for the different vegetation communities, including high quality indicators, see O'Neill et al. (in prep.). Typical species recorded in the habitat in the SAC include black bog-rush (<i>Schoenus nigricans</i>), dioecious sedge (<i>C. dioica</i>) and common butterwort (<i>Pinguicula vulgaris</i>) (NPWS internal files)
Vegetation composition: native negative indicator species	Percentage cover at a representative number of monitoring stops	Cover of native negative indicator species at insignificant levels	Negative indicators include species not characteristic of the habitat and species indicative of undesirable activities such as overgrazing, undergrazing, nutrient enrichment, agricultural improvement or impacts on hydrology. Native negative indicators may include <i>Anthoxanthum odoratum</i> , <i>Epilobium hirsutum</i> , <i>Holcus lanatus</i> , <i>Juncus effusus</i> , <i>Phragmites australis</i> and <i>Ranunculus repens</i> . See O'Neill et al. (in prep.)
Vegetation composition: non-native species	Percentage cover at a representative number of monitoring stops	Cover of non-native species less than 1%	Attribute and target based on O'Neill et al. (in prep.). Non-native species can be invasive and have deleterious effects on native vegetation. A low target is set as non-native species can spread rapidly and are most easily dealt with when still at lower abundances
Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 10%	Attribute and target based on O'Neill et al. (in prep.). Scrub and trees will tend to invade if fen conditions become drier
Vegetation composition: algal cover	Percentage cover at, and in local vicinity of, a representative number of monitoring stops	Cover of algae less than 2%	Attribute and target based on O'Neill et al. (in prep.). Algal cover is indicative of nutrient enrichment from multiple sources (McBride et al., 2011)
Vegetation structure: vegetation height	Percentage cover at a representative number of monitoring stops	At least 50% of the live leaves/flowering shoots are more than either 5cm or 15cm above ground surface depending on community type	Attribute and target based on O'Neill et al. (in prep.). While grazing may be appropriate in this habitat, excessive grazing can reduce the ability of plant species to regenerate reproductively and maintain species diversity, especially if flowering shoots are cropped during the growing season
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of monitoring stops	Cover of disturbed bare ground not more than 10%	Attribute and target based on O'Neill et al. (in prep.). While grazing may be appropriate in this habitat, excessive areas of disturbed bare ground may develop due to unsuitable grazing regimes. Disturbance can include hoof marks, wallows, human footprints, vehicle and machinery tracks. Excessive disturbance can result in loss of characteristic species and presage erosion for peatlands
Physical structure: tufa formations	Percentage cover in local vicinity of a representative number of monitoring stops	Disturbed proportion of vegetation cover where tufa is present is less than 1%	Attribute and target based on O'Neill et al. (in prep.)
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat; maintain features of local distinctiveness, subject to natural processes	This includes species on the Flora (Protection) Order, 2015 and/or Red Lists (Byrne et al., 2009; Regan et al., 2010; Lockhart et al., 2012; Wyse Jackson et al., 2016, etc.). The Near Threatened species (Wyse Jackson et al., 2016) round-leaved wintergreen (<i>Pyrola rotundifolia</i>) has been recorded in the habitat around Newtown Lough in the SAC (NPWS internal files)
Transitional areas between fen and adjacent habitats	Hectares; distribution	Maintain adequate transitional areas to support/protect the alkaline fen ecosystem and the services it provides	In many cases, fens transition to other wetland habitats. It is important that the transitional areas between fens and other habitats are maintained in as natural condition as possible in order to protect the functioning of the fen

Conservation Objectives for : River Boyne and River Blackwater SAC [002299]

91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)*

To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)* in River Boyne and River Blackwater SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes. See map 3 for surveyed woodland areas	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)* is present within River Boyne and River Blackwater SAC. As part of the National Survey of Native Woodlands (NSNW), the sub-sites Grove Island (NSNW site code 688) and Yellow Island (752) were surveyed by Perrin et al. (2008). Yellow Island (code 752) was also included in national monitoring surveys (O'Neill and Barron, 2013; Daly et al., in prep.). Map 3 shows the minimum area of alluvial forests within the SAC, which is estimated to be 16.7ha (Perrin et al., 2008; Daly et al., in prep.). It is important to note that further unsurveyed areas may be present within the SAC
Habitat distribution	Occurrence	No decline, subject to natural processes. The surveyed woodland locations are shown on map 3	Distribution based on Perrin et al. (2008) and Daly et al. (in prep.). It is important to note that further unsurveyed areas may be present within the SAC
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	The target areas for individual woodlands aim to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). In some cases, topographical constraints may restrict expansion
Woodland structure: cover and height	Percentage; metres; centimetres	Total canopy cover at least 30%; median canopy height at least 7m; native shrub layer cover 10-75%; native herb/dwarf shrub layer cover at least 20% and height at least 20cm; bryophyte cover at least 4%	The target aims for a diverse structure with a canopy containing mature trees, shrub layer with semi-mature trees and shrubs, and well-developed field layer (herbs, graminoids and dwarf shrubs) and ground layer (bryophytes). Assessment criteria are described in Daly et al. (in prep.) and O'Neill and Barron (2013)
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	The Boyne River Islands are an example of gallery forests of willows (<i>Salicion albae</i>), which occur alongside river channels and on river islands, where tree roots are almost continuously submerged (Daly et al., in prep.). Grove Island (NSNW site code 688) and Yellow Island (752) were assigned by Perrin et al. (2008) to the <i>Salix triandra – Urtica dioica</i> vegetation type (2h) of the <i>Fraxinus excelsior – Hedera helix</i> group. This corresponds to the <i>Salix fragilis – Calystegia sepium</i> sub-community (WL3Di) of the Irish Vegetation Classification (Perrin, 2016; www.biodiversityireland.ie/projects/ivc-classification-explorer)
Woodland structure: natural regeneration	Seedling: sapling: pole ratio	Seedlings, saplings and pole age-classes of target species for 91E0* woodlands and other native tree species occur in adequate proportions to ensure survival of woodland canopy	The target species for 91E0* are alder (<i>Alnus glutinosa</i>), ash (<i>Fraxinus excelsior</i>) and willows (<i>Salix</i> spp.). Assessment criteria are described in Daly et al. (in prep.) and O'Neill and Barron (2013)

Hydrological regime: flooding depth/height of water table	Metres	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	Periodic flooding is essential to maintain alluvial woodlands along river and lake floodplains, but not for woodland around springs/seepage areas. Much of the river channel within the SAC was subject to arterial drainage schemes. Natural flood-plains now exist along only limited stretches of river (NPWS internal files)
Woodland structure: dead wood	Number per hectare	At least 19 stems/ha of dead wood of at least 20cm diameter	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Woodland structure: veteran trees	Number per hectare	No decline	Veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources
Woodland structure: indicators of local distinctiveness	Occurrence; population size	No decline in distribution and, in the case of red listed and other rare or localised species, population size	Includes ancient or long-established woodlands (see Perrin and Daly, 2010), archaeological and geological features as well as red listed and other rare or localised species
Woodland structure: indicators of overgrazing	Occurrence	All five indicators of overgrazing absent	There are five indicators of overgrazing within 91E0*: topiary effect on shrubs and young trees, browse line on mature trees, abundant dung, severe recent bark stripping, and trampling (Daly et al., in prep.)
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover at least 90% of canopy; target species cover at least 50% of canopy	The target species for 91E0* are alder (<i>Alnus glutinosa</i>), ash (<i>Fraxinus excelsior</i>) and willows (<i>Salix</i> spp.) (Daly et al., in prep.; O'Neill and Barron, 2013)
Vegetation composition: typical species	Occurrence	At least 1 target species for 91E0* woodlands present; at least 6 positive indicator species for 91E0* woodlands present	A variety of typical native species should be present, depending on woodland type. The target species for 91E0* are alder (<i>Alnus glutinosa</i>), ash (<i>Fraxinus excelsior</i>) and willows (<i>Salix</i> spp.). Positive indicator species for 91E0* are listed in Daly et al. (in prep.) and O'Neill and Barron (2013)
Vegetation composition: negative indicator species	Occurrence	Negative indicator species cover not greater than 10%; regeneration of negative indicator species absent	Negative indicator species (i.e. any non-native species, including herbaceous species) should be absent or under control. The canopy at Grove Island (NSNW site code 688) and Yellow Island (752) is dominated by a range of <i>Salix</i> spp. (<i>S. cinerea</i> , <i>S. triandra</i> , <i>S. fragilis</i> , <i>S. viminalis</i>) (Perrin et al., 2008). Although the latter two are not native to Ireland, an exception is made for these species where they occur within gallery woodland (Daly et al., in prep.). Perrin et al. (2008) recorded some sycamore (<i>Acer pseudoplatanus</i>) in the canopy at Grove Island (NSNW site code 688). Daly et al. (in prep.) found that the recent arrival of the invasive non-native herb Himalayan balsam (<i>Impatiens glandulifera</i>) at Yellow Island (752) has caused significant negative impacts to the alluvial forest habitat
Vegetation composition: problematic native species	Percentage	Cover of common nettle (<i>Urtica dioica</i>) less than 75%	Common nettle (<i>Urtica dioica</i>) is a positive indicator species for 91E0* but, in some cases, it may become excessively dominant. Increased light and nutrient enrichment are factors which favour proliferation of common nettle (Daly et al., in prep.)

Conservation Objectives for : River Boyne and River Blackwater SAC [002299]

1099 River Lamprey *Lampetra fluviatilis*

To restore the favourable conservation condition of River Lamprey (*Lampetra fluviatilis*) in River Boyne and River Blackwater SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Percentage of river accessible	Restore access to all water courses down to first order streams	Artificial barriers can block or impede the passage of upstream migrating lamprey, thereby restricting access to spawning areas (Gargan et al., 2011; Rooney et al., 2015). There are a number of weirs along the lower sections of the Boyne main channel, the most substantial of these are located at Slane and downstream of Navan at Blackcastle. Efforts to trap adult river lamprey were undertaken at four locations throughout the catchment during November 2014 to April 2015. This was augmented in April 2015 by an extensive fyke-netting survey (n=26 sites). No adult river lamprey were encountered, with the only record to date being a dead individual from the River Boyne at Slane in late March 2015 (Gallagher et al., 2016). On the Boyne main channel, there is ideal spawning habitat both upstream and downstream of the weir at Blackcastle but spawning has not been observed at these locations to date
Distribution of larvae	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	Not less than 50% of sample sites with suitable habitat positive for larval brook/river lamprey	It is not possible to distinguish between larval brook and river lamprey in the field and they are therefore considered together in assessing conservation status. A survey of the Boyne catchment in 2015 recorded n=583 <i>Lampetra</i> spp. larvae from n=102 sites (Gallagher et al., 2016). As stated, the weirs in the lower main stem are a significant impediment to river lamprey passage and, for this reason, these larvae are considered to be mainly, if not all, brook lamprey. To achieve favourable condition <i>Lampetra</i> spp. should, as a minimum, be present in not less than 50% of all sampling sites surveyed with suitable habitat present within the natural range (JNCC, 2015). <i>Lampetra</i> spp. larvae were recorded from 72% of sites indicating a pass for this target. Distribution remained similar to a 2005 survey (O'Connor, 2006) although larvae continued to be absent from the Boycetown and Skane Rivers, as well as the upper reaches of the Kells Blackwater system
Population structure of larvae	Number of age/size classes	At least three age/size classes of larval brook/river lamprey present	The target of at least three age/size classes is based on guidance from JNCC (2015). Larvae typically range from 10-150mm in length and this corresponds to up to six age classes. A broad range of size classes (12-153mm), including young-of-year larvae, was recorded from the 2015 Boyne catchment-wide survey indicating a pass for this target. However, given the issue of artificial barriers on the River Boyne, it is likely that this value pertains to brook lamprey, as previously stated
Larval lamprey density in fine sediment	Larval lamprey/m ²	Mean density of brook/river larval lamprey in sites with suitable habitat more than 5/m ²	A target mean density of more than 5/m ² larvae in sites with suitable habitat is required to achieve favourable condition (JNCC, 2015). In the Boyne survey a mean density of 6/m ² <i>Lampetra</i> spp. larvae (n=583) was obtained. A number of tributaries did not achieve a pass for this target, including the Athboy/Tremblestown, Boycetown, Deel, Skane and Stonyford Rivers. Again, the overall mean density value is most likely indicative of the status of brook lamprey in the Boyne catchment

Extent and distribution of spawning nursery habitat	m ² and occurrence	No decline in extent and distribution of spawning and nursery beds	<p>This target is based on spawning and nursery bed mapping during targeted larval lamprey monitoring surveys. River lamprey spawn in clean gravels in flowing water where they excavate shallow nests. While coarse substrate is required for spawning, the close proximity of nursery areas comprising mainly sand/silt are necessary for the development of larvae. The 2015 Boyne survey recorded adequate spawning and nursery habitat availability within the catchment (Gallagher et al., 2016). However, the sequence of weirs in the lower main channel of the Boyne represents a significant impediment to upstream passage. In addition, this lower section of river is in a degraded hydromorphological state with impounding and, therefore, poor habitat availability for spawning</p>
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Conservation Objectives for : River Boyne and River Blackwater SAC [002299]

1106 Salmon *Salmo salar*

To restore the favourable conservation condition of Atlantic Salmon (*Salmo salar*) in River Boyne and River Blackwater SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	Percentage of river accessible	100% of river channels down to second order accessible from estuary	Artificial barriers block salmon's upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. There are multiple barriers to fish migration in the Boyne system
Adult spawning fish	Number	Conservation limit (CL) for each system consistently exceeded	A conservation limit (CL) is defined by the North Atlantic Salmon Conservation Organisation (NASCO) as "the spawning stock level that produces long-term average maximum sustainable yield as derived from the adult to adult stock and recruitment relationship". The target is based on the Technical Expert Group on Salmon's (TEGOS) annual model output of CL attainment levels. See Gargan et al. (2021) for further details. Stock estimates are either derived from direct counts of adults (rod catch, fish counter) or indirectly by fry abundance counts. The Boyne is significantly below its CL
Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 minutes sampling	Target is threshold value for rivers currently exceeding their conservation limit (CL)
Out-migrating smolt abundance	Number	No significant decline	Smolt abundance can be negatively affected by a number of impacts such as estuarine pollution, predation and sea lice (<i>Lepeophtheirus salmonis</i>)
Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes	Salmon spawn in clean gravels. There is restricted habitat for salmon in the Boyne and habitat rehabilitation programmes have been undertaken in sections of the catchment
Water quality	EPA Q value	At least Q4 at all sites sampled by EPA	Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA)

Conservation Objectives for : River Boyne and River Blackwater SAC [002299]**1355 Otter *Lutra lutra***

To maintain the favourable conservation condition of Otter (*Lutra lutra*) in River Boyne and River Blackwater SAC, which is defined by the following list of attributes and targets:

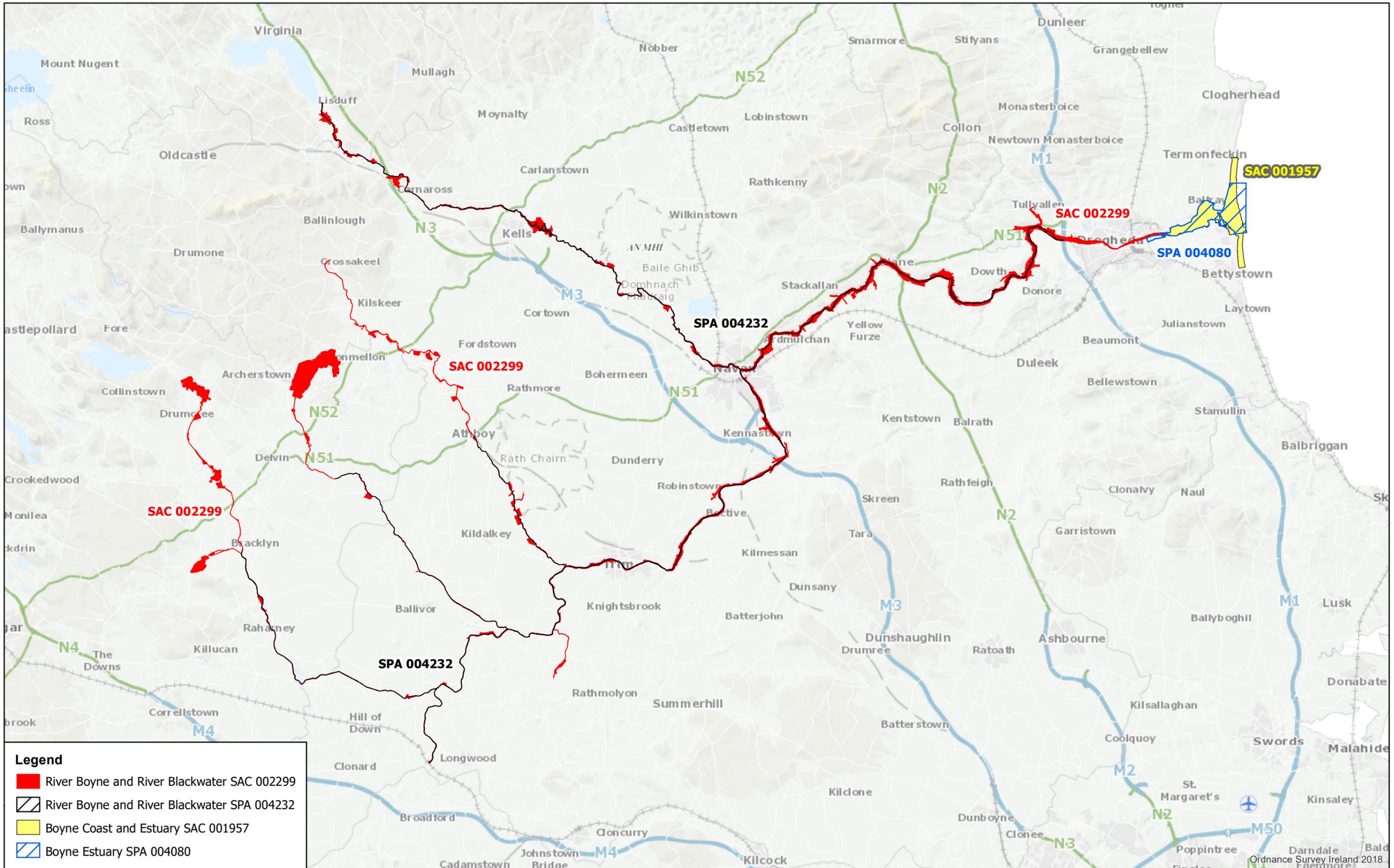
Attribute	Measure	Target	Notes
Distribution	Percentage positive survey sites	No significant decline	Measure based on standard otter survey technique. Favourable Conservation Status (FCS) target, based on 1980/81 survey findings, is 88% in SACs. Current range is estimated at 93.6% (Reid et al., 2013)
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 447.6ha along river banks/ lake shoreline/around ponds	No field survey. Areas mapped to include 10m terrestrial buffer, identified as critical for otters (NPWS, 2007), along rivers and around water bodies
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 263.3km	No field survey. River length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters (Chapman and Chapman, 1982)
Extent of freshwater (lake) habitat	Hectares	No significant decline. Area mapped and calculated as 31.6ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (NPWS, 2007)
Couching sites and holts	Number	No significant decline	Otters need lying up areas throughout their territory where they are secure from disturbance (Kruuk and Moorhouse, 1991; Kruuk, 2006)
Fish biomass available	Kilograms	No significant decline	Broad diet that varies locally and seasonally, but dominated by fish, in particular salmonids, eels and sticklebacks in freshwater (Bailey and Rochford, 2006; Reid et al., 2013)
Barriers to connectivity	Number	No significant increase	Otters will regularly commute across stretches of open water up to 500m, e.g. between the mainland and an island; between two islands; across an estuary (De Jongh and O'Neill, 2010). It is important that such commuting routes are not obstructed



Legend

 River Boyne and River Blackwater SAC 002299

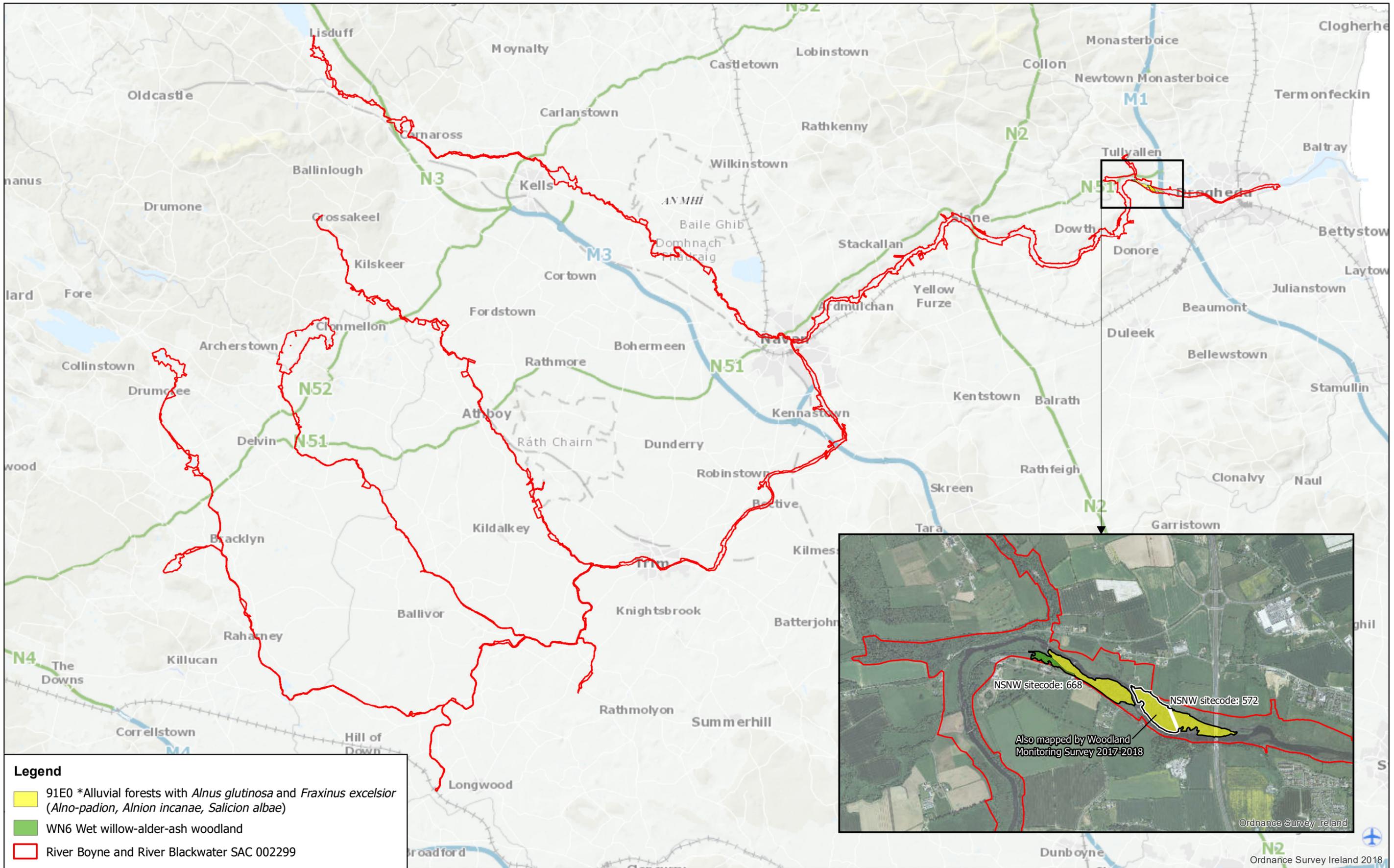




Legend

- River Boyne and River Blackwater SAC 002299
- River Boyne and River Blackwater SPA 004232
- Boyne Coast and Estuary SAC 001957
- Boyne Estuary SPA 004080

Ordnance Survey Ireland 2018.



Legend

- 91E0 *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-padion*, *Alnion incanae*, *Salicion albae*)
- WN6 Wet willow-alder-ash woodland
- River Boyne and River Blackwater SAC 002299