

# Natura Impact Statement

**Moy & Killala Bay**

# Natura Impact Statement

For

## River Basin (34) Moy & Killala Bay Flood Risk Management Plan

*Areas for Further Assessment included in the Plan:*

<i>Béal Átha na Muice</i>	<i>Swinford</i>
<i>Béal an Átha &amp; máguaird</i>	<i>Ballina &amp; Environs</i>
<i>Caisleán an Bharraigh</i>	<i>Castlebar</i>
<i>Baile Chathail &amp; máguaird (Béal Eacha san áireamh)</i>	<i>Charlestown &amp; Environs (Incl Bellaghy)</i>
<i>Crois Mhaoilíona</i>	<i>Crossmolina</i>
<i>Béal Easa</i>	<i>Foxford</i>

Flood Risk Management Plans prepared by the Office of Public Works 2018

*In accordance with*

*European Communities (Assessment and Management of Flood Risks) Regulations 2010 and 2015*



## Purpose of this Report

As part of the National Catchment-based Flood Risk Assessment & Management (CFRAM) programme, the Commissioners of Public Works have commissioned expert consultants to prepare Strategic Environmental Assessments, Appropriate Assessment Screening Reports and, where deemed necessary by the Commissioners of Public Works, Natura Impacts Assessments, associated with the national suite of Flood Risk Management Plans.

This is necessary to meet the requirements of both S.I. No. 435 of 2004 European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (as amended by S.I. No. 200/2011), and S.I. No. 477/2011 European Communities (Birds and Natural Habitats) Regulations 2011.

Expert Consultants have prepared these Reports on behalf of the Commissioners of Public Works to inform the Commissioners' determination as to whether the Plans are likely to have significant effects on the environment and whether an Appropriate Assessment of a plan or project is required and, if required, whether or not the plans shall adversely affect the integrity of any European site.

The Report contained in this document is specific to the Flood Risk Management Plan as indicated on the front cover.

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## Acknowledgements

The Office of Public Works (OPW) gratefully acknowledges the assistance, input and provision of data by a large number of organisations towards the implementation of the National CFRAM Programme. In particular, the OPW acknowledges the assistance of JBA Consulting Engineers and the valuable input and support of the Local Authorities at project level in each of the study areas.

The OPW also acknowledges the participation of members of the public, representative organisations and other groups throughout each stage of consultation.

# Flood Risk Management Plan

The various documents and maps that make up the Plan are as follows:

- Flood Risk Management Plan (Volume I)
- **SEA Environmental Report and the Natural Impact Statement (Volume II)**
  - SEA Environmental Report including Non-Technical Summary (Volume IIa)
  - **Natura Impact Statement (Volume IIa – Appendix B) – this report**
  - Addendum to the Environmental Report (Volume IIb)
  - SEA Statement (Volume IIc)

## Moy - Killala Bay Catchment Flood Risk Management Plan, Unit of Management 34

### Natura Impact Statement

### Revision History

Revision Ref / Date Issued	Amendments	Issued to
Draft / June 2016		Office of Public Works
Draft Final / August 2016	Amendments following OPW comments	Office of Public Works
Version 4.0 / 03 August 2017	Final issue for DEPR adoption of plan	John Martin, Paul Stewart, OPW
V7.0 / 14 December 2017	Minor updates	John Martin, Paul Stewart, OPW
V8.0/ 30 January 2018	NIS Updates	Paul Stewart, OPW

### Contract

This report describes work commissioned by The Office of Public Works (OPW), by a letter dated (28/07/11). The Office of Public Works' representative for the contract was Michael Duffy. Tanya Slattery, Niamh Sweeney and Anne Murray of JBA Consulting carried out this work.

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## B.1 Introduction

JBA Consulting has been appointed by the Office of Public Works to carry out an assessment of the Catchment Flood Risk Assessment and Management (CFRAM) Plan measures proposed for the Moy-Killala Bay Unit of Management (UoM) or River Basin.

The Moy-Killala River Basin spans counties Mayo and Sligo and a number of Natura 2000 sites, designated under the EU Birds Directive (2009/147/EC) and Habitats Directive (92/43/EEC), is located within the zone of influence of the proposed Plan.

Therefore, the plan needs to go through the appropriate assessment (AA) process at a plan level in accordance with Article 6(3) of the Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora).

### B.1.1 Legislative Context

The Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora) aims to maintain or restore the favourable conservation status of habitats and species of community interest across Europe.

The requirements of Articles 6(3) and 6(4) of the Habitats Directive have been transposed into Irish legislation by means of the Habitats Regulations, 1997 (S.I. No. 94 of 1997) and the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 / 2011).

Under the Directive a network of sites of nature conservation importance have been identified by each Member State as containing specified habitats or species requiring to be maintained or returned to favourable conservation status. In Ireland the network consists of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs), and also candidate sites, which form the Natura 2000 network.

Article 6(3) of the Habitats Directive requires that, in relation to European designated sites (i.e. SACs and SPAs that form the Natura 2000 network), *"any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to **appropriate assessment** of its implications for the site in view of the site's conservation objectives"*.

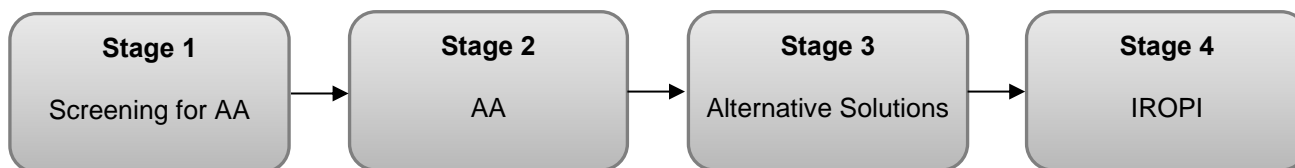
A competent authority (e.g. Local Authority) can only agree to a plan or project after having determined that it will not adversely affect the integrity of the site concerned.

Under article 6(4) of the Directive, if adverse impacts are likely, and in the absence of alternative options, a plan or project must nevertheless proceed for imperative reasons of overriding public interest (IROPI), including social or economic reasons, a Member State is required to take all compensatory measures necessary to ensure the overall integrity of the Natura 2000 site. The European Commission have to be informed of any compensatory measures adopted, unless a priority habitat type or species is present and in which case an opinion from the European Commission is required beforehand (unless for human health or public safety reasons, or of benefit to the environment).

The Planning and Development Act 2000, and amendments, consolidates all planning legislation from 1963 to 1999 and is the basis for the Irish planning code, setting out the detail of regional planning guidelines, development plans and local area plans as well as the basic framework of the development management and consent system. The Act sets out the requirement of a Natura Impact Report for a land use plan, to meet the requirements of article 6(3) of the Habitats Directive, the consideration of in-combination effects and classify any implications in view of the conservation objectives of Natura 2000 sites.

### B.1.2 Appropriate Assessment Process

Guidance on the Appropriate Assessment (AA) process was produced by the European Commission in 2002, which was subsequently developed into guidance specifically for Ireland by the Department of Environment, Heritage and Local Government (DEHLG) (2009). These guidance documents identify a staged approach to conducting an AA, as shown Figure B-14-1.



**Figure B-14-1: The Appropriate Assessment Process (from: Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities, DEHLG, 2009)**

### **Stage 1 - Screening for AA**

The initial, screening stage of the Appropriate Assessment is to determine:

- whether the proposed plan or project is directly connected with or necessary for the management of the European designated site for nature conservation
- if it is likely to have a significant adverse effect on the European designated site, either individually or in combination with other plans or projects

For those sites where potential adverse impacts are identified, either alone or in combination with other plans or projects, further assessment is necessary to determine if the proposals will have an adverse impact on the integrity of a European designated site, in view of the sites conservation objectives (i.e. the process proceeds to Stage 2).

### **Stage 2 - AA**

This stage requires a more in-depth evaluation of the plan or project, and the potential direct and indirect impacts of them on the integrity and interest features of the European designated site(s), alone and in-combination with other plans and projects, taking into account the site's structure, function and conservation objectives. Where required, mitigation or avoidance measures will be suggested.

The competent authority can only agree to the plan or project after having ascertained that it will not adversely affect the integrity of the site(s) concerned. If this cannot be determined, and where mitigation cannot be achieved, then alternative solutions will need to be considered (i.e. the process proceeds to Stage 3).

### **Stage 3 - Alternative Solutions**

Where adverse impacts on the integrity of Natura 2000 sites are identified, and mitigation cannot be satisfactorily implemented, alternative ways of achieving the objectives of the plan or project that avoid adverse impacts need to be considered. If none can be found, the process proceeds to Stage 4.

### **Stage 4 - IROPI**

Where adverse impacts of a plan or project on the integrity of Natura 2000 sites are identified and no alternative solutions exist, the plan will only be allowed to progress if imperative reasons of overriding public interest (IROPI) can be demonstrated. In this case compensatory measures will be required.

The process only proceeds through each of the four stages for certain plans or projects. For example, for a plan or project, not connected with management of a site, but where no likely significant impacts are identified, the process stops at stage 1. Throughout the process, the precautionary principle must be applied, so that any uncertainties do not result in adverse impacts on a site.

## **B.1.3 Methodology**

This Natura Impact Report has been prepared with regard to the following documents:

- DoEHLG (2009 rev 2010) Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government.
- European Communities (EC) (2000) Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission.

- EC (2002) Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission.
- EC (2007) Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission. European Commission.
- EC (2007) Interpretation Manual of European Union Habitats. Version EUR 27. European Commission.
- National Parks and Wildlife Service (NPWS) (2008). The Status of EU Protected Habitats and Species in Ireland. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.
- NPWS (2014). The Status of EU Protected Habitats and Species in Ireland. Habitats Assessment Volume 2. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.
- NPWS (2014). The Status of EU Protected Habitats and Species in Ireland. Species Assessment Volume 3. Habitats Assessment Volume 2. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

## **B.2 Moy-Killala Bay CFRAM Plan**

River Basin 34, also referred to as Moy-Killala Bay is predominantly within County Mayo but there are also some small areas of County Sligo included. River Basin 34 covers an area of 2,314 km<sup>2</sup> of the Western River Basin District (RBD). The main settlements in this River Basin are Castlebar, Ballina and Swinford, all in County Mayo.

### **B.2.1 Objectives of the Western CFRAM Programme**

The Moy-Killala Bay CFRAM Plan forms part of the Western CFRAM Programme. The CFRAM Programme is central to the medium to long-term strategy for the reduction and management of flood risk in Ireland.

The objectives of the Western CFRAM programme are outlined below;

- Produce detailed flood mapping in order to identify and map the existing and potential future flood hazard and risk areas within the Western RBD;
- Build the strategic information base necessary for making informed decisions in relation to managing flood risk;
- Identify viable structural and non-structural measures and options for managing the flood risks for localised high-risk areas and within the catchment as a whole;
- Prepare a Flood Risk Management Plans for each UoM within the Western RBD that sets out the measures and policies, including guidance on appropriate future development, that should be pursued by the local authorities, the OPW and other stakeholders to achieve the most cost effective and sustainable management of flood risk within the study area taking account of the effects of climate change and complying with the requirements of the Water Framework Directive (WFD);
- Prepare a Strategic Environmental Assessment (SEA) and an Appropriate Assessment (AA) for the FRMP for the River Basin; and
- Implement the requirements of EU Directive 2007/60/EC on the assessment and management of flood risks.

### **B.2.2 Management measures**

The development of management measures were selected by assessing the applicability of measures across four different Spatial Scales of Assessment (SSA):

- The Unit of Management or River Basin;
- Each Sub-Catchment of Coastal Area within the River Basin;

- Areas for Further Assessment (AFA) Level; and
- Flood Cell Level, where appropriate.

A 'measure' describes one approach to reduce flood risk in a single location, for example a flood wall along a river or channel excavation for a certain reach. An 'option' describes the full suite of measures required to manage flood risk in a specified AFA or flood cell, for example channel excavation in conjunction with a flood wall. The NIS considers impacts posed by measures at all scales. Further details of measures at all SSAs is discussed in the Preliminary Options Report for River Basin 34.

### **Unit of Management or River Basin Level**

At this scale measures that could provide benefits to multiple AFAs within the River Basin and other areas were considered, along with the spatial and temporal coherence of measures being considered at smaller spatial scales. FRM measures applicable at this spatial scale included:

- Planning Policy Requirements;
- Flood Forecasting and Warning Systems;
- Sustainable Urban Drainage systems (SUDs);
- Land Use Management, where applicable;
- Measures implemented under other legislation;
- Requirements for additional monitoring (rain and river level / flow gauges); and
- Provision of maintenance.

### **Sub-Catchment Level**

The sub-catchment SSA refers to the catchment of the principal river on which an AFA sits, and as such alternative AFAs upstream or downstream which may benefit from a catchment level solution. Methods that could provide benefits to multiple AFAs include upstream storage or flood forecasting systems. Methods proposed for an individual AFA also need to consider the positive and negative impacts at a catchment level.

### **AFA Level**

At this scale, methods benefitting only the particular AFA in question were considered, even if the implementation of a given measure includes works or activities outside of the AFA, i.e., elsewhere in the sub-catchment or River Basin. Examples of where this might apply would be storage options upstream of the AFA, or flood forecasting and warning systems, that provide no benefits to other AFAs, as well as all other FRM measures and options, such as protection measures, conveyance improvement, etc.

### **Flood Cell Level**

Within an AFA there may be discreet areas of flood risk, called 'Flood Cells' that are hydraulically independent from other areas at risk within the AFA. The viability of measures will be assessed at a flood cell only if an AFA wide solution is not viable.

A 'measure' describes one approach to reduce flood risk in a single location, for example a flood wall along a river or channel excavation for a certain reach. An 'option' describes the full suite of measures required to manage flood risk in a specified AFA or flood cell, for example channel excavation in conjunction with a flood wall.

The NIS considers impacts posed by measures on an AFA scale. Further details on the assessment of measures at all SSAs is discussed in the Preliminary Options Report for UoM 34.

## **B.2.3 Alternatives to the Plan**

The development of the draft FRMP for River Basin 34 included the consideration of a range of flood management measures at different spatial scales within River Basin 34. The potential measure provides alternatives to the measures presented in the draft FRMP. The process of

choosing the preferred measures went through a number of steps starting off with the Preliminary Options Report. This report assessed the technical, social, economic and environmental impacts of a range of measures. Alternatives we considered at the spatial scales and different measures were considered at the AFA stage.

The 'Do Nothing' alternative, whereby the status quo remains and no Flood Risk Management Plan for River Basin 34 would be adapted, has been assessed.

Certain controls would remain in place for example the Guidelines on the Planning System and Flood Risk Management and preparation of Local Adaptation Plans. A number of the current Local Area Plans and the Mayo County Development Plan has objectives dealing with spatial planning in flood risk areas, adaptation to climate change etc. The Department of the Environment's requirements for Local Authorities to prepare climate change adaptation plans would, at a minimum, ensure that future flood levels would be considered in future planning. The impacts of the 'do nothing' alternative would be neutral for all of the environmental objectives but would have a long term negative impact on humans and local economy particularly in the AFAs liable to flooding.

There are no other viable alternatives to the Plan. Section 12 of the SEA describes in technical detail, the alternatives considered at the spatial scale and the types of measures considered.

#### **B.2.4 Potential impacts of the Plan**

As outlined in the EC guidance on the assessment of plans and projects affecting Natura 2000 sites (EC, 2002), impacts that could potentially occur through the implementation of the proposed Plan are as follows;

- Loss/ reduction of habitat area
- Disturbance to Key species
- Habitat or species fragmentation
- Reduction in species density
- Changes in key indicators of conservation value, such as changes in water quality and quantity.

#### **B.2.5 Flood risk management methods in River Basin 34**

Following a comprehensive multi-criteria option assessment process, preferred flood risk management options were recommended in the FRMP for each River Basin and AFA. The Areas for Further Assessment (AFAs) of flood risk in River Basin 34 were Castlebar, Ballina, Foxford, Swinford and Charlestown. Structural flood risk management methods have been considered for Ballina, Castlebar and Swinford. Crossmolina was also identified as an AFA, but is being studied under a separate commission by OPW and has not been subject to assessment of structural flood management methods under the CFRAM.

The management options were assessed against the following criteria; technical, economic, environmental, social and cultural, health and safety, and adaptability for the future. The options were considered further in the SEA of the Plan for River Basin 34. The measures of the preferred options for River Basin 34, selected based on the outcome of these assessments, are detailed in Table B-14-2. Only options proposed for Ballina were found to be economically viable with respect to current levels of flood risk.

Measures that may be applied under the Plan and require further assessment fall under one of three categories:

1. Measures that are applicable to all areas within the River Basin under prevention, protection and preparedness;
2. Catchment or sub-catchment measures that may cover more than one AFA (an Area for Further Assessment);
3. AFA scale measures (typically a town) that may be required to be assessed in further detail at a project level.

Measures that are applicable to all areas are assessed for potential significant impacts to Natura 2000 sites in Table B-14-1. Structural flood risk management methods that have been proposed and assessed for viability in River Basin 34 are in Table B-14-2. Potential locations of structural flood risk management measures are in Figure B-14-2, Figure B-14-3 and Figure B-14-4.

**Table B-14-1 Assessment of significance of impact of measures to be applied within the River Basin**

Methods	Significance of impact	Reasoning
Prevention: Sustainable Planning and Development Management	Potential significant impact	Application of guidelines that support sustainable development will promote positive impacts during operation but may cause negative impacts during implementation at a project level.
Prevention: Sustainable Drainage Systems (SUDS)	Potential significant impact -	SUDS when implemented should improve water quality resulting in a positive impact. However, the implementation of SUDS could have adverse ecological effects on waterbodies, their structure and function, and on sensitive species that they support. Individual projects that seek to implement SUDS must be assessed individually for Appropriate Assessment.
Protection: Voluntary Home Relocation Scheme	Potential significant impact –	Homes that are abandoned due to flooding will require decommissioning. This, in conjunction with selection of areas for relocation, may cause significant impact to Natura 2000 sites and will require Appropriate Assessment at a project level.
Prevention: Local Adaption Planning	Potential significant impact	Local Authorities considering potential impacts of climate change on flooding and flood risk in local adaption planning, in particular in the area of planning and designing infrastructure. Individual plans may require separate Appropriate Assessment.
Prevention: Land Use Management and Natural Flood Risk Management Methods	Potential significant impact	The WFD and Habitats Directive have many common goals and links. Measures that are implemented that may promote positive impacts to biodiversity and towards achieving Good water status for waterbodies, may have a significant positive impact upon Natura 2000 sites. However, proposals for implementation will require assessment to determine their suitability and appropriateness regarding the conservation objectives of the relevant Natura 2000 sites.
Protection: Minor Works Scheme	Potential significant impact	Using precautionary principle, minor works schemes will likely involve physical works and therefore has the potential to cause a significant impact on Natura 2000 sites. Projects under the Minor Works Scheme will require Appropriate Assessment.
Protection: Maintenance of Arterial Drainage Schemes	Potential significant impact	The OPW are maintaining the River Moy and Kilalla Arterial Drainage Schemes. Sites suffering from hydromorphological pressures, including those at Conn and Moy WMU, are undergoing remedial works and/or targeted actions to achieve good ecological status.



Methods	Significance of impact	Reasoning
		Arterial Drainage Schemes within waterbodies have the potential to physically alter the structure and function of waterbodies and directly and indirectly impact upon water dependent species. The above Arterial Drainage Schemes have been subjected to and continue to be subjected to Appropriate Assessment at a project level.
Protection: Maintenance of Drainage Districts	Potential significant impact	There are seven drainage districts in this River Basin, within which there are a number of watercourses requiring maintenance. Maintenance can involve clearance, alteration and protection works that may impact upon protected habitats and species, and so, will require Appropriate Assessment at a project level.
Maintenance of Channels Not Part of a Scheme	Potential significant impact	Outside of the Arterial Drainage and Drainage District Schemes, landowners who have watercourses on their lands have a responsibility for their maintenance. Unregulated drainage maintenance could cause significant negative impacts to Natura 2000 sites and so, requires Appropriate Assessment.
Preparedness: Flood Forecasting	None anticipated	This service will involve the issuing of flood forecasts and general alerts at both national and catchment scales. It will not result in physical actions and therefore is not likely to cause significant impacts to Natura 2000 sites.
Preparedness: Review of Emergency Response Plans for Severe Weather	Potential significant impact	Review of plans are not likely to cause significant impacts on Natura 2000 sites, however, plans or actions that may occur as a result of this review, including Major Emergency Management Plans, may require assessment at a plan or project level.
Preparedness: Promotion of Individual and Community Resilience	Potential significant impact	Promotion of resilience to include the requirement for environmental assessment. Promotion of resilience unlikely to cause significant impacts, however, preparatory actions that may arise as a result of preparedness may require assessment at a project level.
Preparedness: Individual Property Protection	Potential significant impact	Actions that may arise in the protection of individual property from flooding may cause significant impact to Natura 2000 sites and requires assessment at a project level.
Preparedness: Flood-Related Data Collection	Potential significant impact	Collection of data not likely to cause significant impact as hydrometric data collection network already in place across the country in general, however, the scarcity of sub-daily rainfall gauges in the west of Ireland will require improvements and installation of new gauges. Plans or projects involved in these processes will require further assessment.

Methods	Significance of impact	Reasoning
Flood forecasting and warning systems	Potential significant impact	Previously installed gauges that have no disruption to flow and are installed sensitively to avoid damage and disruption to habitats and species, will not require further assessment. Installation of new gauges or flood forecasting systems could have a significant impact to Natura 2000 sites and require further assessment at a project level.

**Table B-14-2: Preferred options and associated structural measures for River Basin 34**

AFA Name	Preferred Option	Structural Measures
Ballina AFA	River Moy and Knockanelo (of Suffraunbrougue) flood defences to 1% AEP for fluvial risk and 0.5% AEP for tidal risk design standard.	<p>Construction of a 1.2m high wall at Bachelor's Walk, 0.6m high at Clare Street, 0.45m high wall at Cathedral Road and 0.6m high wall at Ridgepool Road.</p> <p>Construction of 1.2m high wall at Marian Crescent and improved culvert and inlet through Ballina town.</p> <p>Embankment at rear of properties on Killala Road (0.6m high) and improved flood relief culvert and inlet.</p>

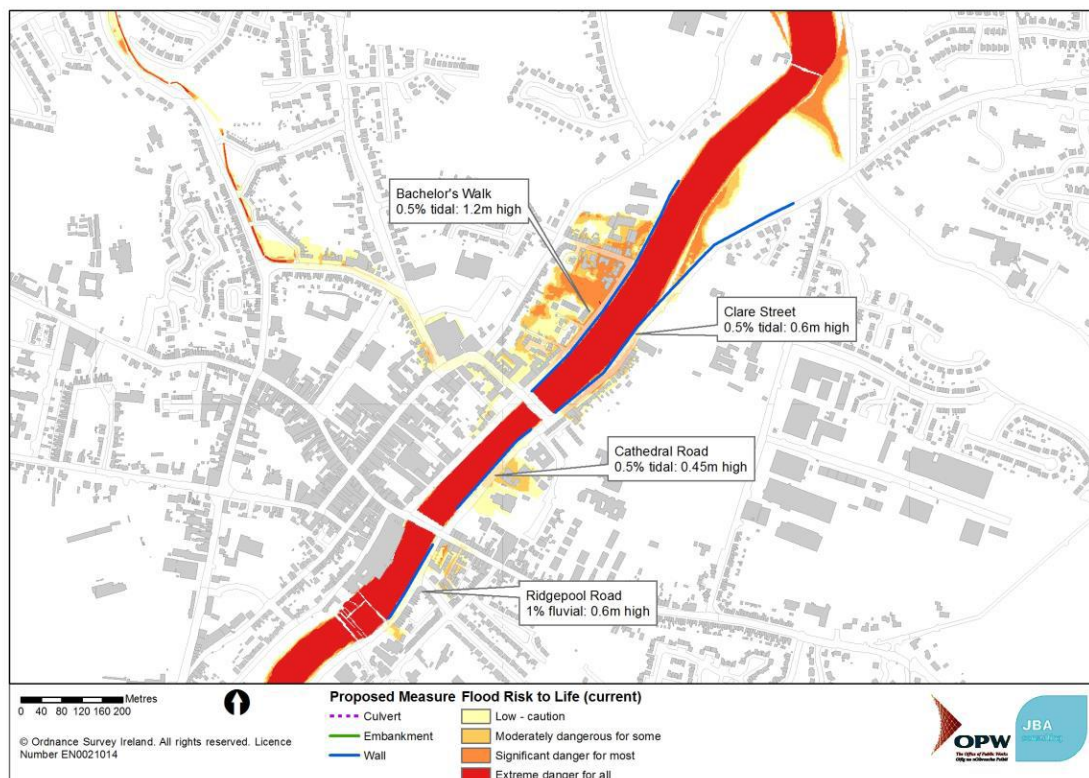


Figure B-14-2 Location of measures for Ballina AFA.

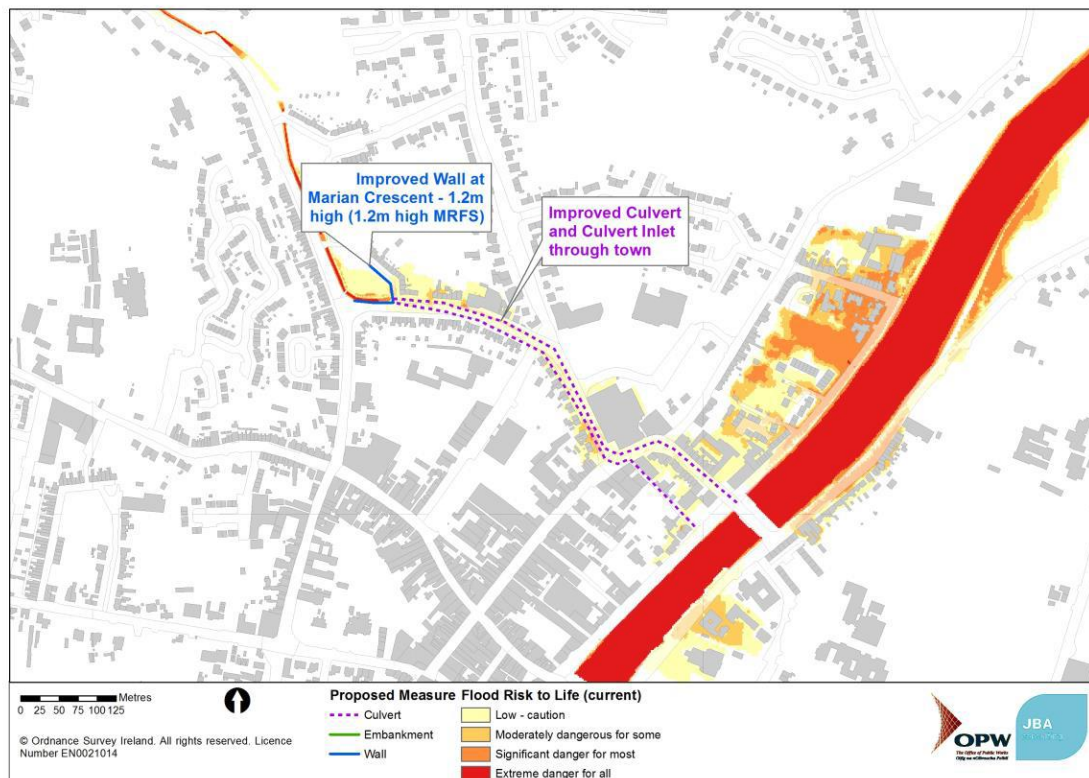


Figure B-14-3 Location of measures for Ballina (Marian Crescent) AFA.

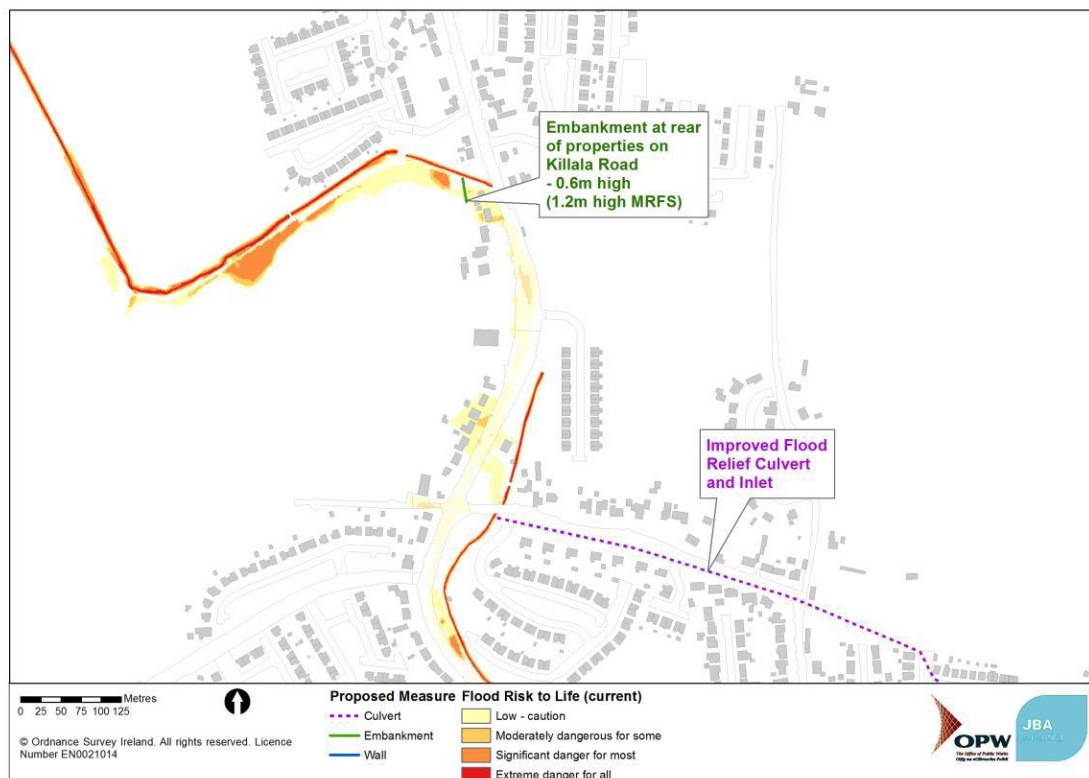


Figure B-14-4: Location of measures for Ballina (Killala Road) AFA.

### **B.3 Stage 1 - Screening for Appropriate Assessment**

Assessment of the potential impacts of flood risk management objectives and measures within the Plan as described, are required under regulation 42 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011).

This section aims to identify whether the proposed objectives and measures are likely to have a significant effect, either alone, or in-combination with other projects and plans, on the Natura 2000 sites within the zone of influence.

The 'screening' process addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3) of the Habitats Directive:

- Is the plan or programme directly connected to or necessary for the management of the site; and
- Will the plan or programme, alone or in-combination with other plans and projects, have a significant effect on a Natura 2000 site in view of its conservation objectives.

If the effects are deemed to be significant, potentially significant or uncertain, then the plan or programme that is under assessment is subject to a Stage 2 Appropriate Assessment, reported in the form of a Natura Impact Statement.

The Plan is not directly connected to the management of any Natura 2000 sites, however, they could have potential to cause significant effects on Natura 2000 sites.

The screening assessment will determine the likelihood of potential impacts on Natura 2000 sites caused by the proposed objectives and measures.

#### **B.3.1 Screening methodology**

In accordance with DEHLG guidance, the key to determining if an Appropriate Assessment is required for a Plan, is in the assessment of whether the plan and its policies and objectives are likely to have a significant effect on a Natura 2000 site.

For this process, the screening of this plan has been broken down into 4 steps.

1. Description of the programme (Section B.2);

Screening of Natura 2000 sites within the various zones of influence of the plan dependant on the presence of potential pathways and nature of the qualifying interests (

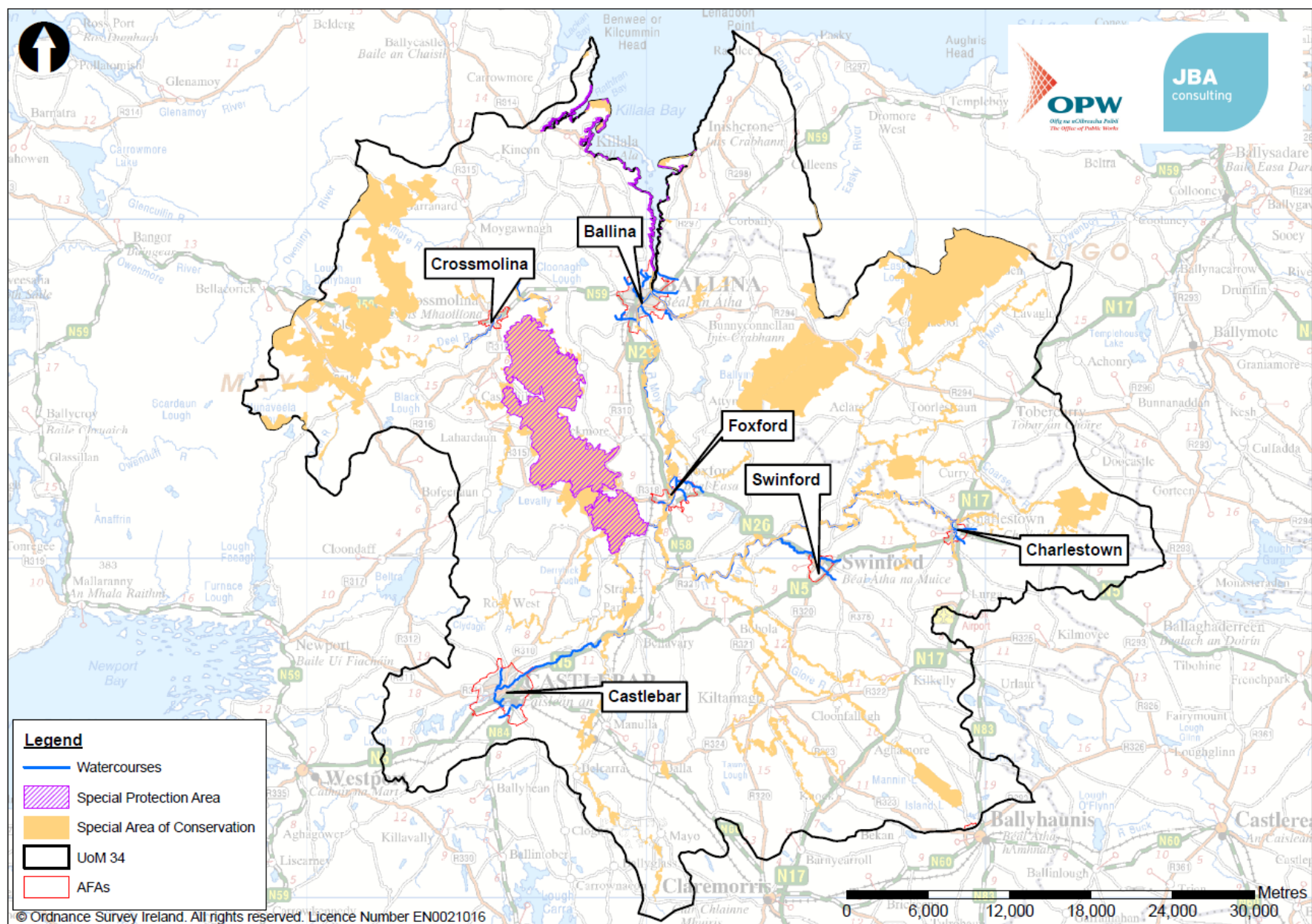
2. Table B-14-3).
3. Assessing the measures to identify potential impacts. Determining the significance of these potential impacts and the requirement for follow up assessments. This is presented in Table B-14-1.
4. Screening Statement with conclusions. This is presented in Section B.6.

### **B.4 Study Area**

The following section describes the screening methods used at various scales to ensure inclusion of all Natura 2000 sites that may be potentially impacted by all objectives and measures of the Plan. Figure B-14-5 displays the Natura 2000 sites within UoM 34, however, it is not inclusive of all potential Natura 2000 sites that have been screened in as potentially being impacted by the plan. Natura 2000 sites outside of the boundary of UoM 34 will also be considered in line with the screening methodology at the relevant scales.



**Figure B-14-5. Natura 2000 sites in UoM 34**



#### **B.4.2 Identification of Relevant Natura 2000 Sites**

The relevant Natura 2000 sites were identified dependant on several factors. This included those within the River Basin, those within 15km of the River Basin and those connected hydrologically either through groundwater or surface water pathways as defined by the WFD and EPA. Natura 2000 sites containing Freshwater Pearl Mussel (FWPM) *Margaritifera margaritifera* or *Margaritifera durrovensis* within 35km were included, as were Natura 2000 sites that contained Groundwater Dependant Terrestrial Ecosystems that were hydrologically connected. Consultation was carried out with EPA staff in relation to the method for screenings of GWDTEs.

Data for this process was obtained from the WFD and NPWS website and JBA derived data, then visualised and assessed using ArcGIS and Microsoft Excel. Further details of the relevant Natura 2000 sites within the likely zones of impact of the Plan are presented in tables in Section B.5.

The zones of impact of consideration for potential impacts on Natura 2000 sites are discussed here:

##### **River Basin or UoM scale**

Natura 2000 sites that are within the River Basin, and therefore within the area of the Plan, are at risk of direct and indirect impacts as a result of the objectives and measures of the Plan.

##### **15km Scale**

A buffer area of 15km was used for selection of Natura 2000 sites, based on DEHLG Guidance (DEHLG, 2010), which is the distance considered appropriate for Plans. This 15km buffer also addresses the potential land and air pathways, as the distances defined in Ryan Hanley, 2014b for land and air pathways, are well accommodated within 15km. This distance was evaluated on a case by case basis, dependent on the nature of the Qualifying Interests present. The method used in this current assessment is a slight variation on the method of Ryan Hanley (2014b), as it uses more up to date information regarding potential pathways present in a catchment. The Ryan Hanley method, if it were used, would remove Natura 2000 sites with no surface water connectivity to a River Basin, but which are situated within the catchment of a River Basin and this may result in the exclusion of a Natura 2000 sites that may be potentially impacted by land and air pathways. Therefore, the use of the River Basin and 15km buffer will, by default, include Natura 2000 sites potentially impacted by land and air pathways.

##### **Hydrologically connected**

Hydrological connections between the River Basin and Natura 2000 sites were identified through the use of WFD defined active aquifers and EPA defined river network. These connections can increase or reduce the number of Natura 2000 sites at risk from potential impacts as a result of the objectives and measures of the Plan.

Groundwater pathways with the potential to transport impact to Groundwater Dependent Terrestrial Ecosystem (GWDTE) of Natura 2000 sites, are defined by the use of active groundwater bodies shapefiles from the EPA Envision Maps, 2017. This method is based upon the WFD risk assessments and WFD GWDTE maps. According to the WFD assessment guidance, the impact of pollutants or nutrients within the zone of influence varies according to a number of factors including aquifer vulnerability. As current catchment areas for GWDTEs is still undergoing determinations (Matthew Smith EPA, personal communication. 22<sup>nd</sup> November, 2016), a precautionary approach to the cumulative impacts of schemes, was taken for this assessment.

##### **Freshwater Pearl Mussel (FWPM) and Groundwater Dependant Terrestrial Ecosystems (GWDTE)**

In order to take into account freshwater pearl mussel (*Margaritifera margaritifera* and/or *Margaritifera durrovensis*) populations, all Natura 2000 sites within 35km of the River Basin (adapted from Ryan Hanley 2014) were selected to include for Natura 2000 sites containing freshwater pearl mussel populations. In relation to freshwater pearl mussel, Natura 2000 sites that have FWPM as a qualifying interest were assessed and then on a case by case basis, the location of possible FWPM populations were examined.

Natura 2000 sites located outside of the River Basin's surface water and groundwater catchments were screened out on the basis that there would be no impact on Natura 2000 sites outside of the catchment. Those sites within River Basin then proceeded to a more detailed review by an ecologist in JBA Ireland and were either screened in or out on the basis of the following criteria:

- Distance from the River Basin at various levels based upon an adapted methodology from Ryan Hanley (2014b) including the WFD surface, 15km buffer and groundwater catchments and the 35km downstream buffer for FWPM;
- Hydrological connectivity to River Basin;
- Qualifying interests and special conservation interests for which the site was selected and their sensitivities e.g. GWDTEs; and
- The conservation objectives for those sites.

## B.5 Findings of the Screening Process

Sixty-three Natura 2000 sites were screened for potential impacts as they were determined to be within at least one of the previously described zones (

Table B-14-3). Twelve Natura 2000 sites are within River Basin 34. These 12 Natura 2000 sites will require further assessment for potential impacts.

Of the 51 Natura 2000 sites outside the River Basin, 43 are within 15 km but are not hydrologically connected. These 43 will not need to be considered further due to lack of pathway for transporting impacts. The remaining eight sites, located within 15 km are connected by groundwater pathways only. These sites may potentially be susceptible to groundwater impacts only. Of the eight Natura 2000 sites located within 15 km of the River Basin and connected via groundwater pathways, Flughany Bog, Turloughmore (Sligo), Clew Bay Complex, Bricklieve Mountains and Keishcorran, Unshin River and Cloonakillina Lough SACs have Groundwater Dependant Terrestrial Ecosystems. These six sites can be included with the original 12 sites that require further assessment for potential impacts.

Four sites have Freshwater Pearl Mussel (FWPM) as a Qualifying Interest, none of which are within the River Basin or are connected via surface water pathways. Newport River SAC however, is connected hydrologically via groundwater pathway and will require further assessment.

In conclusion, a total of 19 Natura 2000 sites are within, or hydrologically connected to the River Basin 34, may be impacted by measures implemented within the River Basin and so may require further assessment depending on the nature of the potential impacts, as determined in Table B-14-1 and Table B-14-2. These Natura 2000 sites are presented in Table B-14-4.

**Table B-14-3 Natura 2000 sites screened and screening criteria**

Site code	SACs and SPAs listed	Within UoM	Distance to UoM (km)	Surface water connected	Ground water connected	GWDTE	FWPM
IE0000461	Ardkill Turlough SAC		11			X	
IE0004133	Aughris Head SPA		12			X	
IE0000463	Balla Turlough SAC	X	0	X	X	X	
IE0002081	Ballinafad SAC	X	0	X	X		
IE0000622	Ballysadare Bay SAC		9			X	
IE0004129	Ballysadare Bay SPA		9			X	
IE0001922	Bellacorick Bog Complex SAC	X	0	X	X	X	
IE0000466	Bellacorick Iron Flush SAC		2			X	
IE0000592	Bellanagare Bog SAC		13			X	
IE0004105	Bellanagare Bog SPA		13			X	
IE0000471	Brackloon Woods SAC		9				
IE0001656	Bricklieve Mountains & Keishcorran SAC		12		X	X	
IE0000595	Callow Bog SAC		4			X	



Site code	SACs and SPAs listed	Within UoM	Distance to UoM (km)	Surface water connected	Ground water connected	GWDTE	FWPM
IE0000597	Carrowbehy/Caher Bog SAC		3			X	
IE0000475	Carrowkeel Turlough SAC		5			X	
IE0000476	Carrowmore Lake Complex SAC		7			X	
IE0001482	Clew Bay Complex SAC		7		X	X	
IE0001899	Cloonakillina Lough SAC		1		X	X	
IE0000600	Cloonchambers Bog SAC		7			X	
IE0000614	Cloonshanville Bog SAC		13			X	
IE0000480	Clyard Kettle-Holes SAC		12			X	
IE0000218	Coolcam Turlough SAC		11			X	
IE0002110	Corliskea/Trien/Cloonfelliv Bog SAC		12			X	
IE0000255	Croaghill Turlough SAC		12			X	
IE0000604	Derrinea Bog SAC		4			X	
IE0000492	Doocastle Turlough SAC		1			X	
IE0002338	Drumalough Bog SAC		5			X	
IE0000607	Errit Lough SAC		1				
IE0000497	Flughany Bog SAC		1		X	X	
IE0000500	Glenamoy Bog Complex SAC		4			X	
IE0000503	Greaghans Turlough SAC		10			X	
IE0000504	Kilglassan/Caheravoostia Turlough Complex SAC		8			X	
IE0000458	Killala Bay/Moy Estuary SAC	X	0	X	X	X	
IE0004036	Killala Bay/Moy Estuary SPA	X	0	X	X	X	
IE0001669	Knockalongy And Knockachree Cliffs SAC		4				
IE0000516	Lackan Saltmarsh And Kilcummin Head SAC	X	0	X	X		
IE0004051	Lough Carra SPA		4			X	
IE0001774	Lough Carra/Mask Complex SAC		4			X	
IE0004228	Lough Conn and Lough Cullin SPA	X	0	X	X	X	
IE0000297	Lough Corrib SAC		8			X	X
IE0002177	Lough Dahybaun SAC		0				
IE0004048	Lough Gara SPA		4			X	
IE0000633	Lough Hoe Bog SAC	X	0	X	X	X	
IE0004062	Lough Mask SPA		10			X	
IE0000634	Lough Nabrickkeagh Bog SAC	X	0	X	X	X	
IE0000527	Moore Hall (Lough Carra) SAC		5				
IE0001932	Mweelrea/Sheeffry/Erriff Complex SAC		9			X	X
IE0002144	Newport River SAC		1		X		X
IE0000534	Owenduff/Nephin Complex SAC	X	0	X	X	X	
IE0004098	Owenduff/Nephin Complex SPA		0			X	
IE0002006	Ox Mountains Bogs SAC	X	0	X	X	X	
IE0002298	River Moy SAC	X	0	X	X	X	
IE0000541	Skealaghan Turlough SAC		10			X	

Site code	SACs and SPAs listed	Within UoM	Distance to UoM (km)	Surface water connected	Ground water connected	GWDTE	FWPM
IE0000542	Slieve Fyagh Bog SAC		10			X	
IE0000636	Templehouse And Cloonacleigha Loughs SAC		3				
IE0002031	The Twelve Bens/Garraun Complex SAC		34			X	X
IE0002179	Towerhill House SAC		3				
IE0002354	Tullaghanrock Bog SAC		4			X	
IE0000637	Turloughmore (Sligo) SAC		0		X	X	
IE0000638	Union Wood SAC		13				
IE0001898	Unshin River SAC		0		X	X	
IE0001571	Urlaur Lakes SAC		0		X		
IE0002296	Williamstown Turloughs SAC		13			X	

**Table B-14-4 Natura 2000 sites that require further assessment for potential impacts**

Site code	Site name	Appropriate Assessment required	Reasoning
<b>IE0000463</b>	Balla Turlough SAC	Required	Pathways and / or sensitive ecological receptors present - At risk from potentially significant impacts
<b>IE0002081</b>	Ballinafad SAC	Required	Pathways and / or sensitive ecological receptors present - At risk from potentially significant impacts
<b>IE0001922</b>	Bellacorick Bog Complex SAC	Required	Pathways and / or sensitive ecological receptors present - At risk from potentially significant impacts
<b>IE0001656</b>	Bricklieve Mountains & Keishcorran SAC	Required	Pathways and / or sensitive ecological receptors present - At risk from potentially significant impacts
<b>IE0001482</b>	Clew Bay Complex SAC	Required	Pathways and / or sensitive ecological receptors present - At risk from potentially significant impacts
<b>IE0001899</b>	Cloonakillina Lough SAC	Required	Pathways and / or sensitive ecological receptors present - At risk from potentially significant impacts
<b>IE0000497</b>	Flughany Bog SAC	Required	Pathways and / or sensitive ecological receptors present - At risk from potentially significant impacts
<b>IE0000458</b>	Killala Bay/Moy Estuary SAC	Required	Pathways and / or sensitive ecological receptors present - At risk from potentially significant impacts
<b>IE0004036</b>	Killala Bay/Moy Estuary SPA	Required	Pathways and / or sensitive ecological receptors present - At risk from potentially significant impacts
<b>IE0000516</b>	Lackan Saltmarsh And Kilcummin Head SAC	Required	Pathways and / or sensitive ecological receptors present - At risk from potentially significant impacts
<b>IE0004228</b>	Lough Conn and Lough Cullin SPA	Required	Pathways and / or sensitive ecological receptors present - At risk from potentially significant impacts

<b>IE0000633</b>	Lough Hoe Bog SAC	Required	Pathways and / or sensitive ecological receptors present - At risk from potentially significant impacts
<b>IE0000634</b>	Lough Nabrickkeagh Bog SAC	Required	Pathways and / or sensitive ecological receptors present - At risk from potentially significant impacts
<b>IE0002144</b>	Newport River SAC	Required	Pathways and / or sensitive ecological receptors present - At risk from potentially significant impacts
<b>IE0000534</b>	Owenduff/Nephrin Complex SAC	Required	Pathways and / or sensitive ecological receptors present - At risk from potentially significant impacts
<b>IE0002006</b>	Ox Mountains Bogs SAC	Required	Pathways and / or sensitive ecological receptors present - At risk from potentially significant impacts
<b>IE0002298</b>	River Moy SAC	Required	Pathways and / or sensitive ecological receptors present - At risk from potentially significant impacts
<b>IE0000637</b>	Turloughmore (Sligo) SAC	Required	Pathways and / or sensitive ecological receptors present - At risk from potentially significant impacts
<b>IE0001898</b>	Unshin River SAC	Required	Pathways and / or sensitive ecological receptors present - At risk from potentially significant impacts
<b>IE0000461</b>	Ardkill Turlough SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0004133</b>	Aughris Head SPA	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0000622</b>	Ballysadare Bay SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0004129</b>	Ballysadare Bay SPA	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0000466</b>	Bellacorick Iron Flush SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0000592</b>	Bellanagare Bog SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0004105</b>	Bellanagare Bog SPA	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0000471</b>	Brackloon Woods SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0000595</b>	Callow Bog SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0000597</b>	Carrowbehy/Caher Bog SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0000475</b>	Carrowkeel Turlough SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts

<b>IE0000476</b>	Carrowmore Lake Complex SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0000600</b>	Cloonchambers Bog SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0000614</b>	Cloonshanville Bog SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0000480</b>	Clyard Kettle-Holes SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0000218</b>	Coolcam Turlough SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0002110</b>	Corliskea/Trien/Cloonfellov Bog SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0000255</b>	Croaghill Turlough SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0000604</b>	Derrinea Bog SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0000492</b>	Doocastle Turlough SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0002338</b>	Drumalough Bog SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0000607</b>	Errit Lough SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0000500</b>	Glenamoy Bog Complex SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0000503</b>	Greaghans Turlough SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0000504</b>	Kilglassan/Caheravoostia Turlough Complex SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0001669</b>	Knockalongy And Knockachree Cliffs SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0004051</b>	Lough Carra SPA	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0001774</b>	Lough Carra/Mask Complex SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0000297</b>	Lough Corrib SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
<b>IE0002177</b>	Lough Dahybaun SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts

IE0004048	Lough Gara SPA	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
IE0004062	Lough Mask SPA	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
IE0000527	Moore Hall (Lough Carra) SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
IE0001932	Mweelrea/Sheeffry/Erriff Complex SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
IE0004098	Owenduff/Nephin Complex SPA	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
IE0000541	Skealoghan Turlough SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
IE0000542	Slieve Fyagh Bog SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
IE0000636	Templehouse And Cloonacleigha Loughs SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
IE0002031	The Twelve Bens/Garraun Complex SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
IE0002179	Towerhill House SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
IE0002354	Tullaghanrock Bog SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
IE0000638	Union Wood SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
IE0001571	Urlaur Lakes SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts
IE0002296	Williamstown Turloughs SAC	Not required	Outside UoM and no pathways present - not at risk from potentially significant impacts

### B.5.3 Qualifying Interests

The qualifying interests for the Natura 2000 sites that were screened in are provided in Appendix B.13. Designated habitats and species within the screened in SACs and SPAs have the potential to be affected by the implementation of the proposed Plan.

### B.5.4 Conservation objectives

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. 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.

Conservation objectives for SACs and SPAs (i.e. sites within the Natura 2000 network) are required for the habitats and species for which the sites are selected. Detailed site-specific conservation objectives have been provided for the majority of SACs and SPAs, which can be

found within the Conservation Objectives document for each site on the NPWS website. Generic conservation objectives have been compiled for the remaining SAC and SPAs.

The overall aim of conservation objectives is for the maintenance or restoration of the favourable conservation conditions of the Annex I habitats and/or the Annex II species for which a SAC has been selected, under which the site-specific objectives contain more detailed attributes, measures and targets.

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.

The conservation objectives for SPAs are also to maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for SPAs, which are defined by the following list of attributes and targets;

- Population trend; Measure of percentage change and whether the long term population trend stable or increasing.
- Distribution: Number, range, timing and intensity of use of areas. There is to be no significant decrease in the range, timing or intensity of use of areas by golden plover, other than that occurring from natural patterns of variation.

The conservation objective for non-breeding birds Special Conservation Interests for SPAs are as follows;

- To maintain the favourable conservation condition of the non-breeding waterbird Special Conservation Interest species listed for a SPA.
- To maintain the favourable conservation condition of the wetland habitat for a SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.

The conservation objectives were considered when carrying out the AA screening process for the Plan and any measures or potential flood relief works that may potentially impact on Natura 2000 sites.

#### **B.5.5 Cumulative Impacts**

A key part of the SEA process is to determine the plan and policy context in which the Western CFRAM proposed activities will be implemented. The Western CFRAM objectives are incorporated into the River Basin 34 FRMP, which in turn is informed by the current spatial planning in the towns and counties of that River Basin. The Western CFRAM proposed activities, and hence the River Basin 34 FRMP, will influence and will in turn be influenced by a number of external statutory and non-statutory plans, strategies and policies and ongoing studies. The interaction of the environmental protection objectives within these documents, with the proposals of the Western CFRAM proposed activities, must therefore be considered. A number of plans, strategies and legislation were examined as part of the SEA process, which are also detailed in Appendix A of the SEA document. A selection of these plans and policies, most relevant to those that could potentially affect Natura 2000 sites in-combination with the River Basin 34 FRMP.

Cumulative impacts are impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project or plan (Walker and Johnston 1999). As most of the measures that are proposed at this level are not spatially specific, effects on particular European sites cannot reasonably be identified or assessed. Cumulative impacts that may occur between relevant plans and/or projects in combination with Western CFRAM activities are identified in as much detail as is possible at this level.

**Table B-14-5: Plans and policies relevant to River Basin 34, a brief description and their potential cumulative impacts with the Plan.**

Plans and Policies	Description	Potential cumulative impacts
Mayo County Development Plan 2014-2020	Provides a spatial planning framework that gives effect to the delivery of sustainable and planned economic and social development. Eight goals are set, which include the protection and enhancement of the natural environment, under which developments will be restricted in areas at risk of flooding.	The strategic aims of the Plan include the protection of the environment and natural resources of the County, with objectives of the protection of Natura 2000 sites and flood risk management and assessment. Objectives of Development Plans and FRM are aligned in their aim to provide sustainable development regarding flood risk. Positive cumulative impacts will be designed into each Plan at a project level and so, must be assessed at a project level. Project level assessment will ensure that cumulative impacts are addressed and therefore, no negative in-combination effects to Natura 2000 sites are expected.
Actions for Biodiversity 2011-2016, Ireland's National Biodiversity Plan	Aims to conserve and restore biodiversity and ecosystems, and halt their loss, through setting 7 objectives and associated action in order to achieve this on a national and international scale.	Implementation of NFRM measures could help achieve the aims of the National Biodiversity Plan through optimisation of biodiversity benefits in FRM planning. A number of actions that will result from the National Species Action Plans will relate to works within watercourses. Actions that arise as a result of Ireland's National Biodiversity Plan and National Species Plans must be considered at a project level. Project level assessment will ensure that cumulative impacts are addressed and therefore, no negative in-combination effects to Natura 2000 sites are expected.
County Mayo Biodiversity Action Plan 2010-2015	Aims to promote, protect and enhance biodiversity and key habitats and species within Co. Mayo.	Local area biodiversity action plans mirror the objectives of the National Biodiversity Plan and therefore, cumulative and interactive impacts must be assessed similarly at a project level. Project level assessment will ensure that cumulative impacts are addressed and therefore, no negative in-combination effects to Natura 2000 sites are expected.
National Peatland Strategy	Outlines principles and actions for the conservation and management of Ireland's peatlands.	Identifies the restoration of functioning wetlands as beneficial for the attenuation of water during low-medium intensity rainfall events. Channel maintenance could impact the aim of the National Peatland Strategy, but implementation of NFRM measures could also contribute to the aim of the strategy in improving bogs. Measures that result from the Plan for River Basin 34 must be screened for in-combination and interactive impacts that may occur with actions that arise as a result of the National Peatland Strategy at a project level. Project level assessment will ensure that cumulative impacts are addressed and therefore, no negative in-combination effects to Natura 2000 sites are expected.
Forestry Programme 2014-2020: Ireland	Aims to develop a competitive and sustainable forest sector through the implementation of measures, in particular afforestation, woodland creation and the prevention and restoration of damage to forests.	Forestry Programme - Interaction between land cover, land use and management, drainage maintenance and flood risk. NFRM approaches consider hydrological processes across a whole catchment of a river in order to determine measures that can be used as means of flood management using natural processes. Potential for impact interactions between Plan and Programme upon implementation of proposed measures. Plan and Programme must consider cumulative impacts and impact interactions in further detail when assessing measures at a project level. Project level assessment will ensure that cumulative impacts are



Plans and Policies	Description	Potential cumulative impacts
		addressed and therefore, no negative in-combination effects to Natura 2000 sites are expected.
River Basin Management Plan (RBMP) for the Western River Basin District in Ireland (2009-2015)	The Western RBMP has been produced in accordance with the requirements of the WFD and outlines aims and objectives for achieving these within the Western RBD.	The plan aims to achieve good status for 74% of rivers by 2015, with 100% compliance to be achieved by 2027. Actions that may arise as a result of the RBMP and will be put in place to achieve good status will be considered at a project level. Project level assessment will ensure that cumulative impacts are addressed and therefore, no negative in-combination effects to Natura 2000 sites are expected.
Moy Water Management Unit Action Plan	Details the pressures, risks and programme of actions for the Moy Water Management Unit. The main pressures and risks to the Management Unit are nutrient enrichment, point source discharges from municipal and industrial discharges, quarries, landfills, agriculture, on-site domestic treatment systems, forestry, dangerous substances and morphology.	The proposed Plan should not result in the addition of nutrients to the system. However, the maintenance of channels could impact the aim regarding morphology. Impacts to Natura 2000 sites and qualifying interests will have to be examined at a project level. Project level assessment will ensure that cumulative impacts are addressed and therefore, no negative in-combination effects to Natura 2000 sites are expected.
Groundwater Protection Schemes	Groundwater Protection Schemes aim to maintain the quantity and quality of groundwater, and in some cases improve it, by applying a risk assessment-based approach to groundwater protection and sustainable development.	A scheme provides guidelines for the planning and licensing authorities in carrying out their functions, and a framework to assist in decision-making on the location, nature and control of developments and activities in order to protect groundwater. A framework has been developed for the assessment of Ground Water Dependant Terrestrial Ecosystems under the WFD in collaboration with the NPWS, however this has not been rolled out over the entirety of Ireland. Groundwater protection responses may involve hard structures or alterations to hydrology, and so could change water levels, impacting groundwater dependant Natura 2000 sites and ground water dependant Qualifying interests through Cumulative Impacts. Assessment at a project level will need to be carried out to determine impact interactions and cumulative impacts that may occur as a result of measures. Project level assessment will ensure that cumulative impacts are addressed and therefore, no negative in-combination effects to Natura 2000 sites are expected.
Water Services Strategic Plan 2015. (Irish Water).	Addressing 6 key themes, the most relevant being the effective management of wastewater, and the protection and enhancement of the environment.	The AA process that was conducted upon the Water Services Strategic Plan included the incorporation of changes to the plan, that ensure that no adverse effects occur upon Natura 2000 sites as a result of the plan. It is not likely to cause adverse impacts in-combination with this Plan at this level, however, it is possible that any actions that may arise as a result of this plan be assessed for significance of in-combination effects at a project level, in-combination with any projects that may arise as a result of the FRMP. Project level assessment will ensure that cumulative impacts are addressed and therefore, no negative in-combination effects to Natura 2000 sites are expected.
Rural Environmental	The REPS offers payment rewards to farmers who	The objectives of these schemes are the establishment of farming practices and production

Plans and Policies	Description	Potential cumulative impacts
Protection Scheme (REPS) / Agri-Environmental Options Scheme (AEOS) / Green-Low Carbon Agri-Environmental Scheme (GLAS)	undertake farming methods in an environmentally friendly way. AEOS was launched in 2010 to build on the REPS scheme, promoting Biodiversity, improve water quality and combat climate change. GLAS is the newest agri-environmental scheme, rewarding farmers for carrying out environmentally sound practices that meet the criteria set by the scheme.	methods which reflect conservation issues, protect wildlife habitats and endangered species of flora and fauna and produce quality food in an extensive and environmentally friendly manner. Maintenance that will occur as part of these schemes will need to be considered at a project level to ensure that the objectives of the agri-schemes are not compromised., Project level assessment will ensure that cumulative impacts are addressed and therefore, no negative in-combination effects to Natura 2000 sites are expected.
Food Harvest 2020 and Food Wise 2025	Food Harvest 2020 plan is a strategy for the medium-term development of the agri-food (including drinks) fisheries and forestry sector for the period to 2020. It outlines the key actions needed to ensure that the sector contributes to the maximum possible extent to our export-led economic recovery and the full development of the smart economy. Food Wise 2025 sets out a cohesive, strategic plan for the development of the agri-food sector over the next decade.	Food Harvest – promotes productivity from land/ land improvement/ land drainage. Re-zoning of land and implementation of NFRM measures could impact this. Potential for cumulative impact with channel maintenance to drain lands. Both Food Harvest 2020 and Food Wise 2025 plans have the potential to increase pressure on water bodies through land management and therefore, could result in cumulative impacts to Natura 2000 sites. Execution of measures will need to consider cumulative impacts at a project level and will require further assessment. Project level assessment will ensure that cumulative impacts are addressed and therefore, no negative in-combination effects to Natura 2000 sites are expected at this level.
National Rural Development Programme 2014-2020 (DAFM)	Arising from the most recent reform of CAP agreed under the Irish Presidency of the EU, a new suite of rural development measures has been designed to enhance the competitiveness of the agri-food sector, achieve more sustainable management of natural resources and ensure a more balanced development of rural areas. There is a broad range of schemes and supports contained in Ireland's new RDP for the period 2014-20. Ireland's RDP was formally adopted by the EU Commission on 26th May 2015.	The National Rural Development Programme recognises that agriculture can have significant impacts on the environment, including the provision of environmental services, such as biodiversity, flood and drought control, and as a carbon sink. Measures that may arise as a result of the National Rural Development Programme may also potentially cause significant impacts that will have to be determined at a project level. The role agricultural land can play in flood control and mitigation will need to be considered as part of the CFRAM Scheme study, as will the importance of protecting key agricultural areas within the RBD. Cumulative impacts that may arise as a result of these schemes, relative to Natura 2000 sites and their designated features, will have to be determined at a project level through further assessment. Project level assessment will ensure that cumulative impacts are addressed and therefore, no negative in-combination effects to Natura 2000 sites are expected.
Freshwater Pearl Mussel Sub-Basin Management Plans (various)	The purpose of the Freshwater Pearl Mussel Sub-Basin Management Plans is to address catchment-wide issues that are impacting upon mussel populations (physical modification, pollution, recreation, agricultural activities, forestry). The plans also contain Summary Action Programmes which contain the site specific measures needed to bring the populations back into favourable condition.	The Freshwater Pearl Mussel Sub-Basin Management Plans are directly connected to the conservation of freshwater Pearl Mussel within designated SACs. It recognises that there is potential to indirectly impact on other listed species in these SACs as a result of protection measures. Plans will undergo further assessment at a project level. In order to determine cumulative impacts these will have to be screened against potential impacts that may occur as a result of FRMP measures at a project level. Project level assessment will ensure that cumulative impacts are addressed and therefore, no negative in-combination effects to Natura 2000 sites are expected.
Environmental River Enhancement Programme (EREP)	The Environmental River Enhancement Programme (EREP) is an OPW funded project that is being co-ordinated and managed by Inland Fisheries Ireland.	The programme involves two different approaches to enhancement, these being capital enhancement and enhanced maintenance respectively. The EREP and the FRMPs developed as part of the CFRAM works potentially could work together to deliver further

Plans and Policies	Description	Potential cumulative impacts
	The programme focuses on the enhancement of drained salmonid rivers in Ireland.	environmental benefits. Works at arise as a result of this Programme have the potential to impact other designated features and should be screened for AA. These can then be assessed with any potential impacts that may arise as a result of CFRAM measures at a project level. Project level assessment will ensure that cumulative impacts are addressed and therefore, no negative in-combination effects to Natura 2000 sites are expected.
Western River Basin District Eel Management Plan and National Report for Ireland on Eel Stock Recovery Plan (2008)	These plans give an overview of the status of eels in the Western River Basin and asses the status and threats to Eels in Ireland. The National Report contains a number of measures to allow the recovery of the stock of European eel. It also establishes the basis for the development of Eel Management Plans in river basin districts.	The management actions from the National Stock Recovery Plan are translated directly into the Western RBD Eel Management Plan. The main morphological pressures arise from channelisation and dredging impacting bed slope, side slope and flow changes. This plan contains a number of management actions to assist in the recovery of Eel stocks. CFRAM measures may occur within the same environment that these measures occur in and have the potential for conflict. Any potential impacts will have to be assessed further to determine cumulative impacts with this Plan at a project level. Project level assessment will ensure that cumulative impacts are addressed and therefore, no negative in-combination effects to Natura 2000 sites are expected.
Shellfish Water Action Programmes	Shellfish Waters Directive translated into Irish Law by European Communities (Quality of Shellfish Waters) Regulations 2006 (SI No 268) establishes measures to protect shellfish waters, against pollution and to safeguard certain shellfish populations from various harmful consequences, resulting from the discharge of pollutant substances into the sea.	There are currently various Shellfish Waters with Shellfish Action Programmes in Ireland. Any proposed CFRAM works will have to ensure that the water quality of the Shellfish areas is not impacted upon by the flood risk management options proposed. Actions that may result through the Shellfish Water Action Programmes and have the potential to impact EU designated habitats and species cumulatively with this Plan must be assessed further at a project level. Project level assessment will ensure that cumulative impacts are addressed and therefore, no negative in-combination effects to Natura 2000 sites are expected.
Coillte District Strategic Plans:	Coillte's estate is divided into 317 forests, which are combined into 13 forest management districts. Coillte has developed plans for each of these districts, known as District Strategic Plans (DSPs), which describe Coillte's forests in the area and set out the long-term vision for the management of these forests as well as short-term objectives for the district.	DSPs address a wide range of economic, social and environmental objectives. They specifically recognise the impact forestry can have on water quality, and propose measures such as the introduction of riparian buffer zones to protect watercourses. Measures have the potential to provide a positive cumulative impact to the conservation objectives of designated features, however, these impacts must be determined at a project level through further assessment. Project level assessment will ensure that cumulative impacts are addressed and therefore, no negative in-combination effects to Natura 2000 sites are expected.
Turf-cutting: Industrial scale and other	Included in this assessment at the request of DAHRRG following public consultation. Turf cutting at all scales can impact upon conservation objectives of European designated sites by effecting water quality, water levels, habitat area, habitat quality and key species.	This plan is being conducted at a strategic level and as no locations of works have been identified, no in-combination impacts can be identified at this level with turf cutting. However, it is likely that on a project level there could be in-combination impacts that could arise, therefore it is recommended that any project level works will include the assessment of potential in-combination impacts with local turf-cutting, both legal and illegal at a project level. Project level assessment will ensure that cumulative impacts are addressed and therefore, no negative in-combination effects to Natura 2000 sites are expected.

## **B.6 Screening Summary and Conclusion**

As outlined in Table B-14-1 and Table B-14-2, a number of prevention, protection and preparedness flood risk management measures are deemed to have a likely significant effect on Natura 2000 sites. Given that the implementation extent of these measures at a plan level is throughout the River Basins, those Natura 2000 sites listed in Table B-14-4 could potentially be impacted as a result.

The proposed Plan is not directly connected with or necessary to the management of Natura 2000 sites. It is, accordingly, necessary for the competent authority to assess whether the proposed Plan, either individually or in combination with other plans or projects, would be likely to have significant effects on any Natura 2000 site.

Cumulative impacts have been assessed. There may be an increase in pressures upon designated features as a result of actions that will take place in the implementation of these plans, any potential impacts must be determined through AA screening at a project level. Project level assessment will ensure that cumulative impacts are addressed and therefore, no negative effects were determined to result from cumulative or in-combination impacts, between this River Basin Plan and the plans and policies assessed.

Given the presence of pathways and the potential impacts posed by the proposed Plan on the 19 Natura 2000 sites (Table B-14-4), it is concluded by the authors of this report that it is not possible to rule out (screen out) likely significant effects on these Natura 2000 sites. Therefore, it is recommended by the authors of this report that the proposed Plan should be brought forward to the second stage of the Appropriate Assessment process. The resulting Natura Impact Statement follows.

## **B.7 Natura Impact Statement**

This Natura Impact Statement (NIS) aims to determine whether the proposed Plan would result in significant adverse impacts on the integrity of any Natura 2000 site with respect to the site's structure, function, and/ or conservation objectives. It also aims to provide supporting information for the competent authority to carry out an Appropriate Assessment of the proposed Plan.

### **B.7.6 Potential significant effects**

The FRMP for River Basin 34 is a high level plan, which provides methods and measures for flood risk management. This proposed Plan does not detail specifics of the locations for the implementation of many of the measures that could cause significant effects on Natura 2000 sites. Thus, the potential significant effects are discussed below in terms of the measures being implemented throughout the River Basin.

However, flood risk management measures at an AFA level are viable within this River Basin and have been proposed for Ballina. Therefore, given the more localised nature of the potentially viable flood relief works, the potential significant effects on Natura 2000 sites within the vicinity of the potential works will be considered in Section B.7.7.

As outlined in Section B.2.4, the potential impacts that could occur through the implementation of the Plan are;

- Loss/ reduction of habitat area
- Disturbance to Key species
- Habitat or species fragmentation
- Reduction in species density
- Changes in key indicators of conservation value, such as changes in water quality and quantity.

#### **Loss or reduction of habitat area**

Direct habitat loss is caused where there is complete removal of a habitat type. Loss of habitat can also occur through the deterioration of habitat quality and therefore a loss of the function of that habitat. This can be due to factors such as land take requirements, physical alterations and introduction of invasive species.

There is potential that the Natura 2000 sites screened into this assessment may be adversely affected in this manner through the implementation of the proposed Plan. The measures of the proposed Plan, such as the review of development plans and resulting changes in land use management, minor works scheme, natural flood risk management measures, maintenance of channels and arterial drainage schemes, and individual property protection could result in the loss or reduction of habitat area. Protection and preparedness measures such as the voluntary home relocation and minor works scheme, and individual property protection will result in actions that will involve the development of physical structures, which could result in direct habitat loss with long term consequences.

Indirect habitat loss may also occur through disruption of hydrological links to a designated site that supports surface or ground water dependant habitats such as peatland and wetland habitats e.g. implementation of SuDs, diversion of water flows and maintenance of arterial drainage schemes.

The implementation of natural flood management measures, although primarily beneficial in the provision of refuges for species and the protection and restoration of bog and wetland habitats, may result in changes of land use within the River Basin. If measures are inappropriately implemented, habitat loss or degradation of habitat quality may occur.

As the measures of the proposed Plan are set at a high level, loss or reduction of habitat area of the Natura 2000 sites screened into this assessment cannot be ruled out at this stage.

Therefore, the significance of potential habitat loss will be assessed at project level and will be dependant on the final locations and detailed design of the proposed measures.

Mitigation measures are detailed in Section B.2.5 to ensure the potential for loss or reduction in habitat area will not adversely affect the integrity of a Natura 2000 site due to the implementation of the proposed Plan.

### Disturbance to key species

Key species are those species listed within the annexes of the Habitats Directive for which Natura sites are designated. Disturbance to species supported by a Natura site may result due to physical disturbance of a habitat that may result in direct mortalities or displacement of the species. Sources of disturbance may also take the form of increased noise, visual presence of people, vibration and increased illumination of areas. Increased disturbance levels within the sensitivity threshold of a species may cause the displacement or flight of a species from their respective habitat.

Of the SACs and SPAs screened into the assessment, the species that could be potentially disturbed are listed below in Table B-14-6. All the SPAs screened in to this assessment have key species that are vulnerable to disturbance of the proposed Plan.

**Table B-14-6: Key species of the Screened-in Natura 2000 sites**

Species	Natura 2000 site
Atlantic salmon	Newport River SAC
	Owenduff/Nephrin Complex SAC
	River Moy SAC
	Unshin River SAC
Bar-tailed Godwit	Killala Bay/Moy Estuary SPA
Brook lamprey	River Moy SAC
Common Gull	Lough Conn and Lough Cullin SPA
Common Scoter	Lough Conn and Lough Cullin SPA
Curlew	Killala Bay/Moy Estuary SPA
Dunlin	Killala Bay/Moy Estuary SPA
Freshwater pearl mussel	Newport River SAC
Geyer's whorl snail	Bellacorick Bog Complex SAC
	Clew Bay Complex SAC
	Lough Hoe Bog SAC
	Ox Mountains Bogs SAC
Golden Plover	Killala Bay/Moy Estuary SPA
Greenland White-fronted Goose	Lough Conn and Lough Cullin SPA
Grey Plover	Killala Bay/Moy Estuary SPA
Harbor seal	Clew Bay Complex SAC
	Killala Bay/Moy Estuary SAC
Lesser horseshoe bat	Ballinafad SAC
Marsh fritillary	Bricklieve Mountains & Keishcorran SAC
Marsh saxifrage	Bellacorick Bog Complex SAC
	Owenduff/Nephrin Complex SAC
	Ox Mountains Bogs SAC
Narrow-mouthed whorl snail	Killala Bay/Moy Estuary SAC
Otter	Clew Bay Complex SAC
	Owenduff/Nephrin Complex SAC
	River Moy SAC
	Unshin River SAC
Redshank	Killala Bay/Moy Estuary SPA
Ringed Plover	Killala Bay/Moy Estuary SPA
Sanderling	Killala Bay/Moy Estuary SPA
Sea lamprey	Killala Bay/Moy Estuary SAC
	River Moy SAC
Slender green feather-moss	Owenduff/Nephrin Complex SAC
Tufted Duck	Lough Conn and Lough Cullin SPA
White-clawed Crayfish	Bricklieve Mountains & Keishcorran SAC
	Lough Hoe Bog SAC

Species	Natura 2000 site
	River Moy SAC

In relation to the proposed Plan, activities that may potentially disturb key species are those that will result in physical disturbance due to works being carried out, such as the implementation of natural flood risk management measures, the minor works scheme, maintenance of channels and installation of new gauges. These measures may pose sources of disturbance during construction of works and their operation. The works may also cause disturbance to the resting and/ or breeding places and foraging areas of these key species.

The measures of the proposed Plan have the potential to cause disturbance impacts to key species of the Natura sites screened in to this assessment. As these measures are set at a high level and the location has not been determined, the significance of disturbance to key species will be assessed at project level and will be dependent on the final locations and detailed design of the proposed measures.

Mitigation measures are detailed in Section B.9 to ensure that disturbance to key species will not adversely affect the integrity of a Natura 2000 site due to the implementation of the proposed Plan.

### **Fragmentation**

Habitat and species fragmentation occurs when the connectivity between habitats and species is restricted or lost and impedes the natural movement of a species. This can result in singular habitat units being formed and isolated species communities. Fragmentation can arise as a result of barriers to migratory movements where important corridors exist, e.g. river, riparian and coastal corridors. The inappropriate installation of measures that may act as a barrier to free movement of a species and/ or physically separate a habitat, will result in fragmentation.

The implementation of measures such as natural flood management measures, minor scheme works and individual property protection may result in the installation of structures that may impeded movement of a species. For example, the inappropriate installation of a culvert may impede the movement of salmon within a river catchment and act as a migratory barrier. This may in turn prevent salmon reaching freshwater pearl mussel located upstream, thus breaking the lifecycle of freshwater pearl mussel and creating an isolated population.

As the measures of the proposed Plan are not specific regarding location of implementation, fragmentation of the Natura 2000 sites screened into this assessment cannot be ruled out. Therefore, the significance of potential fragmentation will be assessed at project level and will be dependent on the final locations and detailed design of the proposed measures.

Mitigation measures are detailed in Section B.9 to ensure that fragmentation will not adversely affect the integrity of a Natura 2000 site due to the implementation of the proposed Plan.

### **Reduction in species density**

Reduction in the density of species may arise due to the factors discussed above; habitat loss or degradation, disturbance and fragmentation. As outlined above, the measures of the proposed Plan have the potential to cause these impacts. The implementation of the voluntary home relocation scheme could also result in development in rural areas where species are sensitive to human activity.

As the measures of the proposed Plan are not specific regarding location of implementation, reduction in species density of the Natura 2000 sites screened into this assessment cannot be ruled out. Therefore, the significance of potential reduction of species density will be assessed at project level and will be dependent on the final locations and detailed design of the proposed measures.

Mitigation measures are detailed in Section B.9 to ensure that reduction in species density will not adversely affect the integrity of a Natura 2000 site due to the implementation of the proposed Plan.

### **Changes in key indicators of conservation value**

The key indicators of conservation value for the Natura sites likely to be affected by the implementation of the proposed Plan include surface water and groundwater quality and quantity. As outlined in the screening process the Natura sites either fall within the area of the River Basin or are hydrologically connected to the area of the proposed Plan. Any deterioration in water quality could potentially result in an adverse impacts, either directly or indirectly, on a range of habitats and species that are surface water or groundwater dependant, such as lakes, rivers, coastal lagoons and bays, seals, salmon, otter and freshwater pearl mussel. Maintaining the hydrological regime, e.g. recharge, flow rates and direction, of these habitats is also very important for the function and structure of the habitats and the species that they support.

The measures of the Plan, such as the review of development plans and resulting changes in land use management, implementation of SuDs, minor works scheme, natural flood risk management measures and maintenance of channels could potentially cause impacts to water quality and quantity. These pressures would mainly arise from the activity of both land-based and in-stream works, where there is the potential for discharge of silt laden runoff and pollutants such as hydrocarbons to coastal, freshwater and groundwater bodies. Hydrological alterations may also occur through the potential diversion of flows and implementation of SuDs and natural flood risk management measures. Therefore, all measures must be appropriately assessed for their suitability at a given location.

As the measures of the proposed Plan are not specific regarding location of implementation, changes in key indicators of conservation value of the Natura 2000 sites screened into this assessment cannot be ruled out. Therefore, the significance of potential changes in key indicators will be assessed at project level and will be dependant on the final locations and detailed design of the proposed measures.

Mitigation measures are detailed in Section B.9 to ensure that changes in key indicators of conservation value will not adversely affect the integrity of a Natura 2000 site due to the implementation of the proposed Plan.

#### B.7.7 AFA Measures – potential significant effects

As a location has been determined for potential flood relief works within Ballina, the potential impacts of the works are considered in relation to the screened in Natura 2000 sites that are within 5km and have hydrological connectivity to the AFA area. As the potentially viable flood relief works are not at final design and changes may occur, all qualifying interests of the screened in Natura 2000 sites must be considered, although at project level not all qualifying interests may be impacted by the potential scheme.

**Table B-14-7: Screened in Natura 2000 sites for AFA measures**

Site Code	Site name	Qualifying Interests
IE0000458	Killala Bay/Moy Estuary SAC	Sea lamprey ( <i>Petromyzon marinus</i> )
		Harbor seal ( <i>Phoca vitulina</i> )
		Narrow-mouthed whorl snail ( <i>Vertigo angustior</i> )
		Estuaries
		Mudflats and sandflats not covered by seawater at low tide
		Annual vegetation of drift lines
		Vegetated sea cliffs of the Atlantic and Baltic coasts
		Salicornia and other annuals colonising mud and sand
		Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritima</i> )
		Embryonic shifting dunes
		Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes)
		Fixed coastal dunes with herbaceous vegetation (grey dunes)
		Humid dune slacks
IE0002298	River Moy SAC	White-clawed Crayfish ( <i>Austropotamobius pallipes</i> )
		Brook lamprey ( <i>Lampetra planeri</i> )
		Otter ( <i>Lutra lutra</i> )
		Sea lamprey ( <i>Petromyzon marinus</i> )
		Atlantic salmon ( <i>Salmo salar</i> )
		Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i>



Site Code	Site name	Qualifying Interests
		(Alno-Padion, Alnion incanae, Salicion albae)
		Active raised bogs
		Degraded raised bogs still capable of natural regeneration
		Depressions on peat substrates of the Rhynchosporion
		Alkaline fens
		Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles
IE0004036	Killala Bay/Moy Estuary SPA	Ringed Plover ( <i>Charadrius hiaticula</i> )
		Golden Plover ( <i>Pluvialis apricaria</i> )
		Grey Plover ( <i>Pluvialis squatarola</i> )
		Sanderling ( <i>Calidris alba</i> )
		Dunlin ( <i>Calidris alpina</i> )
		Bar-tailed Godwit ( <i>Limosa lapponica</i> )
		Curlew ( <i>Numenius arquata</i> )
		Redshank ( <i>Tringa totanus</i> )
IE0004228	Lough Conn and Lough Cullin SPA	Greenland White-fronted Goose ( <i>Anser albifrons flavirostris</i> )
		Tufted Duck ( <i>Aythya fuligula</i> )
		Common Scoter ( <i>Melanitta nigra</i> )
		Common Gull ( <i>Larus canus</i> )

### Loss or reduction of habitat area

Significant direct habitat loss may occur as a result of AFA measures that may be implemented as part of the potential flood relief works within Ballina. This could include the complete or partial removal or reduction in habitat area of key habitats present that are designated due to their specific nature e.g. Alluvial forests with *A. glutinosa* and *F. excelsior* (Alno-Padion, Alnion incanae, Salicion albae) on the River Moy (of which the total extent is currently unknown) or Mudflats and sandflats not covered by seawater at low tide at Killala Bay; or habitats that are important for designated species e.g. The River Moy for Otter (*L. lutra*).

Direct habitat loss that may occur through the redirection of foot or vehicular traffic, causing trampling of previously undisturbed habitats and/or through the erection of hard structures such as walls or embankments causing a total habitat loss in a variety of habitats including wetland habitats around Ballina that are important for roosting, feeding and breeding water birds from Killala Bay/ Moy Estuary SPA e.g. Clookturk cutover Bog or Iniscrone Spit, or aquatic habitat including the River Moy, that is used by Otter, Lamprey, Salmon and further inland freshwater Crayfish.

Changes to a habitat can cause a reduction in habitat quality, resulting in a loss of habitat or a reduction in the suitable habitat area available for protected species. Salmon, lamprey and crayfish all require different hydromorphological features for various life stages. Changes to hydromorphological features could occur during construction if mitigation measures are not put in place to prevent siltation and disturbance resulting in hydromorphological alterations. Impacts that may occur during construction that may result in a loss or reduction of habitat area include contamination of water courses with hydrocarbons or nutrients, or through the introduction and/or spread of invasive species. Non-native invasive species, including Butterfly Bush, Cherry Laurel, Himalayan Knotweed, Japanese Knotweed and Canadian Waterweed have all been recorded as being present in Ballina Town within the last 10 years (www.nbdc.ie). Incorrect management of site compound could cause the inadvertent spread of any invasive species that may be present, or the introduction of new invasive species, reducing suitable habitat for native species. Unmitigated nutrient release to the River Moy could cause nutrient enrichment and potentially algal blooms and/or eutrophication.

There is potential that the Natura 2000 sites screened into this assessment may be adversely affected in this manner through the implementation of the proposed Plan. The measures of the proposed Plan that will involve the development of physical structures could result in direct habitat loss with long term consequences. Permanent structures, if sited inappropriately, could be located within sensitive and designated habitats, resulting in loss of that habitat e.g. shoreline habitats those that may be used for foraging by water birds including Plover, Dunlin (*C. alpina alpina*), Sanderling (*C. alba*), Redshank (*T. totanus*) or Bar-tailed Godwits (*L.*

*lapponica*) at Killala Bay/Moy Estuary SPA. Changes to normal physical processes through the construction of hard structures including flood walls and embankments, may impact natural erosion/ deposition processes, increase or decrease water table and result in a loss or reduction of habitat area including Mudflats and sandflats or *Salicornia* dominated habitats at Killala Bay/Moy Estuary SAC.

Indirect habitat loss may also occur through disruption of hydrological links to a designated site that supports surface or ground water dependant habitats such as peatland and wetland habitats e.g. creation of physical barriers preventing surface and ground water flows. Habitats and species that directly depend on groundwater can include terrestrial, surface water and groundwater habitats. At this site, this could include habitats such as Active Raised Bogs, Alkaline Fens, Alluvial Forests with *A. glutinosa* and *F. excelsior* (Alno-Padion, Alnion incanae, Salicion albae) within the River Moy SAC, or species such as the Narrow-mouthed Whorl Snail (*V. angustior*) at Killanley.

Mitigation measures are detailed in Section B.9 to ensure the potential for habitat loss will not adversely affect the integrity of a Natura 2000 site due to the implementation of the proposed Plan at the available level of detail. The implementation of AFA works will require further assessment at a project level, at which stage more detailed mitigation measures can be designed as appropriate, using details determined in the final design.

### **Disturbance to Key species**

Key species as listed under the Habitats and Birds Directive, that may be present are listed in Table B-14-7 and include Otter (*L. lutra*) recorded throughout the River Moy and around Killala Bay, Harbour Seal (*P. vitulina*) around Rinnacurry Point, Sea Lamprey (*P. marinus*) and Salmon (*S. salar*) on the River Moy, Narrow-mouthed Whorl Snail (*V. angustior*) and various riparian and wading bird species. These species can be impacted through noise, vibrational and visual disturbance. The River Moy, an important salmonid river, is connected to Lough Conn and Lough Cullin and supports Lamprey, Otter and Freshwater Crayfish (*A. pallipes*). Key species that may be present, are protected under the Habitats Directive but are not Qualifying Features of the SAC include bats, the Red listed Artic Char (*Salvelinus alpinus*) and floral species protected under the Flora Protection Order 1999 and amendments e.g. Heath Cudweed (*Omalotheca sylvatica*), Great Burnet (*Sanguisorba officinalis*) and Irish Ladies tresses (*Spiranthes romanzoffiana*). Vegetative species are not likely to be impacted by noise or visual disturbance and will only require assessment for significance of impact through vibrational disturbance at a more detailed project level. Disturbance can occur during construction of measures or afterwards during the operational phase. It can affect animal behaviour, changing normal foraging and commuting routes and causing breeding species to abandon their young. All potential mitigation measures that may alter or increase footfall in areas where key species may be present must be considered for impact and mitigated against. Visual impacts can arise from the presence of humans, equipment, structures and temporary or permanent lighting.

Seasonality of works will have to be taken into consideration as some key species may only be present and therefore, susceptible to disturbance during certain seasons i.e. wintering and migratory birds within the town of Ballina at the weir, Beleek and Tom Ruane park on the Sligo Road. Seasonality of works can increase or decrease the significance of potential impacts e.g. removal of mature trees that may provide winter roosts to bat species could cause fatal disturbance.

Mitigation measures are detailed in Section B.9 to ensure the potential for disturbance to key species will not adversely affect the integrity of a Natura 2000 site due to the implementation of the proposed Plan at the available level of detail during construction and operational phases. The implementation of AFA works will require further assessment at a project level, at which stage more detailed mitigation measures can be designed as appropriate, using details determined in the final design.

### **Habitat or species fragmentation**

Breaking up of habitats through the destruction of wildlife corridors or disturbance, or a loss / reduction in habitat area can result in interference with ecological units fragmenting habitat and species populations. Singular habitat units may be formed and isolated species communities may suffer long term through lack of genetic exchange. Habitat and species fragmentation will impact in-particular species with a local range and distribution e.g. Narrow-mouthed Whorl Snail (*V. angustior*) or mobile species that utilise linear developments as ecological corridors e.g. salmon or otter using the River Moy.

Species such as Whorl Snail that are very localised in their range, require specific wetland habitats and plants where they complete their lifecycle. Obstruction of natural hydrological processes, through erection of physical structures or siltation, can alter the water level of a habitat, causing it to dry out or increase in wetness levels. Altering the habitat in this way reduces its suitability as a habitat for localised species and can cause fragmentation of suitable habitats.

The inappropriate implementation of flood relief measures may result in the installation of structures that may impede movement of a species. Permanent structures including flood walls and embankments may restrict movement of species or separate habitats, especially in a riverine and coastal setting. Salmon and lamprey are migratory species that require connectivity between rivers and lakes. The migration of these species could potentially be impacted by measures, including the construction of structures adjacent to rivers including embankments. Installation of a culvert may impede the movement of lamprey or salmon within a river catchment e.g. erection of a culvert at Ballina could prevent salmon movement to Lough Conn and Lough Cullin.

Mitigation measures are detailed in Section B.9 to ensure the potential for habitat or species fragmentation will not adversely affect the integrity of a Natura 2000 site due to the implementation of the proposed Plan at the available level of detail during construction and operational phases. The implementation of AFA works will require further assessment at a project level, at which stage more detailed mitigation measures can be designed as appropriate, using details determined in the final design.

### **Reduction in species density**

The loss of suitable breeding and foraging habitat for coastal species including coastal, sea and riparian birds, either through disturbance or displacement, can cause a reduction in bird species population densities. Bird species, such as Curlew or Golden Plover may leave previously suitable habitats to find alternative breeding or foraging habitat due to disturbance or a reduction in habitat quality causing less successful breeding attempts and a lack of suitable food.

Due to the specific microhabitat requirements of Whorl Snail and their dependency on specific groundwater dependant habitats and plants, it is often restricted to a narrow zone around wetlands. Any impacts to those wetlands, could significantly impact the snail, reducing species density on a national level.

Otter, seals and dolphins are known to use coastal areas near Killala Bay. Disturbance or the erection of physical barriers that may influence the movement of prey species including salmonids, could result in further travel distances for foraging predators, requiring a higher calorie intake that may not be available locally. Salmon that are prevented from migrating to breeding grounds in subsequent years will then suffer from a reduction in species numbers. This will then result in lower numbers of prey species for predatory marine and freshwater mammals. Lower numbers of prey species will impact predatory marine and freshwater mammals and could result in an increase in the number of unsuccessful breeding attempts, causing a reduction in species density.

Mitigation measures are detailed in Section B.9 to ensure the potential for a reduction in species density will not adversely affect the integrity of a Natura 2000 site due to the implementation of the proposed Plan at the available level of detail during construction and operational phases. The implementation of AFA works will require further assessment at a project level, at which

stage more detailed mitigation measures can be designed as appropriate, using details determined in the final design.

### **Changes in key indicators of conservation value**

The key indicators of conservation value for the Natura sites outlined in Table B-14-7 that are likely to be affected by the implementation of the proposed Plan include surface water and groundwater quality and quantity, as these sites are hydrologically connected. Any deterioration in water quality during the construction phase or during operation could potentially result in direct or indirect adverse impacts, on a range of habitats and species that are surface water or groundwater dependant, such as wetlands for waterbirds that may be present at Lough Cullin or Quignashee bog and woodland, any Alluvial Woodland that may be present on the River Moy and habitat within the SAC used by Otter or Salmon. Maintaining the hydrological regime, e.g. recharge, flow rates and direction, of these habitats is also very important for the function and structure of the habitats and the species that they support.

Operational phase impacts could include newly erected flood walls interrupting groundwater flows and interacting with coastal/ riverine bodies causing changes to water table height, flow regime and flow rates. Discharges of silt laden waters or other pollutants can occur through improper management of runoff from hard structures erected as flood defence methods. During construction, discharge of silt laden runoff and pollutants such as hydrocarbons to coastal, freshwater and groundwater bodies can increase turbidity and cause adverse impacts. Groundwater dependant terrestrial ecosystems and the habitats and species that depend on them, including Narrow-mouthed whorl snail, will be impacted by changes to water quantity and quality at both operational and construction phases. This can include water levels in wetlands and the birds that utilise these habitats such as Curlew (*N. arquata*), Dunlin (*C. alpina alpina*) and Bar-tailed Godwit (*L. lapponica*). Therefore, all measures must be appropriately assessed for their suitability at a given location and all potential impacts must be considered at both construction and operational phase.

Mitigation measures are detailed in Section B.9 to ensure the potential for changes in key indicators of conservation value will not adversely affect the integrity of a Natura 2000 site due to the implementation of the proposed Plan at the available level of detail during construction and operational phases. The implementation of AFA works will require further assessment at a project level, at which stage more detailed mitigation measures can be designed as appropriate, using details determined in the final design.

## **B.8 Implementation routes for physical works**

Measures requiring physical works may either require planning consent or confirmation, or will be an exempted development.

Works that will require planning consent or confirmation, will be carried out by either the OPW or relevant Local Authority. Works may progress to construction stage as one of the following:

- Project led by OPW (or by a Local Authority on behalf of the OPW), under the Arterial Drainage Acts.
- Project led by the relevant Local Authority under the Planning and Development Regulations.
- Project led by the relevant Local Authority under the Strategic Infrastructure Act.

Project level assessments that may be required for all types of project include:

- Environmental Impact Assessment: For a project above the thresholds specified under Article 24 of the European Communities (Environmental Impact Assessment) Regulations, 1989 as amended or a project likely to have significant effects on the environment, having regard to the criteria specified for under Article 27 of the same EIA Regulations 1989 as amended.

- **Appropriate Assessment:** All projects will be screened for Appropriate Assessment and, where there is a potential for a significant effect on a European (Natura 2000) site, an Appropriate Assessment will be undertaken in accordance with the European Communities (Birds and Natural Habitats) Regulations 2011.

Exempted developments include those of limited scale and scope, that may fall under the category of Minor Flood Mitigation Works or Coastal Protection Scheme. Exempted developments may be carried out by Local Authorities under funding by the OPW, will be exempted in accordance with the Planning and Development Act 2000 (as amended) and will comply with all relevant environmental legislation. This could require the undertaking of an EIA or AA screening for physical works. Local Authorities must supply written confirmation of legislative compliance under condition of funding.

## **B.9 Mitigation Measures**

Projects stemming from the Flood Risk Management Plans (FRMP) will apply a range of standard processes and measures that will mitigate potential environmental impacts. While the applicability of processes and particular measures will be dependent on the nature and scale of each project, examples of typical processes and measures that will be implemented where applicable at the different stages of project implementation are set out below.

### **B.9.8 Project Mitigation: Consenting Process**

As set out in Section 0 above, the consenting process for the progression of measures involving physical works will require the applicable environmental assessments. Also, the consenting authorities may set out specific environmental conditions as part of the project approval.

### **B.9.9 Project Mitigation: Pre-Construction / Detailed Design**

For the detailed design of projects, where options are available, the design uses a hierarchy to mitigation measures along the following principles:

- **Avoidance:** avoid creating the potential impact where feasible.
- **Mitigation:** minimise the potential impact through mitigating measures
- **Enhancement:** Enhance the environment to better than pre-project conditions, where reasonably possible

The progression of a flood management project through the detailed design phase can entail a series of surveys to inform the design, where the scale of surveys would be proportionate to the complexity and potential impacts of the project. These can include:

- engineering structure surveys,
- topographical surveys,
- habitat & species surveys<sup>7</sup>
- ornithological surveys,
- bat surveys,
- fish surveys,

<sup>7</sup>

In the context of ecological mitigation, the habitat and species surveys are conducted as required to assess the various aspects for the project, such as ecological surveys for:

- protected or notable habitats and species, including Annex 1 habitats, Annex II and Annex IV species,
- species protected under the Wildlife Acts,
- species protected under the Flora Protection Order,
- the resting and breeding places of relevant species and,
- invasive species, both plant and animal.

- water quality surveys,
- archaeological surveys,
- landscape and visual assessments,
- land valuation surveys and
- other surveys as deemed necessary to prepare a project.

Where necessary, Wildlife Derogation Licences and archaeological licences will be sought from Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

The scope of the EIS will contain a WFD assessment, which will include a hydro-morphological assessment, to more clearly consider and support the Water Framework Directive (WFD) objectives (see Section 6.5.4 of FRMP). This WFD assessment will inform the project level AA regarding likely significant effects and adverse impacts on the site integrity of Natura 2000 sites in respect of their conservation objectives and if necessary, appropriate mitigation measures will be implemented at project level to ensure adverse effects will not occur.

The aim of the detailed option design process, in tandem with project-level assessments, would be to result in no loss of QI habitat, including non-priority QI habitats. While it is anticipated that this would be the case for the majority of options, if a project-level assessment at detailed design fails to avoid adverse effects on the integrity of a European site following imposition of mitigation in AA, an Assessment of Alternatives would be undertaken to identify alternative options that would not lead to adverse effects on the integrity of any European site. This would be undertaken prior to any further decisions on how to address the flood risk in the relevant area or prior to progressing to further stages of AA.

The potential role for non-structural measures for each flood risk area, including natural type flood management measures will be examined in more detail and incorporated into the scheme design if deemed appropriate.

#### **B.9.10 Project Mitigation: Construction Stage**

For large and complex projects and sites, where environmental management may entail multiple aspects, a project specific Construction Environmental Management Plan (CEMP) may be developed. This will form a framework for all environmental management processes, mitigation measures and monitoring and will include other environmental requirements such as invasive species management measures, if applicable.<sup>8</sup>

A designated environmental officer, project ecologist and project archaeologist will be appointed, as appropriate for the project.

#### **B.9.11 Project Monitoring**

The Plan, with its associated SEA and plan-level AA, sets out a series of monitoring requirements, in connection with the SEA objectives and the predicted effects of the Plan. For measures involving physical works, the project-level EIA and AA, where conducted, will set out the specific monitoring required for each measure.

<sup>8</sup>

There are a range standard type mitigation measures consisting of good construction practices and good planning of works, that are used within flood management projects such as for example: Refuelling of plant and vehicles away from watercourses, Installation of wheel-wash and plant washing facilities, working only within environmental windows e.g. in-stream works in salmonid channels from May to September, Integrate fisheries in-stream enhancement through the Environmental River Enhancement Programme

## **B.10 Summary and conclusion**

Proposed prevention, protection and preparedness flood risk management measures of the Plan are likely to have a significant effect on Natura 2000 sites that were screened to be within the zone of influence of River Basin 34. This NIS has determined the potential impacts that may occur through the implementation of the Plan and has assessed each one of these potential impacts in as much detail as is possible with the level of detail that is available at this higher plan level.

Viable works were identified for Ballina AFA within this River Basin and some proposed details of physical works that may be carried out because of the Plan are available. However, the design of these works has not been finalised and may change before being implemented. While potential impacts that may occur as a result of these proposed measures have been identified, it is not possible to determine all potential impacts at this plan level without the final project details. Therefore, while this NIS considers the potential project level works, any measures that will be implemented will be required to be screened for AA at a project level.

Mitigation measures that are provided in the NIS will be implemented throughout the entire extent of the execution of projects that may stem from the Plan. This includes mitigation measures to be implemented at the Consenting Process Stage, Pre-Construction, Construction and Monitoring.

Providing the recommended mitigation measures are implemented, it can be concluded by the authors of this report that this Plan will not adversely impact on the site integrity of Natura 2000 sites, either alone or in-combination with other plans, projects or policies.

## **B.11 Influence of NIS on the Plan**

This NIS informs both the Adopted Flood Risk Management Plan and the SEA Statement and Monitoring Programme. The Plan template has changed in response to direct observations made in the NIS and following Public Consultation of the NIS. During the identification of preferred options through Multi-Criteria Analysis, the Plan has incorporated key objectives of the Habitats Directive, including the avoidance of significant effects to the Natura 2000 network, in its assessment.

The Plan has been revised and the outcome of the revision of the Plan, has been a result of statutory consultation and the findings of this NIS. These revisions included clarifications to the consenting process, clarification on the process for the implementation of physical works and a refinement of the mitigation measures to be implemented. Specific comments relating to the draft NIS reports were raised by D/AHRRGA. Table B-14-8 outlines how these have been addressed in this final NIS report. On 28th January 2015 an Appropriate Assessment workshop was held at the OPW offices in Dublin, attended by representatives from all CFRAM consultants, the OPW and NPWS. The purpose of the workshop was to develop the approach to Appropriate Assessment for all projects and form the statutory consultation with NPWS. Some of the issues discussed at this meeting included procedural arrangements around the Natura Impact Assessments; AA Screenings; Plan-level mitigation; Source-pathway-receptor analysis for zones of influence; IROPI, etc.

The approval / adoption of the Plan has not and does not confer approval or permission for the installation or construction of any physical works, without AA Screening and Appropriate Assessment as necessary. Implementation of the Plan to the level as described at this stage, will require the inclusion of mitigation measures that have been detailed in this NIS. Following the approval of the Plan, the next stage is to progress the proposed flood risk management measures by undertaking more detailed assessment and design at project level, and for structural works, before submitting the proposal for Public Exhibition (under the Arterial Drainage Acts) or planning permission. For measures involving physical works, the project-level EIA and AA, where conducted, will set out the specific monitoring required for each measure. The need for on-site specific mitigation measures at a project level will be a requirement of the planning consent for physical project works. This NIS supports the recommendations of the Plan in this regard.

**Table B-14-8: Specific comments on the draft NIS for UoM 34**

Western CFRAM Specific Comments		
Dept. AHRRGA Responses		
ID	Description	Action
<b>SUB-16-459 (UoM 34)</b>	Appendix E – it is unclear how certain methods of flood risk management are deemed to be viable when they entail works and development within European sites, and it is acknowledged in the FRMP that the proposals have not been assessed.	The plan relates to the proposal to progress measures which will be subject to their own individual assessment as appropriate. The plan does not include project specific details.
	Ballina AFA – this involves a series of measures in and adjacent to River Moy cSAC (site code 002298) and Killala Bay/Moy Estuary SPA (site code 000458). The full scale and likely significant effects of these measures are not known. Mitigation measures are not specified in the plan, and the location within or the nearby presence of European sites is not acknowledged in all relevant cases. Further consideration should be given to the method(s) of installation of quay walls in rivers, and to the likely extent of the works areas involved, and to the pumping requirements that will exist in the future.	
	Appendix E – Rehabilitation and extension of existing walls along the River Moy – no mitigation measures are specified and the full details of projects, including the likely scale of construction and of works areas required, are not currently known. It is unclear how it is determined in the NIS that <i>“mitigation of impacts upon habitats and species associated with European sites is possible through the specification of appropriate design and construction methods”</i> .	
	Among other things, the River Deel supports an important population of Freshwater Pearl Mussel (non-SAC). The OPW is advised to ensure that no part of the plan, its implementation, or any associated actions, will occur in or near the Deel or associated tributaries, such that the species or its habitat would be adversely affected, or siltation, sedimentation or pollution would be caused. The wider Deel catchment and ‘ <i>Margaritifera</i> Sensitive Area’ should also be depicted clearly in the plan, with appropriate plan-level mitigation included as necessary.	Details provided in section B-4-2.



**Table B-14-8: Sites which have potential impacts, and from which scale of measure, with specific reference to AFA.**

Site code	Site name	Screening summary for sites brought forward from Screening for NIS							Assessment summary for potential UoM impacts. See Section B.7.1 for details.					Assessment summary for potential AFA measures related impacts. See Section B.7.2. for details.						
		Within UoM	Distance to UoM (km)	FWP M QI	Surfacewater pathway present	GWD TE QI	Groundwater pathway present	Requirement for Appropriate Assessment	At risk of Loss or reduction of habitat area	At risk of disturbance to key species	At risk of fragmentation	At risk of reduction in species density	At risk of changes in key indicators of conservation value	Within ZOI of AFA as defined in Section B.7.2.	Potential impacts from AFA scale measures	At risk of Loss or reduction of habitat area from AFA measures	At risk of disturbance to key species from AFA measures	At risk of fragmentation from AFA measures	At risk of reduction in species density from AFA measures	At risk of changes in key indicators of conservation value from AFA measures
IE0000463	Balla Turlough SAC	X	0		X	X	X	X	X		X	X	X							
IE0002081	Ballinacfad SAC	X	0		X		X	X	X	X	X	X	X							
IE0001922	Bellacorick Bog Complex SAC	X	0		X	X	X	X	X	X	X	X	X							
IE0001656	Bricklieve Mountains & Keishcorran SAC		12			X	X	X	X	X	X	X	X							
IE0001482	Clew Bay Complex SAC		7			X	X	X	X	X	X	X	X							
IE0001899	Cloonakillina Lough SAC		1			X	X	X	X		X	X	X							
IE0000497	Flughany Bog SAC		1			X	X	X	X		X	X	X							
IE0000458	Killala Bay/Moy Estuary SAC	X	0		X	X	X	X	X	X	X	X	X	Ballina	X	X	X	X	X	X
IE0004036	Killala Bay/Moy Estuary SPA	X	0		X	X	X	X	X	X	X	X	X	Ballina	X	X	X	X	X	X
IE0000516	Lackan Saltmarsh And Kilcummin Head SAC	X	0		X		X	X	X		X	X	X							
IE0004228	Lough Conn and Lough Cullin SPA	X	0		X	X	X	X	X	X	X	X	X	Ballina	X	X	X	X	X	X
IE0000633	Lough Hoe Bog SAC	X	0		X	X	X	X	X	X	X	X	X							
IE0000634	Lough Nabrickeagh Bog SAC	X	0		X	X	X	X	X		X	X	X							
IE0002144	Newport River SAC		1	X			X	X	X	X	X	X	X							
IE0000534	Owenduff/Nephin Complex SAC	X	0		X	X	X	X	X	X	X	X	X							
IE0002006	Ox Mountains Bogs SAC	X	0		X	X	X	X	X	X	X	X	X							
IE0002298	River Moy SAC	X	0		X	X	X	X	X	X	X	X	X	Ballina	X	X	X	X	X	X
IE0000637	Turloughmore (Sligo) SAC		0			X	X	X	X		X	X	X							
IE0001898	Unshin River SAC		0			X	X	X	X	X	X	X	X							

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## B.13 Appendix A: Natura 2000 sites screened in and their qualifying interests

Site code	Site name	All name
IE0000458	Killala Bay/Moy Estuary SAC	Harbour seal ( <i>Phoca vitulina</i> )
		Narrow-mouthed whorl snail ( <i>Vertigo angustior</i> )
		Sea lamprey ( <i>Petromyzon marinus</i> )
		Annual vegetation of drift lines
		Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</i> )
		Embryonic shifting dunes
		Estuaries
		Fixed coastal dunes with herbaceous vegetation (grey dunes)
		Humid dune slacks
		Mudflats and sandflats not covered by seawater at low tide
		Salicornia and other annuals colonising mud and sand
		Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes)
		Vegetated sea cliffs of the Atlantic and Baltic coasts
IE0000463	Balla Turlough SAC	Turloughs
IE0000497	Flughany Bog SAC	Active raised bogs
		Degraded raised bogs still capable of natural regeneration
		Depressions on peat substrates of the Rhynchosporion
IE0000516	Lackan Saltmarsh and Kilcummin Head SAC	Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</i> )
		Fixed coastal dunes with herbaceous vegetation (grey dunes)
		Mediterranean salt meadows ( <i>Juncetalia maritimi</i> )
		Salicornia and other annuals colonising mud and sand
		Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes)
IE0000534	Owenduff/Nephin Complex SAC	Atlantic salmon ( <i>Salmo salar</i> )
		Marsh saxifrage ( <i>Saxifraga hirculus</i> )
		Otter ( <i>Lutra lutra</i> )
		Slender green feather-moss ( <i>Drepanocladus vernicosus</i> )
		Alpine and Boreal heaths
		Blanket bogs (* if active bog)
		<i>Juniperus communis</i> formations on heaths or calcareous grasslands
		Natural dystrophic lakes and ponds
		Northern Atlantic wet heaths with <i>Erica tetralix</i>
		Oligotrophic waters containing very few minerals of sandy plains ( <i>Littorelletalia uniflorae</i> )
		Transition mires and quaking bogs
		Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation

Site code	Site name	All name
IE0000633	Lough Hoe Bog SAC	Geyer's whorl snail ( <i>Vertigo geyeri</i> )
		White-clawed Crayfish ( <i>Austropotamobius pallipes</i> )
		Blanket bogs (* if active bog)
		Oligotrophic waters containing very few minerals of sandy plains ( <i>Littorelletalia uniflorae</i> )
IE0000634	Lough Nabrickkeagh Bog SAC	Blanket bogs (* if active bog)
IE0000637	Turloughmore (Sligo) SAC	Turloughs
IE0001482	Clew Bay Complex SAC	Geyer's whorl snail ( <i>Vertigo geyeri</i> )
		Harbor seal ( <i>Phoca vitulina</i> )
		Otter ( <i>Lutra lutra</i> )
		Annual vegetation of drift lines
		Atlantic salt meadows ( <i>Glaucopuccinellietalia maritimae</i> )
		Coastal lagoons
		Embryonic shifting dunes
		Large shallow inlets and bays
		Machairs (* in Ireland)
		Mudflats and sandflats not covered by seawater at low tide
		Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles
		Perennial vegetation of stony banks
		Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes)
IE0001656	Bricklieve Mountains & Keishcorran SAC	Marsh fritillary ( <i>Euphydryas aurinia</i> )
		White-clawed Crayfish ( <i>Austropotamobius pallipes</i> )
		Calcareous and calcshist screes of the montane to alpine levels ( <i>Thlaspietea rotundifolii</i> )
		Lowland hay meadows ( <i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i> )
		Semi-natural dry grasslands and scrubland facies on calcareous substrates ( <i>Festuco-Brometalia</i> ) (* important orchid sites)
		Turloughs
IE0001898	Unshin River SAC	Atlantic salmon ( <i>Salmo salar</i> )
		Otter ( <i>Lutra lutra</i> )
		Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)
		Molinia meadows on calcareous, peaty or clayey-silt-laden soils ( <i>Molinion caeruleae</i> )
		Semi-natural dry grasslands and scrubland facies on calcareous substrates ( <i>Festuco-Brometalia</i> ) (* important orchid sites)
		Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation
IE0001899	Cloonakillina Lough SAC	Transition mires and quaking bogs
IE0001922	Bellacorick Bog Complex SAC	Geyer's whorl snail ( <i>Vertigo geyeri</i> )
		Marsh saxifrage ( <i>Saxifraga hirculus</i> )

Site code	Site name	All name
		Alkaline fens
		Blanket bogs (* if active bog)
		Depressions on peat substrates of the <i>Rhynchosporion</i>
		Natural dystrophic lakes and ponds
		Northern Atlantic wet heaths with <i>Erica tetralix</i>
IE0002006	Ox Mountains Bogs SAC	Geyer's whorl snail ( <i>Vertigo geyeri</i> )
		Marsh saxifrage ( <i>Saxifraga hirculus</i> )
		Blanket bogs (* if active bog)
		Depressions on peat substrates of the <i>Rhynchosporion</i>
		European dry heaths
		Natural dystrophic lakes and ponds
		Northern Atlantic wet heaths with <i>Erica tetralix</i>
		Oligotrophic waters containing very few minerals of sandy plains ( <i>Littorelletalia uniflorae</i> )
IE0002081	Ballinafad SAC	Transition mires and quaking bogs
		Lesser horseshoe bat ( <i>Rhinolophus hipposideros</i> )
IE0002144	Newport River SAC	Atlantic salmon ( <i>Salmo salar</i> )
		Freshwater pearl mussel ( <i>Margaritifera margaritifera</i> )
IE0002298	River Moy SAC	Atlantic salmon ( <i>Salmo salar</i> )
		Brook lamprey ( <i>Lampetra planeri</i> )
		Otter ( <i>Lutra lutra</i> )
		Sea lamprey ( <i>Petromyzon marinus</i> )
		White-clawed Crayfish ( <i>Austropotamobius pallipes</i> )
		Active raised bogs
		Alkaline fens
		Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)
		Degraded raised bogs still capable of natural regeneration
		Depressions on peat substrates of the <i>Rhynchosporion</i>
		Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles
IE0004036	Killala Bay/Moy Estuary SPA	Golden Plover ( <i>Pluvialis apricaria</i> )
		Ringed Plover ( <i>Charadrius hiaticula</i> )
		Grey Plover ( <i>Pluvialis squatarola</i> )
		Sanderling ( <i>Calidris alba</i> )
		Dunlin ( <i>Calidris alpina</i> )
		Bar-tailed Godwit ( <i>Limosa lapponica</i> )
		Curlew ( <i>Numenius arquata</i> )
		Redshank ( <i>Tringa totanus</i> )
IE0004228	Lough Conn and Lough Cullin SPA	Common Gull ( <i>Larus canus</i> )
		Greenland White-fronted Goose ( <i>Anser albifrons flavirostris</i> )

Site code	Site name	All name
		Tufted Duck ( <i>Aythya fuligula</i> )
		Common Scoter ( <i>Melanitta nigra</i> )

## **B.14 Appendix B: Conservation objectives of screened Natura 2000 sites**



## **B.14 Appendix B: Conservation objectives of screened Natura 2000 sites**



## **Conservation objectives for Balla Turlough SAC [000463]**

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.

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.

**Objective:** To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

<b>Code</b>	<b>Description</b>
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3180	Turloughs*
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\* denotes a priority habitat



**Citation:** NPWS (2016) *Conservation objectives for Balla Turlough SAC [000463]. Generic Version 5.0.*  
*Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.*

## Conservation objectives for Ballinafad SAC [002081]

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.

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.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

ADD HABITATS

Code	Common Name	Scientific Name
1303	Lesser Horseshoe Bat	<i>Rhinolophus hipposideros</i>

**Citation:** NPWS (2016) *Conservation objectives for Ballinafad SAC [002081]. Generic Version 5.0.*  
Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

## Conservation objectives for Bellacorick Bog Complex SAC [001922]

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.

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.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

Code	Description
3160	Natural dystrophic lakes and ponds
4010	Northern Atlantic wet heaths with <i>Erica tetralix</i>
7130	Blanket bogs (* if active bog)
7150	Depressions on peat substrates of the Rhynchosporion
7230	Alkaline fens
* denotes a priority habitat	

Code	Common Name	Scientific Name
1013	Geyer's Whorl Snail	<i>Vertigo geyeri</i>



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1528    Marsh Saxifrage    *Saxifraga hirculus*

**Citation:** NPWS (2016) *Conservation objectives for Bellacorick Bog Complex SAC [001922]. Generic Version 5.0. Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.*



## Conservation objectives for Bricklieve Mountains and Keishcorran SAC [001656]

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.

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.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

Code	Description
3180	Turloughs*
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates ( <i>Festuco Brometalia</i> ) (* important orchid sites)*
6510	Lowland hay meadows ( <i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i> )
8120	Calcareous and calcshist screes of the montane to alpine levels ( <i>Thlaspietea rotundifolii</i> )

\* denotes a priority habitat

Code	Common Name	Scientific Name
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1065	Marsh Fritillary	<i>Euphydryas aurinia</i>
1092	White-clawed Crayfish	<i>Austropotamobius pallipes</i>

**Citation:** NPWS (2016) *Conservation objectives for Bricklieve Mountains and Keishcorran SAC [001656]. Generic Version 5.0. Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.*



# National Parks and Wildlife Service

## *Conservation Objectives*

Clew Bay Complex SAC 001482



*An Roinn  
Ealaíon, Oidhreachta agus Gaeltachta*  
*Department of  
Arts, Heritage and the Gaeltacht*

## 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*

001482 Clew Bay Complex SAC

QI	Description
1013	Geyer's whorl snail <i>Vertigo geyeri</i>
1140	Mudflats and sandflats not covered by seawater at low tide
1150	* Coastal lagoons
1160	Large shallow inlets and bays
1210	Annual vegetation of drift lines
1220	Perennial vegetation of stony banks
1330	Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</i> )
1355	Otter <i>Lutra lutra</i>
1365	Common seal <i>Phoca vitulina</i>
2110	Embryonic shifting dunes
2120	Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ("white dunes")

## Supporting documents, relevant reports & publications (listed by date)

Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)

<b>Title:</b>	Monitoring and Assessment of Irish Lagoons for the purpose of the EU Water Framework Directive
<b>Year:</b>	in prep
<b>Author:</b>	Roden, C.M.; Oliver, G.
<b>Series:</b>	Unpublished report to the EPA
<b>Title:</b>	Clew Bay Complex SAC (001482): Conservation objectives supporting document - marine habitats and species [Version 1]
<b>Year:</b>	2011
<b>Author:</b>	NPWS
<b>Series:</b>	Unpublished Report to NPWS
<b>Title:</b>	Clew Bay Complex SAC (001482): Conservation objectives supporting document - coastal habitats [Version 1]
<b>Year:</b>	2011
<b>Author:</b>	NPWS
<b>Series:</b>	Unpublished Report to NPWS
<b>Title:</b>	Otter tracking study of Roaringwater Bay
<b>Year:</b>	2010
<b>Author:</b>	De Jongh, A.; O'Neill, L.
<b>Series:</b>	Unpublished Draft Report to NPWS
<b>Title:</b>	Subtidal benthic surveys (Clew Bay)
<b>Year:</b>	2009
<b>Author:</b>	Aquafact
<b>Series:</b>	Unpublished Report to NPWS
<b>Title:</b>	Saltmarsh Monitoring Report 2007-2008
<b>Year:</b>	2009
<b>Author:</b>	McCorry, M.; Ryle, T.
<b>Series:</b>	Unpublished Report to NPWS
<b>Title:</b>	Clew Bay baseline intertidal survey
<b>Year:</b>	2009
<b>Author:</b>	RPS
<b>Series:</b>	Unpublished Report to NPWS
<b>Title:</b>	Coastal Monitoring Project 2004-2006
<b>Year:</b>	2009
<b>Author:</b>	Ryle, T.; Murray, A.; Connolly, C.; Swann, M.
<b>Series:</b>	Unpublished Report to NPWS
<b>Title:</b>	The phytosociology and conservation value of Irish sand dunes
<b>Year:</b>	2008
<b>Author:</b>	Gaynor, K.
<b>Series:</b>	Unpublished PhD thesis, National University of Ireland, Dublin

<b>Title:</b>	Saltmarsh Monitoring Report 2006
<b>Year:</b>	2007
<b>Author:</b>	McCorry, M.
<b>Series:</b>	Unpublished Report to NPWS
<b>Title:</b>	Inventory of Irish coastal lagoons
<b>Year:</b>	2007
<b>Author:</b>	Oliver, G.
<b>Series:</b>	Unpublished Report to NPWS
<b>Title:</b>	A Survey of Intertidal Mudflats and Sandflats in Ireland
<b>Year:</b>	2006
<b>Author:</b>	Aquafact
<b>Series:</b>	Unpublished Report to NPWS
<b>Title:</b>	Otter Survey of Ireland 2004/2005
<b>Year:</b>	2006
<b>Author:</b>	Bailey, M.; Rochford, J.
<b>Series:</b>	Irish Wildlife Manuals No. 23
<b>Title:</b>	Otters - ecology, behaviour and conservation
<b>Year:</b>	2006
<b>Author:</b>	Kruuk, H.
<b>Series:</b>	Oxford University Press
<b>Title:</b>	Survey of sensitive subtidal benthic marine communities
<b>Year:</b>	2006
<b>Author:</b>	MERC
<b>Series:</b>	Unpublished Report to NPWS
<b>Title:</b>	Harbour seal population assessment in the Republic of Ireland: August 2003
<b>Year:</b>	2004
<b>Author:</b>	Cronin, M.; Duck, C.; Ó Cadhla, O.; Nairn, R.; Strong, D.; O'Keeffe, C.
<b>Series:</b>	Irish Wildlife Manuals No. 11
<b>Title:</b>	Summary of National Parks & Wildlife Service surveys for common (harbour) seals ( <i>Phoca vitulina</i> ) and grey seals ( <i>Halichoerus grypus</i> ), 1978 to 2003
<b>Year:</b>	2004
<b>Author:</b>	Lyons, D.O.
<b>Series:</b>	Irish Wildlife Manuals No. 13
<b>Title:</b>	Broadscale mapping of candidate marine Special Area of Conservation. Clew Bay Complex, cSAC (001482)
<b>Year:</b>	2003
<b>Author:</b>	SSI; Aquafact
<b>Series:</b>	Unpublished Report to NPWS
<b>Title:</b>	A Survey of selected littoral and sublittoral sites in Clew Bay, Co. Mayo
<b>Year:</b>	1999
<b>Author:</b>	Aquafact
<b>Series:</b>	Unpublished Report to NPWS

<b>Title:</b>	National Shingle Beach Survey of Ireland 1999
<b>Year:</b>	1999
<b>Author:</b>	Moore, D.; Wilson, F.
<b>Series:</b>	Unpublished Report to NPWS
<b>Title:</b>	Aquatic vegetation of Irish coastal lagoons
<b>Year:</b>	1998
<b>Author:</b>	Hatch, P.; Healy, B.
<b>Series:</b>	Bulletin of the Irish Biogeographical Society. 21: 2-21
<b>Title:</b>	A survey of the vegetation of Irish coastal lagoons
<b>Year:</b>	1996
<b>Author:</b>	Hatch, P.
<b>Series:</b>	Unpublished Report to NPWS
<b>Title:</b>	The spatial organization of otters ( <i>Lutra lutra</i> ) in Shetland
<b>Year:</b>	1991
<b>Author:</b>	Kruuk, H.; Moorhouse, A.
<b>Series:</b>	J. Zool, 224: 41-57
<b>Title:</b>	Otter survey of Ireland
<b>Year:</b>	1982
<b>Author:</b>	Chapman, P.J.; Chapman, L.L.
<b>Series:</b>	Unpublished Report to Vincent Wildlife Trust
<b>Title:</b>	Lough Furnace, County Mayo; physical and chemical studies of an Irish saline lake, with reference to the biology of <i>Neomysis integer</i>
<b>Year:</b>	1977
<b>Author:</b>	Parker, M.M.
<b>Series:</b>	Unpublished PhD thesis, University of Dublin, Trinity College.

## Spatial data sources

<b>Year:</b>	Interpolated 2011
<b>Title:</b>	Intertidal and subtidal surveys 1999, 2006, 2009; broadscale mapping 2003
<b>GIS operations:</b>	Polygon feature classes from marine community types base data sub-divided based on interpolation of marine survey data; expert opinion used as necessary to resolve any issues arising
<b>Used for:</b>	Marine community types, 1140 (maps 2 & 4)
<b>Year:</b>	2005
<b>Title:</b>	OSi Discovery series vector data
<b>GIS operations:</b>	High Water Mark (HWM) polyline feature class converted into polygon feature class; clipped to SAC boundary
<b>Used for:</b>	1160, 1365 (maps 3 & 9)
<b>Year:</b>	2005
<b>Title:</b>	OSi Discovery series vector data
<b>GIS operations:</b>	High water mark (HWM) and low water mark (LWM) polyline feature classes converted into polygon feature classes and combined; Saltmarsh and Sand Dune CO datasets erased out if applicable
<b>Used for:</b>	Marine community types base data (map 4)
<b>Year:</b>	Revision 2011
<b>Title:</b>	Inventory of Irish Coastal Lagoons. Version 3
<b>GIS operations:</b>	Clipped to SAC boundary
<b>Used for:</b>	1150 (map 5)
<b>Year:</b>	Revision 2010
<b>Title:</b>	Saltmarsh Monitoring Project 2007-2008. Version 1
<b>GIS operations:</b>	QIs selected; clipped to SAC boundary; overlapping regions with Sand Dune CO data investigated and resolved with expert opinion used
<b>Used for:</b>	1330 (map 6)
<b>Year:</b>	2009
<b>Title:</b>	Coastal Monitoring Project 2004-2006. Version 1
<b>GIS operations:</b>	QIs selected; clipped to SAC boundary; overlapping regions with Saltmarsh CO data investigated and resolved with expert opinion used
<b>Used for:</b>	1210, 2110, 2120 (map 7)
<b>Year:</b>	2005
<b>Title:</b>	OSi Discovery series vector data
<b>GIS operations:</b>	Creation of an 80m buffer on the marine side of the high water mark (HWM); creation of a 10m buffer on the terrestrial side of the HWM; combination of 80m and 10m HWM buffer datasets; creation of a 10m buffer on the landward side of the river banks data; creation of a 20m buffer applied to river centerline and stream data; combination of 10m river banks and 20m river and stream centerline buffer datasets; combined river and stream buffer dataset clipped to HWM; combination of HWM buffer dataset with river and stream buffer dataset; overlapping regions investigated and resolved; resulting dataset clipped to SAC boundary; expert opinion used as necessary to resolve any issues arising
<b>Used for:</b>	1355 (map 8)

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<b>Year:</b>	2011
<b>Title:</b>	NPWS rare and threatened species database
<b>GIS operations:</b>	Dataset created from spatial references in database records; expert opinion used as necessary to resolve any issues arising
<b>Used for:</b>	1365 (map 9)

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**1013 Geyer's whorl snail *Vertigo geyeri***

The status of Geyer's whorl snail as a qualifying Annex II species for Clew Bay Complex SAC is currently under review. The outcome of this review will determine whether a site-specific conservation objective is set for this species.

**1140 Mudflats and sandflats not covered by seawater at low tide**

To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in Clew Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 2	Habitat area was estimated using OSI data as 1277ha. See marine supporting document for further details
Community distribution	Hectares	The following sediment communities should be maintained in a natural condition: Intertidal sandy mud with <i>Tubificoides benedii</i> and <i>Pygospio elegans</i> community complex; Sandy mud with polychaetes and bivalves community complex; and Fine sand dominated by <i>Nephtys cirrosa</i> community. See map 4	The likely area of sediment communities was derived from a combination of intertidal and subtidal surveys undertaken in 1999, 2006 and 2009. See marine supporting document for further details

**1150 \* Coastal lagoons**

To maintain the favourable conservation condition of Lagoons in Clew Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 5 for mapped lagoons	The main lagoon is Furnace Lough. Claggan Lagoon has also been mapped, however, further information is required on this lagoon. NB there maybe other lagoons within the SAC. The following targets and notes concentrate on the largest lagoon, Furnace Lough
Habitat area	Hectares	Area stable, subject to slight natural variation. Favourable reference area of surveyed lagoons is 163.3ha. Furnace Lough- 162.1ha; Claggan Lagoon- 1.2ha. See map 5	Areas calculated from spatial data derived from Oliver, 2007. NB there maybe other lagoons within the SAC
Salinity regime	Practical salinity units (psu)	Maintain current spatial and temporal variation in salinity regime	Furnace Lough is a natural, deep (up to 21m), stratified lagoon with natural periodic overturns and anoxia. It has permanent open connection to the sea through which seawater enters when tides exceed MHWN though this connection is somewhat constricted by weirs. There are major freshwater inputs at the northern end from the large Lough Feeagh/Burrishoole catchment area. The surface layer is oligohaline to mesohaline (0.5-12.0 psu) for most of the time but salinity varies from north (fresh water) to south (high salinity) and summer to winter. The waters are sharply stratified, a permanent halocline runs from 1-3m down to 8m, below which the water is of constant salinity (approx. 20psu), anaerobic and stagnant (Parker, 1977). See Oliver (2007) and Roden and Oliver (in prep.) for further information
Hydrological regime	Metres	Maintain current annual water level fluctuations	This is to ensure maintenance of the current communities of the lagoon margins and the current hydrological functioning of the lagoon itself, especially the salinity regime
Hydrological regime	Discharge (m <sup>3</sup> /second)	Maintain/restore freshwater discharge regime	There is evidence that the original hydrological regime in the Burrishoole catchment has been impacted due to overgrazing and afforestation resulting in changes to run-off regimes with associated increased siltation and eutrophication. The extent to which these changes have impacted on Lough Furnace is unclear but needs further study

**1150 \* Coastal lagoons**

**To maintain the favourable conservation condition of Lagoons in Clew Bay Complex SAC, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Barrier	Weir function	Maintain current weir structure at Furnace Lough to ensure maintenance of the current salinity regime	In Furnace Lough, input to and output of saline water is affected to an unknown degree by two weirs. The effect of the weirs needs to be quantified to determine their effect on the salinity regime of the lagoon. These weirs or some similar type structures are shown on the first edition of the 6" OS maps and therefore have been in place for over 170 years
Water quality: chlorophyll a	µg/L	Maintain annual median chlorophyll in Furnace Lough at less than 2.5µg/L	These limits are needed to ensure that excessive shading from phytoplankton does not reduce submergent macrophytes colonisation of the littoral zone the lagoon (J. Ryan, pers comm). The current median levels are less than the target but summer levels are elevated (Roden and Oliver, in prep.) and should be closely monitored
Water quality: Molybdate Reactive Phosphorus (MRP)	mg/L	Maintain annual median MRP in Furnace Lough at less than 0.01mg/L	These limits are needed to ensure that excessive shading from phytoplankton does not reduce submergent macrophytes colonisation of the littoral zone areas of the lagoon (J. Ryan, pers comm). The current median levels in Furnace Lough are 0.005mg/L (Roden and Oliver, in prep). It is possible that the target may be exceeded during periods of overturn. Collection of data on nutrient levels close to the halocline would be useful for the assessment of this possibility
Water quality: Dissolved Inorganic Nitrogen (DIN)	mg/L	Maintain annual median DIN (Dissolved inorganic nitrogen) in Furnace Lough at less than 0.15mg/L	These limits are needed to ensure that excessive shading from phytoplankton does not reduce submergent macrophytes colonisation of the littoral zone of the lagoon (J. Ryan, pers comm). The current median levels of DIN in Furnace Lough are less than 0.1mg/L (Roden and Oliver, in prep)
Water quality: Biological Oxygen Demand (BOD)	mg/L	Maintain annual median BOD (Biological Oxygen Demand) in Furnace Lough at less than 2.0mg/L	These limits are needed to ensure that excessive shading from phytoplankton does not reduce submergent macrophytes colonisation of the littoral zone of the lagoon (J. Ryan, pers comm). The current annual median levels of BOD in Furnace Lough are just below the target (Roden and Oliver, in prep) and should be closely monitored. The relationship between organic matter, mainly peat silt, input from L. Feeagh and BOD in the surface waters and anoxia in the deeper waters warrants further investigation

**1150 \* Coastal lagoons**

**To maintain the favourable conservation condition of Lagoons in Clew Bay Complex SAC, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Depth of submergent macrophyte colonisation	Metres	Maintain/increase the depth of submergent macrophyte colonisation of the lagoon	Increased depth of colonisation increases both the extent and diversity of submergent macrophytes. In comparison with similar lagoons the extent of submergent macrophyte colonisation in Furnace Lough appears to be restricted probably due to high water colour. However data on the depth of colonisation and water colour and the relationship between them is lacking. It is also possible that anoxia may be a problem, at least in some areas. These issues need to be investigated
Typical plant species	Number and m <sup>2</sup>	Maintain number and extent of listed lagoonal specialists, subject to natural variation	Species in Furnace Lough listed in Oliver (2007), Hatch (1996) and Hatch and Healy (1998). A very limited number of plant species are currently listed for the site based on a series of shallow water transects. A snorkelling survey of this complex lagoon is required establish if that list is fully representative of the flora of the lagoon
Typical animal species	Number	Maintain listed lagoon specialists, subject to natural variation	Species in Furnace Lough listed in Oliver (2007), which rated the aquatic fauna as of moderate-high conservation value based on its high diversity and the presence of rare and unexpected crustaceans
Negative indicator species	Number and % cover	Negative indicator species absent or under control	Eutrophication would favour phytoplankton blooms at the expense of submerged macrophytes

**1160 Large shallow inlets and bays**

To maintain the favourable conservation condition of Large shallow inlets and bays in Clew Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 3	Habitat area was estimated using OSI data as 10189ha. See marine supporting document for further details.
Community extent	Hectares	Maintain the natural extent of the <i>Zostera</i> dominated and maërl dominated communities. See map 4	The likely extent of the <i>Zostera</i> dominated and maërl dominated communities was derived from the acoustic survey and the dive survey undertaken in 2006. See marine supporting document for further details
Shoot density	Shoots per m <sup>2</sup>	Maintain the high quality of <i>Zostera</i> dominated community	2006 diver observation and underwater viewer. See marine supporting document for further details
Community structure	Biological composition	Maintain the high quality of maërl dominated communities	Area established from an acoustic mapping survey 2003 and a 2006 diver observation and underwater viewer. See marine supporting document for further details
Community distribution	Hectares	The following communities should be maintained in a natural condition: Sandy mud with polychaetes and bivalves community complex; Fine sand dominated by <i>Nephtys cirrosa</i> community; Intertidal sandy mud with <i>Tubificoides benedii</i> and <i>Pygospio elegans</i> community complex; Shingle; and Reef. See map 4	The likely area of sediment communities was derived from a combination of acoustic mapping survey in 2003, intertidal data from 1999, 2006 and 2009 and subtidal data obtained in 1999 and 2009. See marine supporting document for further details

**1210 Annual vegetation of drift lines**

**To maintain the favourable conservation condition of Annual vegetation of driftlines in Clew Bay Complex 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, including erosion and succession. For sub-sites mapped: Bartraw - 0.04ha and Rosmurrevagh - 0.08ha. See map 7	Current area unknown. Two sub-sites (Bartraw and Rosmurrevagh) were mapped during the Coastal Monitoring Project (Ryle et al., 2009), giving a total estimated area of 0.12ha. NB further unsurveyed areas maybe present in the site. Habitat is very difficult to measure in view of its dynamic nature which means that it can appear and disappear within a site from year to year. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes	Current distribution unknown. Majority of habitat found at Bartraw and Rosmurrevagh, although there may be additional patches distributed throughout the site. See coastal habitats supporting document for further details
Physical structure: functionality and sediment supply	Presence/absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Dunes are naturally dynamic systems that require continuous supply and circulation of sand. Accumulation of organic matter in tidal litter is essential for trapping sand and initiating dune formation. Physical barriers can lead to fossilisation or over-stabilisation of dunes, as well as beach starvation resulting in increased rates of erosion. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain the presence of species-poor communities with typical species: <i>Cakile maritima</i> , <i>Honckenya peploides</i> , <i>Salsola kali</i> and <i>Atriplex</i> spp.	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details

**1220 Perennial vegetation of stony banks**

**To maintain the favourable conservation condition of Perennial vegetation of stony banks in Clew Bay Complex 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, including erosion and succession	Current area unknown, but Clew Bay is considered to have the largest shingle reserves in the country. It was recorded from Clew Bay Complex, Bartraw and Rosmurrevagh during the National Shingle Beach Survey (Moore and Wilson, 1999), but the extent was not mapped. The Coastal Monitoring Project mapped 0.48ha of this habitat at Bartraw and 0.01ha at Rosmurrevagh (Ryle et al., 2009). The extent is considerably greater than this figure, as substantial shingle deposits are known to occur in association with many of the drumlins in Clew Bay. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes	Distribution unknown at present, although the habitat has been recorded at Clew Bay Complex (Moore and Wilson, 1999), as well as Bartraw and Rosmurrevagh (Moore and Wilson, 1999; Ryle et al., 2009). See coastal habitats supporting document for further details
Physical structure: Functionality and sediment supply	Presence/absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Site represents the only known example of incipient gravel barrier formation in the country. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Moore and Wilson (1999) and Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain the presence of species-poor communities with typical species: <i>Honckenya peploides</i> , <i>Beta vulgaris</i> ssp. <i>maritima</i> , <i>Crithmum maritimum</i> , <i>Tripleurospermum maritimum</i> , <i>Glaucium flavum</i> and <i>Silene uniflora</i>	Based on data from Moore and Wilson (1999) and Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from Moore and Wilson (1999) and Ryle et al. (2009). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. See coastal habitats supporting document for further details



## Conservation objectives for: Clew Bay Complex SAC [001482]

### 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)

To restore the favourable conservation condition of Atlantic salt meadows in Clew Bay Complex 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, including erosion and succession. For sub-sites mapped: Mallaranny - 19.76ha, Tooreen - 1.06ha, Rosmurrevagh - 6.40ha, Tierna - 0.39ha, Rockfleet Castle - 0.37ha, Rosharnagh East - 0.03ha, Caraholly - 0.36ha, Kiladangan - 0.96ha, Annagh Island - 5.23ha, Bartraw - 0.38ha. See map 6	Based on data from the Saltmarsh Monitoring Project (McCorry, 2007). Ten sub-sites were mapped (34.94ha) and additional areas of potential saltmarsh (3.92ha) were identified for an examination of aerial photographs, giving a total estimated area of 38.86ha. NB further unsurveyed areas maybe present within the site. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 6 for known distribution	Based on data from McCorry (2007). See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions	See coastal habitats backing document for further details
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession	Based on data from McCorry (2007). The efficiency of sediment circulation throughout a saltmarsh depends on the creek pattern. See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	Based on data from McCorry (2007). See coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% area outside creeks vegetated.	Based on data from McCorry (2007). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry & Ryle, 2009)	Based on data from McCorry (2007). See coastal habitats supporting document for further details

**1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)**

To restore the favourable conservation condition of Atlantic salt meadows in Clew Bay Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Vegetation structure: negative indicator species - <i>Spartina anglica</i>	Hectares	No significant expansion of <i>Spartina</i> . No new sites for this species and an annual spread of less than 1% where it is already known to occur	Based on data from McCorry (2007). See coastal habitats supporting document for further details

**1355 Otter *Lutra lutra***

**To restore the favourable conservation condition of Otter in Clew Bay Complex 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. FCS target, based on 1980/81 survey findings, is 88% in SACs. Current range in west estimated at 70% (Bailey and Rochford, 2006)
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 233.1ha above high water mark (HWM); 47.3ha along river banks/ around ponds	No field survey. Areas mapped to include 10m terrestrial buffer along shoreline (above HWM and along river banks) identified as critical for otters (NPWS, 2007)
Extent of marine habitat	Hectares	No significant decline. Area mapped and calculated as 2426.7ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (HWM) (NPWS, 2007; Kruuk, 2006)
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 10.2km	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/lagoon) habitat	Hectares	No significant decline. Area mapped and calculated as 141.3ha	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, 2006; Kruuk and Moorhouse, 1991)
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) and wrasse and rockling in coastal waters (Kingston et al., 1999)
Barriers to connectivity	Number	No significant increase. For guidance, see map 8	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

**1365 Common seal *Phoca vitulina***

**To maintain the favourable conservation condition of Harbour seal in Clew Bay Complex SAC, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Access to suitable habitat	Number of artificial barriers	Species range within the site should not be restricted by artificial barriers to site use	See marine supporting document for further details
Breeding behaviour	Breeding sites	The breeding sites should be maintained in a natural condition. See map 9	Attribute and target based on background knowledge of Irish breeding populations, review of data from Lyons (2004) and unpublished National Parks and Wildlife Service records. See marine supporting document for further details
Moulting behaviour	Moult haul-out sites	The moult haul-out sites should be maintained in a natural condition. See map 9	Attribute and target based on background knowledge of Irish populations, review of data from Lyons (2004), Cronin et al. (2004) and unpublished National Parks and Wildlife Service records. See marine supporting document for further details
Resting behaviour	Resting haul-out sites	The resting haul-out sites should be maintained in a natural condition. See map 9	Attribute and target based on background knowledge of Irish populations, review of data from Lyons (2004) and unpublished National Parks and Wildlife Service records. See marine supporting document for further details
Disturbance	Level of impact	Human activities should occur at levels that do not adversely affect the harbour seal population at the site	See marine supporting document for further details

**2110 Embryonic shifting dunes**

**To restore the favourable conservation condition of Embryonic shifting dunes in Clew Bay Complex 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, including erosion and succession. For sub-sites mapped: Bartraw - 0.02ha and Rosmurrevagh - 1.38ha. See map 7	Current area unknown. Two sub-sites (Bartraw and Rosmurrevagh) were mapped during the Coastal Monitoring Project (Ryle et al., 2009), giving a total estimated area of 1.40ha. NB further unsurveyed areas maybe present in the site. Habitat is very difficult to measure in view of its dynamic nature. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 7 for known distribution	Mobile dunes are well developed at Rosmurrevagh, while those at Bartraw have been compromised by the installation of coastal protection works. See coastal habitats supporting document for further details
Physical structure: functionality and sediment supply	Presence/absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Dunes are naturally dynamic systems that require continuous supply and circulation of sand. Physical barriers can lead to fossilisation or over-stabilisation of dunes, as well as beach starvation resulting in increased rates of erosion. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: plant health of foredune grasses	Percentage cover	More than 95% of <i>Elytrigia</i> and/or <i>Leymus</i> should be healthy (i.e. green plant parts above ground and flowering heads present)	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover	Maintain the presence of species-poor communities with typical species: <i>Elytrigia juncea</i> and/or <i>Leymus arenarius</i>	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from Ryle et al. (2009). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. Sea-buckthorn ( <i>Hippophae rhamnoides</i> ) should be absent or effectively controlled. See coastal habitats supporting document for further details

**Conservation objectives for: Clew Bay Complex SAC [001482]**

**2120 Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")**

**To restore the favourable conservation condition of Shifting dunes along the shoreline with *Ammophila arenaria* in Clew Bay Complex 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 including erosion and succession. For sub-sites mapped: Bartraw - 0.18ha and Rosmurrevagh - 0.36ha. See map 7	Current area unknown. Two sub-sites (Bartraw and Rosmurrevagh) were mapped during the Coastal Monitoring Project (Ryle et al., 2009), giving a total estimated area of 0.54ha. NB further unsurveyed areas may be present in the site. Habitat is very difficult to measure in view of its dynamic nature. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 7 for known distribution	Mobile dunes are well developed at Rosmurrevagh, while those at Bartraw have been compromised by the installation of coastal protection works. See coastal habitats supporting document for further details
Physical structure: functionality and sediment supply	Presence/absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Dunes are naturally dynamic systems that require continuous supply and circulation of sand. <i>Ammophila</i> reproduces vegetatively and requires constant accretion of fresh sand to maintain active growth encouraging further accretion. Physical barriers can lead to fossilisation or over-stabilisation of dunes, as well as beach starvation resulting in increased rates of erosion. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Gaynor (2008) and Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: plant health of dune grasses	Percentage cover	More than 95% of <i>Ammophila</i> and/or <i>Leymus</i> should be healthy (i.e. green plant parts above ground and flowering heads present)	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain the presence of species-poor communities dominated by <i>Ammophila arenaria</i> and/or <i>Leymus arenarius</i>	Based on data from Gaynor (2008) and Ryle et al. (2009). See coastal habitats supporting document for further details

**2120      Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")**

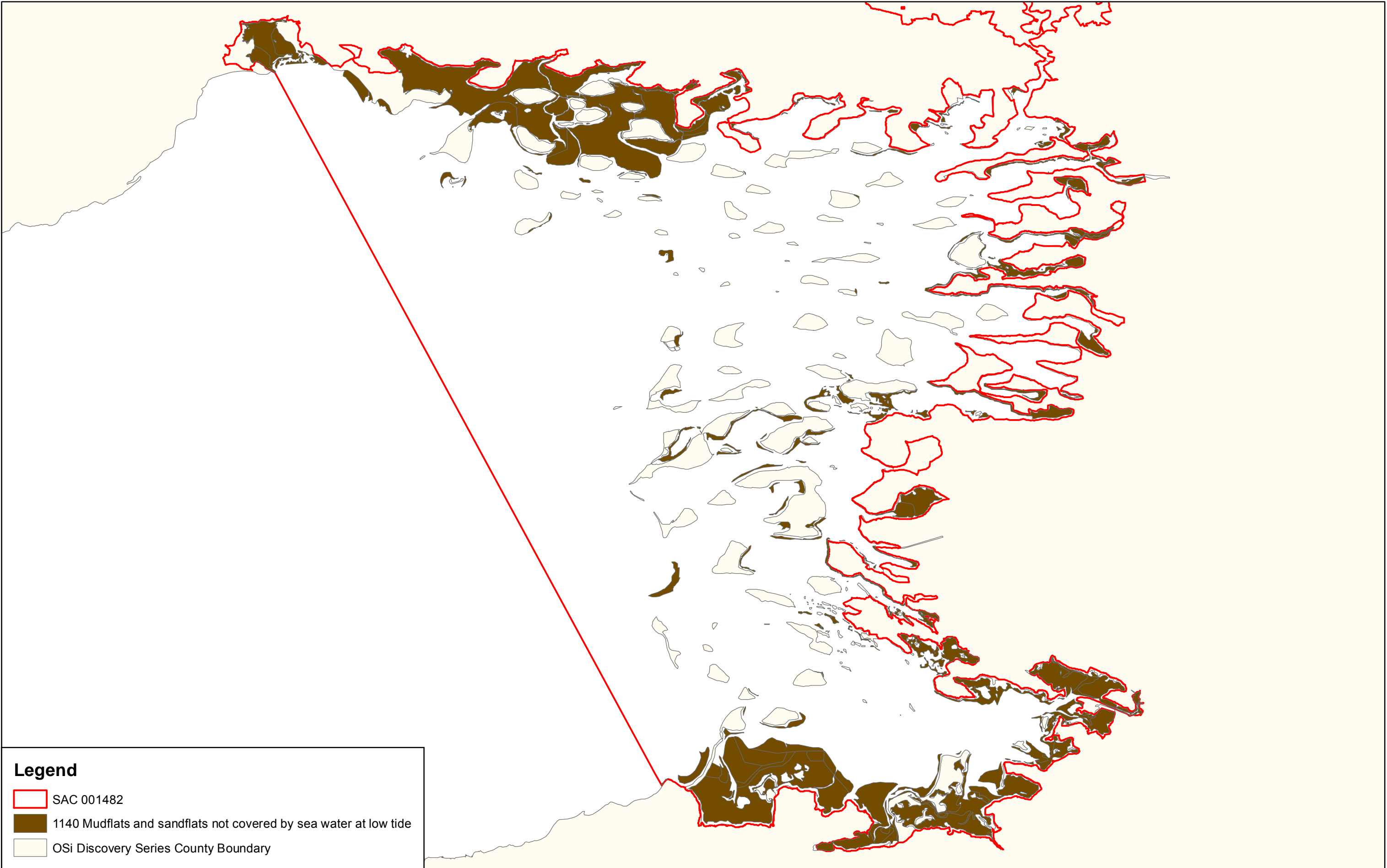
**To restore the favourable conservation condition of Shifting dunes along the shoreline with *Ammophila arenaria* in Clew Bay Complex SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from Ryle et al. (2009). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. Sea-buckthorn ( <i>Hippophae rhamnoides</i> ) should be absent or effectively controlled. See coastal habitats supporting document for further details







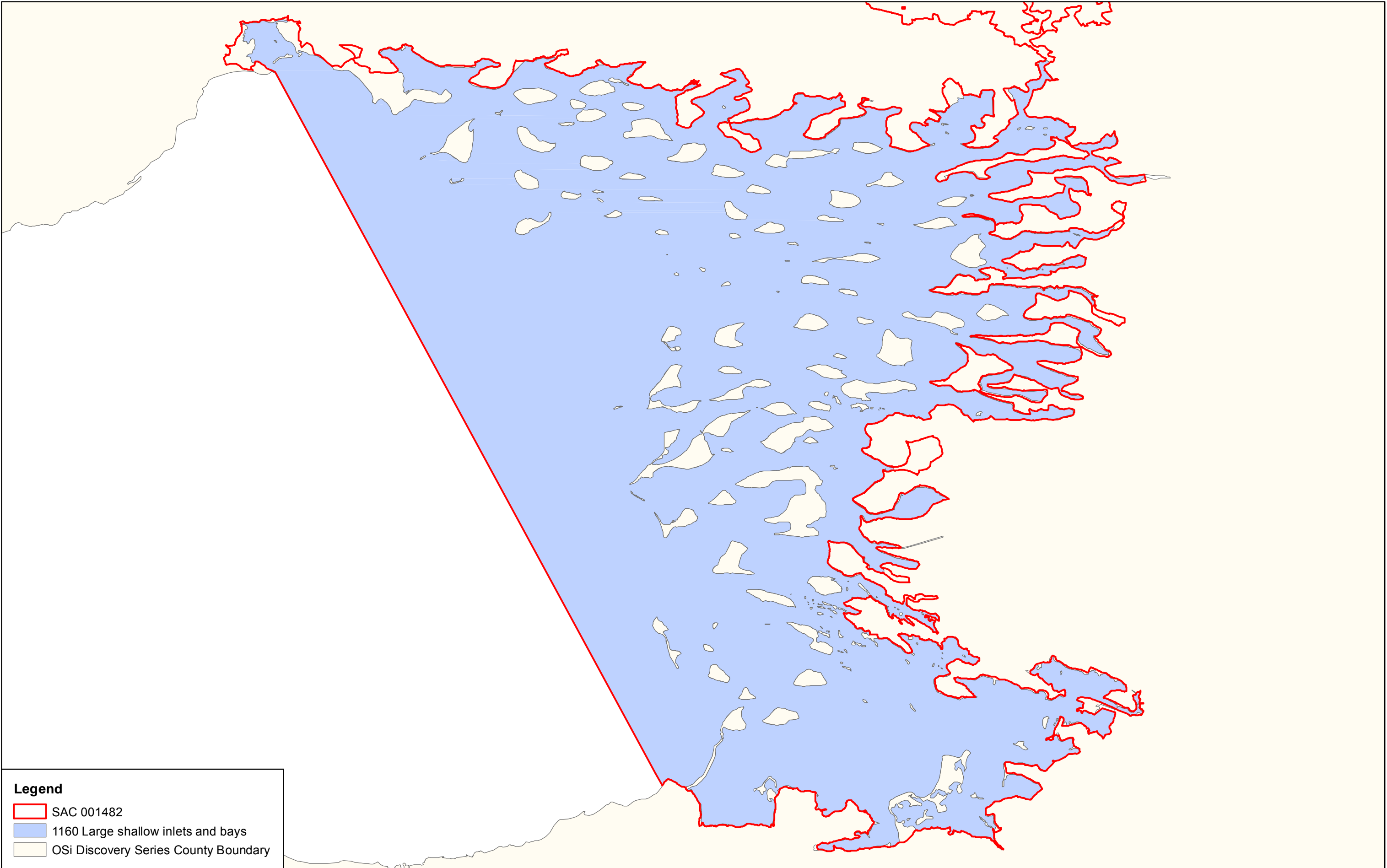


**Legend**

SAC 001482


1140 Mudflats and sandflats not covered by sea water at low tide

OSi Discovery Series County Boundary



**Legend**

- SAC 001482
- 1160 Large shallow inlets and bays
- OSi Discovery Series County Boundary



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**MAP 3:**  
**CLEW BAY COMPLEX**  
**CONSERVATION OBJECTIVES**  
**LARGE SHALLOW INLETS AND BAYS**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

**COUNTY MAYO**


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3 km

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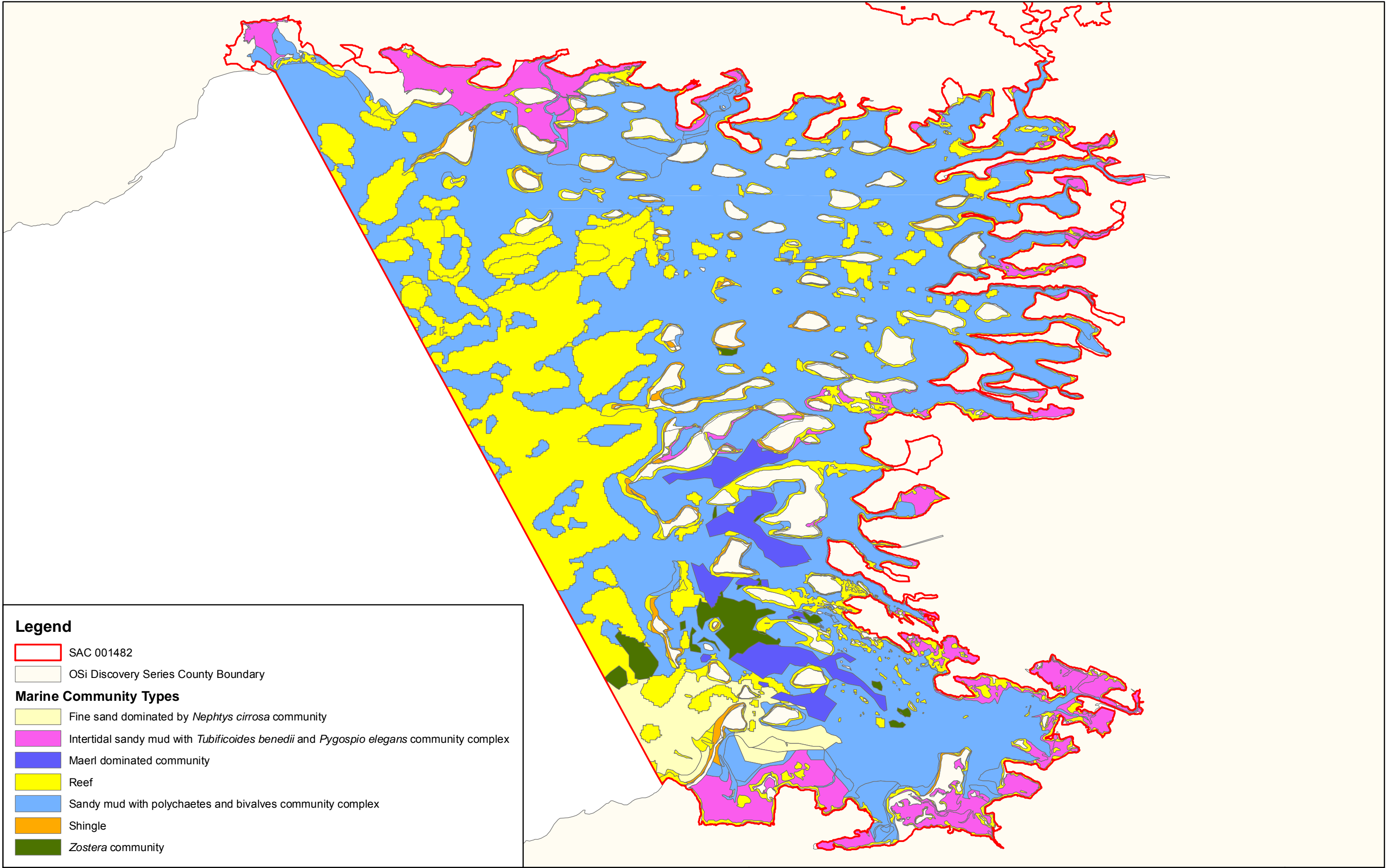


The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material by permission of the Government (Permit number EN 0059208).  
Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbhreithniú a déanamh ar theorainneacha na gceantar comharthaíthe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadúnas Uimh. EN 0059208)

**SITE CODE**

**SAC 001482**  
**Version 1.05**

**Map Version 1**  
**Date: June 2011**



**Legend**

SAC 001482

OSi Discovery Series County Boundary

**Marine Community Types**

Fine sand dominated by *Nephtys cirrosa* community

Intertidal sandy mud with *Tubificoides benedii* and *Pygospio elegans* community complex

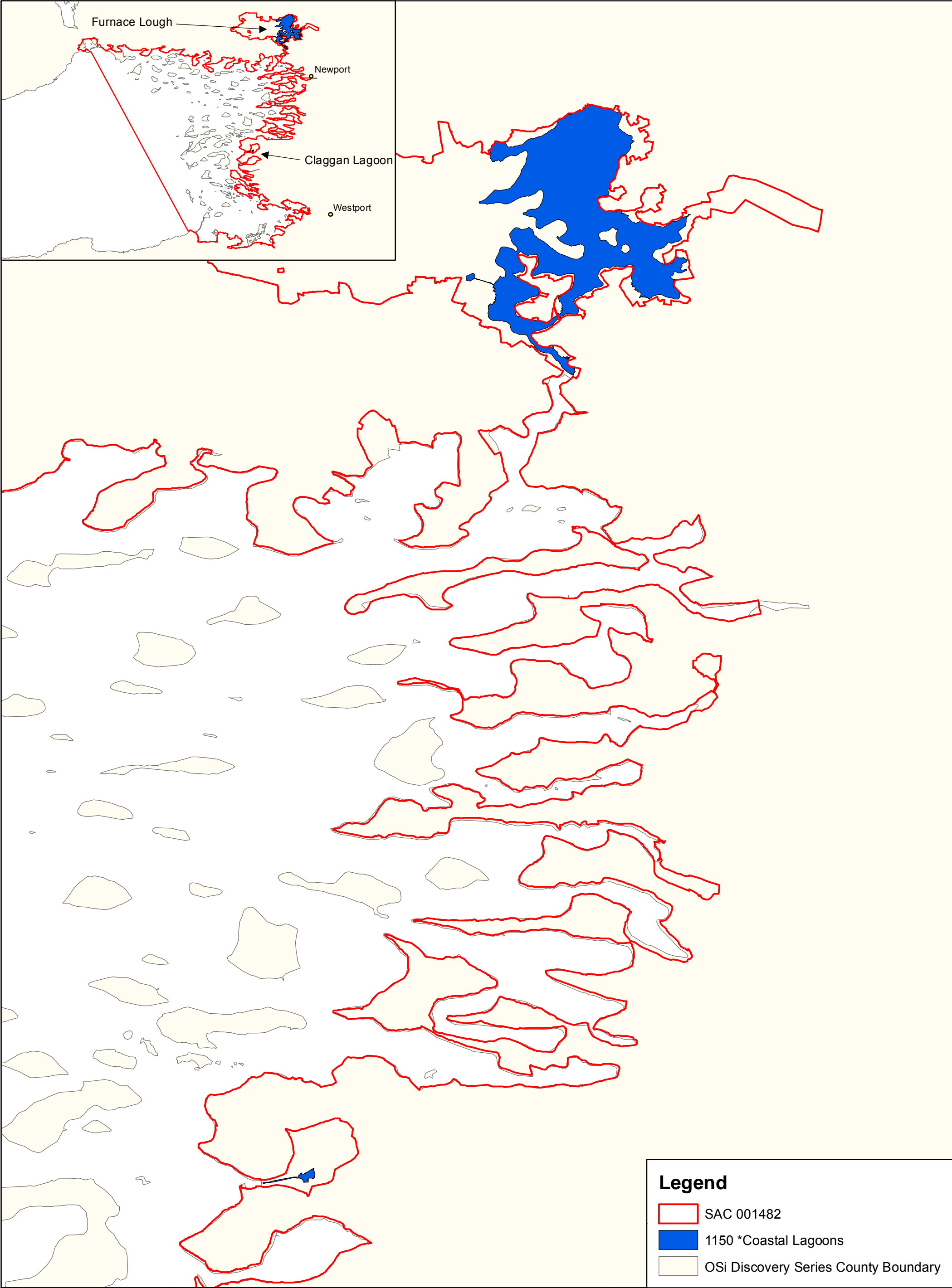
Maerl dominated community

Reef

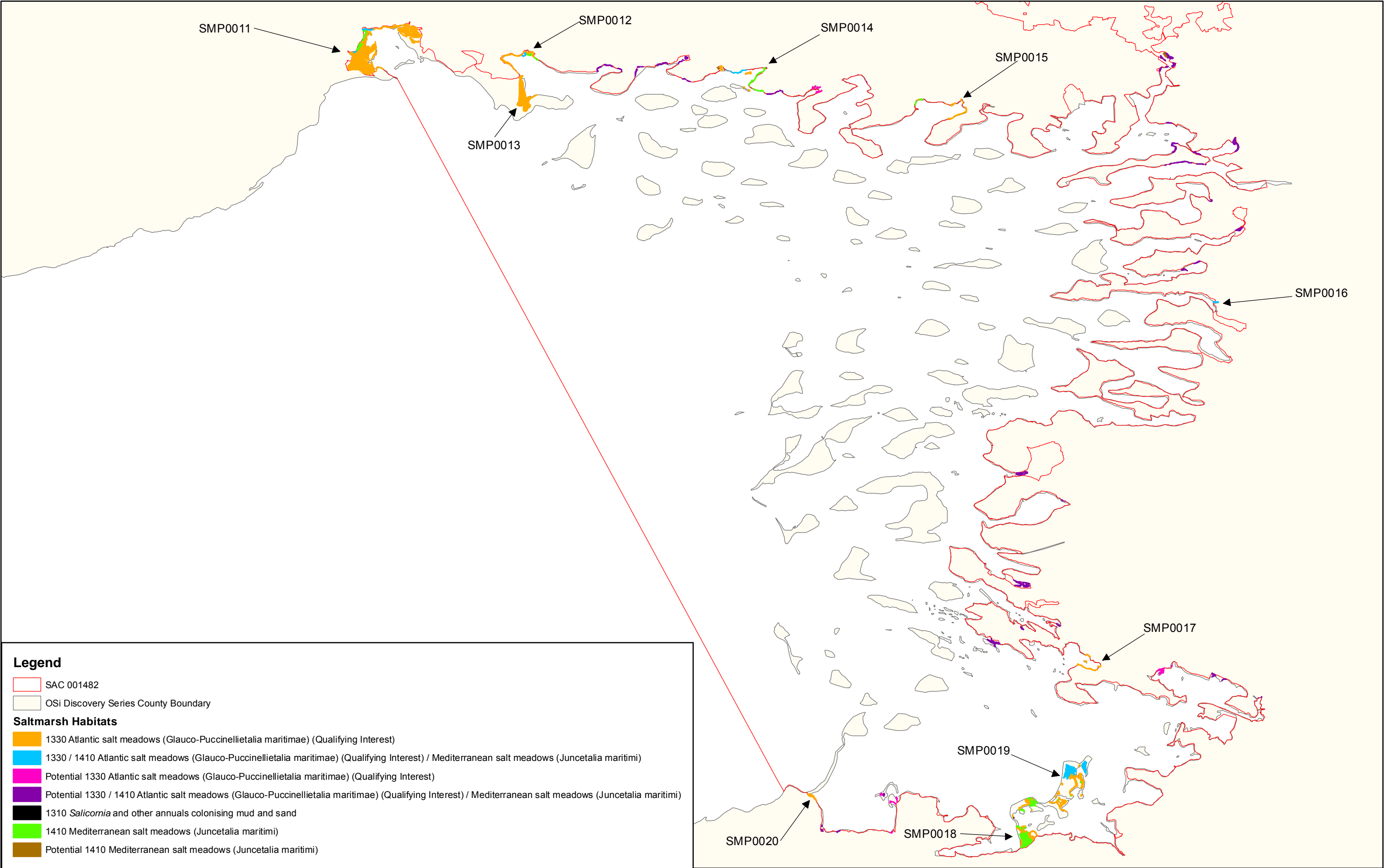
Sandy mud with polychaetes and bivalves community complex

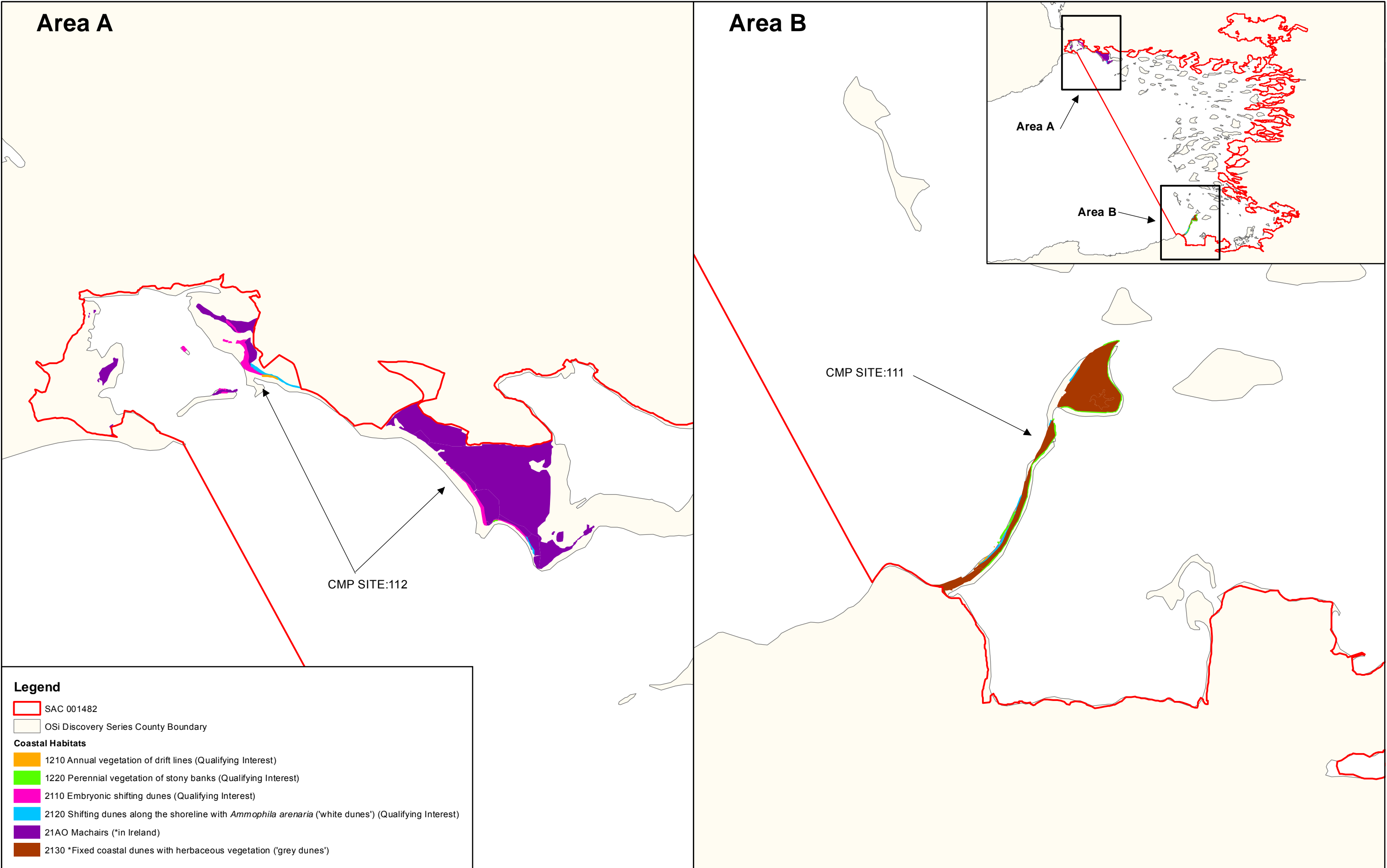
Shingle

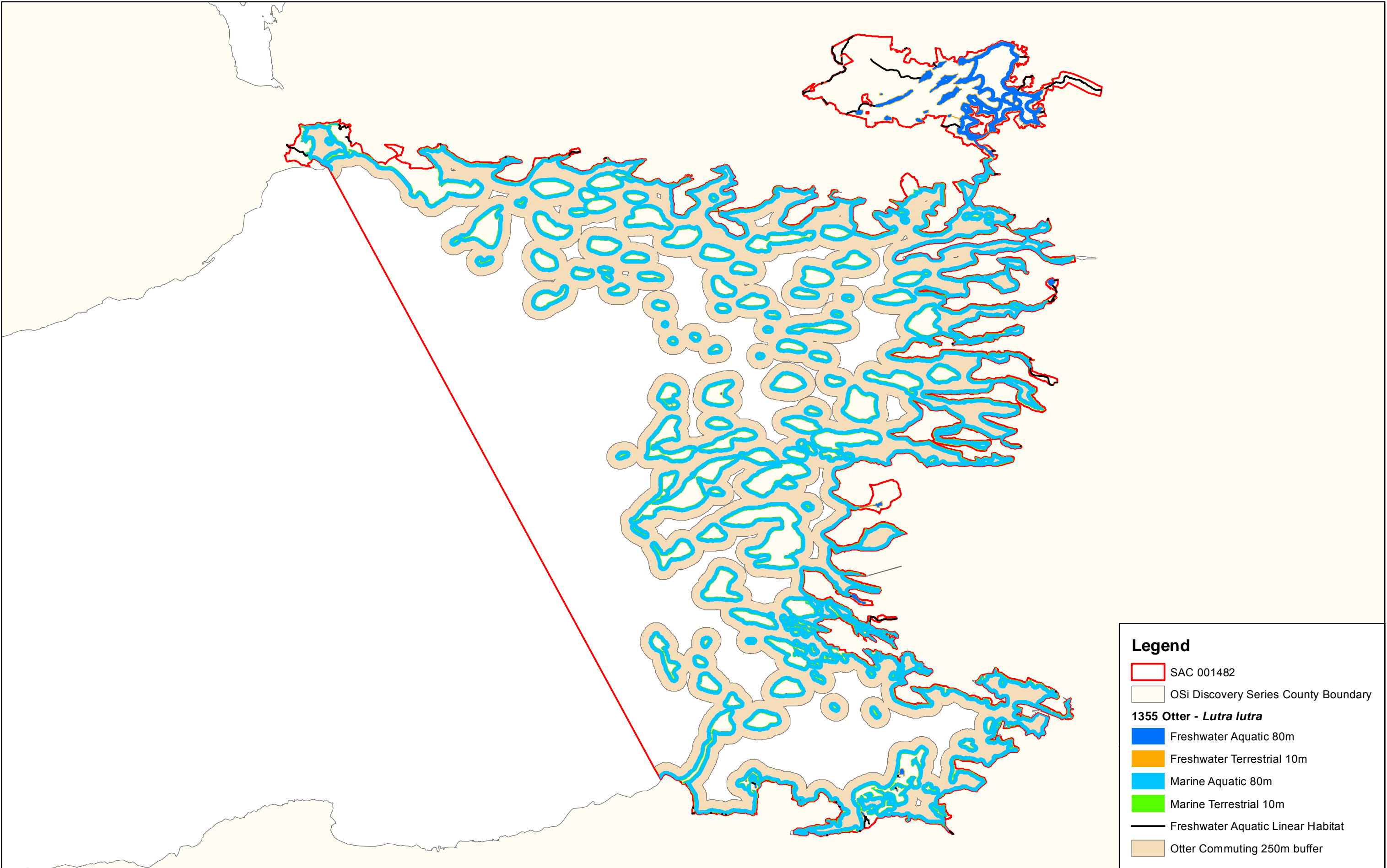
*Zostera* community

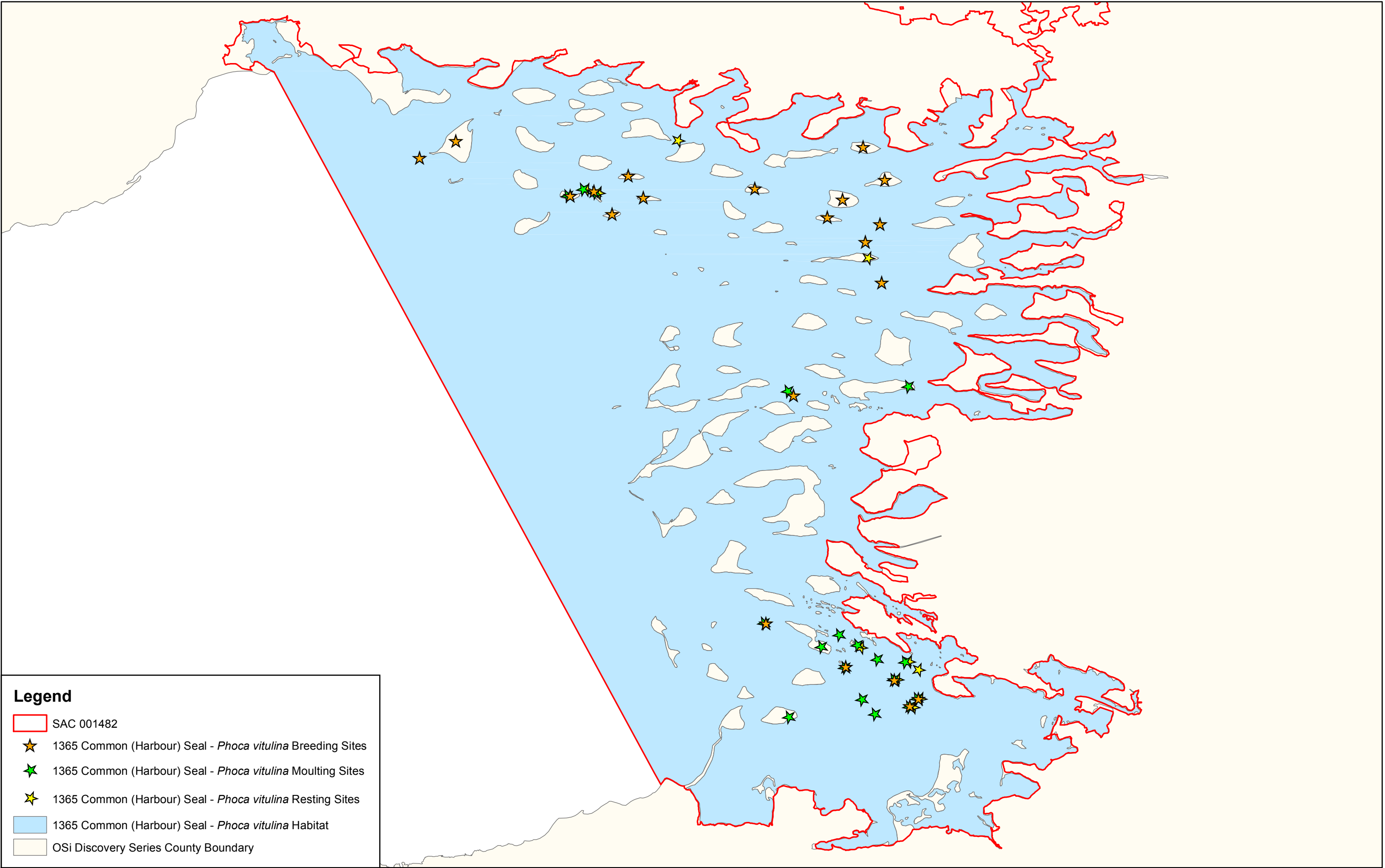
















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***Department of***  
***Arts, Heritage and the Gaeltacht***

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## Conservation objectives for Cloonakillina Lough SAC [001899]

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.

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.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

Code	Description
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7140	Transition mires and quaking bogs
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\* denotes a priority habitat



**Citation:** NPWS (2016) *Conservation objectives for Cloonakillina Lough SAC [001899]. Generic Version 5.0. Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.*

# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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Flughany Bog SAC 000497



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Arts, Heritage and the Gaeltacht*



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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*

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000497	Flughany Bog SAC
<hr/>	
7110	Active raised bogsE
7120	Degraded raised bogs still capable of natural regeneration
7150	Depressions on peat substrates of the Rhynchosporion

## Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)

### NPWS Documents

<b>Year :</b>	2014
<b>Title :</b>	Raised Bog Monitoring and Assessment Survey 2013
<b>Author :</b>	Fernandez, F.; Connolly K.; Crowley W.; Denyer J.; Duff K.; Smith G.
<b>Series :</b>	Irish Wildlife Manual No. 81
<b>Year :</b>	2014
<b>Title :</b>	National raised bog SAC management plan
<b>Author :</b>	Department of Arts, Heritage and the Gaeltacht
<b>Series :</b>	Draft for consultation. 15 January 2014
<b>Year :</b>	2014
<b>Title :</b>	Flughany Bog (SAC 000497), Co. Sligo, Site Report
<b>Author :</b>	Fernandez, F.; Connolly, K.; Crowley, W.; Denyer J.; Duff K.; Smith G.
<b>Series :</b>	Raised bog monitoring and assessment survey 2013
<b>Year :</b>	2016
<b>Title :</b>	Flughany Bog SAC (site code: 497) Conservation objectives supporting document- raised bog habitats V1
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document

### Other References

<b>Year :</b>	2011
<b>Title :</b>	Review and revision of empirical critical loads and dose-response relationships. Proceedings of an expert workshop, Noordwijkerhout, 23-25 June 2010
<b>Author :</b>	Bobbink, R.; Hettelingh, J.P.
<b>Series :</b>	RIVM report 680359002, Coordination Centre for Effects, National Institute for Public Health and the Environment (RIVM)
<b>Year :</b>	2014
<b>Title :</b>	Nitrogen deposition and exceedance of critical loads for nutrient nitrogen in Irish grasslands
<b>Author :</b>	Henry, J.; Aherne, J.
<b>Series :</b>	Science of the Total Environment 470–471: 216–223



## Spatial data sources

<b>Year :</b>	2014
<b>Title :</b>	Scientific Basis for Raised Bog Conservation in Ireland
<b>GIS Operations :</b>	RBSB13_SACs_ARB_DRB dataset, RBSB13_SACs_2012_HB dataset, RBSB13_SACs_DrainagePatterns_5k dataset and RBSB13_SAC_LIDAR_DTMs dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising potential
<b>Used For :</b>	7110; digital elevation model; drainage patterns (maps 2 and 4)
<b>Year :</b>	2013
<b>Title :</b>	Raised Bog Monitoring and Assessment Survey 2013
<b>GIS Operations :</b>	RBMA13_ecotope_map dataset clipped to SAC boundary. Appropriate ecotopes selected and exported to new dataset. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	7110 ecotopes (map 3)

## Conservation Objectives for : Flughany Bog SAC [000497]

### 7110 Active raised bogs

**To restore the favourable conservation condition of Active raised bogs in Flughany Bog SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Restore area of active raised bog to 23.6ha, subject to natural processes	Active Raised Bog (ARB) habitat was mapped at 11.4ha by Fernandez et al. (2014). Area of Degraded Raised Bog (DRB) on the High Bog (HB) has been modelled as 13.1ha. See map 2. However, it is estimated that only 9.2ha is potentially restorable to ARB by drain blocking. The total potential ARB on the HB is therefore estimated to be 20.6ha. Eco-hydrological assessments of the cutover estimates that an additional 3.0ha of bog forming habitats could be restored. The long term target for ARB is therefore 23.6ha. See raised bog supporting document for further details on this and following attributes
Habitat distribution	Occurrence	Restore the distribution and variability of active raised bog across the SAC. See map 3 for distribution in 2012	ARB habitat at Flughany Bog is central and sub-central ecotopes and active flush. ARB currently occurs most abundantly on the south-eastern part of Flughany Bog. DRB occurs on both parts of the bog, which will require restoration measures. There is also potential for ARB restoration on cutover areas of the bog (see area target above)
High bog area	Hectares	No decline in extent of high bog necessary to support the development and maintenance of active raised bog. See map 2	The area of high bog within Flughany Bog SAC in 2012 (latest figure available) was 143.7ha (DAHG 2014)
Hydrological regime: water levels	Centimetres	Restore appropriate water levels throughout the site	For ARB, mean water level needs to be near or above the surface of the bog lawns for most of the year. Seasonal fluctuations should not exceed 20cm, and should only be 10cm below the surface, except for very short periods of time. Open water is often characteristic of soak systems
Hydrological regime: flow patterns	Flow direction; slope	Restore, where possible, appropriate high bog topography, flow directions and slopes. See map 4 for current situation	ARB depends on mean water levels being near or above the surface of bog lawns for most of the year. Long and gentle slopes are the most favourable to achieve these conditions. Changes to flow directions due to subsidence of bogs can radically change water regimes and cause drying out of high quality ARB areas and soak systems
Transitional areas between high bog and adjacent mineral soils (including cutover areas)	Hectares; distribution	Restore adequate transitional areas to support/protect active raised bog and the services it provides	No natural marginal habitats exist around the margins of the bog. Eco-hydrological assessments have evaluated the potential for ARB restoration on cutover areas (see note for habitat area attribute above)
Vegetation quality: central ecotope, active flush, soaks, bog woodland	Hectares	Restore 11.8ha of central ecotope/active flush/soaks/bog woodland as appropriate	At least 50% of ARB habitat should be high quality (i.e. central ecotope, active flush, soaks, bog woodland). Target area of active raised bog for the site has been set at 23.6ha (see area target above)
Vegetation quality: microtopographical features	Hectares	Restore adequate cover of high quality microtopographical features	High quality microtopography (hummocks, hollows and pools) is well developed in the southern part of Flughany Bog
Vegetation quality: bog moss ( <i>Sphagnum</i> ) species	Percentage cover	Restore adequate cover of bog moss ( <i>Sphagnum</i> ) species to ensure peat-forming capacity	<i>Sphagnum</i> cover varies naturally across Ireland with relatively high cover in the east to lower cover in the west. Hummock forming species such as <i>Sphagnum austinii</i> are particularly good peat formers. <i>Sphagnum</i> cover and distribution also varies naturally across a site

Typical ARB species: flora	Occurrence	Restore, where appropriate, typical active raised bog flora	Typical flora species include widespread species, as well as those with more restricted distributions but typical of the habitat's subtypes or geographical range
Typical ARB species: fauna	Occurrence	Restore, where appropriate, typical active raised bog fauna	Typical fauna species include widespread species, as well as those with more restricted distributions but typical of the habitat's subtypes or geographical range
Elements of local distinctiveness	Occurrence	Maintain features of local distinctiveness, subject to natural processes	Flughany Bog is noted for the presence of a number of flush systems and associated swallow-holes
Negative physical indicators	Percentage cover	Negative physical features absent or insignificant	Negative physical indicators include: bare peat, algae dominated pools and hollows, marginal cracks, tear patterns, subsidence features such as dry mineral mounds /ridges emerging or expanding and evidence of burning
Vegetation composition: native negative indicator species	Percentage cover	Native negative indicator species at insignificant levels	Disturbance indicators include species indicative of conditions drying out such as abundant bog asphodel ( <i>Narthecium ossifragum</i> ), deergrass ( <i>Trichophorum germanicum</i> ) and haretail cotton-grass ( <i>Eriophorum vaginatum</i> ) forming tussocks; abundant magellanic bog-moss ( <i>Sphagnum magellanicum</i> ) in pools previously dominated by <i>Sphagnum</i> species typical of very wet conditions (e.g. feathery bog-moss ( <i>S. cuspidatum</i> )); and indicators of frequent burning events such as abundant <i>Cladonia floerkeana</i> and high cover of carnation sedge ( <i>Carex panicea</i> ) (particularly in true midlands raised bogs)
Vegetation composition: non-native invasive species	Percentage cover	Non-native invasive species at insignificant levels and not more than 1% cover	Most common non-native invasive species include lodgepole pine ( <i>Pinus contorta</i> ), rhododendron ( <i>Rhododendron ponticum</i> ), and pitcherplant ( <i>Sarracenia purpurea</i> )
Air quality: nitrogen deposition	kg N/ha/year	Air quality surrounding bog close to natural reference conditions. The total N deposition should not exceed 5kg N/ha/yr	Change in air quality can result from fertiliser drift; adjacent quarry activities; or other atmospheric inputs. The critical load range for ombrotrophic bogs has been set as between 5 and 10kg N/ha/yr (Bobbink and Hettelingh, 2011). The latest N deposition figures for the area around Flughany Bog suggests that the current level is approximately 8.2kg N/ha/yr (Henry and Aherne, 2014)
Water quality	Hydrochemical measures	Water quality on the high bog and in transitional areas close to natural reference conditions	Water chemistry within raised bogs is influenced by atmospheric inputs (rainwater). However, within soak systems, water chemistry is influenced by other inputs such as focused flow or interaction with underlying substrates. Water chemistry in areas surrounding the high bog varies due to influences of different water types (bog water, regional groundwater, and run-off from surrounding mineral lands)

## Conservation Objectives for : Flughany Bog SAC [000497]

### **7120                      Degraded raised bogs still capable of natural regeneration**

The long-term aim for Degraded raised bogs still capable of natural regeneration is that its peat-forming capability is re-established; therefore, the conservation objective for this habitat is inherently linked to that of Active raised bogs (7110) and a separate conservation objective has not been set in Flughany Bog SAC

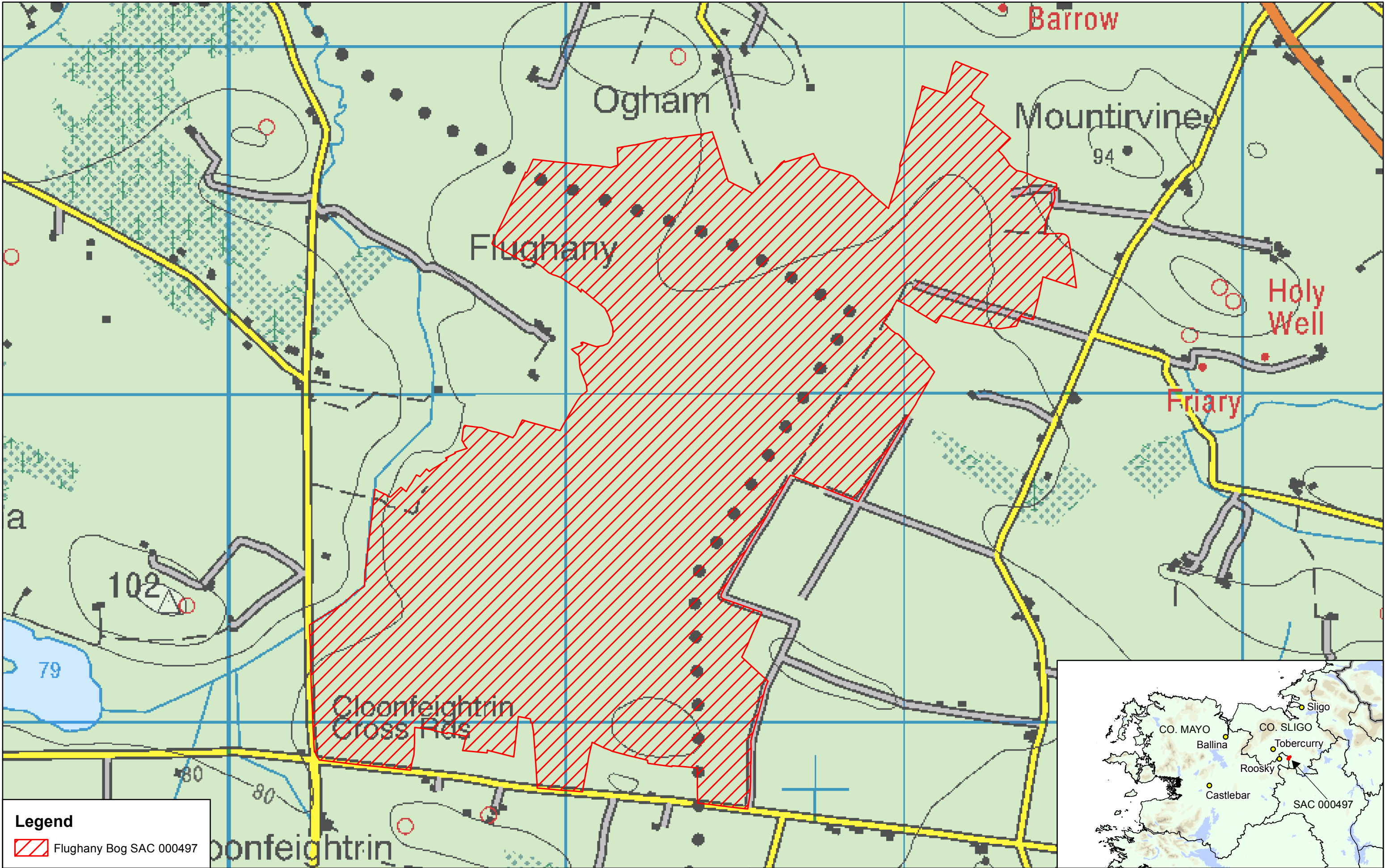
Attribute	Measure	Target	Notes
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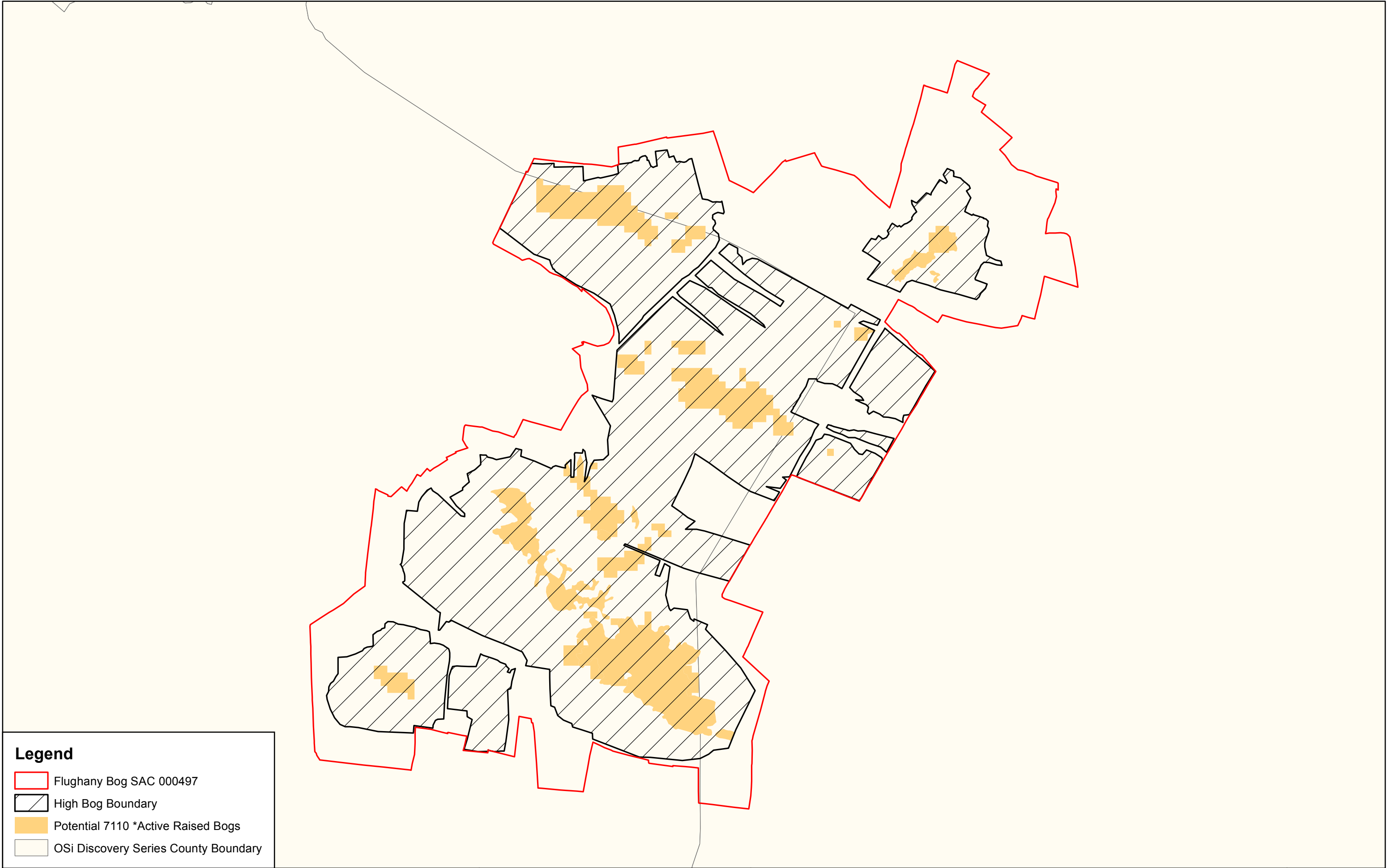
## Conservation Objectives for : Flughany Bog SAC [000497]

### 7150 Depressions on peat substrates of the Rhynchosporion





Depressions on peat substrates of the Rhynchosporion is an integral part of good quality Active raised bogs (7110) and thus a separate conservation objective has not been set for the habitat in Flughany Bog SAC

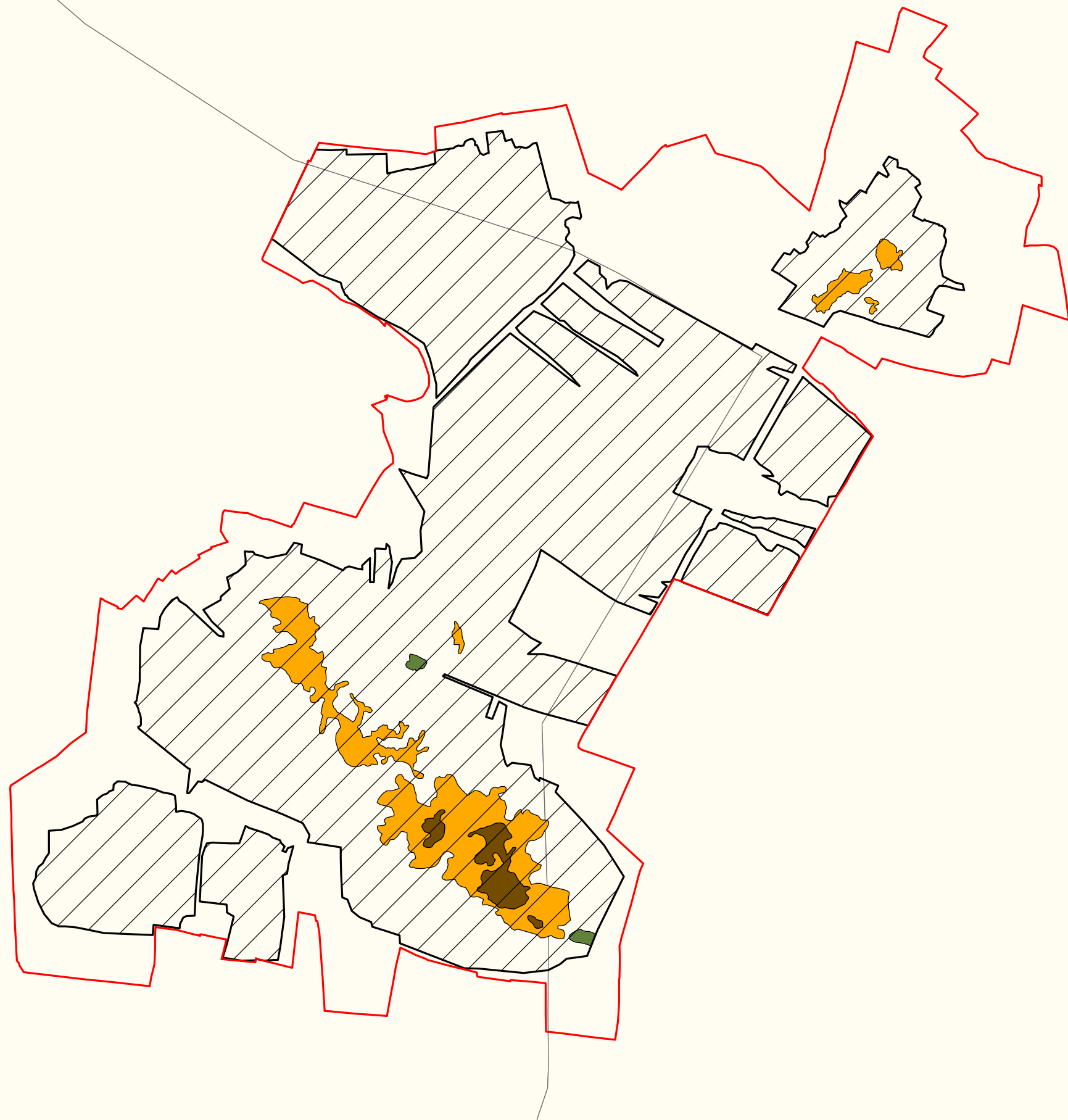
Attribute	Measure	Target	Notes
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



**Legend**




-  Flughany Bog SAC 000497
-  High Bog Boundary
-  Potential 7110 \*Active Raised Bogs
-  OSi Discovery Series County Boundary



## Legend

-  Flughany Bog SAC 000497
-  High Bog Boundary
-  OSi Discovery Series County Boundary

## Active Raised Bogs Ecotopes

-  Central ecotope
-  Soaks / active flush
-  Sub-central ecotope



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Department of  
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## MAP 3: FLUGHANY BOG SAC CONSERVATION OBJECTIVES ACTIVE RAISED BOGS ECOTOPES

Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:  
SAC 000497; version 3.01. Co. Mayo / Sligo

0 100 200 300 400 500 m

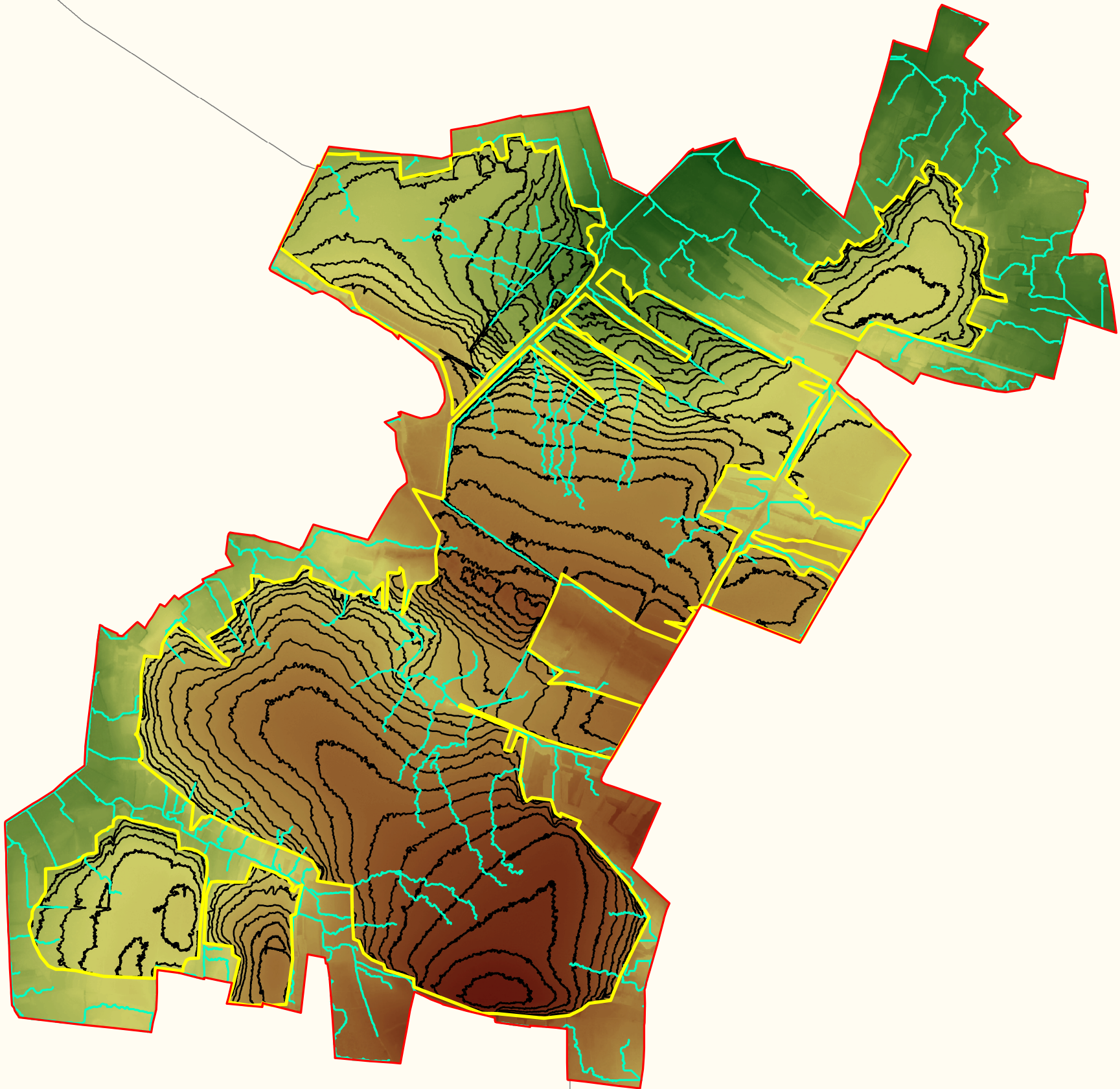
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
Ordnance Survey of Ireland Licence No EN 0059216. © Ordnance Survey of Ireland Government of Ireland.

Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaíthe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh EN 0059216. © Suirbhéarachta Ordonáis na hÉireann Rialtas na hÉireann.








Map Version 1  
Date: Jan 2016

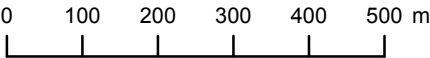
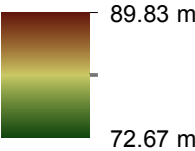




**Legend**

-  Flughany Bog SAC 000497
-  OSi Discovery Series County Boundary
-  High Bog Boundary
-  Drainage Patterns
-  Contours

**Elevation**



# National Parks and Wildlife Service

## Conservation Objectives Series

Killala Bay/Moy Estuary SAC 000458



**An Roinn**  
***Ealaíon, Oidhreachta agus Gaeltachta***  
**Department of**  
***Arts, Heritage and the Gaeltacht***



**National Parks and Wildlife Service,  
Department of Arts, Heritage and the Gaeltacht,  
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**Web: [www.npws.ie](http://www.npws.ie)  
E-mail: [nature.conservation@ahg.gov.ie](mailto:nature.conservation@ahg.gov.ie)**

**Citation:**

NPWS (2012) Conservation Objectives: Killala Bay/Moy Estuary SAC 000458. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

**Series Editors: Rebecca Jeffrey & Naomi Kingston  
ISSN 2009-4086**

## 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*

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### 000458 Killala Bay/Moy Estuary SAC

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1014	Narrow-mouthed Whorl Snail <i>Vertigo angustior</i>
1095	Sea Lamprey <i>Petromyzon marinus</i>
1130	Estuaries
1140	Mudflats and sandflats not covered by seawater at low tide
1210	Annual vegetation of drift lines
1310	Salicornia and other annuals colonizing mud and sand
1330	Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</i> )
1365	Harbour Seal <i>Phoca vitulina</i>
2110	Embryonic shifting dunes
2120	Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ('white dunes')
2130	*Fixed coastal dunes with herbaceous vegetation ('grey dunes')
2190	Humid dune slacks

**Please note that this SAC overlaps with Killala Bay/Moy Estuary SPA (004036) and is adjacent to River Moy SAC (002298). 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 (listed by date)

Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)

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**Title:** Harbour seal pilot monitoring project, 2011

**Year:** 2012

**Author:** NPWS

**Series:** Unpublished Report to NPWS

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**Title:** Killala Bay/Moy Estuary SAC (000458). Conservation objectives supporting document - marine habitats and species. [Version 1]

**Year:** 2012

**Author:** NPWS

**Series:** Unpublished Report to NPWS

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**Title:** Killala Bay/Moy Estuary SAC (000458). Conservation objectives supporting document - coastal habitats. [Version 1]

**Year:** 2012

**Author:** NPWS

**Series:** Unpublished Report to NPWS

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**Title:** Subtidal Benthic Investigations in Killala Bay/Moy Estuary cSAC (Site Code: IE000458) Co. Sligo/Mayo

**Year:** 2011

**Author:** Aquafact

**Series:** Unpublished Report to NPWS & MI

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**Title:** A survey of mudflats and sandflats in Ireland An intertidal soft sediment survey of Killala Bay

**Year:** 2011

**Author:** ASU

**Series:** Unpublished Report to NPWS & MI

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**Title:** Monitoring and Condition Assessment of Populations of *Vertigo geyeri*, *Vertigo angustior* and *Vertigo moulinsiana* in Ireland

**Year:** 2011

**Author:** Moorkens, E.A.; Killeen, I.J.

**Series:** Irish Wildlife Manuals, No. 55

---

**Title:** Harbour seal pilot monitoring project, 2010

**Year:** 2011

**Author:** NPWS

**Series:** Unpublished Report to NPWS

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**Title:** Harbour seal population monitoring 2009-2012: Report no. 1. Report on a pilot monitoring study carried out in southern and western Ireland, 2009

**Year:** 2010

**Author:** NPWS

**Series:** Unpublished Report to NPWS

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**Title:** Saltmarsh Monitoring Report 2007-2008

**Year:** 2009

**Author:** McCorry, M.; Ryle, T.

**Series:** Unpublished Report to NPWS

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<b>Title:</b>	Coastal Monitoring Project 2004-2006
<b>Year:</b>	2009
<b>Author:</b>	Ryle, T.; Murray, A.; Connolly, C.; Swann, M.
<b>Series:</b>	Unpublished Report to NPWS
<b>Title:</b>	The phytosociology and conservation value of Irish sand dunes
<b>Year:</b>	2008
<b>Author:</b>	Gaynor, K.
<b>Series:</b>	Unpublished PhD thesis, National University of Ireland, Dublin
<b>Title:</b>	Saltmarsh Monitoring Report 2006
<b>Year:</b>	2007
<b>Author:</b>	McCorry, M.
<b>Series:</b>	Unpublished Report to NPWS
<b>Title:</b>	A Survey of Juvenile Lamprey Populations in the Corrib and Suir Catchments
<b>Year:</b>	2007
<b>Author:</b>	O'Connor, W.
<b>Series:</b>	Irish Wildlife Manuals No. 26
<b>Title:</b>	Harbour seal population assessment in the Republic of Ireland: August 2003
<b>Year:</b>	2004
<b>Author:</b>	Cronin, M.; Duck, C.; Ó Cadhla, O.; Nairn, R.; Strong, D.; O'Keeffe, C.
<b>Series:</b>	Irish Wildlife Manuals No. 11
<b>Title:</b>	Summary of National Parks & Wildlife Service surveys for common (harbour) seals ( <i>Phoca vitulina</i> ) and grey seals ( <i>Halichoerus grypus</i> ), 1978 to 2003
<b>Year:</b>	2004
<b>Author:</b>	Lyons, D.O.
<b>Series:</b>	Irish Wildlife Manuals No. 13
<b>Title:</b>	A survey of juvenile lamprey populations in the Moy catchment
<b>Year:</b>	2004
<b>Author:</b>	O'Connor, W.
<b>Series:</b>	Irish Wildlife Manuals No. 15
<b>Title:</b>	Monitoring the river, sea and brook lamprey, <i>Lampetra fluviatilis</i> , <i>L. planeri</i> and <i>Petromyzon marinus</i>
<b>Year:</b>	2003
<b>Author:</b>	Harvey, J.; Cowx, I.
<b>Series:</b>	Conserving Natura 2000 Rivers Monitoring Series No. 5. English Nature, Peterborough
<b>Title:</b>	A survey of bottlenose dolphins ( <i>Tursiops truncatus</i> ) in the Shannon Estuary
<b>Year:</b>	2000
<b>Author:</b>	Rogan, E.; Ingram, S.; Holmes, B.; O'Flanagan, C.
<b>Series:</b>	Marine Institute Marine Resource Series No. 9
<b>Title:</b>	1989 survey of breeding herds of common seal <i>Phoca vitulina</i> with reference to previous surveys
<b>Year:</b>	1990
<b>Author:</b>	Harrington, R.
<b>Series:</b>	Unpublished Report to Wildlife Service

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**Title:** An assessment of the status of the common seal *Phoca vitulina vitulina* in Ireland  
**Year:** 1980  
**Author:** Summers, C.F.; Warner, P.J; Nairn, R.G.W.; Curry, M.G.; Flynn, J.  
**Series:** Biological Conservation 17: 115-123

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## Spatial data sources

<b>Year:</b>	2010
<b>Title:</b>	EPA WFD transitional waterbody data
<b>GIS operations:</b>	Clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used for:</b>	1130 (map 3)
<b>Year:</b>	Interpolated 2012
<b>Title:</b>	Mudflat and sandflat survey 2010; subtidal benthic survey 2010
<b>GIS operations:</b>	Polygon feature classes from marine community types base data sub-divided based on interpolation of marine survey data. Expert opinion used as necessary to resolve any issues arising
<b>Used for:</b>	Marine community types, 1140 (maps 4 and 5)
<b>Year:</b>	2005
<b>Title:</b>	OSi Discovery series vector data
<b>GIS operations:</b>	High water mark (HWM) and low water mark (LWM) polyline feature classes converted into polygon feature classes and combined; EU Annex I Saltmarsh and Coastal data erased out if present
<b>Used for:</b>	Marine community types base data (map 5)
<b>Year:</b>	Revision 2010
<b>Title:</b>	Saltmarsh Monitoring Project 2007-2008. Version 1
<b>GIS operations:</b>	QIs selected; clipped to SAC boundary; overlapping regions with Coastal CO data investigated and resolved with expert opinion used
<b>Used for:</b>	1310, 1330 (map 6)
<b>Year:</b>	2009
<b>Title:</b>	Coastal Monitoring Project 2004-2006. Version 1
<b>GIS operations:</b>	QIs selected; clipped to SAC boundary; overlapping regions with Saltmarsh CO data investigated and resolved with expert opinion used
<b>Used for:</b>	1210, 2110, 2120, 2130, 2190 (map 7)
<b>Year:</b>	2012
<b>Title:</b>	NPWS rare and threatened species database
<b>GIS operations:</b>	Dataset created from spatial references in database records. Expert opinion used as necessary to resolve any issues arising
<b>Used for:</b>	1014, 1365 (maps 8 and 9)
<b>Year:</b>	2005
<b>Title:</b>	OSi Discovery series vector data
<b>GIS operations:</b>	High Water Mark (HWM) polyline feature class converted into polygon feature class; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used for:</b>	1365 (map 9)

1014 Narrow-mouthed Whorl Snail *Vertigo angustior*

To maintain the favourable conservation condition of Narrow-mouthed Whorl Snail in Killala Bay/Moy Estuary SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: occupied sites	Number	No decline. There is one known site for this species in this SAC. See map 8	From Moorkens and Killeen (2011)
Presence on transect	Occurrence	Adult or sub-adult snails are present in at least 3 places on the transect where optimal or sub-optimal habitat occurs (minimum 5 samples)	Transect established as part of condition assessment monitoring at this site (Moorkens and Killeen, 2011). See habitat area target below for definition of optimal and sub-optimal habitat
Abundance	Number per sample	At least 2 samples on the transect have more than 10 <i>V. angustior</i> individuals (minimum 5 samples)	From Moorkens and Killeen (2011)
Transect habitat quality	Metres	More than 50m of habitat along the transect is classed as optimal or sub-optimal	From Moorkens and Killeen (2011). See habitat area target below for definition of optimal and sub-optimal habitat
Transect optimal wetness	Metres	Soils, at time of sampling, are damp (optimal wetness) and covered with a layer of humid thatch for more than 50m along the transect	From Moorkens and Killeen (2011)
Habitat area	Hectares	1.465ha of potential habitat (optimal and sub-optimal); Optimal habitat is defined as marsh with transition of ecotone between red fescue ( <i>Festuca rubra</i> ) and silverweed ( <i>Potentilla anserina</i> ) wet grassland and waterlogged marsh dominated by yellow iris ( <i>Iris pseudacorus</i> ) and low growing herbs. Vegetation height 20-40cm. Habitat growing on wet to saturated soil covered with a deep layer of mosses and humid, open structured thatch. Sub-optimal habitat is defined as for optimal habitat, but either vegetation height is less than 20cm, or between 40 and 50cm; or the soil is dry, or covered with standing water	From Moorkens and Killeen (2011)

1095 Sea Lamprey *Petromyzon marinus*

To maintain the favourable conservation condition of Sea Lamprey in Killala Bay/Moy Estuary SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	% of estuary accessible	No barriers for migratory life stages of lamprey moving from freshwater to marine habitats and vice versa	This SAC only covers the estuarine portion of the River Moy. The adjacent River Moy SAC (site code: 2298) encompasses the freshwater elements of sea lamprey habitat. Artificial barriers can block or cause difficulties to lampreys' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. See O'Connor (2004) for further information on artificial barriers in the Moy catchment
Population structure of juveniles	Number of age/size groups	At least three age/size groups present	Attribute and target based on data from Harvey and Cowx (2003) and O'Connor (2007). Important juvenile habitat identified immediately downstream of Ballina (see O'Connor, 2004)
Juvenile density in fine sediment	Juveniles/m <sup>2</sup>	Juvenile density at least 1/m <sup>2</sup>	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003). Important juvenile habitat identified immediately downstream of Ballina (see O'Connor, 2004)

1130 Estuaries

To maintain the favourable conservation condition of Estuaries in Killala Bay/Moy Estuary SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 3	Habitat area was estimated as 736ha using OSI data and the defined Transitional Water Body area under the Water Framework Directive
Community extent	Hectares	Maintain the extent of the <i>Zostera</i> -dominated community, subject to natural processes. See map 5	Estimated by EPA during 2011 intertidal survey. See marine supporting document for further details
Community structure: <i>Zostera</i> density	Shoots per m <sup>2</sup>	Conserve the high quality of the <i>Zostera</i> -dominated community, subject to natural processes	Estimated by EPA during 2011 intertidal survey. See marine supporting document for further details
Community distribution	Hectares	Conserve the following community types in a natural condition: Muddy sand to fine sand dominated by <i>Hydrobia ulvae</i> , <i>Pygospio elegans</i> and <i>Tubificoides benedii</i> community complex; Estuarine muddy sand dominated by <i>Hediste diversicolor</i> and <i>Heterochaeta costata</i> community complex; and Fine sand dominated by <i>Nephtys cirrosa</i> community complex. See map 5	Habitat structure was elucidated from intertidal and subtidal surveys undertaken in 2010 (Aquafact, 2011; ASU, 2011). See marine supporting document for further details

## Conservation objectives for: Killala Bay/Moy Estuary SAC [000458]

### 1140 Mudflats and sandflats not covered by seawater at low tide

To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in Killala Bay/Moy Estuary SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 4	Habitat area was estimated as 1,332ha using OSI data
Community extent	Hectares	Maintain the extent of the <i>Zostera</i> -dominated community, subject to natural processes. See map 5	Estimated by EPA during 2011 intertidal survey. See marine supporting document for further details
Community structure: <i>Zostera</i> density	Shoots per m <sup>2</sup>	Conserve the high quality of the <i>Zostera</i> -dominated community, subject to natural processes	Estimated by EPA during 2011 intertidal survey. See marine supporting document for further details
Community distribution	Hectares	Conserve the following community types in a natural condition: Muddy sand to fine sand dominated by <i>Hydrobia ulvae</i> , <i>Pygospio elegans</i> and <i>Tubificoides benedii</i> community complex; Estuarine muddy sand dominated by <i>Hediste diversicolor</i> and <i>Heterochaeta costata</i> community complex and Fine sand dominated by <i>Nephtys cirrosa</i> community complex. See map 5	Habitat structure was elucidated from intertidal survey undertaken in 2010 (ASU, 2011). See marine supporting document for further details

**1210 Annual vegetation of drift lines**

**To maintain the favourable conservation condition of Annual vegetation of drift lines in Killala Bay/Moy Estuary 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, including erosion and succession. For sub-site mapped: Bartragh Island-0.58ha. See map 7	Based on data from the Coastal Monitoring Project (Ryle et al. 2009). Habitat is very difficult to measure in view of its dynamic nature which means that it can appear and disappear within a site from year to year. This habitat was only recorded from Bartragh Island. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes	Based on data from Ryle et al. (2009). Two separate narrow strips of strandline habitat were recorded on the northern side of Bartragh Island. See coastal habitats supporting document for further details
Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Dunes are naturally dynamic systems that require continuous supply and circulation of sand. Accumulation of organic matter in tidal litter is essential for trapping sand and initiating dune formation. Sea defence/coastal protection works are present near the main access point to the beach at Inishcrone (Ryle et al. 2009). See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Ryle et al. (2009). At Bartragh Island there are transitions from sand dunes into saltmarsh habitats. See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain the presence of species-poor communities with typical species: sea rocket ( <i>Cakile maritima</i> ), sea sandwort ( <i>Honckenya peploides</i> ), prickly saltwort ( <i>Salsola kali</i> ) and Orache ( <i>Atriplex</i> spp.)	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details

**1310 Salicornia and other annuals colonizing mud and sand**

**To maintain the favourable conservation condition of *Salicornia* and other annuals colonizing mud and sand in Killala Bay/Moy Estuary 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, including erosion and succession. For sub-sites mapped: Bartragh Island- 0.26ha, Ross- 0.29ha. See map 6	Based on data from Saltmarsh Monitoring Project (SMP) (McCorry, 2007). Habitat mapped at two of the four sub-sites surveyed, giving a total estimated area of 0.55ha. NB further unsurveyed areas maybe present within the site. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes. See map 6 for known distribution	Based on data from McCorry (2007). <i>Salicornia</i> is an annual species, so its distribution can vary significantly from year to year. See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/ absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions	Based on data from McCorry (2007). Sediment supply is particularly important for this pioneer saltmarsh community, as the distribution of this habitat depends on accretion rates. Accretion was noted at Ross and Bartragh Island. Old seawalls were recorded at Bartragh Island and some protection works were noted around buildings close to the shoreline at Ross. See coastal habitats backing document for further details
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession	Based on data from McCorry and Ryle (2009). Creeks deliver sediment throughout saltmarsh system. Creeks and pan structures are well developed at Ross. See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	This pioneer saltmarsh community requires regular tidal inundation. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from McCorry (2007). Transitions to dune habitats are found at Bartragh Island and Ross. See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimeters	Maintain structural variation within sward	Based on data from McCorry (2007). At Castleconor, grazing is absent. There are moderate levels of grazing at Rusheens, while grazing at Ross is heavy in places. Grazing intensity is low on Bartragh Island See coastal habitats supporting document for further details

**1310 Salicornia and other annuals colonizing mud and sand**

To maintain the favourable conservation condition of *Salicornia* and other annuals colonizing mud and sand in Killala Bay/Moy Estuary SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of the area outside of the creeks vegetated	Based on data from McCorry (2007). Castleconor and Rusheens are heavily poached in places. There are moderate levels of poaching at Bartragh Island and Ross. See coastal habitats supporting document for further details
Vegetation composition: typical species & sub-communities	Percentage cover	Maintain the presence of species-poor communities with typical species listed in the Saltmarsh Monitoring Project (McCorry and Ryle, 2009)	See coastal habitats supporting document for further details
Vegetation structure: negative indicator species- <i>Spartina anglica</i>	Hectares	No significant expansion of common cordgrass ( <i>Spartina anglica</i> ), with an annual spread of less than 1%	Based on data from McCorry (2007). See coastal habitats supporting document for further details



**1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)**

To maintain the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia*) in Killala Bay/Moy Estuary 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, including erosion and succession. For sub-sites mapped: Bartragh Island- 29.22ha, Ross- 14.95ha, Rusheens- 1.24ha, Castleconor - 1.61ha. See map 6	Based on data from the Saltmarsh Monitoring Project (SMP) (McCorry, 2007; McCorry and Ryle 2009). Four sub-sites that supported Atlantic salt meadow were mapped (47.02ha) and additional areas of potential ASM (3.34ha) were identified from an examination of aerial photographs, giving a total estimated area of 50.37ha. NB further unsurveyed areas maybe present within the site. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes. See map 6 for known distribution	Based on data from McCorry (2007). ASM is the dominant saltmarsh type with a wide distribution throughout the SAC. See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/ absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions	Based on data from McCorry and Ryle (2009). The SMP noted accretion at Ross and Bartragh Island. Old seawalls were recorded at Bartragh Island and there are some protection works around buildings close to the shoreline at Ross. See coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure/ allow to develop, subject to natural processes, including erosion and succession	Based on data from McCorry and Ryle (2009). Creeks and pan structures are well developed at Ross. See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from McCorry (2007). Transitions to dune habitats are found at Bartragh Island and Ross. See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimeters	Maintain structural variation within sward	Based on data from McCorry (2007). At Castleconor, grazing is absent. At Rusheens there are moderate levels of grazing. At Ross grazing is heavy in places. At Bartragh Island grazing intensity is low. See coastal habitats supporting document for further details

**1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)**

To maintain the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia*) in Killala Bay/Moy Estuary SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of the area outside of the creeks vegetated	Based on data from McCorry (2007). Castleconor and Rusheens are heavily poached in places. There are moderate levels of poaching at Bartragh Island and Ross. See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009)	Based on data from McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: negative indicator species- <i>Spartina anglica</i>	Hectares	No significant expansion of common cordgrass ( <i>Spartina anglica</i> ), with an annual spread of less than 1%	Based on data from McCorry (2007). See coastal habitats supporting document for further details

**1365 Harbour Seal *Phoca vitulina***

**To maintain the favourable conservation condition of Harbour Seal in Killala Bay/Moy Estuary SAC, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Access to suitable habitat	Number of artificial barriers	Species range within the site should not be restricted by artificial barriers to site use. See map 9 for suitable habitat	See marine supporting document for further details
Breeding behaviour	Breeding sites	Conserve the breeding sites in a natural condition. See map 9	Attribute and target based on background knowledge of Irish breeding populations, review of data summarised by Summers et al. (1980), Harrington (1990), Lyons (2004) and unpublished National Parks and Wildlife Service records. See marine supporting document for further details
Moulting behaviour	Moult haul-out sites	Conserve the moult haul-out sites in a natural condition. See map 9	Attribute and target based on background knowledge of Irish populations, review of data from Lyons (2004), Cronin et al. (2004), NPWS (2010), NPWS (2011), NPWS (2012) and unpublished National Parks and Wildlife Service records. See marine supporting document for further details
Resting behaviour	Resting haul-out sites	Conserve the resting haul-out sites in a natural condition. See map 9	Attribute and target based on background knowledge of Irish populations, review of data from Lyons (2004), unpublished National Parks and Wildlife Service records and unpublished data collected by University College Cork/Inland Fisheries Ireland. See marine supporting document for further details
Disturbance	Level of impact	Human activities should occur at levels that do not adversely affect the harbour seal population at the site	See marine supporting document for further details

## 2110 Embryonic shifting dunes

To restore the favourable conservation condition of Embryonic shifting dunes in Killala Bay/Moy Estuary SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area increasing, subject to natural processes, including erosion and succession. For sub-site mapped: Ross- 0.81ha, Bartragh Island - 0.75ha. See map 7	Based on data from the Coastal Monitoring Project (Ryle et al., 2009). Habitat is very difficult to measure in view of its dynamic nature and was only recorded at Bartragh Island and Ross, giving a total estimated area of 1.56ha. Accretion was noted from the western end of Bartragh Island. Embryo dune habitat is restricted to a small area on the seaward edge at Ross. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes. See map 7 for known distribution	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Dunes are naturally dynamic systems that require continuous supply and circulation of sand. Sea defence/coastal protection works are present near the main access point to the beach at Inishcrone (Ryle et al. 2009). See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Gaynor (2008) and Ryle et al. (2009). At Bartragh Island and Ross there are transitions from sand dunes into saltmarsh habitats. See coastal habitats supporting document for further details
Vegetation composition: plant health of foredune grasses	Percentage cover	More than 95% of sand couch ( <i>Elytrigia juncea</i> ) and/or lyme-grass ( <i>Leymus arenarius</i> ) should be healthy (i.e. green plant parts above ground and flowering heads present)	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain the presence of species-poor communities with typical species: sand couch ( <i>Elytrigia juncea</i> ) and/or lyme-grass ( <i>Leymus arenarius</i> )	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from Ryle et al. (2009). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. Sea-buckthorn ( <i>Hippophae rhamnoides</i> ) should be absent or effectively controlled. See coastal habitats supporting document for further details

**2120 Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes')**

To restore the favourable conservation condition of Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) in Killala Bay/Moy Estuary SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area increasing, subject to natural processes including erosion and succession. For sub-sites mapped: Ross- 1.58; Bartragh Island- 7.52ha ; Inishcrone- 3.65ha. See map 7	Habitat was mapped during the Coastal Monitoring Project (Ryle et al., 2009). Habitat was mapped at three sub-sites to give a total estimated area of 12.75ha. Habitat is very difficult to measure in view of its dynamic nature. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes. See map 7 for known distribution	Based on data from Ryle et al. (2009). Mobile dunes are well developed at Bartragh Island, while at Inishcrone they are patchy in distribution and eroded back to the fixed dune in places. See coastal habitats supporting document for further details
Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Dunes are naturally dynamic systems that require continuous supply and circulation of sand. Marram ( <i>Ammophila arenaria</i> ) reproduces vegetatively and requires constant accretion of fresh sand to maintain active growth, thus encouraging further accretion. There are coastal protection works in place at Inishcrone. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Gaynor (2008) and Ryle et al. (2009). At both Bartragh Island and Ross there are transitions from sand dune to saltmarsh habitats. See coastal habitats supporting document for further details
Vegetation composition: plant health of dune grasses	Percentage cover	More than 95% of marram ( <i>Ammophila arenaria</i> ) and/or lyme-grass ( <i>Leymus arenarius</i> ) should be healthy (i.e. green plant parts above ground and flowering heads present)	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain the presence of species-poor communities dominated by marram ( <i>Ammophila arenaria</i> ) and/or lyme-grass ( <i>Leymus arenarius</i> )	Based on data from Ryle et al. (2009). Bartragh Island, Ross and Inishcrone all support a characteristic dune flora. See coastal habitats supporting document for further details

**2120 Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes')**

To restore the favourable conservation condition of Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) in Killala Bay/Moy Estuary SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from Ryle et al. (2009). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. Sea-buckthorn ( <i>Hippophae rhamnoides</i> ) should be absent or effectively controlled. The mobile dune habitat at Ross has a high cover of creeping thistle ( <i>Cirsium arvense</i> ) and common ragwort ( <i>Senecio jacobaea</i> ). At Inishcrone and Bartragh Island, ragwort ( <i>Senecio jacobaea</i> ) is also common. See coastal habitats supporting document for further details

**2130 \*Fixed coastal dunes with herbaceous vegetation ('grey dunes')**

**To restore the favourable conservation condition of Fixed coastal dunes with herbaceous vegetation (grey dunes) in Killala Bay/Moy Estuary SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area increasing, subject to natural processes including erosion and succession. For sub-site mapped: Ross - 100.79ha; Bartragh Island - 120.13ha; Inishcrone - 38.53ha. See map 7	Based on data from the Coastal Monitoring Project (Ryle et al., 2009). Habitat mapped at three sub-sites to give a total estimated area of 259.46ha. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes. See map 7 for known distribution	Based on data from the Coastal Monitoring Project (Ryle et al., 2009). Fixed dune habitat is extensive at Bartragh Island. The extent of the fixed dune habitat is reduced at Inishcrone owing to presence of Enniscrone golf course. See coastal habitats supporting document for further details
Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions.	Based on data from the Coastal Monitoring Project (Ryle et al., 2009). Physical barriers can lead to fossilisation or over-stabilisation of dunes, as well as beach starvation resulting in increased rates of erosion. There are coastal protection works at the main access to the beach at Inishcrone. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Ryle et al. (2009). At both Bartragh Island and Ross there are transitions from sand dune to saltmarsh habitats. See coastal habitats supporting document for further details
Vegetation structure: bare ground	Percentage cover	Bare ground should not exceed 10% of fixed dune habitat, subject to natural processes.	Based on data from Gaynor (2008) and Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: sward height	Centimeters	Maintain structural variation within sward.	Based on data from Gaynor (2008) and Ryle et al. (2009). Vegetation is quite rank in places at Ross, Inishcrone and Bartragh Island due to undergrazing. See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in Ryle et al. (2009)	Based on data from Gaynor (2008) and Ryle et al. (2009). See coastal habitats supporting document for further details

**2130 \*Fixed coastal dunes with herbaceous vegetation ('grey dunes')**

To restore the favourable conservation condition of Fixed coastal dunes with herbaceous vegetation (grey dunes) in Killala Bay/Moy Estuary SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Vegetation composition: negative indicator species (including <i>Hippophae rhamnoides</i> )	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from Ryle et al. (2009). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. Sea-buckthorn ( <i>Hippophae rhamnoides</i> ) should be absent or effectively controlled. Bracken ( <i>Pteridium aquilinum</i> ) was recorded at Bartragh Island. At Inishcrone, common ragwort ( <i>Senecio jacobaea</i> ), creeping thistle ( <i>Cirsium vulgare</i> ) and bramble ( <i>Rubus fruticosus</i> ) occur. At Ross, creeping thistle ( <i>Cirsium arvense</i> ), common ragwort ( <i>Senecio jacobaea</i> ) and hogweed ( <i>Heracleum sphondylium</i> ) occur. See coastal habitats supporting document for further details
Vegetation composition: scrub/trees	Percentage cover	No more than 5% cover or under control	Based on data from Ryle et al. (2009). Scattered shrubs and stunted trees occur at Ross, while occasional scrub occurs at Bartragh Island. See coastal habitats supporting document for further details



**2190 Humid dune slacks**

**To maintain the favourable conservation condition of Humid dune slacks in Killala Bay/Moy Estuary 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 including erosion and succession. For sub-sites mapped: Ross: 3.87ha; Bartragh Island: 1.22ha. See map 6	Based on data from the Coastal Monitoring Project (Ryle et al., 2009). Habitat was mapped at two sub-sites, giving a total estimated area of 5.09ha. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes. See map 6 for known distribution	Based on data from Ryle et al. (2009). Dune slacks at Bartragh Island are narrow linear features. See coastal habitats supporting document for further details.
Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain natural circulation of sediment and organic matter, without any physical obstructions	Physical barriers can lead to fossilisation or over-stabilisation of dunes, as well as beach starvation resulting in increased rates of erosion. See coastal habitats supporting document for further details
Physical structure: hydrological and flooding regime	Presence/ absence of water abstraction or drainage works	Maintain natural hydrological regime	Based on data from Gaynor (2008) and Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Ryle et al., (2009). At both Bartragh Island and Ross sub-sites there are transitions from sand dune to saltmarsh habitats. See coastal habitats supporting document for further details
Vegetation structure: bare ground	Percentage cover	Bare ground should not exceed 5% of dune slack habitat, with the exception of pioneer slacks which can have up to 20% bare ground.	Based on data from Gaynor (2008) and Ryle et al. (2009). At Ross, the dune slacks are poached by cattke in places. See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimeters	Maintain structural variation within sward.	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in Ryle et al. (2009)	Based on data from Gaynor (2008) and Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: cover of <i>S. repens</i>	% cover; centimeters	Maintain more than 40% cover of creeping willow ( <i>Salix repens</i> )	Based on data from Ryle et al. (2009). Cover of creeping willow ( <i>Salix repens</i> ) needs to be controlled (e.g. through an appropriate grazing regime) to prevent the development of a coarse, rank vegetation cover. <i>Salix repens</i> ssp. <i>argentea</i> was noted at Bartragh Island, but its cover was only 10% and it was not widespread. See coastal habitats supporting document for further details

**2190 Humid dune slacks**

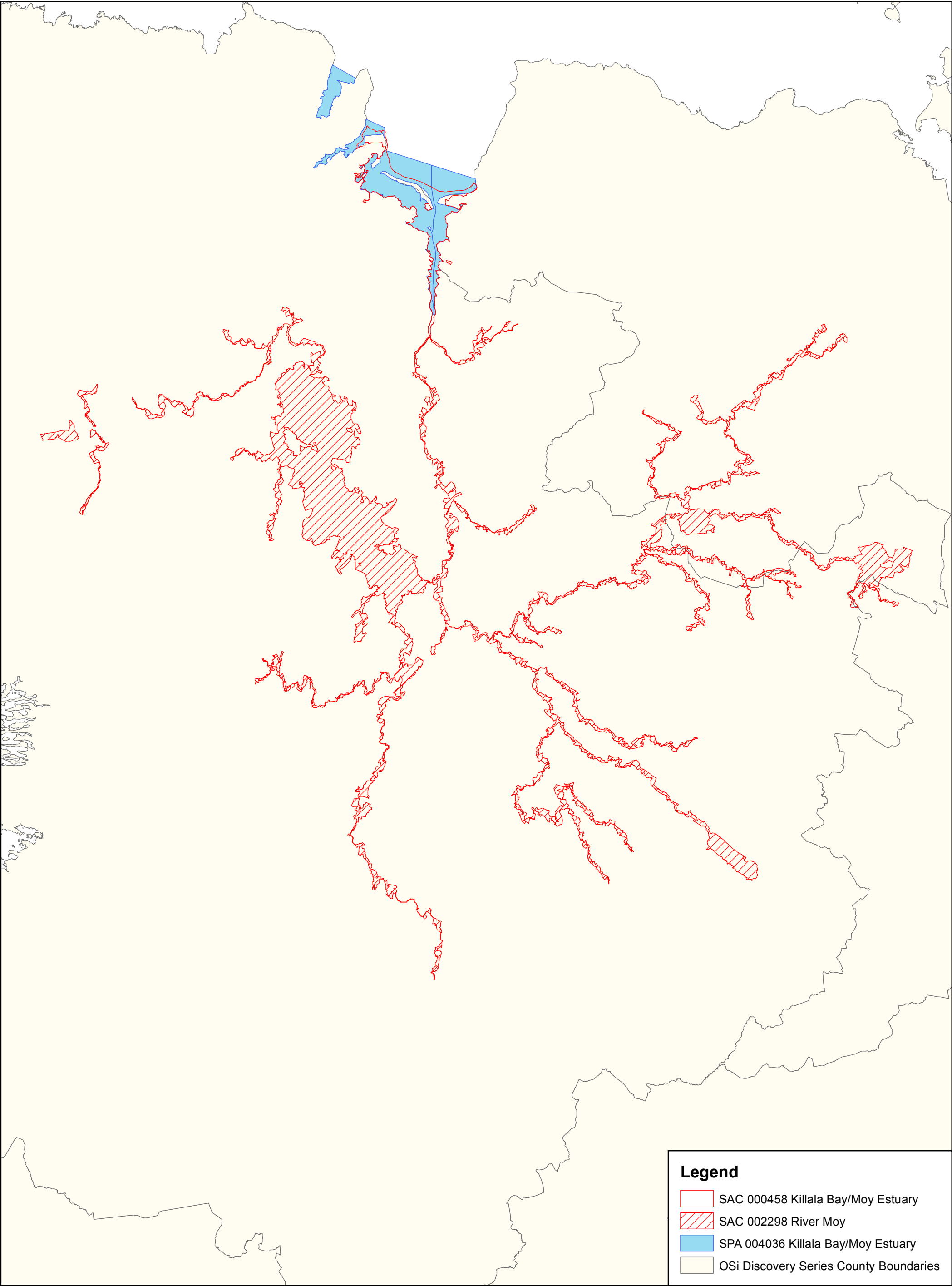
**To maintain the favourable conservation condition of Humid dune slacks in Killala Bay/Moy Estuary SAC, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from Ryle et al. (2009). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. Sea-buckthorn ( <i>Hippophae rhamnoides</i> ) should be absent or effectively controlled. See coastal habitats supporting document for further details
Vegetation composition: scrub/trees	Percentage cover	No more than 5% cover or under control	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details



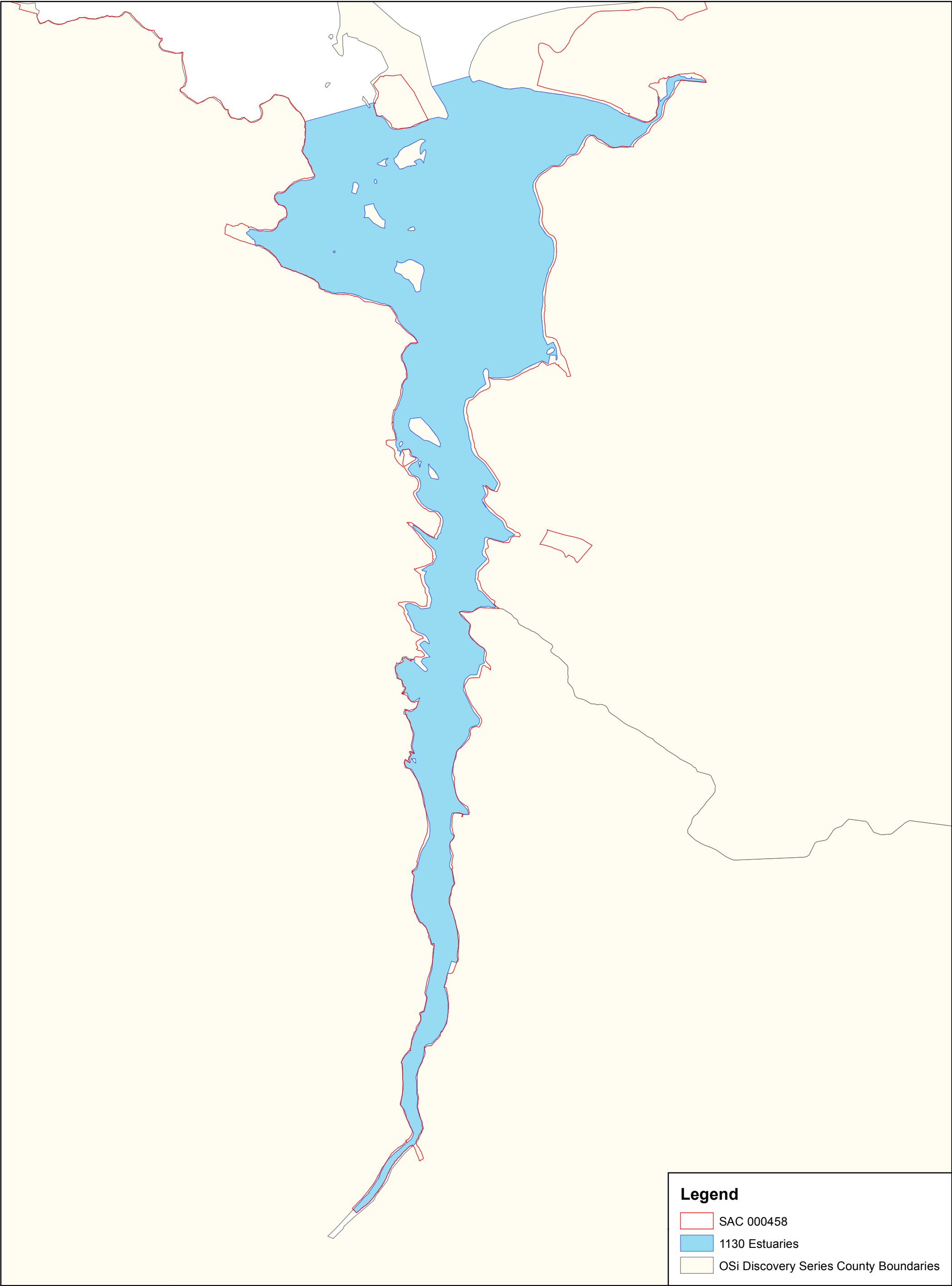






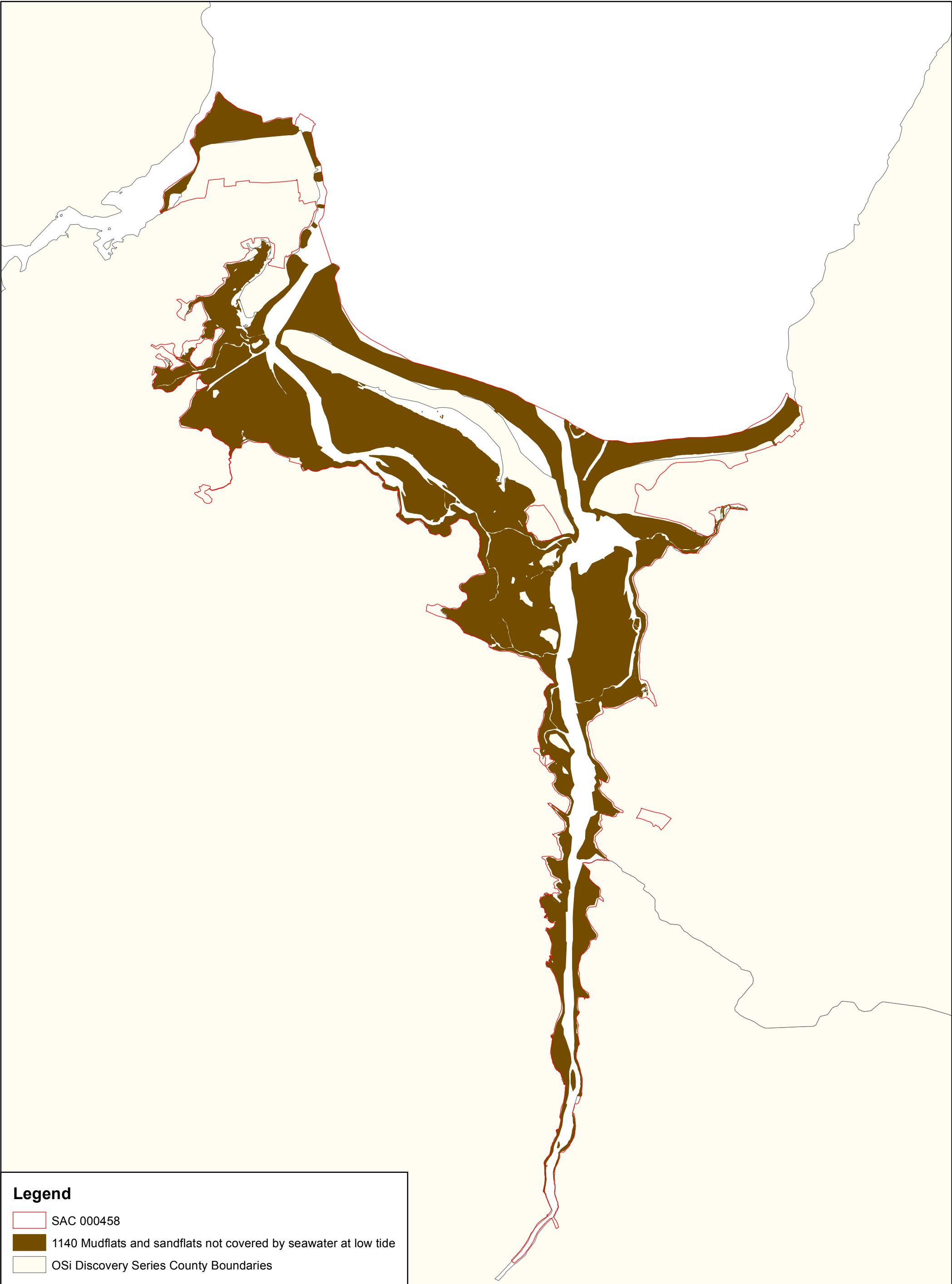
**Legend**

-  SAC 000458 Killala Bay/Moy Estuary
-  SAC 002298 River Moy
-  SPA 004036 Killala Bay/Moy Estuary
-  OSi Discovery Series County Boundaries






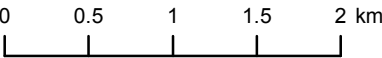
**Legend**

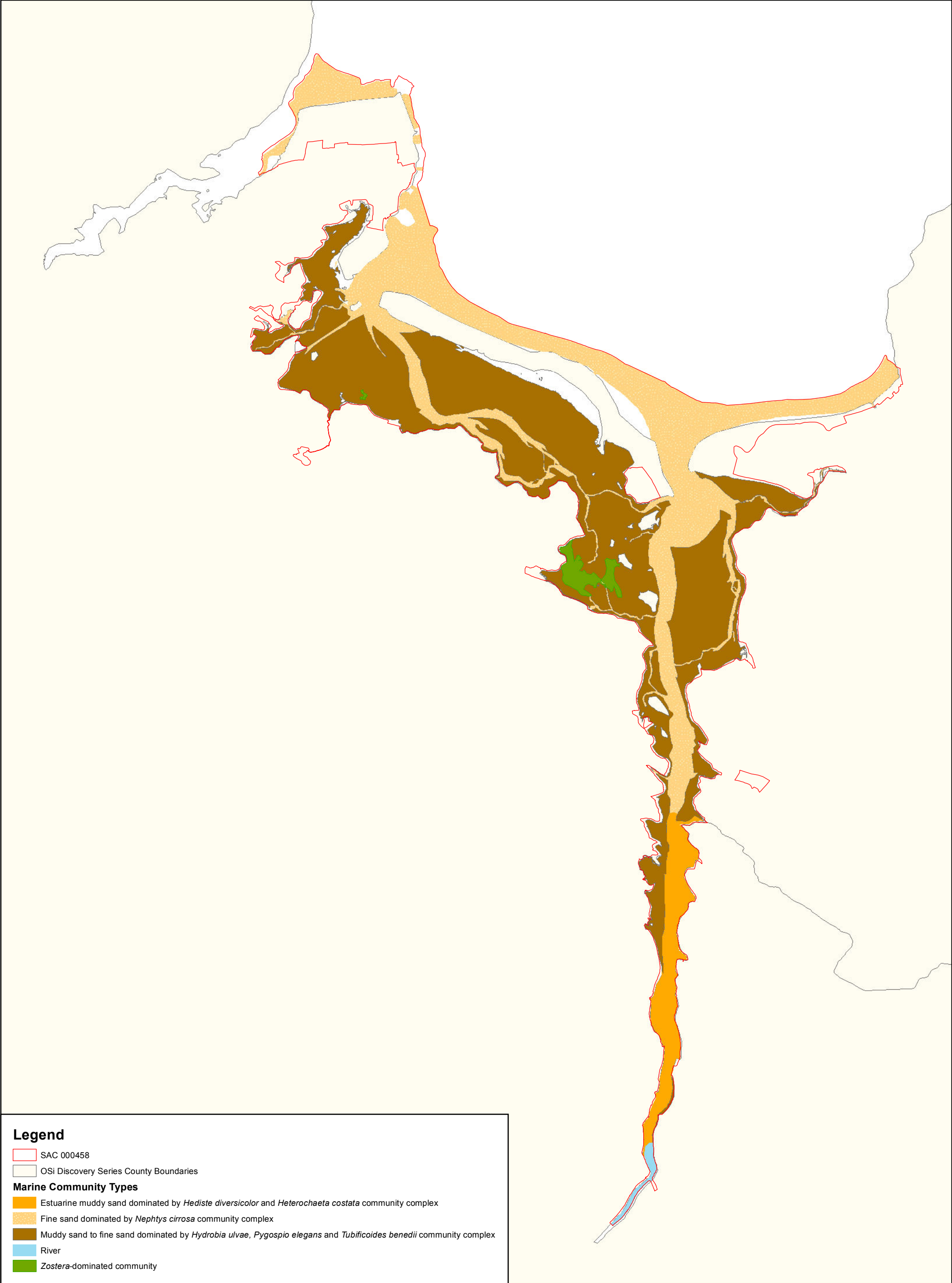
- SAC 000458
- 1130 Estuaries
- OSi Discovery Series County Boundaries



**Legend**

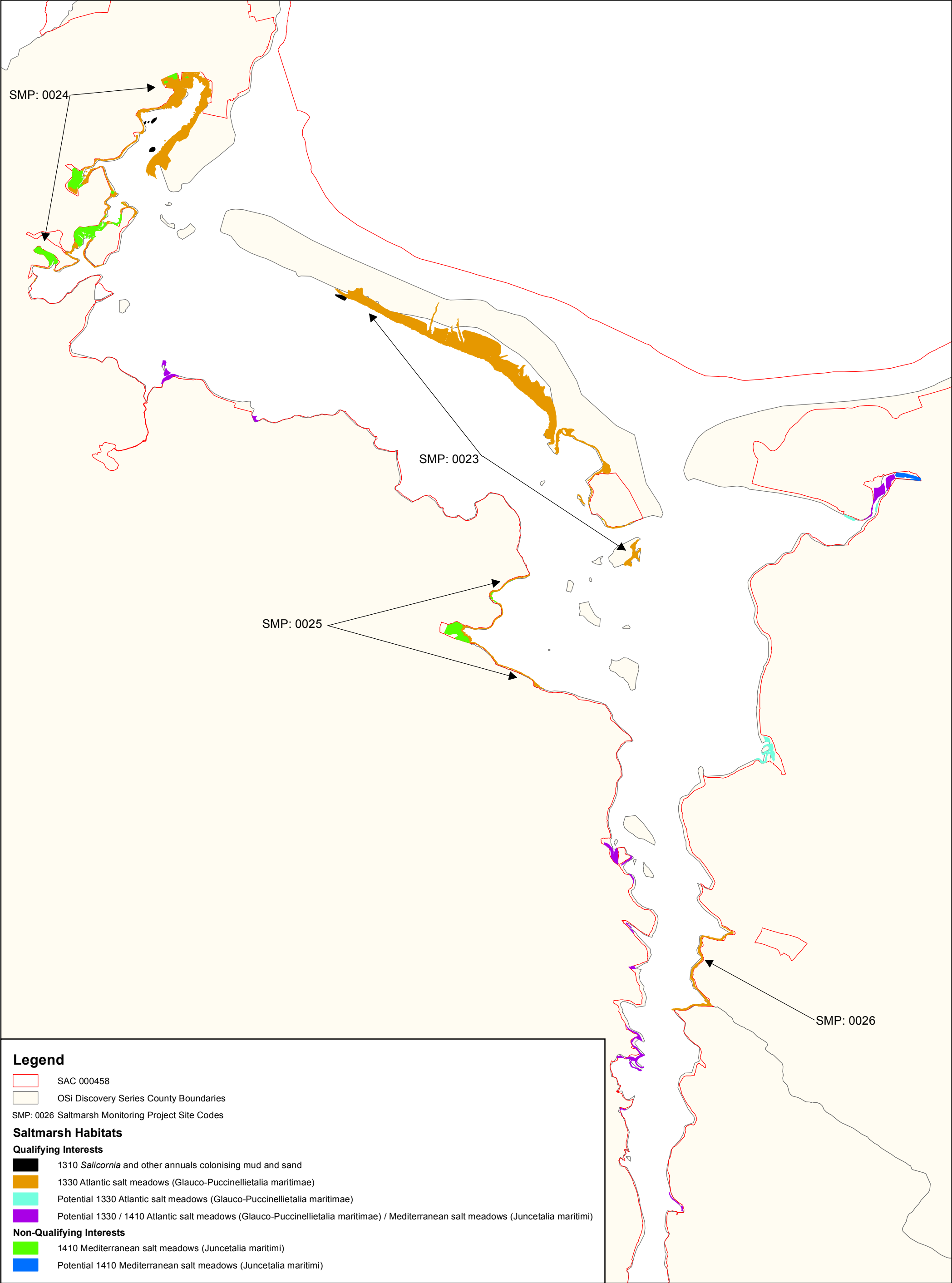
-  SAC 000458
-  1140 Mudflats and sandflats not covered by seawater at low tide
-  OSi Discovery Series County Boundaries





Legend

- SAC 000458
- OSi Discovery Series County Boundaries
- Marine Community Types**
  - Estuarine muddy sand dominated by *Hediste diversicolor* and *Heterochaeta costata* community complex
  - Fine sand dominated by *Nephtys cirrosa* community complex
  - Muddy sand to fine sand dominated by *Hydrobia ulvae*, *Pygospio elegans* and *Tubificoides benedii* community complex
  - River
  - Zostera*-dominated community



**Legend**

- SAC 000458
  - OSi Discovery Series County Boundaries
- SMP: 0026 Saltmarsh Monitoring Project Site Codes

**Saltmarsh Habitats**

**Qualifying Interests**

- 1310 *Salicornia* and other annuals colonising mud and sand
- 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- Potential 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- Potential 1330 / 1410 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) / Mediterranean salt meadows (*Juncetalia maritimi*)

**Non-Qualifying Interests**

- 1410 Mediterranean salt meadows (*Juncetalia maritimi*)
- Potential 1410 Mediterranean salt meadows (*Juncetalia maritimi*)

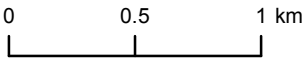


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Department of  
Arts, Heritage and the Gaeltacht

**MAP 6:  
KILLALA BAY / MOY ESTUARY SAC  
CONSERVATION OBJECTIVES  
SALTMARSH HABITATS**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SAC 000458  
CO.MAYO; version 1.01, CO. SLIGO; version 1.01

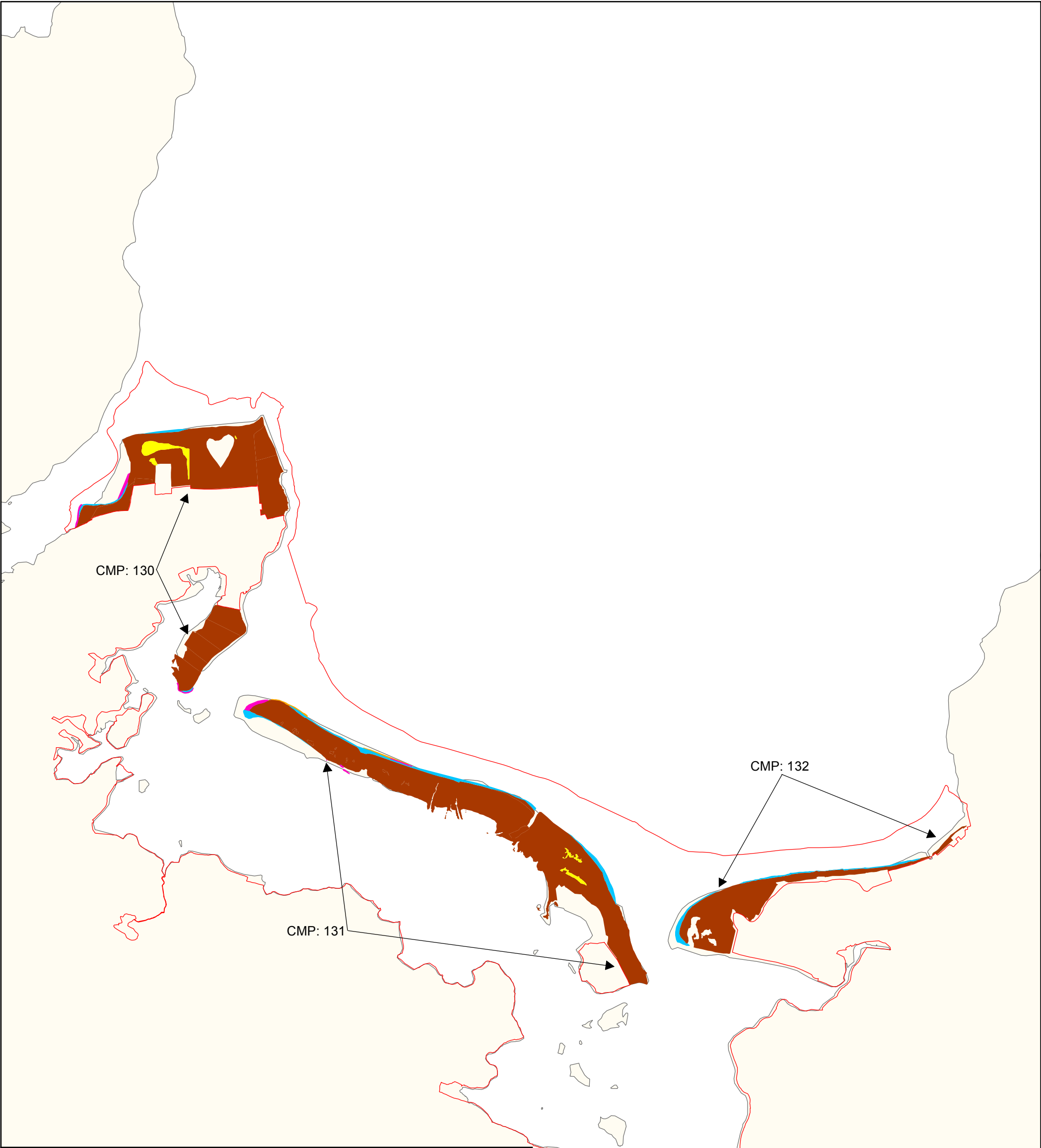


The mapped boundaries are of an indicative and general nature only.  
Boundaries of designated areas are subject to revision.  
Reproduced from Ordnance Survey material by permission  
of the Government (Permit number EN 0059208).  
Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta.  
Féadfar athbhreithnithe a déanamh ar theorainneacha na goeantar  
comharthaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis  
le chead ón Rialtas (Ceadúnas Uimh. EN 0059208)



**Map Version 1  
Date: Aug 2012**





**Legend**

- SAC 000458
- OSi Discovery Series County Boundaries

CMP: 131 Coastal Monitoring Project Site Codes

**Qualifying Interests**

- 1210 Annual vegetation of drift lines
- 2110 Embryonic shifting dunes
- 2120 Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes')
- 2130 \*Fixed coastal dunes with herbaceous vegetation ('grey dunes')
- 2190 Humid dune slacks

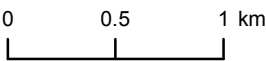


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**MAP 7:  
KILLALA BAY / MOY ESTUARY SAC  
CONSERVATION OBJECTIVES  
SAND DUNE HABITATS**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

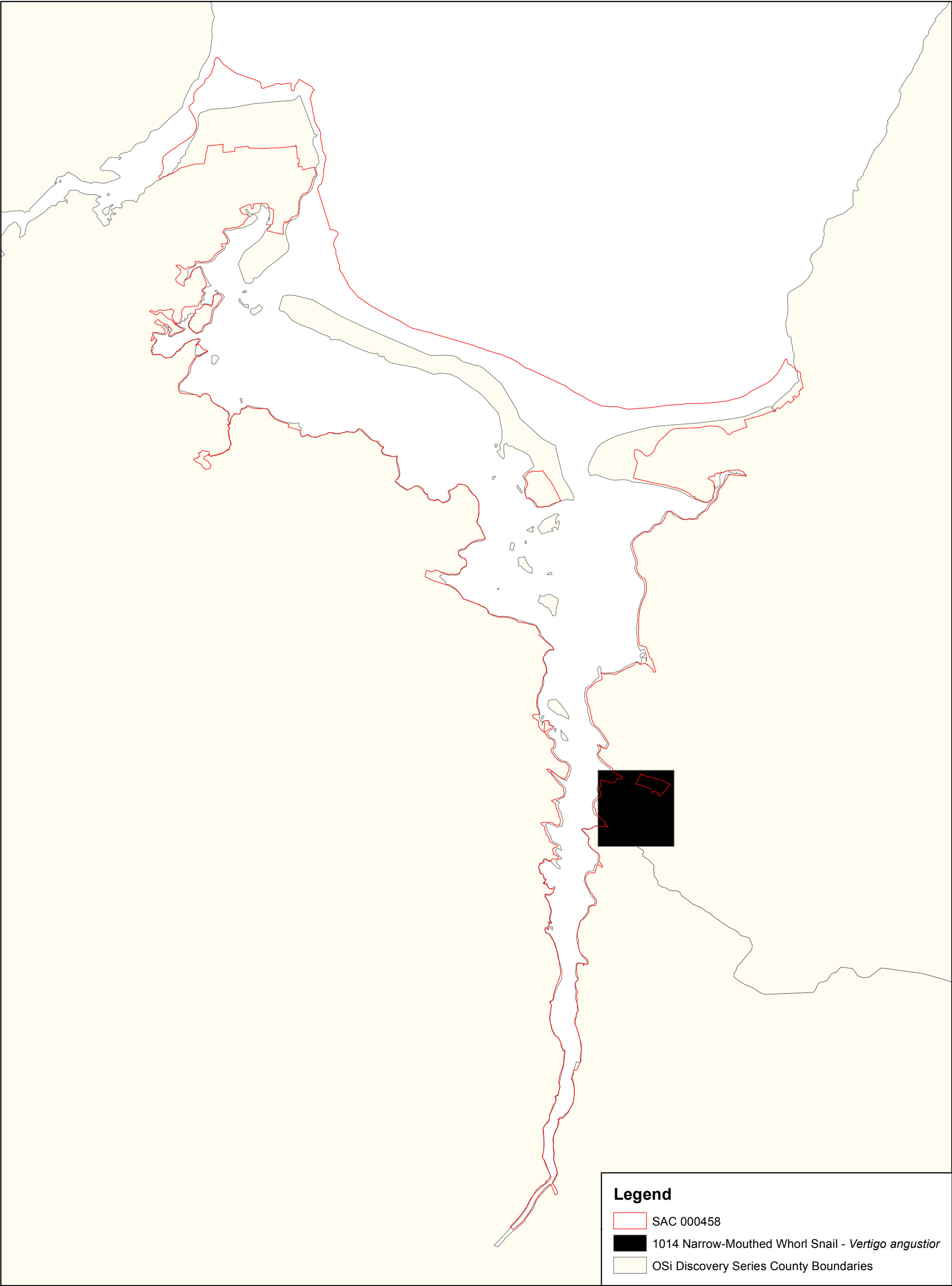
SITE CODE: SAC 000458  
CO.MAYO; version 1.01, CO. SLIGO; version 1.01

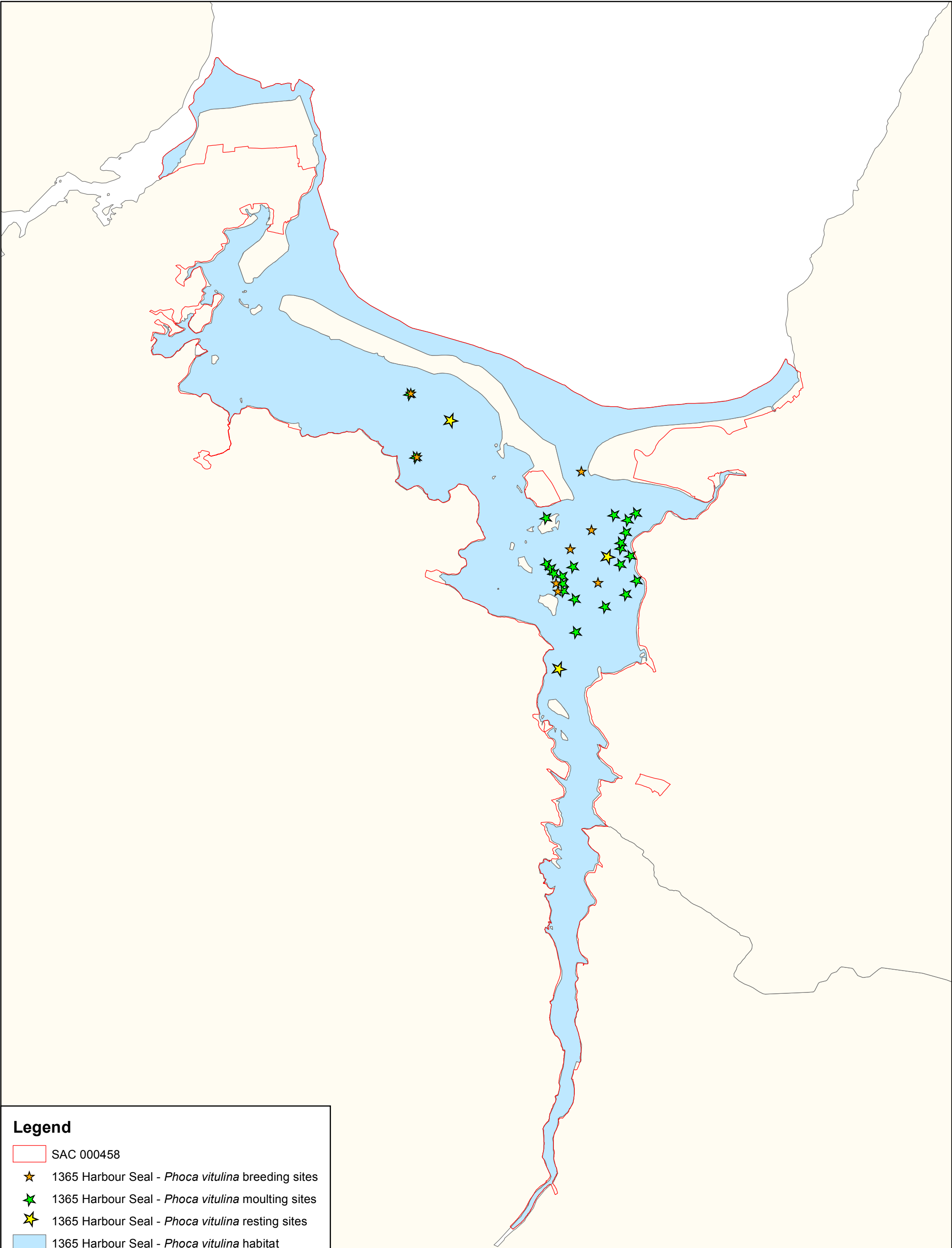


The mapped boundaries are of an indicative and general nature only.  
Boundaries of designated areas are subject to revision.  
Reproduced from Ordnance Survey material by permission  
of the Government (Permit number EN 0059208).  
Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta.  
Féadfar athbhreithnithe a déanamh ar theorainneacha na goeantar  
comharthaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis  
le chead ón Rialtas (Ceadúnas Uimh. EN 0059208)









**Map Version 1  
Date: Aug 2012**





**Legend**

-  SAC 000458
-  1365 Harbour Seal - *Phoca vitulina* breeding sites
-  1365 Harbour Seal - *Phoca vitulina* moulting sites
-  1365 Harbour Seal - *Phoca vitulina* resting sites
-  1365 Harbour Seal - *Phoca vitulina* habitat
-  OSi Discovery Series County Boundaries

# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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Killala Bay/Moy Estuary SPA 004036



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*Department of  
Arts, Heritage and the Gaeltacht*



**National Parks and Wildlife Service,  
Department of Arts, Heritage and the Gaeltacht,  
7 Ely Place, Dublin 2, Ireland.  
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E-mail: [nature.conservation@ahg.gov.ie](mailto:nature.conservation@ahg.gov.ie)**

**Citation:**

**NPWS (2013) Conservation Objectives: Killala Bay/Moy Estuary SPA 004036.  
Version 1. National Parks and Wildlife Service, Department of Arts, Heritage  
and the Gaeltacht.**

**Series Editor: Rebecca Jeffrey  
ISSN 2009-4086**

## 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*

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004036      Killala Bay/Moy Estuary SPA

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- A137      Ringed Plover *Charadrius hiaticula*
- A140      Golden Plover *Pluvialis apricaria*
- A141      Grey Plover *Pluvialis squatarola*
- A144      Sanderling *Calidris alba*
- A149      Dunlin *Calidris alpina alpina*
- A157      Bar-tailed Godwit *Limosa lapponica*
- A160      Curlew *Numenius arquata*
- A162      Redshank *Tringa totanus*
- A999      Wetlands

**Please note that this SPA overlaps with Killala Bay/Moy Estuary SAC (000458) and Lackan Saltmarsh and Kilcummin Head SAC (000516). See map 2. The conservation objectives for this site should be used in conjunction with those for the overlapping sites as appropriate.**

## Supporting documents, relevant reports & publications

*Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)*

### NPWS Documents

**Year :** 2013

**Title :** Killala Bay/Moy Estuary SPA (site code 4036) Conservation objectives supporting document V1

**Author :** NPWS

**Series :** Conservation objectives supporting document

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**A137                      Ringed Plover *Charadrius hiaticula***

**To maintain the favourable conservation condition of Ringed Plover in Killala Bay/Moy Estuary SPA, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of the conservation objectives supporting document
Distribution	Number and range of areas used by waterbirds	No significant decrease in the range, timing or intensity of use of areas by ringed plover, other than that occurring from natural patterns of variation	Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of conservation objectives supporting document

**A140 Golden Plover *Pluvialis apricaria***

**To maintain the favourable conservation condition of Golden Plover in Killala Bay/Moy Estuary SPA, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of the conservation objectives supporting document
Distribution	Number, range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by golden plover, other than that occurring from natural patterns of variation	Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**A141                  Grey Plover *Pluvialis squatarola***

**To maintain the favourable conservation condition of Grey Plover in Killala Bay/Moy Estuary SPA, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of the conservation objectives supporting document
Distribution	Number, range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by grey plover, other than that occurring from natural patterns of variation	Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**A144 Sanderling *Calidris alba***

**To maintain the favourable conservation condition of Sanderling in Killala Bay/Moy Estuary SPA, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Number, range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by sanderling, other than that occurring from natural patterns of variation	Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**A149                      Dunlin *Calidris alpina alpina***

**To maintain the favourable conservation condition of Dunlin in Killala Bay/Moy Estuary SPA, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of the conservation objectives supporting document
Distribution	Number, range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by dunlin, other than that occurring from natural patterns of variation	Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**A157 Bar-tailed Godwit *Limosa lapponica***

**To maintain the favourable conservation condition of Bar-tailed Godwit in Killala Bay/Moy Estuary SPA, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of the conservation objectives supporting document
Distribution	Number, range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by bar-tailed godwit, other than that occurring from natural patterns of variation	Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**A160 Curlew *Numenius arquata***

**To maintain the favourable conservation condition of Curlew in Killala Bay/Moy Estuary SPA, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of the conservation objectives supporting document
Distribution	Number, range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by curlew, other than that occurring from natural patterns of variation	Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**A162                      Redshank *Tringa totanus***

**To maintain the favourable conservation condition of Redshank in Killala Bay/Moy Estuary SPA, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of the conservation objectives supporting document
Distribution	Number, range, timing and intensity of use of area	No significant decrease in the range, timing or intensity of use of areas by redshank, other than that occurring from natural patterns of variation	Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document



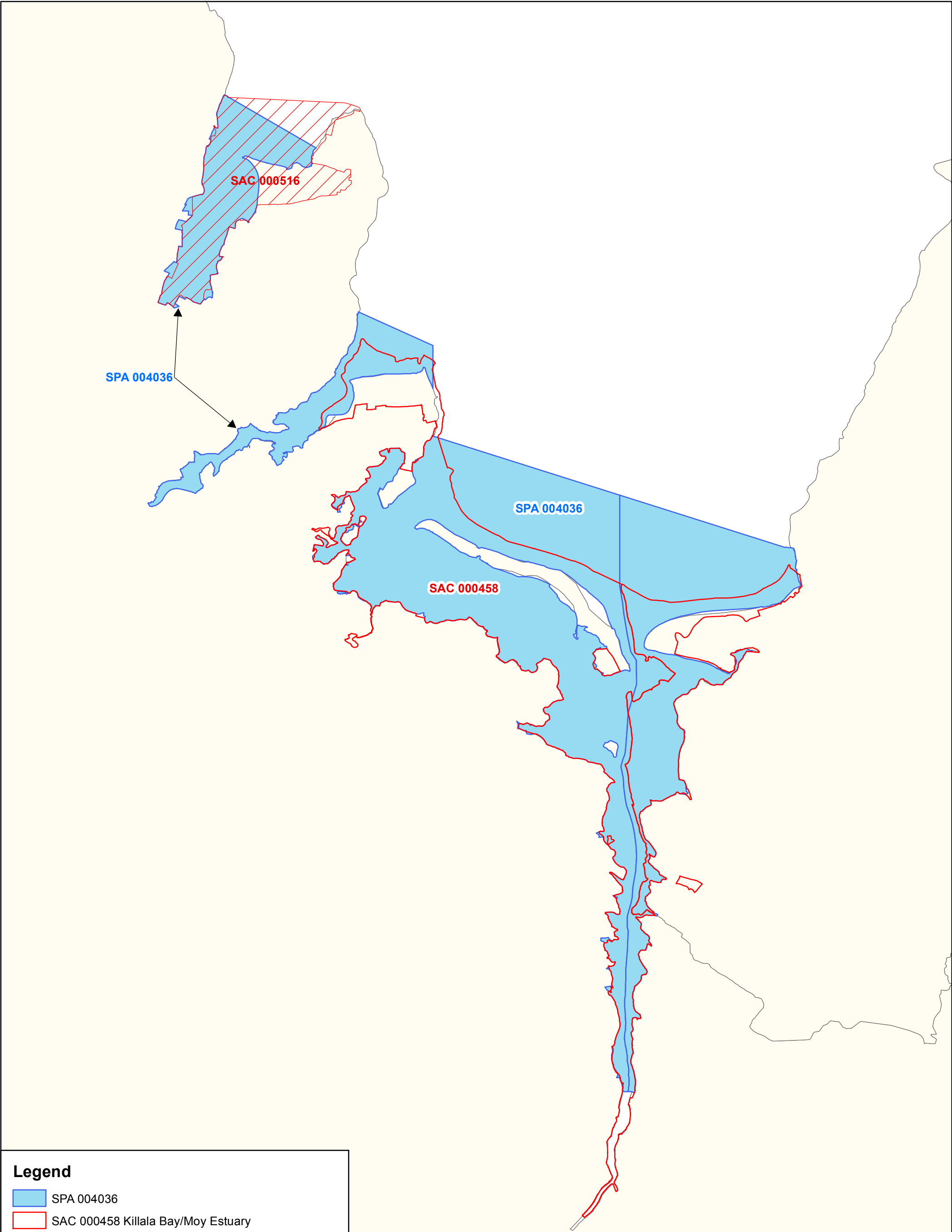
## Conservation Objectives for : Killala Bay/Moy Estuary SPA [004036]

### A999 Wetlands

**To maintain the favourable conservation condition of wetland habitat in Killala Bay/Moy Estuary SPA as a resource for the regularly occurring migratory waterbirds that utilise it. This is defined by the following attribute and target:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 3204 hectares, other than that occurring from natural patterns of variation	The wetland habitat area was estimated as 3204ha using OSi data and relevant orthophotographs. For further information see part three of the conservation objectives supporting document





Legend

- SPA 004036
- SAC 000458 Killala Bay/Moy Estuary
- SAC 000516 Lackan Saltmarsh And Kilcummin Head
- OSi Discovery Series County Boundaries



# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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### Lackan Saltmarsh and Kilcummin Head SAC 000516



An Roinn Ealaíon, Oidhreachta,  
Gnóthaí Réigiúnacha, Tuaithe agus Gaeltachta

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Department of Arts, Heritage,  
Regional, Rural and Gaeltacht Affairs



**National Parks and Wildlife Service,  
Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs,  
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Web: [www.npws.ie](http://www.npws.ie)  
E-mail: [nature.conservation@ahg.gov.ie](mailto:nature.conservation@ahg.gov.ie)**

**Citation:**

**NPWS (2016) Conservation Objectives: Lackan Saltmarsh and Kilcummin Head  
SAC 000516. Version 1. National Parks and Wildlife Service, Department of Arts,  
Heritage, Regional, Rural and Gaeltacht Affairs.**

**Series Editor: Rebecca Jeffrey  
ISSN 2009-4086**

## 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.

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- 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

000516	Lackan Saltmarsh and Kilcummin Head SAC
1310	<del>Ulex</del> and other annuals colonising mud and sand
1330	Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritima</i> )
1410	Mediterranean salt meadows ( <i>Juncetalia maritimi</i> )
2120	Shifting dunes along the shoreline with <del>Cl { [ ] @ } ^</del> (white dunes)
2130	Fixed coastal dunes with herbaceous vegetation (grey dunes)E

**Please note that this SAC overlaps with Killala Bay/Moy Estuary SPA (004036). See map 2. The conservation objectives for this site should be used in conjunction with those for the overlapping site as appropriate.**

## Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)

### NPWS Documents

<b>Year :</b>	2007
<b>Title :</b>	Saltmarsh Monitoring Project 2006
<b>Author :</b>	McCorry, M.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2009
<b>Title :</b>	Coastal Monitoring Project 2004-2006
<b>Author :</b>	Ryle, T.; Murray, A.; Connolly, K.; Swann, M.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2009
<b>Title :</b>	Saltmarsh monitoring project 2007-2008
<b>Author :</b>	McCorry, M.; Ryle, T.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2013
<b>Title :</b>	Monitoring survey of Annex I sand dune habitats in Ireland
<b>Author :</b>	Delaney, A.; Devaney, F.M.; Martin, J.M.; Barron, S.J.
<b>Series :</b>	Irish Wildlife Manual No. 75
<b>Year :</b>	2016
<b>Title :</b>	Lacken Saltmarsh and Kilcummin Head SAC (site code: 516) Conservation objectives supporting document- coastal habitats V1
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document

### Other References

<b>Year :</b>	2008
<b>Title :</b>	The phytosociology and conservation value of Irish sand dunes
<b>Author :</b>	Gaynor, K.
<b>Series :</b>	Unpublished PhD thesis, National University of Ireland, Dublin



## Spatial data sources

<b>Year :</b>	Revision 2010
<b>Title :</b>	Saltmarsh Monitoring Project 2007-2008. Version 1
<b>GIS Operations :</b>	QIs selected; clipped to SAC boundary; overlapping regions with Coastal CO data investigated and resolved with expert opinion used
<b>Used For :</b>	1310, 1330, 1410 (map 3)
<hr/>	
<b>Year :</b>	2009
<b>Title :</b>	Coastal Monitoring Project 2004-2006. Version 1
<b>GIS Operations :</b>	QIs selected; clipped to SAC boundary; overlapping regions with Saltmarsh CO data investigated and resolved with expert opinion used
<b>Used For :</b>	2120, 2130 (map 4)
<hr/>	

## Conservation Objectives for : Lackan Saltmarsh and Kilcummin Head SAC [000516]

### 1310 *Salicornia* and other annuals colonising mud and sand

**To restore the favourable conservation condition of *Salicornia* and other annuals colonising mud and sand in Lackan Saltmarsh and Kilcummin Head 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, including erosion and succession. For the sub-site mapped: Lackan - 0.001ha	Based on data from the Saltmarsh Monitoring Project (SMP) (McCorry, 2007; McCorry and Ryle, 2009). <i>Salicornia</i> and other annuals colonising mud and sand was surveyed at the sub-site Lackan (site ID: SMP0022) to give a total estimated area of 0.001ha in Lackan Saltmarsh and Kilcummin Head SAC. This extent is too small to be mapped. NB further unsurveyed areas may be present within the SAC. See the Lackan Saltmarsh and Kilcummin Head SAC conservation objectives supporting document for coastal habitats for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes	Based on data from McCorry (2007) and McCorry and Ryle (2009). <i>Salicornia</i> is an annual species, so its distribution can vary significantly from year to year. See the coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain, or where necessary restore, natural circulation of sediments and organic matter, without any physical obstructions	Based on data from McCorry (2007) and McCorry and Ryle (2009). Sediment supply is particularly important for this pioneer saltmarsh community, as its distribution depends on accretion rates. Within the estuary and along the margins of the Cloonalaghan River, sediments originating from the river have built up to form an extensive saltmarsh (Ryle et al., 2009). See the coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession	Based on data from McCorry (2007) and McCorry and Ryle (2009). Creeks deliver sediment throughout the saltmarsh system. At Lackan, the creek network is well-developed and many of the creeks contain very soft mud and are unusually deep. See the coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	Based on data from McCorry (2007) and McCorry and Ryle (2009). This pioneer saltmarsh community requires regular tidal inundation. See the coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from McCorry (2007) and McCorry and Ryle (2009). See the coastal habitats supporting document for further details
Vegetation structure: sward height	Centimetres	Maintain structural variation within sward	Based on data from McCorry (2007) and McCorry and Ryle (2009). See the coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Maintain more than 90% of the area outside of creeks vegetated	Based on data from McCorry (2007) and McCorry and Ryle (2009). See the coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover	Maintain the presence of species-poor communities with typical species listed in McCorry and Ryle (2009)	Based on data from McCorry (2007) and McCorry and Ryle (2009). There is frequent glasswort ( <i>Salicornia</i> sp.) and occasional annual sea-blite ( <i>Suaeda maritima</i> ) associated with some areas. See the coastal habitats supporting document for further details
Vegetation composition: negative indicator species - <i>Spartina anglica</i>	Hectares	There is no record of common cordgrass ( <i>Spartina anglica</i> ) in the SAC and its establishment should be prevented	Based on data from McCorry (2007) and McCorry and Ryle (2009). No common cordgrass ( <i>Spartina anglica</i> ) was recorded in this habitat in the SAC. See the coastal habitats supporting document for further details

## Conservation Objectives for : Lackan Saltmarsh and Kilcummin Head SAC [000516]

### 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)

**To maintain the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) in Lackan Saltmarsh and Kilcummin Head 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, including erosion and succession. For the sub-site (Lackan) and potential areas mapped: 32.70ha. See map 3	Based on data from the Saltmarsh Monitoring Project (SMP) (McCorry, 2007; McCorry and Ryle, 2009). The sub-site Lackan (site ID: SMP0022) that supports Atlantic Salt Meadows (ASM) was mapped (32.43ha) and additional areas of potential ASM habitat (0.27ha) were identified from an examination of aerial photographs, giving a total estimated area of 32.70ha within Lackan Saltmarsh and Kilcummin Head SAC. NB further unsurveyed areas may be present within the SAC. See the Lackan Saltmarsh and Kilcummin Head SAC conservation objectives supporting document for coastal habitats for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes. See map 3 for known distribution	Based on data from McCorry (2007) and McCorry and Ryle (2009). The saltmarsh is mostly contained in one large main unit. A band of saltmarsh extends along the north-western and north-eastern shorelines of Lackan Bay, which eventually narrows out and transitions to sand dune and sandy beach habitats. NB further unsurveyed areas may be present within the SAC. See the coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions	Based on data from McCorry (2007) and McCorry and Ryle (2009). Erosion and accretion mainly affects the ASM at this SAC. See the coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession	Based on data from McCorry (2007) and McCorry and Ryle (2009). The original creek network has been affected by drainage and some of the channels in the mid-eastern part of the saltmarsh have been artificially deepened and straightened in the past. See the coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	Based on data from McCorry (2007) and McCorry and Ryle (2009). There have been drainage and land reclamation works in the past with regularly-spaced drains across the north-western section of the saltmarsh linking with drains from adjacent wet grassland on slopes to the Cloonalaghan River. See the coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from McCorry (2007) and McCorry and Ryle (2009). Natural transitions occur between saltmarsh types as well as to other coastal habitats such as sand dunes. See the coastal habitats supporting document for further details
Vegetation structure: sward height	Centimetres	Maintain structural variation within sward	Based on data from McCorry (2007) and McCorry and Ryle (2009). Sheep grazing has created a typical low sward (1-2cm high). See the coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Maintain more than 90% of the area outside of creeks vegetated	Based on data from McCorry (2007) and McCorry and Ryle (2009). There are vehicle tracks and wheel ruts on the ASM at the north-western and north-eastern corners of the saltmarsh where minor roads allow access to the sandflats and Lackan Bay. See the coastal habitats supporting document for further details

Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain range of sub-communities with typical species listed in McCorry and Ryle (2009)	Based on data from McCorry (2007) and McCorry and Ryle (2009). ASM vegetation is dominated by a thrift ( <i>Armeria maritima</i> ) and sea plantain ( <i>Plantago maritima</i> ) sward. See the coastal habitats supporting document for further details
Vegetation composition: negative indicator species - <i>Spartina anglica</i>	Hectares	There is no record of common cordgrass ( <i>Spartina anglica</i> ) in the SAC and its establishment should be prevented	Based on data from McCorry (2007) and McCorry and Ryle (2009). No common cordgrass ( <i>Spartina anglica</i> ) was recorded in this habitat in the SAC. See the coastal habitats supporting document for further details

## Conservation Objectives for : Lackan Saltmarsh and Kilcummin Head SAC [000516]

### 1410 Mediterranean salt meadows (*Juncetalia maritimi*)

**To restore the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*) in Lackan Saltmarsh and Kilcummin Head 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, including erosion and succession. For the sub-site (Lackan): 65.03ha. See map 3	Based on data from the Saltmarsh Monitoring Project (SMP) (McCorry, 2007; McCorry and Ryle, 2009). The sub-site Lackan (site ID: SMP0022) that supports Mediterranean Salt Meadows (MSM) was mapped to give a total estimated area of 65.03ha within Lackan Saltmarsh and Kilcummin Head SAC. NB further unsurveyed areas may be present within the SAC. See the Lackan Saltmarsh and Kilcummin Head SAC conservation objectives supporting document for coastal habitats for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes. See map 3 for known distribution	Based on data from McCorry (2007) and McCorry and Ryle (2009). MSM habitat dominates the western side of Cloonalaghan River and the southern part of the saltmarsh. NB further unsurveyed areas may be present within the SAC. See the coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions	Based on data from McCorry (2007) and McCorry and Ryle (2009). Some minor erosion and accretion occurs within the MSM further up the Cloonalaghan River channel from the ASM habitat. See the coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession	Based on data from McCorry (2007) and McCorry and Ryle (2009). The creek and pan topography in the MSM is very well-developed with frequent pans and a dense network of creeks. See the coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	Based on data from McCorry (2007) and McCorry and Ryle (2009). Mediterranean salt meadow is found high up in the saltmarsh but requires occasional tidal inundation. See the coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from McCorry (2007) and McCorry and Ryle (2009). Natural transitions occur between saltmarsh types as well as to other coastal habitats such as sand dunes. See the coastal habitats supporting document for further details
Vegetation structure: sward height	Centimetres	Maintain structural variation in the sward	Based on data from McCorry (2007) and McCorry and Ryle (2009). The grazing level is low in the MSM as the dense patches of sea rush ( <i>Juncus maritimus</i> ) present protect the other vegetation. See the coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Maintain more than 90% of the area outside of creeks vegetated	Based on data from McCorry (2007) and McCorry and Ryle (2009). The MSM habitat has suffered some damage due to heavy cattle poaching. See the coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain range of sub-communities with typical species listed in McCorry and Ryle (2009)	Based on data from McCorry (2007) and McCorry and Ryle (2009). Sea rush ( <i>Juncus maritimus</i> ) occurs on slightly elevated sites and its sharp stems protect succulent plants such as common scurvygrass ( <i>Cochlearia officinalis</i> ) and sea aster ( <i>Aster tripolium</i> ) from grazing. Sea club-rush ( <i>Bolboschoenus maritimus</i> ) and common reed ( <i>Phragmites australis</i> ) are present in the ditches. This limited species diversity is typical of MSM habitat. See the coastal habitats supporting document for further details

Vegetation composition: negative indicator species - <i>Spartina anglica</i>	Hectares	There is no record of common cordgrass ( <i>Spartina anglica</i> ) in the SAC and its establishment should be prevented	Based on data from McCorry (2007) and McCorry and Ryle (2009). No common cordgrass ( <i>Spartina anglica</i> ) was recorded in this habitat in the SAC. See the coastal habitats supporting document for further details
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## Conservation Objectives for : Lackan Saltmarsh and Kilcummin Head SAC [000516]

### 2120 Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)

To restore the favourable conservation condition of Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) in Lackan Saltmarsh and Kilcummin Head 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, including erosion and succession. For the sub-site mapped: Lackan (including Rathlackan) - 2.82ha. See map 4	Based on data from the Coastal Monitoring Project (CMP) (Ryle et al., 2009). Shifting dunes along the shoreline with <i>Ammophila arenaria</i> was mapped at the sub-site Lackan (including Rathlackan; CMP site ID: 129) to give a total estimated area of 2.82ha within Lackan Saltmarsh and Kilcummin Head SAC. This habitat is very difficult to measure in view of its dynamic nature. See the Lackan Saltmarsh and Kilcummin Head SAC conservation objectives supporting document for coastal habitats for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes. See map 4 for known distribution	Based on data from Ryle et al. (2009). See the coastal habitats supporting document for further details
Physical structure: functionality and sediment supply	Presence/absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Based on data from Ryle et al. (2009). Dunes are naturally dynamic systems that require continuous supply and circulation of sand. Marram grass ( <i>Ammophila arenaria</i> ) reproduces vegetatively and requires constant accretion of fresh sand to maintain active growth encouraging further accretion. The sandhills at the Rathlackan sub-site, on the north-west side of Lackan Saltmarsh and Kilcummin Head SAC, are badly eroded, which has resulted in the availability of sediment that may be re-worked to form temporary foredune habitat. There appears to have been some attempts at dune protection through the planting of marram grass and lyme-grass ( <i>Leymus arenarius</i> ) on heaped banks of sand and cobbles. See the coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Gaynor (2008) and Ryle et al. (2009). Mobile dunes at Rathlackan extend around the seaward edge of the spit. Behind the dunes, there are sheltered intertidal sandflats which in turn are backed by extensive saltmarsh. See the coastal habitats supporting document for further details
Vegetation composition: plant health of dune grasses	Percentage cover	More than 95% of marram grass ( <i>Ammophila arenaria</i> ) and/or lyme-grass ( <i>Leymus arenarius</i> ) should be healthy (i.e. green plant parts above ground and flowering heads present)	Based on data from Ryle et al. (2009). Although mobile dunes occur along the full northern edge of the spit in the SAC, the characteristic vegetation of marram ( <i>Ammophila arenaria</i> ) is frequently quite sparse and/or has an unhealthy appearance, reflecting the general lack of sediment mobility along the seaward edge of the dunes. Only at the western tip of the spit, where accreting or locally recycled sediment accumulates, is there a substantial band of healthy marram. See the coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain the presence of species-poor communities dominated by marram grass ( <i>Ammophila arenaria</i> ) and/or lyme-grass ( <i>Leymus arenarius</i> )	Based on data from Ryle et al. (2009). The mobile dune habitat at Rathlackan is characterised by the presence of marram grass ( <i>Ammophila arenaria</i> ). Lyme-grass ( <i>Leymus arenarius</i> ) is also present in places. See the coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-native species) to represent less than 5% cover	Based on data from Ryle et al. (2009). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. Sea buckthorn ( <i>Hippophae rhamnoides</i> ) should be absent or effectively controlled. See the coastal habitats supporting document for further details

## Conservation Objectives for : Lackan Saltmarsh and Kilcummin Head SAC [000516]

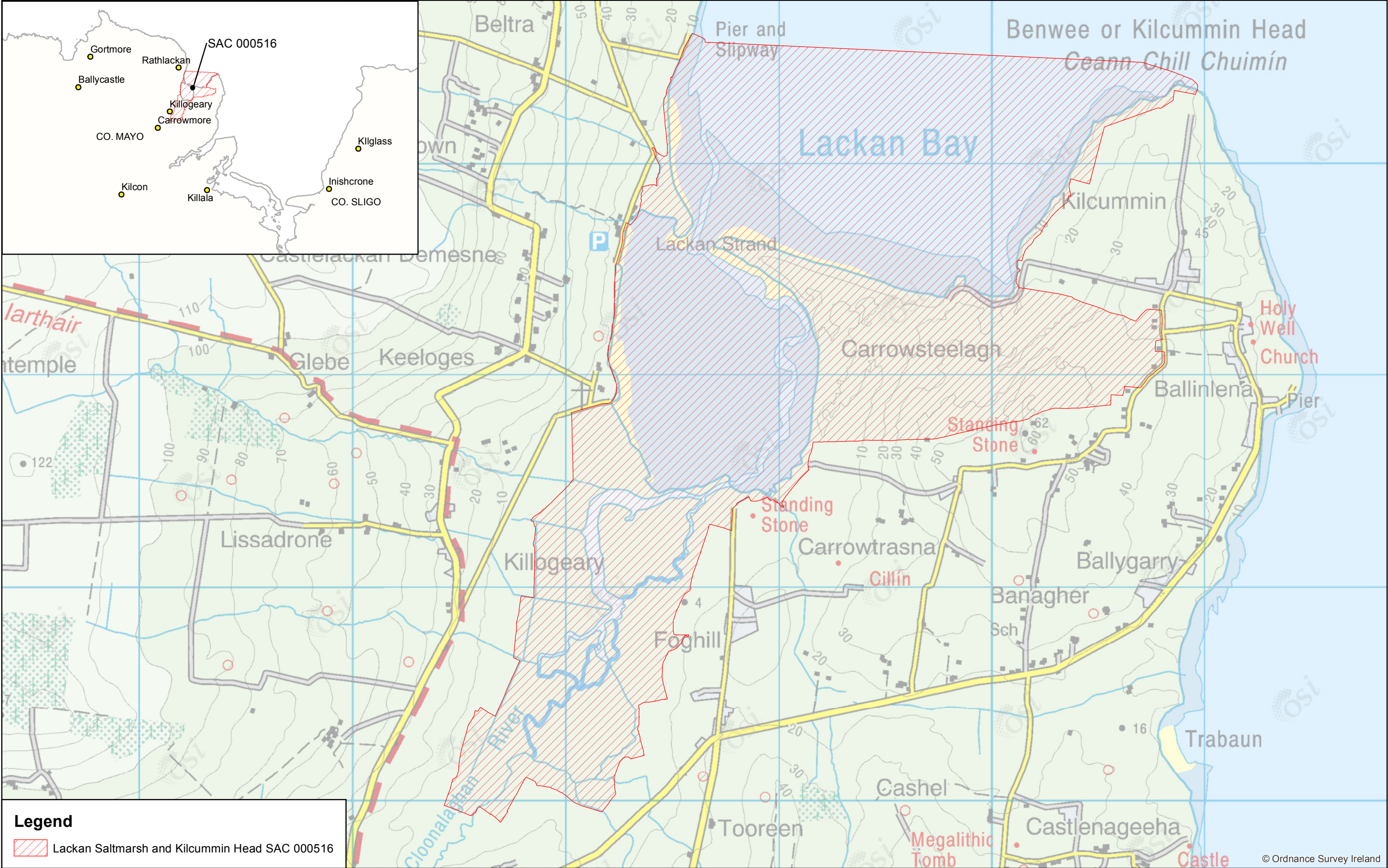
### 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)

**To restore the favourable conservation condition of Fixed coastal dunes with herbaceous vegetation (grey dunes)\* in Lackan Saltmarsh and Kilcummin Head 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, including erosion and succession. For sub-site mapped: Lackan (including Rathlackan) - 95.18ha. See map 4	Based on data from the Coastal Monitoring Project (CMP) (Ryle et al., 2009). Fixed coastal dunes with herbaceous vegetation was mapped at the sub-site Lackan (including Rathlackan; CMP site ID: 129) to give a total estimated area of 95.18ha within Lackan Saltmarsh and Kilcummin Head SAC. See the Lackan Saltmarsh and Kilcummin Head SAC conservation objectives supporting document for coastal habitats for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes. See map 4 for known distribution	Based on data from Ryle et al. (2009). See the coastal habitats supporting document for further details
Physical structure: functionality and sediment supply	Presence/absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Based on data from Ryle et al. (2009). Physical barriers can lead to fossilisation or over-stabilisation of dunes, as well as beach starvation resulting in increased rates of erosion. The north-facing (seaward) side of the Lackan dunes has a highly eroded dune face which, coupled with the lack of any substantially accreting habitat and no significant foredune development, suggests the system is being depleted of sediment. See the coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Ryle et al. (2009). The outer zone of Lackan Saltmarsh and Kilcummin Head SAC is dominated by a sand dune system and a sandy beach. The sand dunes are dominated by fixed dunes. Behind the dunes, there are sheltered intertidal sandflats which in turn are backed by extensive saltmarsh. See the coastal habitats supporting document for further details
Vegetation structure: bare ground	Percentage cover	Bare ground should not exceed 10% of fixed dune habitat, subject to natural processes	Based on data from Gaynor (2008) and Ryle et al. (2009). See the coastal habitats supporting document for further details
Vegetation structure: sward height	Centimetres	Maintain structural variation within sward	Based on data from Gaynor (2008) and Ryle et al. (2009). Different levels of grazing have resulted in varying sward heights in the fixed dune habitat at this SAC. See the coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain the range of sub-communities with typical species listed in Delaney et al. (2013)	Based on data from Gaynor (2008) and Ryle et al. (2009). The more commonly noted species in the fixed dunes included sand sedge ( <i>Carex arenaria</i> ), glaucous sedge ( <i>C. flacca</i> ), red fescue ( <i>Festuca rubra</i> ), lady's bedstraw ( <i>Galium verum</i> ), cat's ear ( <i>Hypochaeris radicata</i> ), common bird's-foot trefoil ( <i>Lotus corniculatus</i> ), field wood-rush ( <i>Luzula campestris</i> ), mouse-ear-hawkweed ( <i>Pilosella officinarum</i> ), ribwort plantain ( <i>Plantago lanceolata</i> ), yellow-rattle ( <i>Rhinanthus minor</i> ), wild thyme ( <i>Thymus polytrichus</i> ) and Germander speedwell ( <i>Veronica chamaedrys</i> ). See the coastal habitats supporting document for further details




Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-native species) to represent less than 5% cover	Based on data from Gaynor (2008) and Ryle et al. (2009). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. Sea buckthorn ( <i>Hippophae rhamnoides</i> ) should be absent or effectively controlled. At Lackan Saltmarsh and Kilcummin Head SAC, the localised proliferation of species such as creeping thistle ( <i>Cirsium arvense</i> ), spear thistle ( <i>C. vulgare</i> ) and common ragwort ( <i>Senecio jacobaea</i> ) in the fixed dunes may be indicative of recent overgrazing and intensive management. See the coastal habitats supporting document for further details
Vegetation composition: scrub/trees	Percentage cover	No more than 5% cover or under control	Based on data from Ryle et al. (2009). At Lackan Saltmarsh and Kilcummin Head SAC, there were occasional stunted hawthorn ( <i>Crataegus monogyna</i> ) shrubs in the fixed dune grassland, although the total shrub and tree cover was insignificant. See the coastal habitats supporting document for further details



**Legend**

 Lackan Saltmarsh and Kilcummin Head SAC 000516

 An Roinn Ealaíon, Oidhreacht, Gnóthaí Réigiúnacha, Tuaithe agus Gaeltachta  
Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs

**MAP 1:  
LACKAN SALTMARSH AND KILCUMMIN HEAD SAC  
CONSERVATION OBJECTIVES  
SAC DESIGNATION**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

**SITE CODE:  
SAC 000516; version 3.  
CO. MAYO**

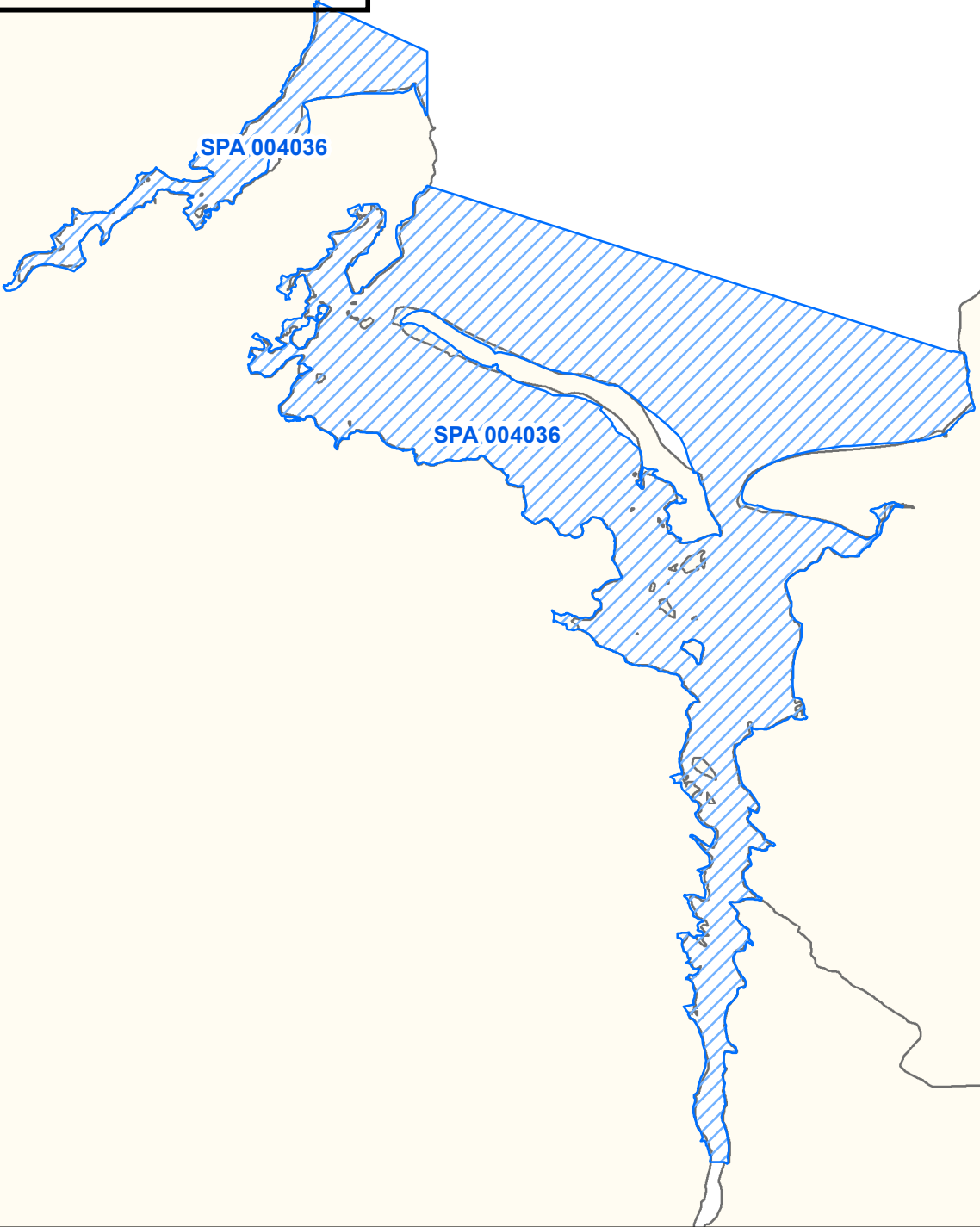
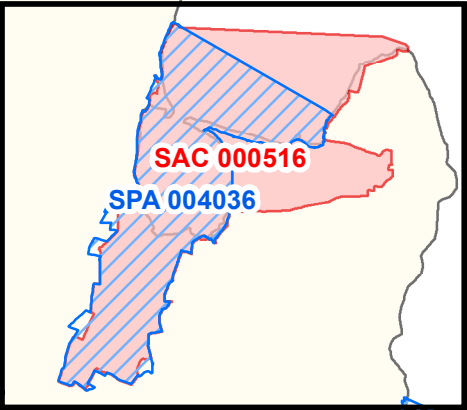
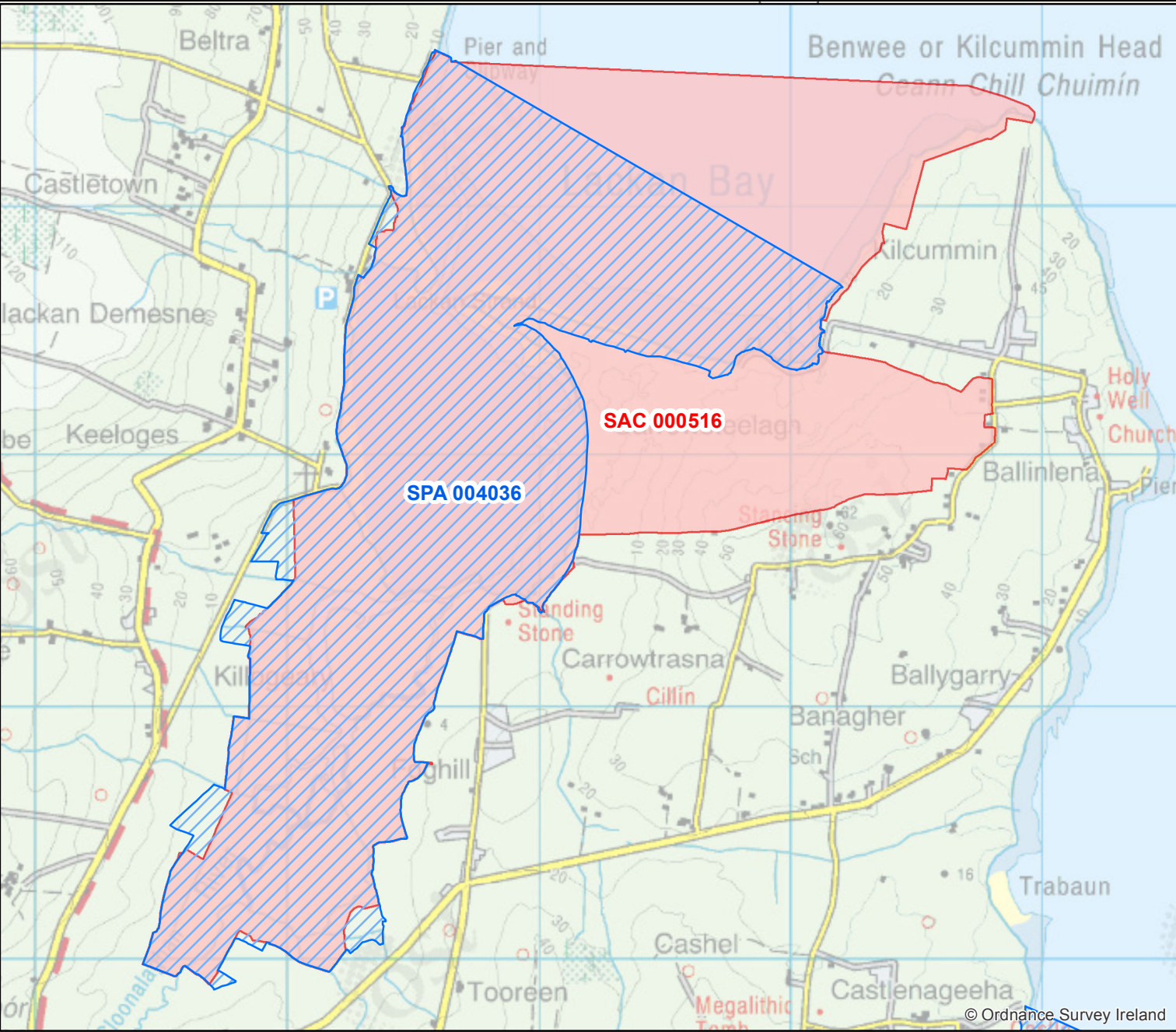
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The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
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Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh EN 0059216. © Suirbhéarachta Ordonáis na hÉireann Rialtas na hÉireann.


  
**Map Version 1  
Date: Oct 2016**





**Legend**

- Lackan Saltmarsh and Kilcummin Head SAC 000516
- Killala Bay/Moy Estuary SPA 004036
- OSi Discovery Series County Boundary



An Roinn Ealaíon, Oidhreacht,  
Gnóthaí Réigiúnacha, Tuirne agus Gaeltachta

Department of Arts, Heritage,  
Regional, Rural and Gaeltacht Affairs

**MAP 2:**  
**LACKAN SALTMARSH AND KILCUMMIN HEAD SAC**  
**CONSERVATION OBJECTIVES**  
**OVERLAPPING DESIGNATIONS**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

**SITE CODE:**  
**SAC 000516; version 3. SPA 004036; version 3.**  
**CO. MAYO**

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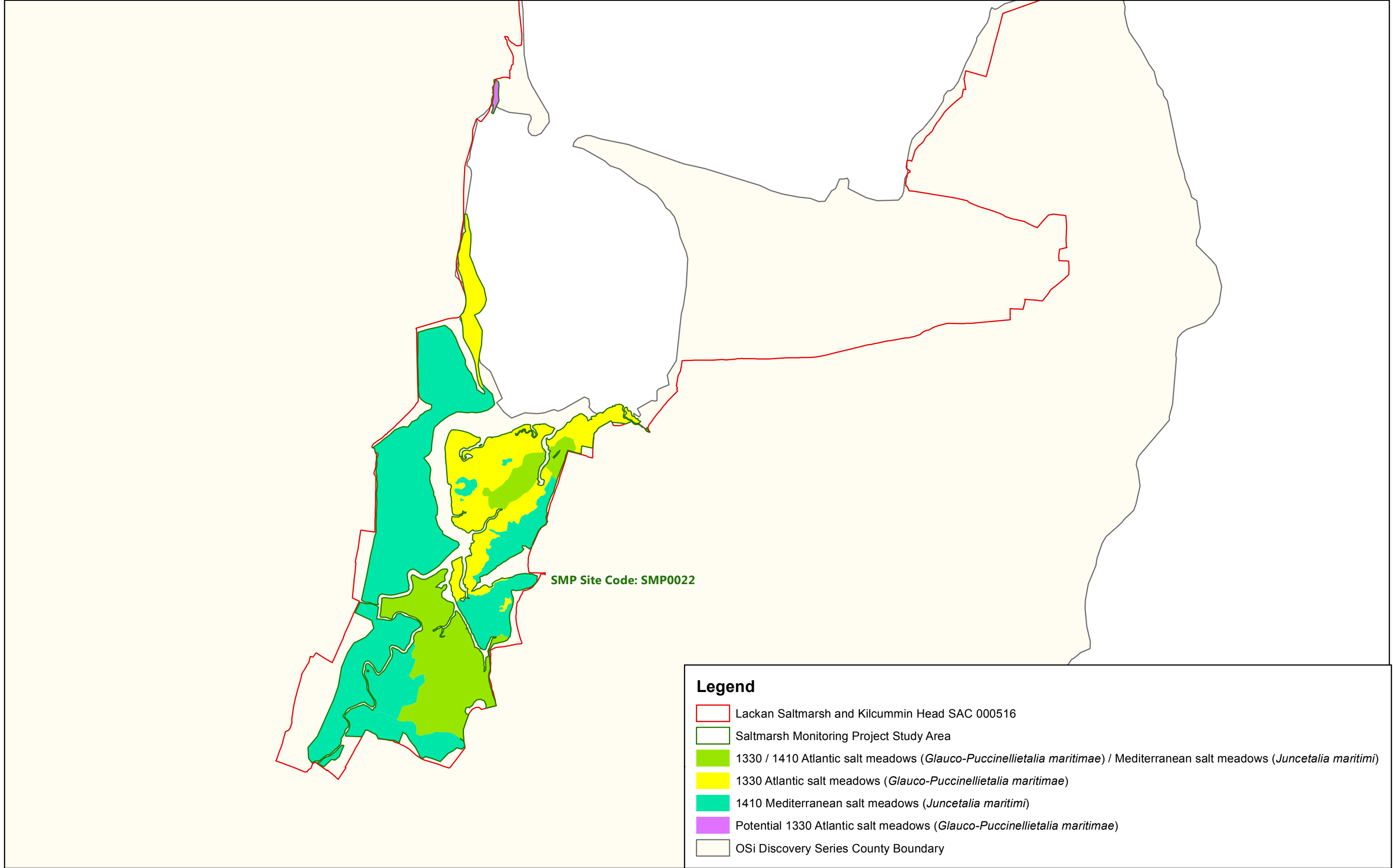
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
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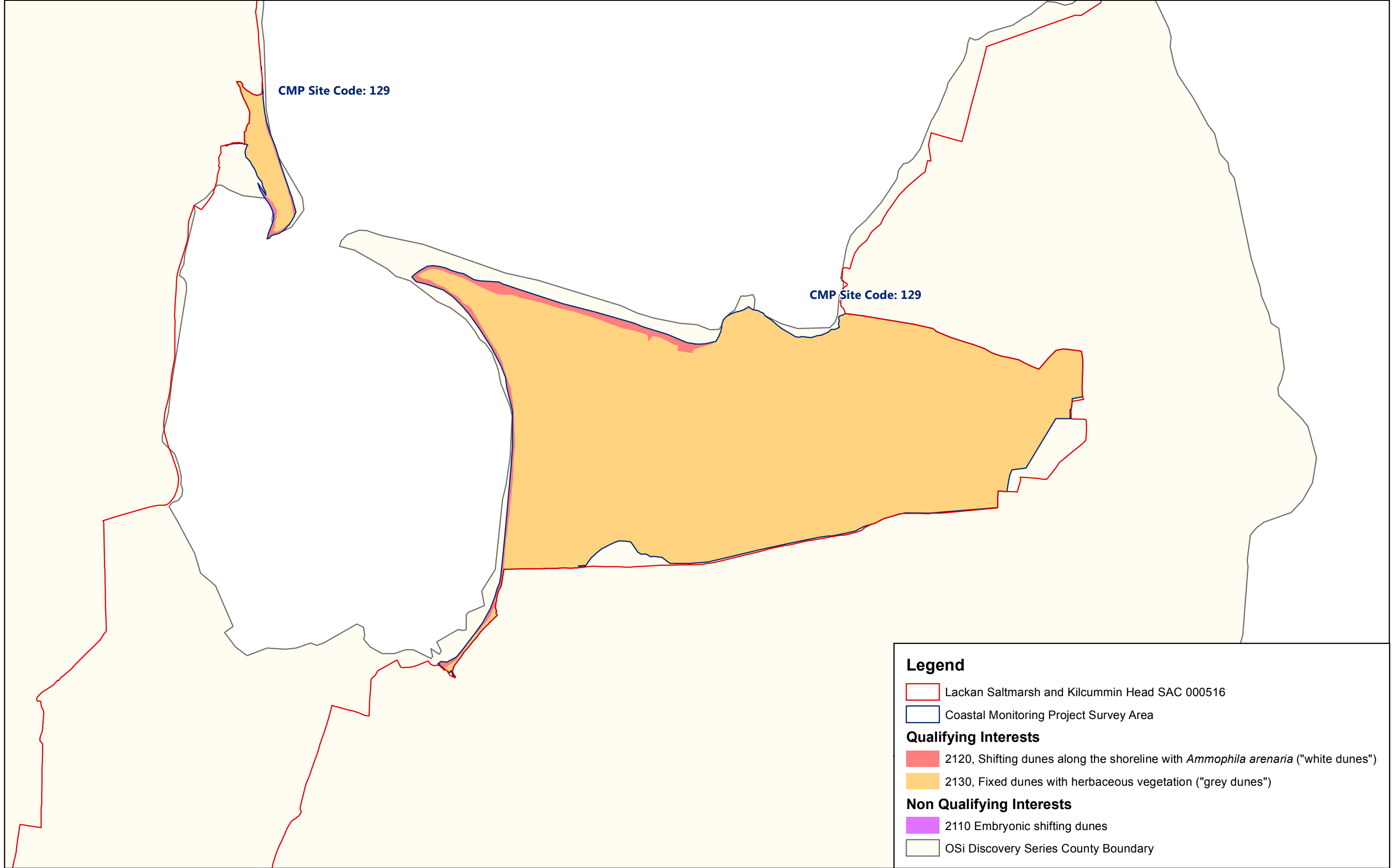
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**Map Version 1**  
**Date: Oct 2016**





## Conservation objectives for Lough Conn and Lough Cullin SPA [004228]

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.

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.

Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

Bird Code	Common Name	Scientific Name
A061	Tufted Duck	<i>Aythya fuligula</i>
A065	Common Scoter	<i>Melanitta nigra</i>
A182	Common Gull	<i>Larus canus</i>
A395	Greenland White-fronted Goose	<i>Anser albifrons flavirostris</i>

To acknowledge the importance of Ireland's wetlands to wintering waterbirds, "Wetland and Waterbirds" may be included as a Special Conservation Interest for some SPAs that have been



designated for wintering waterbirds and that contain a wetland site of significant importance to one or more of the species of Special Conservation Interest. Thus, a second objective is included as follows:

Objective: To maintain or restore the favourable conservation condition of the wetland habitat at Lough Conn and Lough Cullin SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.

**Citation:** NPWS (2016) *Conservation objectives for Lough Conn and Lough Cullin SPA [004228]. Generic Version 5.0. Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.*

# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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### Lough Hoe Bog SAC 000633



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





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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*

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000633	Lough Hoe Bog SAC
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1013	Geyer's Whorl Snail <i>Vertigo geyeri</i>
1092	White-clawed Crayfish <i>Austropotamobius pallipes</i>
3110	Oligotrophic waters containing very few minerals of sandy plains ( <i>Littorelletalia uniflorae</i> )
7130	Blanket bogs (* if active bog)

**Please note that this SAC is adjacent to River Moy SAC (002298). See map 2. The conservation objectives for this site should be used in conjunction with those for the adjacent site as appropriate.**

## Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)

### NPWS Documents

<b>Year :</b>	1989
<b>Title :</b>	A survey to locate blanket bogs of scientific interest in County Kerry and County Sligo
<b>Author :</b>	Douglas, C.; Garvey, L.; Kelly, L.; O'Sullivan, A.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	1998
<b>Title :</b>	Conservation management of the white-clawed crayfish, <i>Austropotamobius pallipes</i>
<b>Author :</b>	Reynolds, J.D.
<b>Series :</b>	Irish Wildlife Manual No. 1
<b>Year :</b>	2005
<b>Title :</b>	Conservation Plan for 2005-2010. Lough Hoe Bog cSAC Site Code 000633 Cos. Sligo and Mayo
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation Plan
<b>Year :</b>	2010
<b>Title :</b>	A technical manual for monitoring white-clawed crayfish ( <i>Austropotamobius pallipes</i> ) in Irish lakes
<b>Author :</b>	Reynolds, J., O'Connor, W., O'Keeffe, C.; Lynn, D.
<b>Series :</b>	Irish Wildlife Manual No.45
<b>Year :</b>	2011
<b>Title :</b>	Monitoring and condition assessment of populations of <i>Vertigo geyeri</i> , <i>Vertigo angustior</i> and <i>Vertigo moulinsiana</i> in Ireland
<b>Author :</b>	Moorkens, E.; Killeen, I.
<b>Series :</b>	Irish Wildlife Manual No. 55
<b>Year :</b>	2012
<b>Title :</b>	Ireland Red List No. 8: Bryophytes
<b>Author :</b>	Lockhart, N.; Hodgetts, N.; Holyoak, D.
<b>Series :</b>	Ireland Red List series, NPWS
<b>Year :</b>	2013
<b>Title :</b>	The status of EU protected habitats and species in Ireland. Volume 2. Habitats assessments
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation assessments
<b>Year :</b>	2014
<b>Title :</b>	Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland, Version 2.0
<b>Author :</b>	Perrin, P.M.; Barron, S.J.; Roche, J.R.; O'Hanrahan, B.
<b>Series :</b>	Irish Wildlife Manual No. 79
<b>Year :</b>	2015
<b>Title :</b>	Habitats Directive Annex I lake habitats: a working interpretation for the purposes of site-specific conservation objectives and Article 17 reporting
<b>Author :</b>	O Connor, Á.
<b>Series :</b>	Unpublished document by NPWS
<b>Year :</b>	2016
<b>Title :</b>	Ireland Red List No. 10: Vascular Plants
<b>Author :</b>	Wyse Jackson, M.; FitzPatrick, Ú.; Cole, E.; Jebb, M.; McFerran, D.; Sheehy Skeffington, M.; Wright, M.
<b>Series :</b>	Ireland Red Lists series, NPWS

**Year :** 2017

**Title :** Lough Hoe Bog SAC (site code: 633) Conservation objectives supporting document- blanket bogs and associated habitats V1

**Author :** NPWS

**Series :** Conservation objectives supporting document

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## Other References

**Year :** 1982

**Title :** Eutrophication of waters. Monitoring assessment and control

**Author :** OECD

**Series :** OECD, Paris

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**Year :** 1996

**Title :** Notes on some non-marine Mollusca from Co. Sligo and Co. Leitrim, including a new site for *Vertigo geyeri* Lindholm

**Author :** Cawley, M.

**Series :** Irish Naturalists' Journal, 25: 183-185

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**Year :** 2000

**Title :** Colour in Irish lakes

**Author :** Free, G.; Allott, N.; Mills, P.; Kennelly, C.; Day, S.

**Series :** Verhandlungen Internationale Vereinigung für theoretische und angewandte Limnologie, 27: 2620-2623

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**Year :** 2002

**Title :** A survey of the white-clawed crayfish (*Austropotamobius pallipes*) Lereboullet and of water quality in two catchments of eastern Ireland

**Author :** Demers, A.; Reynolds, J.D.

**Series :** Bulletin Francais de la Pêche et de la Pisciculture, 367: 729-740

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**Year :** 2002

**Title :** Deterioration of Atlantic soft water macrophyte communities by acidification, eutrophication and alkalinisation

**Author :** Arts, G.H.P.

**Series :** Aquatic Botany, 73: 373-393

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**Year :** 2006

**Title :** A reference-based typology and ecological assessment system for Irish lakes. Preliminary investigations. Final report. Project 2000-FS-1-M1 Ecological assessment of lakes pilot study to establish monitoring methodologies EU (WFD)

**Author :** Free, G.; Little, R.; Tierney, D.; Donnelly, K.; Coroni, R.

**Series :** EPA, Wexford

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**Year :** 2008

**Title :** Water Quality in Ireland 2004-2006

**Author :** Clabby, K.J.; Bradley, C.; Craig, M.; Daly, D.; Lucey, J.; McGarrigle, M.; O'Boyle, S.; Tierney, D.; Bowman, J.

**Series :** EPA, Wexford

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**Year :** 2009

**Title :** The identification, characterization and conservation value of isoetid lakes in Ireland

**Author :** Free, G.; Bowman, J.; McGarrigle, M.; Little, R.; Coroni, R.; Donnelly, K.; Tierney, D.; Trodd, W.

**Series :** Aquatic Conservation: Marine and Freshwater Ecosystems, 19(3): 264–273

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**Year :** 2010

**Title :** Water quality in Ireland 2007-2009

**Author :** McGarrigle, M.; Lucey, J.; Ó Cinnéide, M.

**Series :** EPA, Wexford

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**Year :** 2015

**Title :** Water quality in Ireland 2010-2012

**Author :** Bradley, C.; Byrne, C.; Craig, M.; Free, G.; Gallagher, T.; Kennedy, B.; Little, R.; Lucey, J.; Mannix, A.; McCreesh, P.; McDermott, G.; McGarrigle, M.; Ní Longphuirt, S.; O'Boyle, S.; Plant, C.; Tierney, D.; Trodd, W.; Webster, P.; Wilkes, R.; Wynne, C.

**Series :** EPA, Wexford

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## Spatial data sources

<b>Year :</b>	2008
<b>Title :</b>	OSi 1:5000 IG vector dataset
<b>GIS Operations :</b>	WaterPolygons feature class clipped to the SAC boundary. Expert opinion used to identify Annex I habitat and to resolve any issues arising
<b>Used For :</b>	3110 (map 3)
<hr/>	
<b>Year :</b>	2017
<b>Title :</b>	NPWS rare and threatened species database
<b>GIS Operations :</b>	Dataset created from spatial references in database records. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	1013, 1092 (maps 4 and 5)
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## Conservation Objectives for : Lough Hoe Bog SAC [000633]

### 3110 Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)

**To maintain the favourable conservation condition of Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) in Lough Hoe Bog 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	Lake habitat 3110 is likely to occur in larger upland lakes in the SAC, such as Loughs Hoe, Alone, Fosse and Nalackagh. The exact distribution of 3110 is unknown, as no specific information on lake vegetation is available. Habitat 3110 may co-occur with lake habitat 3160 in upland lakes, which is also likely to occur in smaller lakes and ponds. There are also calcareous influences- Lough Talt has marginal calcareous springs and may be dominated by lake habitat 3140 (nb 3140 and 3160 are not qualifying interests). In line with Article 17 reporting (NPWS, 2013), all lakes larger than 1ha have been mapped as 'potential 3110' (see map 3). Two measures of extent should be used: 1. the area of the lake itself and; 2. the extent of the vegetation communities/zones that typify the habitat. Further information relating to all attributes is provided in the lake habitats supporting document for the purposes of site-specific conservation objectives and Article 17 reporting (O Connor, 2015)
Habitat distribution	Occurrence	No decline, subject to natural processes	As noted above, the exact distribution of lake habitat 3110 in Lough Hoe Bog SAC is not known. On map 3, all lakes larger than 1ha (based on 1:5,000 data), other than Lough Talt, have been mapped as potential 3110. All of these are above 200m altitude, with seven lakes over 300m
Typical species	Occurrence	Typical species present, in good condition, and demonstrating typical abundances and distribution	For lists of typical plant species, see the Article 17 habitat assessment for lake habitat 3110 (NPWS, 2013) and the lake habitats supporting document (O Connor, 2015). Douglas et al. (1989) recorded bottle sedge ( <i>Carex rostrata</i> ), water horsetail ( <i>Equisetum fluviatile</i> ), bulbous rush ( <i>Juncus bulbosus</i> ), water lobelia ( <i>Lobelia dortmanna</i> ), bogbean ( <i>Menyanthes trifoliata</i> ), common reed ( <i>Phragmites australis</i> ), bog pondweed ( <i>Potamogeton polygonifolius</i> ) and common club-rush ( <i>Schoenoplectus lacustris</i> ), amongst others, in the 3110 lakes in Lough Hoe Bog SAC
Vegetation composition: characteristic zonation	Occurrence	All characteristic zones should be present, correctly distributed and in good condition	Further work is necessary to describe the characteristic zonation and other spatial patterns in lake habitat 3110 (see O Connor, 2015)
Vegetation distribution: maximum depth	Metres	Maintain maximum depth of vegetation, subject to natural processes	The maximum depth of vegetation is likely to be specific to the lake shoreline in question. Further work is necessary to develop indicative targets for lake habitat 3110. Water clarity is expected to be high in upland 3110 lakes, resulting in a large maximum depth of vegetation
Hydrological regime: water level fluctuations	Metres	Maintain appropriate natural hydrological regime necessary to support the habitat	Fluctuations in lake water level are typical in Ireland, but can be amplified by activities such as abstraction and drainage. Increased water level fluctuations can increase wave action, up-root vegetation, increase turbidity, alter the substratum and lead to release of nutrients from the sediment. The hydrological regime of the lakes must be maintained so that the area, distribution and depth of the lake habitat and its constituent/characteristic vegetation zones and communities are not reduced



Lake substratum quality	Various	Maintain appropriate substratum type, extent and chemistry to support the vegetation	Research is required to further characterise the substratum types (particle size and origin) and substratum quality (notably pH, calcium, iron and nutrient concentrations) favoured by each of the five Annex I lake habitats in Ireland. It is likely that lake habitat 3110 is associated with a range of nutrient-poor substrates, from stones, cobble and gravel, through sands, silt, clay and peat. Substratum particle size is likely to vary with depth and along the shoreline within a single lake
Water quality: transparency	Metres	Maintain appropriate Secchi transparency. There should be no decline in Secchi depth/transparency	Transparency relates to light penetration and, hence, to the depth of colonisation of vegetation. It can be affected by phytoplankton blooms, water colour and turbidity. Specific targets have yet to be established for lake habitat 3110 (O Connor, 2015). Habitat 3110 is associated with very clear water, particularly upland examples. The OECD fixed boundary system set transparency targets for oligotrophic lakes of $\geq 6\text{m}$ annual mean Secchi disk depth, and $\geq 3\text{m}$ annual minimum Secchi disk depth. Free et al. (2009) found high isoetid abundance in lakes with Secchi depths of more than 3m
Water quality: nutrients	$\mu\text{g/l P}$ ; $\text{mg/l N}$	Maintain the concentration of nutrients in the water column at sufficiently low levels to support the habitat and its typical species	As a nutrient-poor habitat, oligotrophic and Water Framework Directive (WFD) 'high' status targets apply. Where a lake has nutrient concentrations that are lower than these targets, there should be no decline within class, i.e. no upward trend in nutrient concentrations. For lake habitat 3110, annual average total phosphorus (TP) concentration should be $\leq 10\mu\text{g/l TP}$ , average annual total ammonia concentration should be $\leq 0.040\text{mg/l N}$ and annual 95th percentile for total ammonia should be $\leq 0.090\text{mg/l N}$ . See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009
Water quality: phytoplankton biomass	$\mu\text{g/l Chlorophyll } a$	Maintain appropriate water quality to support the habitat, including high chlorophyll <i>a</i> status	Oligotrophic and WFD 'high' status targets apply to lake habitat 3110. Where a lake has a chlorophyll <i>a</i> concentration that is lower than this target, there should be no decline within class, i.e. no upward trend in phytoplankton biomass. The average growing season (March-October) chlorophyll <i>a</i> concentration must be $< 5.8\mu\text{g/l}$ . The annual average chlorophyll <i>a</i> concentration should be $< 2.5\mu\text{g/l}$ and the annual peak chlorophyll <i>a</i> concentration should be $\leq 8.0\mu\text{g/l}$ . See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009
Water quality: phytoplankton composition	EPA phytoplankton composition metric	Maintain appropriate water quality to support the habitat, including high phytoplankton composition status	The Environmental Protection Agency (EPA) has developed a phytoplankton composition metric for nutrient enrichment of Irish lakes. As for other water quality indicators, lake habitat 3110 requires WFD high status
Water quality: attached algal biomass	Algal cover and EPA phytobenthos metric	Maintain trace/absent attached algal biomass ( $< 5\%$ cover) and high phytobenthos status	Nutrient enrichment can favour epiphytic and epipelic algae that can out-compete the submerged vegetation. The cover abundance of attached algae in lake habitat 3110 should, therefore, be trace/absent ( $< 5\%$ cover). EPA phytobenthos can be used as an indicator of changes in attached algal biomass. As for other water quality indicators, habitat 3110 requires high phytobenthos status
Water quality: macrophyte status	EPA macrophyte metric (The Free Index)	Maintain high macrophyte status	Nutrient enrichment can favour more competitive submerged macrophyte species that out-compete the typical and characteristic species for the lake habitat. The EPA monitors macrophyte status for WFD purposes using the 'Free Index'. The target for lake habitat 3110 is high status or an Ecological Quality Ratio (EQR) for lake macrophytes of $\geq 0.90$ , as defined in Schedule Five of the European Communities Environmental Objectives (Surface Waters) Regulations 2009

Acidification status	pH units; mg/l	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the habitat, subject to natural processes	Acidification can impact on species abundance and composition in soft water lake habitats. In Europe, acidification of isoetid lakes can lead to loss of isoetids and dominance by submerged <i>Sphagnum</i> mosses and <i>Juncus bulbosus</i> (Arts, 2002). The specific requirements of lake habitat 3110, in terms of water and sediment pH, alkalinity and cation concentration, have not been determined. For lake habitat 3110, and adopting a precautionary approach based on Arts (2002), minimum pH should not be <5.5 pH units. Maximum pH should be <9.0 pH units, in line with the surface water standards established for soft waters (where water hardness is ≤100mg/l calcium carbonate). See Schedule Five of the European Communities Environmental Objectives (Surface Waters) Regulations 2009
Water colour	mg/l PtCo	Maintain appropriate water colour to support the habitat	Increased water colour and turbidity decrease light penetration and can reduce the area of available habitat for lake macrophytes, particularly at the lower euphotic depths. The primary source of increased water colour in Ireland is disturbance to peatland. No habitat-specific or national standards for water colour currently exist. Studies have shown median colour concentrations in Irish lakes of 38mg/l PtCo (Free et al., 2000) and 33mg/l PtCo (Free et al., 2006). It is likely that the water colour in all Irish lake habitats would naturally be <50mg/l PtCo. Water colour can be very low (<20mg/l PtCo or even <10mg/l PtCo) in lake habitat 3110, where the peatland in the lake's catchment is intact
Dissolved organic carbon (DOC)	mg/l	Maintain appropriate organic carbon levels to support the habitat	Dissolved (and particulate) organic carbon (OC) in the water column is linked to water colour and acidification (organic acids). Increasing DOC in water has been documented across the Northern Hemisphere, including afforested peatland catchments in Ireland. Damage and degradation of peatland, leading to decomposition of peat is likely to be the predominant source of OC in Ireland. OC in water promotes decomposition by fungi and bacteria that, in turn, releases dissolved nutrients. The increased biomass of decomposers can also impact directly on the characteristic lake communities through shading, competition, etc.
Turbidity	Nephelometric turbidity units/ mg/l SS/ other appropriate units	Maintain appropriate turbidity to support the habitat	Turbidity can significantly affect the quantity and quality of light reaching rooted and attached vegetation and can, therefore, impact on lake habitats. The settlement of higher loads of inorganic or organic material on lake vegetation communities may also have impacts on sensitive, delicate species. Turbidity can increase as a result of re-suspension of material within the lake, higher loads entering the lake, or eutrophication. Turbidity measurement and interpretation is challenging. As a result, it is likely to be difficult to set habitat-specific targets for turbidity in lakes
Fringing habitat: area and condition	Hectares	Maintain the area and condition of fringing habitats necessary to support the natural structure and functioning of habitat 3110	Most lake shorelines have fringing habitats of reedswamp, other swamp, fen, marsh or wet woodland that intergrade with and support the structure and functions of the lake habitat. In Lough Hoe Bog SAC, active blanket bog and heath communities dominate upland lake shorelines. Transition mire, fen, flush and grassland may also occur. Fringing habitats are dependent on the lake, particularly its water levels, and support wetland communities and species of conservation concern. Many of the fringing wetland habitats support higher invertebrate and plant species richness than the lake habitats themselves

## Conservation Objectives for : Lough Hoe Bog SAC [000633]

### 7130 Blanket bogs (\* if active bog)

**To restore the favourable conservation condition of Blanket bogs (\* if active bog) in Lough Hoe Bog 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	Blanket bog has not been mapped in detail for Lough Hoe Bog SAC, but from current available data the total area of the qualifying habitat is estimated to be approximately 1,176ha, covering 37% of the SAC (NPWS internal files). Further details on this and the following attributes can be found in the Lough Hoe Bog SAC conservation objectives supporting document for blanket bogs and associated habitats
Habitat distribution	Occurrence	No decline, subject to natural processes	The habitat mostly occurs in the Co. Sligo section of the SAC, with large expanses present here. In the Co. Mayo section, the habitat occurs at the edge of the SAC at Bunnyconnellan East, south of Fossealough, on the flatter ground in the vicinity of Loughalacka, and to the north and west of the lake at Derrynabaunshy (Douglas et al., 1989; NPWS, 2005; NPWS internal files). Further information can be found within Douglas et al. (1989), NPWS (2005), NPWS internal files and the blanket bogs and associated habitats supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the blanket bogs and associated habitats supporting document for further details
Ecosystem function: peat formation	Active blanket bog as a proportion of the total area of Annex I blanket bog habitat	At least 99% of the total Annex I blanket bog area is active	See the blanket bogs and associated habitats supporting document for further details
Ecosystem function: hydrology	Flow direction, water levels, occurrence of drains and erosion gullies	Natural hydrology unaffected by drains and erosion	Further details and a brief discussion of restoration potential is presented in the blanket bogs and associated habitats supporting document
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	A variety of blanket bog vegetation communities have been recorded in this SAC (Douglas et al., 1989; NPWS internal files), two of which correspond to communities recorded in the National Survey of Upland Habitats and listed in the provisional list of vegetation communities described in Perrin et al. (2014). Further information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species present at each monitoring stop is at least seven	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented
Vegetation composition: lichens and bryophytes	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of bryophytes or lichens, excluding <i>Sphagnum fallax</i> , at least 10%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014). The non-native moss <i>Campylopus introflexus</i> was recorded from the SAC (Douglas et al., 1989), but this species cannot be assigned specifically to blanket bog

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 Perrin et al. (2014)
Vegetation composition: potential dominant species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of each of the potential dominant species less than 75%	Attribute and target based on Perrin et al. (2014). See the blanket bogs and associated habitats supporting document for the list of potential dominant species
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Last complete growing season's shoots of ericoids, crowberry ( <i>Empetrum nigrum</i> ) and bog-myrtle ( <i>Myrica gale</i> ) showing signs of browsing collectively less than 33%	Attribute and target based on Perrin et al. (2014)
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning	Attribute and target based on Perrin et al. (2014), where the list of sensitive areas for this habitat is also presented
Vegetation structure: <i>Sphagnum</i> condition	Condition at a representative number of 2m x 2m monitoring stops	Less than 10% of the <i>Sphagnum</i> cover is crushed, broken and/or pulled up	Attribute and target based on Perrin et al. (2014)
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Attribute and target based on Perrin et al. (2014)
Physical structure: drainage	Percentage area in local vicinity of a representative number of monitoring stops	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	Attribute and target based on Perrin et al. (2014)
Physical structure: erosion	Percentage area in local vicinity of a representative number of monitoring stops	Less than 5% of the greater bog mosaic comprises erosion gullies and eroded areas	Attribute and target based on Perrin et al. (2014)
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	This includes species listed in the Flora (Protection) Order, 2015 and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016)

## Conservation Objectives for : Lough Hoe Bog SAC [000633]

### 1013 Geyer's Whorl Snail *Vertigo geyeri*

**To restore the favourable conservation condition of Geyer's Whorl Snail in Lough Hoe Bog SAC, which is defined by the following list of attributes and targets:**

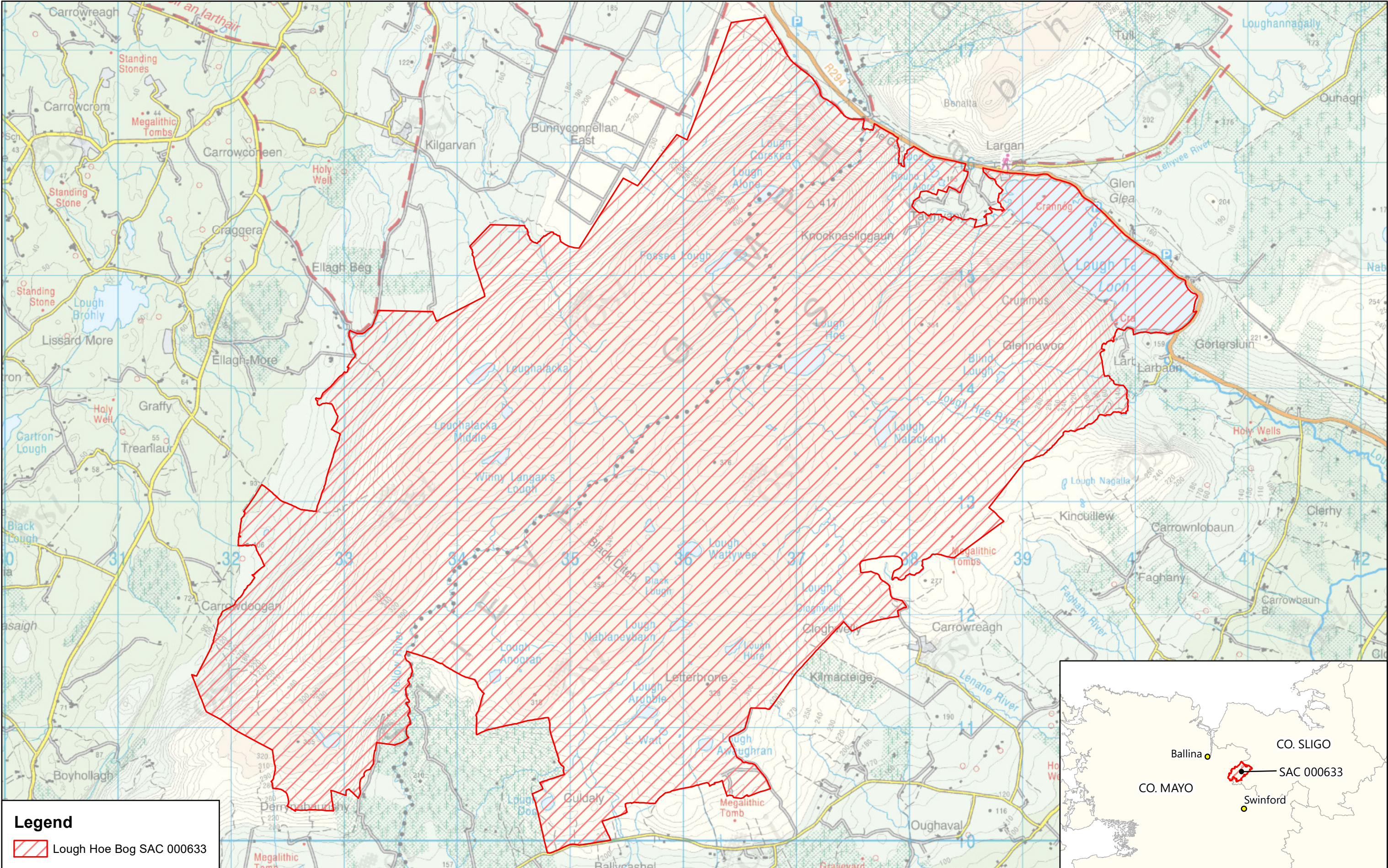
Attribute	Measure	Target	Notes
Distribution: occupied sites	Number of occupied 1km grid squares	Restore at least one sub-population	Geyer's whorl snail ( <i>Vertigo geyeri</i> ) has been recorded in two separate areas on the shore of Lough Talt in Lough Hoe Bog SAC within a single 1km square, G3915 (Cawley, 2006; site code VgCAM7 in Moorkens and Killeen, 2011). See map 4. The last record from the eastern side was in 2005. The current status of the population on the western shore is uncertain. The habitats occupied by Geyer's whorl snail ( <i>V. geyeri</i> ) in the SAC are areas of fen and flush close to the shore of Lough Talt
Occurrence in suitable habitat	Number of positive records in a representative number of samples	No decline, subject to natural processes	Positive samples mean the confirmed presence of snails (living or recently dead adults and/or juveniles). See Moorkens and Killeen (2011)
Habitat area	Hectares	Area of suitable habitat stable or increasing, subject to natural processes; at least 1ha of suitable habitat in at least sub-optimal condition	Apparently suitable conditions for the species are present at several places, with the largest area on the east shore of Lough Talt. Two less extensive areas are found on the west shore. Optimal habitat in the SAC is defined (by Moorkens and Killeen, 2011) as flushed fen grassland with sedge/moss lawns 5-15cm tall, containing species such as <i>Carex lepidocarpa</i> , <i>Pinguicula vulgaris</i> , <i>Briza media</i> , <i>Equisetum palustre</i> , <i>Juncus articulatus</i> and the mosses <i>Drepanocladus revolvens</i> and <i>Campyllum stellatum</i> , with scattered tussocks of <i>Schoenus nigricans</i> no more than 80cm tall. During sampling, the water table should be between 0-5cm of the soil surface, but not above ground level. Sub-optimal habitat is defined as above, but vegetation height is less than 5 or more than 15cm tall, or the water table is below 5cm, or ground is flooded at time of sampling
Habitat quality: soil wetness	Percentage of a representative number of sampling stops	At least 67% of a representative number of sampling stops in areas of optimal habitat should be classified as optimal wetness as defined by Moorkens and Killeen (2011); at least 25% should be optimal wetness in areas of sub-optimal habitat	The soil wetness should be assessed using the criteria described in Moorkens and Killeen (2011)

**Conservation Objectives for : Lough Hoe Bog SAC [000633]****1092 White-clawed Crayfish *Austropotamobius pallipes***


**To maintain the favourable conservation condition of White-clawed Crayfish in Lough Hoe Bog SAC, which is defined by the following list of attributes and targets:**


Attribute	Measure	Target	Notes
Distribution	Number of occupied 1km grid squares	No decline. See map 5	The records for white-clawed crayfish ( <i>Austropotamobius pallipes</i> ) in Lough Hoe SAC all come from Lough Talt. This lake overlaps five 1km grid squares and the species has been recorded from three of these squares, G3815, G3914, G3915. See map 5. There is no reason to suppose it is not present in G4014 and G4015, but this needs confirmation
Population structure: recruitment	Occurrence of juveniles and females with eggs	Juveniles and/or females with eggs should be present in all occupied 1km squares, subject to natural processes and availability of suitable habitat	See Reynolds et al. (2010) for further details
Negative indicator species	Occurrence	No non-indigenous crayfish species	Non-indigenous crayfish species (NICS) are identified as a major direct threat to the white-clawed crayfish ( <i>Austropotamobius pallipes</i> ) and as a disease vector, in particular crayfish plague ( <i>Aphanomyces astaci</i> ), which is fatal to white-clawed crayfish. Ireland is currently free of NICS. See Reynolds (1998) for further details
Disease	Occurrence	No instances of disease	There have been outbreaks of crayfish plague ( <i>Aphanomyces astaci</i> ) in Ireland since 2015 and it is thought that human activity, especially the carrying of disease vectors on contaminated equipment, has introduced and spread the disease. Strict biosecurity is required
Water quality	EPA Q value	At least Q3-4 at all sites sampled by EPA	Target taken from Demers and Reynolds (2002). Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA)
Habitat quality: heterogeneity	Occurrence of positive habitat features	No decline in habitat quality	Crayfish need high habitat heterogeneity. Larger crayfish must have stones to hide under, or an earthen bank in which to burrow. Hatchlings shelter in vegetation, gravel and among fine tree-roots. Smaller crayfish are typically found among weed and debris in shallow water. Larger juveniles in particular may also be found among cobbles and detritus such as leaf litter. These conditions must be available throughout the area of occupied habitat





**Legend**

 Lough Hoe Bog SAC 000633



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

**MAP 1:  
LOUGH HOE BOG SAC  
CONSERVATION OBJECTIVES  
SAC DESIGNATION**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

**SITE CODE:  
SAC 000633; version 3. CO. SLIGO / CO. MAYO**

0

0.5

1

1.5

2 km

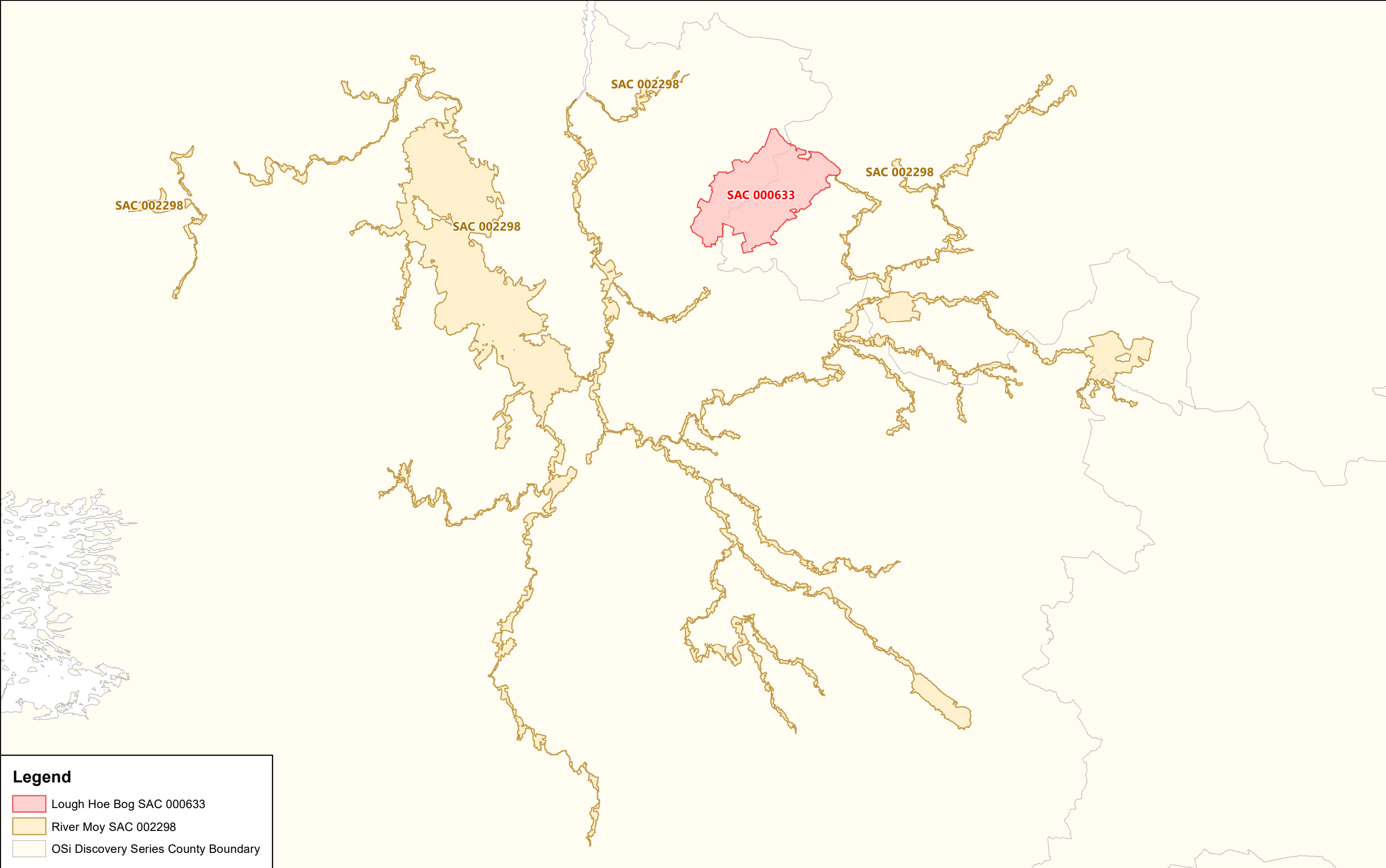
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
Ordnance Survey of Ireland Licence No EN 0059216. © Ordnance Survey of Ireland Government of Ireland.

Níl sna teorainneacha ar na léarscáileanna ach nod garshuimhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh EN 0059216. © Suirbhéarachta Ordonáis na hÉireann Rialtas na hÉireann.



**Map Version 1  
Date: Aug 2017**





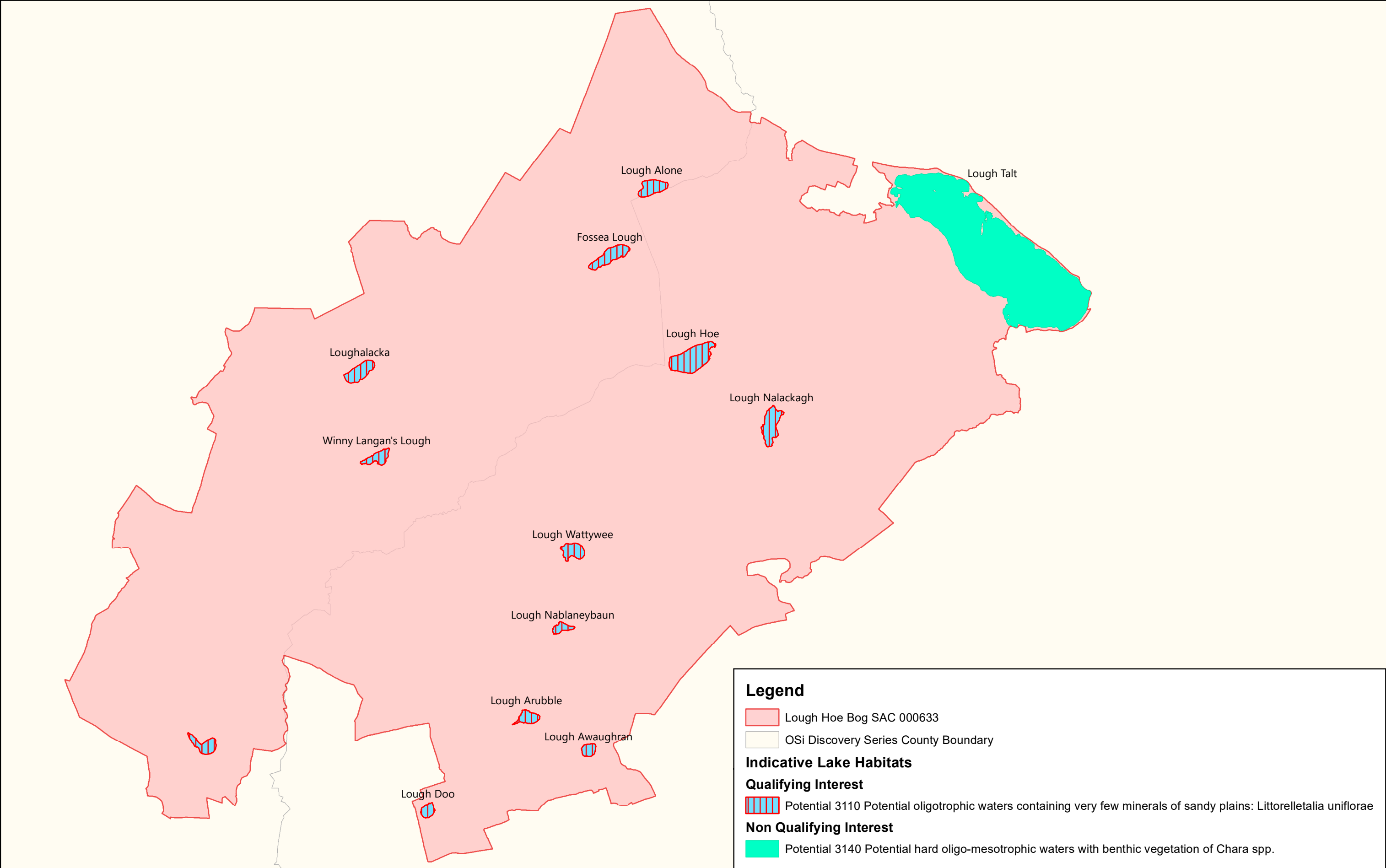
Legend

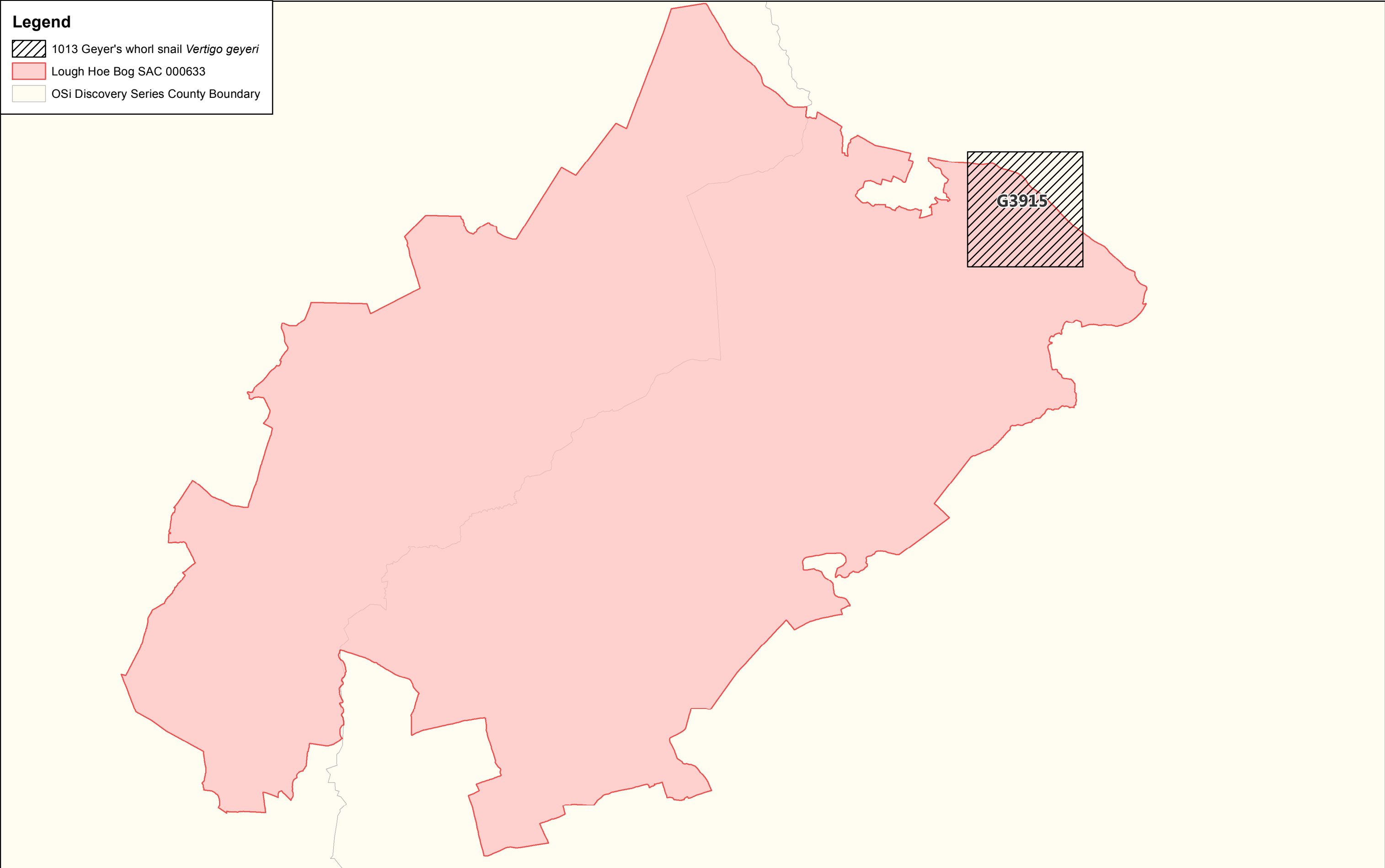
Lough Hoe Bog SAC 000633

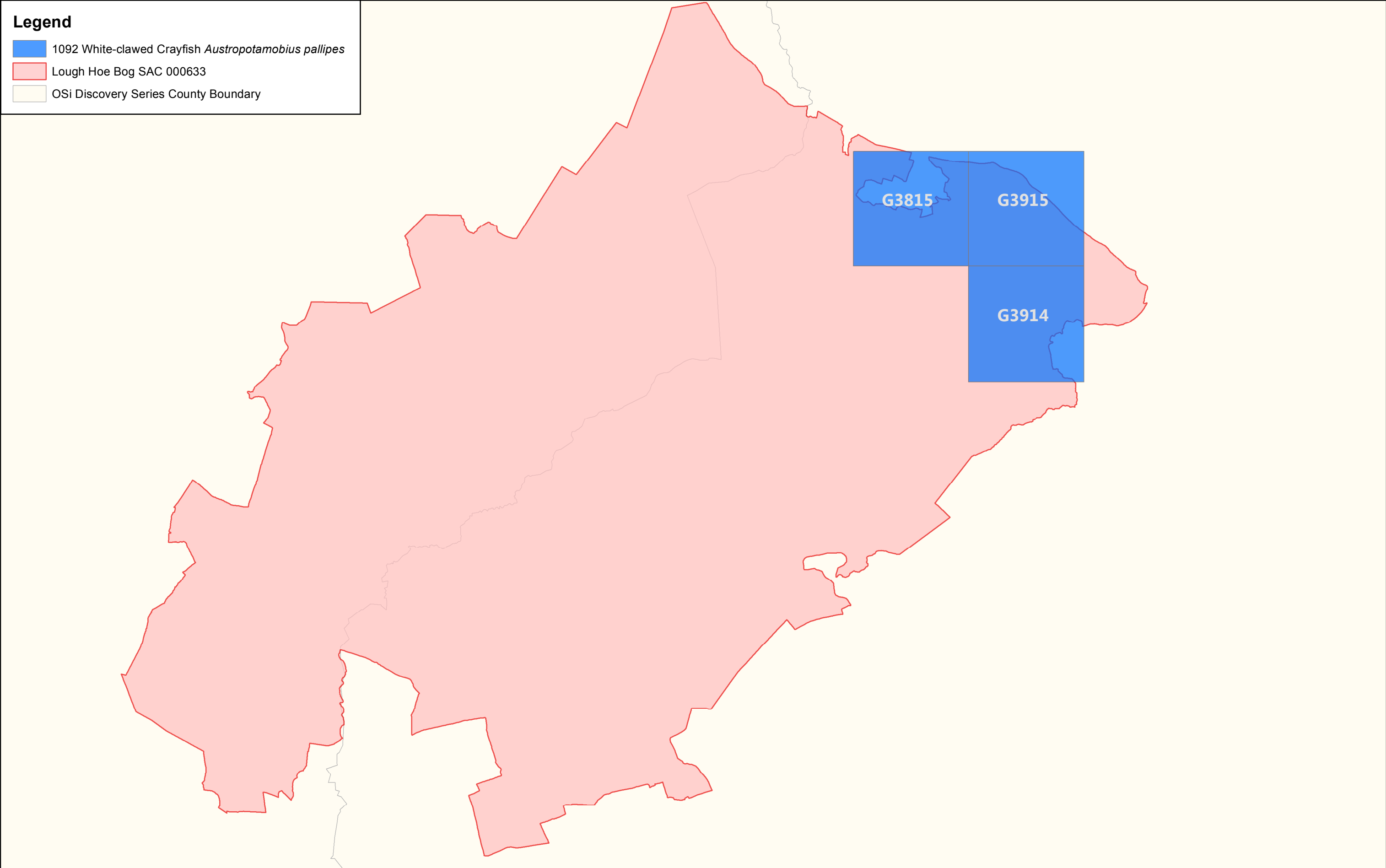
River Moy SAC 002298

OSi Discovery Series County Boundary











## **Conservation objectives for Lough Nabrickkeagh Bog SAC [000634]**

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.

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.

**Objective:** To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

<b>Code</b>	<b>Description</b>
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7130	Blanket bogs (* if active bog)
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\* denotes a priority habitat



**Citation:** NPWS (2016) *Conservation objectives for Lough Nabrickkeagh Bog SAC [000634]. Generic Version 5.0. Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.*



## Conservation objectives for Newport River SAC [002144]

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.

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.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

### ADD HABITATS

Code	Common Name	Scientific Name
1029	Freshwater Pearl Mussel	<i>Margaritifera margaritifera</i>
1106	Salmon	<i>Salmo salar</i>



**Citation:** NPWS (2016) *Conservation objectives for Newport River SAC [002144]. Generic Version 5.0.*  
*Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.*



# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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### Owenduff/Nephin Complex SAC 000534



An Roinn Ealaíon, Oidhreachta,  
Gnóthaí Réigiúnacha, Tuaithe agus Gaeltachta

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Department of Arts, Heritage,  
Regional, Rural and Gaeltacht Affairs



**National Parks and Wildlife Service,  
Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs,  
7 Ely Place, Dublin 2, Ireland.  
Web: [www.npws.ie](http://www.npws.ie)  
E-mail: [nature.conservation@ahg.gov.ie](mailto:nature.conservation@ahg.gov.ie)**

**Citation:**

**NPWS (2017) Conservation Objectives: Owenduff/Nephrin Complex SAC 000534.  
Version 1. National Parks and Wildlife Service, Department of Arts, Heritage,  
Regional, Rural and Gaeltacht Affairs.**

**Series Editor: Rebecca Jeffrey  
ISSN 2009-4086**

## 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

### 000534 Owenduff/Nephin Complex SAC

1106	Salmon <i>Salmo salar</i>
1355	Otter <i>Lutra lutra</i>
1393	Slender Green Feather-moss <i>Drepanocladus vernicosus</i>
1528	Marsh Saxifrage <i>Saxifraga hirculus</i>
3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea
3160	Natural dystrophic lakes and ponds
3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation
4010	Northern Atlantic wet heaths with <del><i>Calluna vulgaris</i></del> <i>Calluna vulgaris</i>
4060	Alpine and Boreal heaths
5130	<del><i>Rhynchospora alba</i></del> <i>Rhynchospora alba</i> formations on heaths or calcareous grasslands
7130	Blanket bogs (* if active bog)
7140	Transition mires and quaking bogs

Please note that this SAC overlaps with Owenduff/Nephin Complex SPA (004098) and is adjacent to Carrowmore Lake Complex SAC (000476), Corraun Plateau SAC (000485), Clew Bay Complex SAC (001482) and Blacksod Bay/Broad Haven SPA (004037). 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](http://www.npws.ie/Publications)

### NPWS Documents

<b>Year :</b>	1987
<b>Title :</b>	The vegetation of Irish rivers
<b>Author :</b>	Heuff, H.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	1987
<b>Title :</b>	A survey to locate blanket bogs of scientific interest in County Mayo. Part I
<b>Author :</b>	Foss, P.; McGee, E.
<b>Series :</b>	A report commissioned by the Wildlife Service
<b>Year :</b>	1989
<b>Title :</b>	Survey to locate blanket bogs of scientific interest in Mayo. Part II
<b>Author :</b>	Douglas, C.; Garvey, L.; Kelly, L.; O'Sullivan, A.; Van Doorsleer, L.
<b>Series :</b>	A report commissioned by the Wildlife Service
<b>Year :</b>	1999
<b>Title :</b>	A survey of the rare and protected flora of County Mayo
<b>Author :</b>	McKee, A-M.
<b>Series :</b>	Unpublished report to Duchas
<b>Year :</b>	2006
<b>Title :</b>	Otter survey of Ireland 2004/2005
<b>Author :</b>	Bailey, M.; Rochford, J.
<b>Series :</b>	Irish Wildlife Manual No. 23
<b>Year :</b>	2006
<b>Title :</b>	Conservation Plan for 2006-2011. Owenduff/Nepin Complex cSAC and SPA Site Codes 000534 and 004098 Co. Mayo
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation Plan
<b>Year :</b>	2007
<b>Title :</b>	Supporting documentation for the Habitats Directive Conservation Status Assessment - backing documents. Article 17 forms and supporting maps
<b>Author :</b>	NPWS
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2012
<b>Title :</b>	The conservation status of juniper formations in Ireland
<b>Author :</b>	Cooper, F.; Stone, R.E.; McEvoy, P.; Wilkins, T.; Reid, N.
<b>Series :</b>	Irish Wildlife Manual No. 63
<b>Year :</b>	2012
<b>Title :</b>	Ireland Red List No. 8: Bryophytes
<b>Author :</b>	Lockhart, N.; Hodgetts, N.; Holyoak, D.
<b>Series :</b>	Ireland Red List series, NPWS
<b>Year :</b>	2013
<b>Title :</b>	National otter survey of Ireland 2010/12
<b>Author :</b>	Reid, N.; Hayden, B.; Lundy, M.G.; Pietravallo, S.; McDonald, R.A.; Montgomery, W.I.
<b>Series :</b>	Irish Wildlife Manual No. 76

<b>Year :</b>	2013
<b>Title :</b>	A survey of red grouse ( <i>Lagopus lagopus scoticus</i> ) in the Owenduff/Nephin Complex Special Protection Area, County Mayo
<b>Author :</b>	Murray, T.; Clotworthy, C.; Bleasdale, A.
<b>Series :</b>	Irish Wildlife Manual No. 77
<b>Year :</b>	2013
<b>Title :</b>	The status of EU protected habitats and species in Ireland. Volume 2. Habitats assessments
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation assessments
<b>Year :</b>	2014
<b>Title :</b>	Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland, Version 2.0
<b>Author :</b>	Perrin, P.M.; Barron, S.J.; Roche, J.R.; O'Hanrahan, B.
<b>Series :</b>	Irish Wildlife Manual No. 79
<b>Year :</b>	2015
<b>Title :</b>	Monitoring recommendations for Marsh Saxifrage ( <i>Saxifraga hirculus</i> L.) in the Republic of Ireland
<b>Author :</b>	Muldoon, C.S.; Waldren, S.; Lynn, D.
<b>Series :</b>	Irish Wildlife Manual No. 88
<b>Year :</b>	2015
<b>Title :</b>	Habitats Directive Annex I lake habitats: a working interpretation for the purposes of site-specific conservation objectives and Article 17 reporting
<b>Author :</b>	O Connor, Á.
<b>Series :</b>	Unpublished document by NPWS
<b>Year :</b>	2015
<b>Title :</b>	Monitoring methods for <i>Hamatocaulis vernicosus</i> (Mitt.) Hedenäs (Slender green feather-moss) in the Republic of Ireland
<b>Author :</b>	Campbell, C.; Hodgetts, N.; Lockhart, N.
<b>Series :</b>	Irish Wildlife Manual No. 91
<b>Year :</b>	2016
<b>Title :</b>	Ireland Red List No. 10: Vascular Plants
<b>Author :</b>	Wyse Jackson, M.; FitzPatrick, Ú.; Cole, E.; Jebb, M.; McFerran, D.; Sheehy Skeffington, M.; Wright, M.
<b>Series :</b>	Ireland Red Lists series, NPWS
<b>Year :</b>	2017
<b>Title :</b>	Owenduff/Nephin Complex SAC (site code: 534) Conservation objectives supporting document- blanket bogs and associated habitats V1
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document

## Other References

<b>Year :</b>	1982
<b>Title :</b>	Otter survey of Ireland
<b>Author :</b>	Chapman, P.J.; Chapman, L.L.
<b>Series :</b>	Unpublished report to Vincent Wildlife Trust
<b>Year :</b>	1982
<b>Title :</b>	Eutrophication of waters. Monitoring assessment and control
<b>Author :</b>	OECD
<b>Series :</b>	OECD, Paris

<b>Year :</b>	1989
<b>Title :</b>	The genera <i>Scorpidium</i> and <i>Hamatocaulis</i> , gen. nov., in northern Europe
<b>Author :</b>	Hedenäs, L.
<b>Series :</b>	Lindbergia, 15: 8-36
<b>Year :</b>	1989
<b>Title :</b>	Three new localities for <i>Saxifraga hirculus</i> L. in Ireland
<b>Author :</b>	Lockhart, N.
<b>Series :</b>	Irish Naturalists' Journal, 23(2): 65-69
<b>Year :</b>	1991
<b>Title :</b>	The spatial organization of otters ( <i>Lutra lutra</i> ) in Shetland
<b>Author :</b>	Kruuk, H.; Moorhouse, A.
<b>Series :</b>	Journal of Zoology, 224: 41-57
<b>Year :</b>	1998
<b>Title :</b>	Studies in Irish Limnology
<b>Author :</b>	Giller, P.S. (ed.)
<b>Series :</b>	Marine Institute, Dublin
<b>Year :</b>	1998
<b>Title :</b>	Studies of Irish Rivers and Lakes
<b>Author :</b>	Moriarty, C. (ed.)
<b>Series :</b>	Marine Institute, Dublin
<b>Year :</b>	2000
<b>Title :</b>	Colour in Irish lakes
<b>Author :</b>	Free, G.; Allott, N.; Mills, P.; Kennelly, C.; Day, S.
<b>Series :</b>	Verhandlungen Internationale Vereinigung für theoretische und angewandte Limnologie, 27: 2620-2623
<b>Year :</b>	2002
<b>Title :</b>	Deterioration of Atlantic soft water macrophyte communities by acidification, eutrophication and alkalinisation
<b>Author :</b>	Arts, G.H.P.
<b>Series :</b>	Aquatic Botany, 73: 373-393
<b>Year :</b>	2003
<b>Title :</b>	Ecology of watercourses characterised by Ranunculion fluitantis and Callitriche-Batrachion vegetation
<b>Author :</b>	Hatton-Ellis, T.W.; Grieve, N.
<b>Series :</b>	Conserving Natura 2000 Rivers Ecology Series No. 11. English Nature, Peterborough
<b>Year :</b>	2005
<b>Title :</b>	Lichens. An illustrated guide to the British and Irish species
<b>Author :</b>	Dobson, F.S.
<b>Series :</b>	The Richmond Publishing Co. Ltd., Slough
<b>Year :</b>	2006
<b>Title :</b>	Otters - ecology, behaviour and conservation
<b>Author :</b>	Kruuk, H.
<b>Series :</b>	Oxford University Press



<b>Year :</b>	2006
<b>Title :</b>	A reference-based typology and ecological assessment system for Irish lakes. Preliminary investigations. Final report. Project 2000-FS-1-M1 Ecological assessment of lakes pilot study to establish monitoring methodologies EU (WFD)
<b>Author :</b>	Free, G.; Little, R.; Tierney, D.; Donnelly, K.; Coroni, R.
<b>Series :</b>	EPA, Wexford
<b>Year :</b>	2008
<b>Title :</b>	Water Quality in Ireland 2004-2006
<b>Author :</b>	Clabby, K.J.; Bradley, C.; Craig, M.; Daly, D.; Lucey, J.; McGarrigle, M.; O'Boyle, S.; Tierney, D.; Bowman, J.
<b>Series :</b>	EPA, Wexford
<b>Year :</b>	2009
<b>Title :</b>	The identification, characterization and conservation value of isoetid lakes in Ireland
<b>Author :</b>	Free, G.; Bowman, J.; McGarrigle, M.; Little, R.; Coroni, R.; Donnelly, K.; Tierney, D.; Trodd, W.
<b>Series :</b>	Aquatic Conservation: Marine and Freshwater Ecosystems, 19(3): 264–273
<b>Year :</b>	2010
<b>Title :</b>	Otter tracking study of Roaringwater Bay
<b>Author :</b>	De Jongh, A.; O'Neill, L.
<b>Series :</b>	Unpublished draft report to NPWS
<b>Year :</b>	2010
<b>Title :</b>	Water quality in Ireland 2007-2009
<b>Author :</b>	McGarrigle, M.; Lucey, J.; Ó Cinnéide, M.
<b>Series :</b>	EPA, Wexford
<b>Year :</b>	2011
<b>Title :</b>	Conservation biology of <i>Saxifraga hirculus</i> L. in Ireland
<b>Author :</b>	Muldoon, C.S.
<b>Series :</b>	Unpublished Ph.D. Thesis, Trinity College Dublin
<b>Year :</b>	2012
<b>Title :</b>	Rare and threatened bryophytes of Ireland
<b>Author :</b>	Lockhart, N.; Hodgetts, N.; Holyoak, D.
<b>Series :</b>	National Museums Northern Ireland
<b>Year :</b>	2012
<b>Title :</b>	The impact of conifer plantation forestry on the ecology of peatland lakes
<b>Author :</b>	Drinan, T.J.
<b>Series :</b>	Unpublished Ph.D. thesis, University College Cork
<b>Year :</b>	2012
<b>Title :</b>	Lichens of Ireland. An illustrated introduction to over 250 species
<b>Author :</b>	Whelan, P.
<b>Series :</b>	The Collins Press, Wilton, Cork
<b>Year :</b>	2013
<b>Title :</b>	Conservation of selected legally protected and Red Listed bryophytes in Ireland
<b>Author :</b>	Campbell, C.
<b>Series :</b>	Unpublished Ph.D. Thesis, Trinity College Dublin
<b>Year :</b>	2013
<b>Title :</b>	Management strategies for the protection of high status water bodies
<b>Author :</b>	Ní Chatháin, B.; Moorkens, E.; Irvine, K.
<b>Series :</b>	Strive Report Series No. 99. EPA, Wexford

<b>Year :</b>	2013
<b>Title :</b>	Interpretation manual of European Union habitats- Eur 28
<b>Author :</b>	European Commission- DG Environment
<b>Series :</b>	European Commission
<b>Year :</b>	2014
<b>Title :</b>	The impact of rural land management changes on soil hydraulic properties and runoff processes: results from experimental plots in upland UK
<b>Author :</b>	Marshall, M.R.; Ballard, C.E.; Frogbrook, Z.L.; Solloway, I.; McIntyre, N.; Reynolds, B.; Wheater, H.S.
<b>Series :</b>	Hydrological Processes, 28: 2617–2629
<b>Year :</b>	2014
<b>Title :</b>	Identifying the role of environmental drivers in organic carbon export from a forested peat catchment
<b>Author :</b>	Ryder, E.; de Eyto, E.; Dillane, M.; Poole, R.; Jennings, E.
<b>Series :</b>	Science of the Total Environment, 490: 28–36.
<b>Year :</b>	2015
<b>Title :</b>	Water quality in Ireland 2010-2012
<b>Author :</b>	Bradley, C.; Byrne, C.; Craig, M.; Free, G.; Gallagher, T.; Kennedy, B.; Little, R.; Lucey, J.; Mannix, A.; McCreesh, P.; McDermott, G.; McGarrigle, M.; Ní Longphuirt, S.; O'Boyle, S.; Plant, C.; Tierney, D.; Trodd, W.; Webster, P.; Wilkes, R.; Wynne, C.
<b>Series :</b>	EPA, Wexford
<b>Year :</b>	2015
<b>Title :</b>	The fecundity of wild Irish Atlantic salmon <i>Salmo salar</i> L. and its application for stock assessment purposes
<b>Author :</b>	de Eyto, E.; White, J.; Boylan, P.; Clarke, B.; Cotter, D.; Doherty, D.; Gargan, P.; Kennedy, R.; McGinnity, P.; O'Maoiléidigh, N.; O'Higgins, K.
<b>Series :</b>	Fisheries Research, 164: 159–169.
<b>Year :</b>	2016
<b>Title :</b>	A narrative for conserving freshwater and wetland habitats in England
<b>Author :</b>	Mainstone, C.; Hall, R.; Diack, I.
<b>Series :</b>	Natural England Research Reports Number 064
<b>Year :</b>	2016
<b>Title :</b>	The Status of Irish Salmon Stocks in 2015 with Precautionary Catch Advice for 2016
<b>Author :</b>	SSCS (Standing Scientific Committee on Salmon)
<b>Series :</b>	Independent Scientific Report to Inland Fisheries Ireland

## Spatial data sources

<b>Year :</b>	2008
<b>Title :</b>	OSi 1:5000 IG vector dataset
<b>GIS Operations :</b>	WaterPolygons feature class clipped to the SAC boundary. Expert opinion used to identify Annex I habitats and to resolve any issues arising
<b>Used For :</b>	3110, 3160 (map 3)
<b>Year :</b>	2017
<b>Title :</b>	NPWS rare and threatened species database
<b>GIS Operations :</b>	Dataset created from spatial references in database records. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	1393, 1528 (maps 4 and 5)
<b>Year :</b>	2005
<b>Title :</b>	OSi Discovery series vector data
<b>GIS Operations :</b>	Creation of 10m buffer on the terrestrial side of river banks data; creation of 20m buffer applied to canal centreline data. Creation of 20m buffer applied to river and stream centreline data; These datasets combined with the derived OSi 1:5000 vector lake buffer data. Overlapping regions investigated and resolved; resulting dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	1355 (no map)
<b>Year :</b>	2010
<b>Title :</b>	OSi 1:5000 IG vector dataset
<b>GIS Operations :</b>	Creation of 80m buffer on the aquatic side of lake data; creation of 10m buffer on the terrestrial side of lake data. These datasets combined with the derived OSi Discovery Series river and canal datasets. Overlapping regions investigated and resolved; resulting dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	1355 (no map)

## Conservation Objectives for : Owenduff/Nephin Complex SAC [000534]

### 3110 Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)

**To maintain the favourable conservation condition of Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) in Owenduff/Nephin Complex 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	Lake habitat 3110 is considered likely to occur in Lough Feeagh and other larger lakes (e.g. Bunaveela, Anaffrin) in Owenduff/Nephin Complex SAC (see map 3). The SAC was formerly selected for lake habitat 3130, based on an older interpretation of that habitat where it was associated with uplands (see O Connor, 2015). In line with Article 17 reporting (NPWS, 2013), all lakes larger than 1ha were mapped as potential 3110. Lake habitat 3160 is likely to co-occur with this habitat in many lakes in the SAC, particularly at higher altitude (above 200m), owing to the base-poor geology (quartzite and schist) and blanket peats. Two measures of extent should be used: 1. the area of the lake itself and; 2. the extent of the vegetation communities/zones that typify the habitat. Further information relating to all attributes is provided in the lake habitats supporting document for the purposes of site-specific conservation objectives and Article 17 reporting (O Connor, 2015)
Habitat distribution	Occurrence	No decline, subject to natural processes	As noted above, all lakes larger than 1ha have been mapped as potential 3110 (see map 3)
Typical species	Occurrence	Typical species present, in good condition, and demonstrating typical abundances and distribution	For lists of typical plant species, see the Article 17 habitat assessment for 3110 (NPWS, 2013) and the lake habitats supporting document (O Connor, 2015). Douglas et al. (1989) provide some records for lake macrophytes from the SAC. Lough Feeagh is a Water Framework Directive (WFD) monitoring lake and regular macrophyte surveys are conducted by the Environmental Protection Agency (EPA). EPA data indicate Lough Feeagh has limited submerged vegetation: quillwort ( <i>Isoetes lacustris</i> ), shoreweed ( <i>Littorella uniflora</i> ) and bulbous rush ( <i>Juncus bulbosus</i> ). There has been extensive study of the Burrishoole catchment, including Lough Feeagh, by the Marine Institute (formerly the Salmon Research Agency). This had concentrated particularly on fish and water quality, but also acidification, climate change, organic carbon, etc. (e.g. Cross et al., 1998 in Giller, 1998; Whelan et al., 1998 in Moriarty, 1998; Ryder et al., 2014; de Eyto et al., 2015)
Vegetation composition: characteristic zonation	Occurrence	All characteristic zones should be present, correctly distributed and in good condition	Further work is necessary to describe the characteristic zonation and other spatial patterns in lake habitat 3110 (see O Connor, 2015)
Vegetation distribution: maximum depth	Metres	Maintain maximum depth of vegetation, subject to natural processes	The maximum depth of vegetation is likely to be specific to the lake shoreline in question. Further work is necessary to develop indicative targets for lake habitat 3110. Maximum depth should be large in lakes in the SAC within undisturbed peatland and uplands; however, pressures such as overgrazing, forestry and peat-cutting may have reduced vegetation depth in some lakes. Data on macrophyte depth in Lough Feeagh will be available from EPA monitoring

Hydrological regime: water level fluctuations	Metres	Maintain/restore appropriate natural hydrological regime necessary to support the habitat	Fluctuations in lake water level are typical in Ireland, but can be amplified by activities such as abstraction, drainage and overgrazing. Increased water level fluctuations can increase wave action, up-root vegetation, increase turbidity, alter the substratum and lead to release of nutrients from the sediment. The hydrological regime of the lakes must be maintained so that the area, distribution and depth of the lake habitat and its constituent/characteristic vegetation zones and communities are not reduced. It is likely that the hydrological regimes of many of the lakes are still altered owing to historic overgrazing (faster run-off, higher flood peaks, lower base flows, etc.; see Marshall et al., 2014)
Lake substratum quality	Various	Maintain appropriate substratum type, extent and chemistry to support the vegetation	Research is required to further characterise the substratum types (particle size and origin) and substratum quality (notably pH, calcium, iron and nutrient concentrations) favoured by each of the five Annex I lake habitats in Ireland. It is likely that lake habitat 3110 is associated with a range of nutrient-poor substrates, from stones, cobble and gravel, through sands, silt, clay and peat. Substratum particle size is likely to vary with depth and along the shoreline within a single lake
Water quality: transparency	Metres	Maintain appropriate Secchi transparency. There should be no decline in Secchi depth/transparency	Transparency relates to light penetration and, hence, to the depth of colonisation of vegetation. It can be affected by phytoplankton blooms, water colour and turbidity. Specific targets have yet to be established for lake habitat 3110 (O Connor, 2015). Habitat 3110 is associated with very clear water. The OECD fixed boundary system set transparency targets for oligotrophic lakes of $\geq 6\text{m}$ annual mean Secchi disk depth, and $\geq 3\text{m}$ annual minimum Secchi disk depth. Free et al. (2009) found high isoetid abundance in lakes with Secchi depths of more than 3m
Water quality: nutrients	$\mu\text{g/l P}$ ; $\text{mg/l N}$	Maintain the concentration of nutrients in the water column at sufficiently low levels to support the habitat and its typical species	As a nutrient poor-habitat, oligotrophic and WFD 'high' status targets apply. Where a lake has nutrient concentrations that are lower than these targets, there should be no decline within class, i.e. no upward trend in nutrient concentrations. For lake habitat 3110, annual average total phosphorus (TP) concentration should be $\leq 10\mu\text{g/l TP}$ , average annual total ammonia concentration should be $\leq 0.040\text{mg/l N}$ and annual 95th percentile for total ammonia should be $\leq 0.090\text{mg/l N}$ . See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009. Lough Feeagh passed the nutrient conditions target in 2007-09 and 2010-12 (McGarrigle et al., 2010; Bradley et al., 2015)
Water quality: phytoplankton biomass	$\mu\text{g/l Chlorophyll } a$	Maintain appropriate water quality to support the habitat, including high chlorophyll <i>a</i> status	Oligotrophic and WFD 'high' status targets apply to lake habitat 3110. Where a lake has a chlorophyll <i>a</i> concentration that is lower than this target, there should be no decline within class, i.e. no upward trend in phytoplankton biomass. The average growing season (March-October) chlorophyll <i>a</i> concentration must be $< 5.8\mu\text{g/l}$ . The annual average chlorophyll <i>a</i> concentration should be $< 2.5\mu\text{g/l}$ and the annual peak chlorophyll <i>a</i> concentration should be $\leq 8.0\mu\text{g/l}$ . See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009. Lough Feeagh passed the target and had high chlorophyll <i>a</i> status in 2007-09 and 2010-12 (McGarrigle et al., 2010; Bradley et al., 2015)
Water quality: phytoplankton composition	EPA phytoplankton composition metric	Maintain appropriate water quality to support the habitat, including high phytoplankton composition status	The EPA has developed a phytoplankton composition metric for nutrient enrichment of Irish lakes. As for other water quality indicators, lake habitat 3110 requires WFD high status

Water quality: attached algal biomass	Algal cover and EPA phytobenthos metric	Maintain trace/absent attached algal biomass ( $<5\%$ cover) and high phytobenthos status	Nutrient enrichment can favour epiphytic and epipelic algae that can out-compete the submerged vegetation. The cover abundance of attached algae in lake habitat 3110 should, therefore, be trace/absent ( $<5\%$ cover). EPA phytobenthos can be used as an indicator of changes in attached algal biomass. As for other water quality indicators, habitat 3110 requires high phytobenthos status
Water quality: macrophyte status	EPA macrophyte metric (The Free Index)	Restore high macrophyte status	Nutrient enrichment can favour more competitive submerged macrophyte species that out-compete the typical and characteristic species for the lake habitat. The EPA monitors macrophyte status for WFD purposes using the 'Free Index'. The target for lake habitat 3110 is high status or an Ecological Quality Ratio (EQR) for lake macrophytes of $\geq 0.90$ , as defined in Schedule Five of the European Communities Environmental Objectives (Surface Waters) Regulations 2009. Lough Feeagh failed the target in 2010-12, having good macrophyte status (Bradley et al., 2015)
Acidification status	pH units; mg/l	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the habitat, subject to natural processes	Acidification can impact on species abundance and composition in soft water lake habitats. In Europe, acidification of isoetid lakes can lead to loss of isoetids and dominance by submerged <i>Sphagnum</i> mosses and <i>Juncus bulbosus</i> (Arts, 2002). The specific requirements of lake habitat 3110, in terms of water and sediment pH, alkalinity and cation concentration, have not been determined. For lake habitat 3110, and adopting a precautionary approach based on Arts (2002), minimum pH should not be $<5.5$ pH units. Maximum pH should be $<9.0$ pH units, in line with the surface water standards established for soft waters (where water hardness is $\leq 100\text{mg/l}$ calcium carbonate). See Schedule Five of the European Communities Environmental Objectives (Surface Waters) Regulations 2009. See McGarrigle et al. (2010) and Bradley et al. (2015) for WFD acidification status in the 2007-09 and 2010-12 periods
Water colour	mg/l PtCo	Maintain/restore appropriate water colour to support the habitat	Increased water colour and turbidity decrease light penetration and can reduce the area of available habitat for lake macrophytes, particularly at the lower euphotic depths. The primary source of increased water colour in Ireland is disturbance to peatland. No habitat-specific or national standards for water colour currently exist. Studies have shown median colour concentrations in Irish lakes of $38\text{mg/l PtCo}$ (Free et al., 2000) and $33\text{mg/l PtCo}$ (Free et al., 2006). It is likely that the water colour in all Irish lake habitats would naturally be $<50\text{mg/l}$ PtCo. Water colour can be very low ( $<20\text{mg/l PtCo}$ or even $<10\text{mg/l PtCo}$ ) in lakes with habitat 3110, where the peatland in the lake's catchment is intact. Free et al. (2006) reported colour of $80\text{mg/l PtCo}$ in Lough Feeagh. Overgrazing and other peatland degradation is likely to have increased colour in some lakes in Owenduff/Nephin Complex SAC

Dissolved organic carbon (DOC)	mg/l	Maintain/restore appropriate organic carbon levels to support the habitat	Dissolved (and particulate) organic carbon (OC) in the water column is linked to water colour and acidification (organic acids). Increasing DOC in water has been documented across the Northern Hemisphere, including afforested peatland catchments in Ireland. Damage and degradation of peatland, leading to decomposition of peat is likely to be the predominant source of OC in Ireland. OC in water promotes decomposition by fungi and bacteria that, in turn, releases dissolved nutrients. The increased biomass of decomposers can also impact directly on the characteristic lake communities through shading, competition, etc. Ryder et al. (2014) investigated OC losses from forestry in the Burrishoole. Overgrazing and other peatland degradation is also likely to have increased DOC in some lakes in Owenduff/Nephin Complex SAC
Turbidity	Nephelometric turbidity units/ mg/l SS/ other appropriate units	Maintain/restore appropriate turbidity to support the habitat	Turbidity can significantly affect the quantity and quality of light reaching rooted and attached vegetation and can, therefore, impact on lake habitats. The settlement of higher loads of inorganic or organic material on lake vegetation communities may also have impacts on sensitive, delicate species. Turbidity can increase as a result of re-suspension of material within the lake, higher loads entering the lake, or eutrophication. Turbidity measurement and interpretation is challenging. As a result, it is likely to be difficult to set habitat-specific targets for turbidity in lakes. Increased loads of fine organic and inorganic particles from overgrazing may have increased turbidity in lakes in Owenduff/Nephin Complex SAC
Fringing habitat: area and condition	Hectares	Maintain the area and condition of fringing habitats necessary to support the natural structure and functioning of habitat 3110	Most lake shorelines have fringing habitats of reedswamp, other swamp, fen, marsh or wet woodland that intergrade with and support the structure and functions of the lake habitat. In this SAC, lake shorelines are likely to have acid grassland, swamp, heath, blanket bog and rock communities. Fringing habitats are dependent on the lake, particularly its water levels, and support wetland communities and species of conservation concern. Many of the fringing wetland habitats support higher invertebrate and plant species richness than the lake habitats themselves



## Conservation Objectives for : Owenduff/Nephin Complex SAC [000534]

### 3160 Natural dystrophic lakes and ponds

**To maintain the favourable conservation condition of Natural dystrophic lakes and ponds in Owenduff/Nephin Complex 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	Owenduff/Nephin Complex SAC has both lowland blanket bog pool systems and upland lakes with habitat 3160. The habitat is likely to be found in many lakes in the SAC, where it may co-occur with lake habitat 3110, and all lakes, with the exception of Lough Feeagh, have been mapped as potential 3160 (see map 3). Many of the bog pools are not mapped in the 1:5,000 OSi data (map 3). Lake habitat 3160 is of high conservation value in the SAC. For further information on the distribution, vegetation and morphology of the habitat in the SAC, see Foss and McGee (1987) and Douglas et al. (1989). Two measures of extent should be used: 1. the area of the lake itself and; 2. the extent of the vegetation communities/zones that typify the habitat. Further information relating to all attributes is provided in the lake habitats supporting document for the purposes of site-specific conservation objectives and Article 17 reporting (O Connor, 2015)
Habitat distribution	Occurrence	No decline, subject to natural processes	As noted above, all lakes and ponds in the SAC, with the exception of Lough Feeagh, have been mapped as potential 3160 (see map 3). Atlantic blanket bog pools, including interconnecting pool systems, were recorded at Uggoon, Sheeanmore and Altnabrocky, Owenglass West and East, Bellagaravaun, and other areas of the SAC (Foss and McGee, 1987; Douglas et al., 1989)
Typical species	Occurrence	Typical species present, in good condition, and demonstrating typical abundances and distribution	For lists of typical plant and invertebrate species, see the Article 17 habitat assessment for 3160 (NPWS, 2013) and O Connor (2015). Douglas et al. (1989) recorded many-stalked spike-rush ( <i>Eleocharis multicaulis</i> ), bogbean ( <i>Menyanthes trifoliata</i> ) and the bog mosses <i>Sphagnum auriculatum</i> and <i>S. cuspidatum</i> in pools, and some water lobelia ( <i>Lobelia dortmanna</i> ) and pipewort ( <i>Eriocaulon aquaticum</i> ), the latter of which is Near Threatened in Ireland (Wyse Jackson et al., 2016). Great sundew ( <i>Drosera anglica</i> ) and round-leaved sundew ( <i>D. rotundifolia</i> ) were abundant in shallower interconnecting pools. Bulbous rush ( <i>Juncus bulbosus</i> ) was recorded in lakes with rock basins
Vegetation composition: characteristic zonation	Occurrence	All characteristic zones should be present, correctly distributed and in good condition	Further work is necessary to describe the characteristic zonation and other spatial patterns in lake habitat 3160 (see O Connor, 2015). Spatial patterns are likely to be relatively simple in 3160 lakes and ponds, with limited zonation
Vegetation distribution: maximum depth	Metres	Maintain maximum depth of vegetation, subject to natural processes	The maximum depth of vegetation is likely to be specific to the lake shoreline in question. Further work is necessary to develop indicative targets for lake habitat 3160. 3160 lakes and ponds naturally have very clear water and, therefore, maximum depth can be large within undisturbed peatland and uplands. Pressures such as overgrazing, forestry and peat-cutting may have reduced vegetation depth in some lakes in Owenduff/Nephin Complex SAC

Hydrological regime: water level fluctuations	Metres	Maintain/restore appropriate natural hydrological regime necessary to support the habitat	Natural water level fluctuations can be amplified by activities such as abstraction, drainage and overgrazing. Increased fluctuations can increase wave action, up-root vegetation, increase turbidity, alter the substratum and lead to release of nutrients from the sediment. The hydrological regime of the lakes and pools must be maintained so that the area, distribution and depth of the lake habitat and its constituent/characteristic vegetation zones and communities are not reduced. The hydrological regime of 3160 lakes and pools is integrally linked to that of the surrounding blanket bog, transition mire/quaking bog and other peatland habitats. Owing to their size and the sensitivity of peatland, 3160 lakes and pools can easily be damaged or destroyed by drainage. It is likely that the hydrological regimes of lakes and pools may still be altered owing to historic overgrazing (faster run-off, higher flood peaks, lower base flows, etc.; see Marshall et al., 2014)
Lake substratum quality	Various	Maintain appropriate substratum type, extent and chemistry to support the vegetation	Research is required to further characterise the substratum types (particle size and origin) and substratum quality (notably pH, calcium, iron and nutrient concentrations) favoured by each of the five Annex I lake habitats in Ireland. It is likely that lake habitat 3160 is associated with nutrient-poor peat and silt substrates
Water quality: transparency	Metres	Maintain appropriate Secchi transparency. There should be no decline in Secchi depth/transparency	Transparency relates to light penetration and, hence, to the depth of colonisation of vegetation. It can be affected by phytoplankton blooms, water colour and turbidity. Specific targets have yet to be established for lake habitat 3160. Lake habitat 3160 is associated with very clear water. The OECD fixed boundary system set transparency targets for ultra-oligotrophic lakes of $\geq 12\text{m}$ annual mean Secchi disk depth, and $\geq 6\text{m}$ annual minimum Secchi disk depth
Water quality: nutrients	$\mu\text{g/l P}$ ; $\text{mg/l N}$	Maintain the concentration of nutrients in the water column at sufficiently low levels to support the habitat and its typical species	As a nutrient-poor habitat, oligotrophic and Water Framework Directive (WFD) 'high' status targets apply. Where a lake has nutrient concentrations that are lower than these targets, there should be no decline within class, i.e. no upward trend in nutrient concentrations. For 3160 lakes and pools, annual average total phosphorus (TP) concentration should be $\leq 5\mu\text{g/l TP}$ , average annual total ammonia concentration should be $\leq 0.040\text{mg/l N}$ and annual 95th percentile for total ammonia should be $\leq 0.090\text{mg/l N}$ . See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009
Water quality: phytoplankton biomass	$\mu\text{g/l Chlorophyll } a$	Maintain appropriate water quality to support the habitat, including high chlorophyll <i>a</i> status	Oligotrophic and WFD 'high' status targets apply to lake habitat 3160. The average growing season (March-October) chlorophyll <i>a</i> concentration must be $< 5.8\mu\text{g/l}$ (The European Communities Environmental Objectives (Surface Waters) Regulations 2009). Where a lake has a chlorophyll <i>a</i> concentration that is lower than this target, there should be no decline within class, i.e. no upward trend in phytoplankton biomass. The OECD targets may be more appropriate for habitat 3160: annual average chlorophyll <i>a</i> concentration $< 1\mu\text{g/l}$ and annual peak chlorophyll <i>a</i> concentration $\leq 2.5\mu\text{g/l}$ . See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009
Water quality: phytoplankton composition	EPA phytoplankton composition metric	Maintain appropriate water quality to support the habitat, including high phytoplankton composition status	The Environmental Protection Agency (EPA) has developed a phytoplankton composition metric for nutrient enrichment of Irish lakes. As for other water quality indicators, lake habitat 3160 requires WFD high status

Water quality: attached algal biomass	Algal cover and EPA phytobenthos metric	Maintain trace/absent attached algal biomass (<5% cover) and high phytobenthos status	Nutrient enrichment can favour epiphytic and epipelic algae that can out-compete the submerged vegetation. The cover abundance of attached algae in 3160 lakes and ponds should, therefore, be trace/absent (<5% cover). EPA phytobenthos can be used as an indicator of changes in attached algal biomass. As for other water quality indicators, lake habitat 3160 requires high phytobenthos status
Water quality: macrophyte status	EPA macrophyte metric (The Free Index)	Maintain high macrophyte status	Nutrient enrichment can favour more competitive submerged macrophyte species that out-compete the typical and characteristic species for the lake habitat. The EPA monitors macrophyte status for WFD purposes using the 'Free Index'. The target for 3160 lakes and pools is high status or an Ecological Quality Ratio (EQR) for lake macrophytes of $\geq 0.90$ , as defined in Schedule Five of the European Communities Environmental Objectives (Surface Waters) Regulations 2009
Acidification status	pH units; mg/l	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the habitat, subject to natural processes	Acidification can impact on species abundance and composition in soft water lake habitats. Although European Commission (2013) describes lake habitat 3160 as having pH 3-6, Drinan (2012) found mean pH values of 5.16 and 5.62 in upland and lowland 3160 lakes, respectively. The target for lake habitat 3160 is pH $>4.5$ and $<9.0$ , in line with the surface water standards for soft waters (where water hardness is $\leq 100\text{mg/l}$ calcium carbonate). See Schedule Five of the European Communities Environmental Objectives (Surface Waters) Regulations 2009. The specific requirements of habitat 3160, in terms of water and sediment pH, alkalinity and cation concentration, have not been determined
Water colour	mg/l PtCo	Maintain/restore appropriate water colour to support the habitat	Increased water colour and turbidity decrease light penetration and can reduce the area of available habitat for lake macrophytes, particularly at the lower euphotic depths. The primary source of increased water colour in Ireland is disturbance to peatland. No habitat-specific or national standards for water colour currently exist. Studies have shown median colour concentrations in Irish lakes of 38mg/l PtCo (Free et al., 2000) and 33mg/l PtCo (Free et al., 2006). It is likely that the water colour in all Irish lake habitats would naturally be $<50\text{mg/l}$ PtCo. Water colour can be very low ( $<20\text{mg/l}$ PtCo or even $<10\text{mg/l}$ PtCo) in 3160 lakes and pools where the peatland in the lake's catchment is intact. Overgrazing and other peatland degradation is likely to have increased colour in some lakes and pools in Owenduff/Nephrin Complex SAC
Dissolved organic carbon (DOC)	mg/l	Maintain/restore appropriate organic carbon levels to support the habitat	Dissolved (and particulate) organic carbon (OC) in the water column is linked to water colour and acidification (organic acids). Increasing DOC in water has been documented across the Northern Hemisphere, including afforested peatland catchments in Ireland. Damage and degradation of peatland, leading to decomposition of peat is likely to be the predominant source of OC in Ireland. OC in water promotes decomposition by fungi and bacteria that, in turn, releases dissolved nutrients. The increased biomass of decomposers can also impact directly on the characteristic lake communities through shading, competition, etc. Overgrazing and other peatland degradation is likely to have increased DOC in some lakes and pools in the SAC

Turbidity	Nephelometric turbidity units/ mg/l SS/ other appropriate units	Maintain/restore appropriate turbidity to support the habitat	Turbidity can significantly affect the quantity and quality of light reaching rooted and attached vegetation and can, therefore, impact on lake habitats. The settlement of higher loads of inorganic or organic material on lake vegetation communities may also have impacts on sensitive, delicate species. Turbidity can increase as a result of re-suspension of material within the lake, higher loads entering the lake, or eutrophication. Turbidity measurement and interpretation is challenging. As a result, it is likely to be difficult to set habitat-specific targets for turbidity in lakes. Increased loads of fine organic and inorganic particles from overgrazing may have increased turbidity in lakes in Owenduff/Nephrin Complex SAC
Fringing habitat: area and condition	Hectares	Maintain the area and condition of fringing habitats necessary to support the natural structure and functioning of habitat 3160	Lakes with 3160, particularly in uplands, are likely to be fringed by acid grassland, heath and rock communities. 3160 pools intergrade with blanket bog communities in Owenduff/Nephrin Complex SAC. Spring-fed flushes are also a feature of the SAC. Quaking bog is also associated with pool systems in the SAC. Fringing habitats support the structure and functions of the lake/pool habitat. They are also dependent on the lake/pool, particularly its water levels, and can support wetland communities and species of conservation concern

## Conservation Objectives for : Owenduff/Nephin Complex SAC [000534]

### 3260 Water courses of plain to montane levels with the *Ranunculus fluitantis* and *Callitriche-Batrachion* vegetation

To maintain the favourable conservation condition of Water courses of plain to montane levels with the *Ranunculus fluitantis* and *Callitriche-Batrachion* vegetation in Owenduff/Nephin Complex SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Kilometres	Area stable or increasing, subject to natural processes	The description of habitat 3260 covers from upland rivers with bryophytes and macroalgae to lowland depositing rivers with pondweeds and starworts. Owenduff/Nephin Complex SAC was selected for highly oligotrophic, base-poor rivers, with limited aquatic vegetation. The main rivers in the SAC are the Owenduff and its tributaries to the south, and parts of the Owenmore and tributaries to the north-east. The Owenduff system was rated as of unique conservation importance and had communities dominated by mosses, liverworts and algae (Heuff, 1987). It is likely that most streams and rivers in the SAC have been negatively impacted by overgrazing in the Nephins and Nephin Begs (see NPWS, 2006; Murray et al., 2013)
Habitat distribution	Occurrence	No decline, subject to natural processes	Further study is needed of Irish sub-types and their conservation value to interpret the broad description of 3260 (European Commission, 2013). As noted above, the SAC was selected for a species-poor sub-type dominated by bryophytes and algae and with limited vascular plants. The uncommon river lichens <i>Ephebe lanata</i> and <i>Porpidia hydrophila</i> are known from the Altaconey and Srahmore rivers in the SAC (see Dobson (2005) and Whelan (2012) for notes on ecology). <i>Bryum riparium</i> , an endangered bryophyte of damp rock near streams and waterfalls occurs in the SAC (Lockhart et al., 2012). Ivy-leaved bellflower ( <i>Wahlenbergia hederacea</i> ) occurs at a number of sites along the Owenduff (including near Lagduff and Srahduggan) and on the Tarsaghaunmore tributary (see McKee, 1999). This is an important outlying population of a Near Threatened species (Wyse Jackson et al., 2016) otherwise concentrated in the south-west and east
Hydrological regime: river flow	Metres per second	Maintain appropriate hydrological regimes	High conservation value sub-types are associated with natural hydrology. A natural flow regime is required for both plant communities and channel geomorphology to be in favourable condition, exhibiting typical dynamics for the river type (Hatton-Ellis and Grieve, 2003). For many sub-types, high flows are required to maintain the substratum necessary for the characteristic species. Flow variation can be particularly important, with high and flood flows being critical to the hydromorphology. Peatlands also have slow-flowing or ponded streams and rivers, with biotic communities likely to resemble those in associated lakes. Many of the rivers and streams in the SAC are naturally very flashy, although some more ponded and slow-flowing stretches occur in areas of relatively flat bog. It is likely that the hydrological regimes of many of the rivers are still altered owing to historic overgrazing (faster run-off, higher flood peaks, lower base flows, etc.; see Marshall et al., 2014)

Hydrological regime: groundwater discharge	Metres per second	Maintain appropriate hydrological regime	The groundwater contribution to rivers in the SAC is likely to be small, owing to the geology and dominance of blanket peat soils. Even small groundwater contributions, however, can significantly alter the hydrochemistry, particularly where there is basic bedrock and/or subsoils
Substratum composition: particle size range	Millimetres	Maintain appropriate substratum particle size range, quantity and quality, subject to natural processes	Many of the high conservation value sub-types are dominated by coarse substrata, and it is likely that bedrock, boulders, cobbles and coarse gravels were naturally abundant in many rivers in this SAC. The size and distribution of particles is largely determined by the river flow. The chemical composition (particularly minerals and nutrients) of the substratum is also important. The quality of finer sediment particles is a notable driver for rooted plant communities. The geomorphology, including channel shape and substratum, of many streams and rivers in the SAC are likely to be significantly altered as a result of overgrazing
Water quality	Various	Maintain appropriate water quality to support the natural structure and functioning of the habitat	The specific targets may vary among sub-types. The rivers within Owenduff/Nephin Complex SAC are naturally very nutrient-poor and, therefore, typically require Water Framework Directive high status, in terms of nutrient and oxygenation standards, and EQRs (Ecological Quality Ratios) for macroinvertebrates and phytobenthos. The occurrence of high status river sites downstream of areas of previously severe overgrazing damage is unexpected and suggests the metrics may not be sensitive to such impacts. See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009, Environmental Protection Agency (EPA) river water quality reports (e.g. Bradley et al., 2015) and Ní Chatháin et al. (2013)
Typical species	Occurrence	Typical species of the relevant habitat sub-types should be present and in good condition	The sub-types of this habitat are poorly understood and their typical species have not yet been fully defined. The typical species may include higher plants, bryophytes, macroalgae and microalgae, and invertebrates. As noted above, rare lichens, bryophytes and the vascular plant species ivy-leaved bellflower ( <i>Wahlenbergia hederacea</i> ) are associated with rivers, streams and riparian areas in Owenduff/Nephin Complex SAC
Floodplain connectivity: area	Hectares	The area of active floodplain at, and upstream of, the habitat, necessary to support all sub-types of the habitat, should be maintained	River connectivity with the floodplain is important for the functioning of this habitat. Channels with a naturally functioning floodplain are better able to maintain habitat and water quality (Hatton-Ellis and Grieve, 2003). Floodplain connectivity is particularly important in terms of sediment sorting and nutrient deposition. High conservation value rivers are intimately connected to floodplain habitats and function as important wildlife corridors, connecting otherwise isolated or fragmented habitats in the wider countryside (Hatton-Ellis and Grieve, 2003; Mainstone et al., 2016). The hydro-morphological impacts associated with overgrazing may have impacted on floodplain connectivity in Owenduff/Nephin Complex SAC

Fringing habitats: Hectares  
area and condition

Maintain the area and  
condition of fringing  
habitats necessary to  
support the habitat and its  
sub-types

Riparian habitats (including those along lake shores), particularly natural/semi-natural woodlands and wetlands, are an integral part of the structure and functioning of river systems, even where they do not form part of a natural floodplain. Fringing habitats can contribute to the aquatic food web (e.g. allochthonous matter such as leaf fall), provide habitat (refuge and resources) for certain life-stages of fish, birds and aquatic invertebrates, assist in the settlement of fine suspended material, protect banks from erosion and contribute to nutrient cycling. Shade may also be important in suppressing algal growth in enriched rivers and moderating temperatures. Equally, fringing habitats are dependent on rivers/lakes, particularly their water levels, and support wetland communities and species of conservation concern. See Mainstone et al. (2016). Rivers and streams in Owenduff/Nepin Complex SAC are often fringed by acid wet grassland, and also blanket bog, heath and flush/poor fen

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## Conservation Objectives for : Owenduff/Nepin Complex SAC [000534]

### 4010 Northern Atlantic wet heaths with *Erica tetralix*

**To restore the favourable conservation condition of Northern Atlantic wet heaths with *Erica tetralix* in Owenduff/Nepin Complex 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	Northern Atlantic wet heaths with <i>Erica tetralix</i> has not been mapped in detail for Owenduff/Nepin Complex SAC, but from current available data the total area of the qualifying habitat is estimated to be approximately 4,524ha, covering 17% of the SAC (NPWS internal files). Further details on this and the following attributes can be found in the Owenduff/Nepin Complex SAC conservation objectives supporting document for blanket bogs and associated habitats
Habitat distribution	Occurrence	No decline, subject to natural processes	The habitat is documented to occur in mosaic with blanket bog within the SAC and is present on the lower slopes of mountains (NPWS, 2006). Further information can be found within NPWS (2006) and the blanket bogs and associated habitats supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the blanket bogs and associated habitats supporting document for further details
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	A variety of wet heath vegetation communities have been noted within the SAC (NPWS, 2006), two of which correspond to communities recorded in the National Survey of Upland Habitats and listed in the provisional list of vegetation communities described in Perrin et al. (2014). Further information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: cross-leaved heath	Occurrence within 20m of a representative number of monitoring stops	Cross-leaved heath ( <i>Erica tetralix</i> ) present within a 20m radius of each monitoring stop	Attribute and target based on Perrin et al. (2014)
Vegetation composition: positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of positive indicator species at least 50%	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented
Vegetation composition: lichens and bryophytes	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of <i>Cladonia</i> and <i>Sphagnum</i> species, <i>Racomitrium lanuginosum</i> and pleurocarpous mosses at least 10%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: ericoid species and crowberry	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of ericoid species and crowberry ( <i>Empetrum nigrum</i> ) at least 15%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: dwarf shrub species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of dwarf shrubs less than 75%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014). Rhododendron ( <i>Rhododendron ponticum</i> ) was recorded from wet heaths in the SAC (NPWS internal files)

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 20%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: bracken	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of bracken ( <i>Pteridium aquilinum</i> ) less than 10%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: soft rush	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of soft rush ( <i>Juncus effusus</i> ) less than 10%	Attribute and target based on Perrin et al. (2014)
Vegetation structure: <i>Sphagnum</i> condition	Condition at a representative number of 2m x 2m monitoring stops	Less than 10% of the <i>Sphagnum</i> cover is crushed, broken and/or pulled up	Attribute and target based on Perrin et al. (2014)
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Less than 33% collectively of the last complete growing season's shoots of ericoids, crowberry ( <i>Empetrum nigrum</i> ) and bog-myrtle ( <i>Myrica gale</i> ) showing signs of browsing	Attribute and target based on Perrin et al. (2014)
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning	Attribute and target based on Perrin et al. (2014), where the list of sensitive areas for this habitat is also presented
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Attribute and target based on Perrin et al. (2014)
Physical structure: drainage	Percentage area in local vicinity of a representative number of monitoring stops	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	Attribute and target based on Perrin et al. (2014)
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	This includes species listed in the Flora (Protection) Order, 2015 (FPO) and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016). The FPO listed and Vulnerable marsh clubmoss ( <i>Lycopodiella inundata</i> ) (Wyse Jackson et al., 2016) is present within the SAC (NPWS, 2006), but cannot be assigned specifically to wet heath

## Conservation Objectives for : Owenduff/Nephin Complex SAC [000534]

### 4060 Alpine and Boreal heaths

**To restore the favourable conservation condition of Alpine and Boreal heaths in Owenduff/Nephin Complex 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	Alpine and Boreal heaths have not been mapped in detail for Owenduff/Nephin Complex SAC, but from current available data the total area of the qualifying habitat is estimated to be approximately 1,150ha, covering 4% of the SAC (NPWS internal files). Further details on this and the following attributes can be found in the Owenduff/Nephin Complex SAC conservation objectives supporting document for blanket bogs and associated habitats
Habitat distribution	Occurrence	No decline, subject to natural processes	The habitat occurs on summits and ridges above 400-500m where it forms a mosaic with bare rock (NPWS internal files). Further information can be found within NPWS internal files and the blanket bogs and associated habitats supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the blanket bogs and associated habitats supporting document for further details
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	The diversity of Alpine and Boreal heath communities within this SAC is unknown. Further information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: lichens and bryophytes	Number of species at a representative number of 2m x 2m monitoring stops	Number of bryophyte or non-crustose lichen species present at each monitoring stop is at least three	Attribute and target based on Perrin et al. (2014)
Vegetation composition: positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of positive indicator species at least 66%	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented
Vegetation composition: dwarf shrub species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of dwarf shrub species at least 10%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 10%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented
Vegetation composition: non-native species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014)
Vegetation structure: signs of grazing	Percentage of leaves grazed at a representative number of 2m x 2m monitoring stops	Less than 10% collectively of the live leaves of specific graminoids showing signs of grazing	Attribute and target based on Perrin et al. (2014). See the blanket bogs and associated habitats supporting document for the list of specific graminoids
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Less than 33% collectively of the last complete growing season's shoots of ericoids and crowberry ( <i>Empetrum nigrum</i> ) showing signs of browsing	Attribute and target based on Perrin et al. (2014)
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning within the habitat	Attribute and target based on Perrin et al. (2014)

Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Attribute and target based on Perrin et al. (2014)
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	This includes species listed in the Flora (Protection) Order, 2015 and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016). The Near Threatened Alpine clubmoss ( <i>Diphasiastrum alpinum</i> ) (Wyse Jackson et al., 2016) was recorded from the Nephin Beg Range by Praeger (NPWS, 2006). This species is known to be associated with this habitat type

## Conservation Objectives for : Owenduff/Nephin Complex SAC [000534]

### 5130 *Juniperus communis* formations on heaths or calcareous grasslands

To maintain the favourable conservation condition of *Juniperus communis* formations on heaths or calcareous grasslands in Owenduff/Nephin Complex 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	<i>Juniperus communis</i> formations on heaths or calcareous grasslands habitat has not been mapped in detail for Owenduff/Nephin Complex SAC and thus the total area of the qualifying habitat is unknown. It has been noted that the habitat is rare within the SAC (Foss and McGee, 1987; Douglas et al., 1990) and is largely confined to ungrazed islands within larger dystrophic and oligotrophic lakes, and may also occur near well-drained areas of bog surrounding rock outcrops in the SAC, and often occurs in a mosaic with wet heath (NPWS, 2006; NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See notes on habitat area above
Juniper population size	Number per formation	At least 50 plants per formation	To classify as a juniper ( <i>Juniperus communis</i> ) formation, at least 50 plants should be present (Cooper et al., 2012)
Vegetation composition: typical species	Number per formation	At least 50% of the listed positive indicator species for the relevant vegetation group present	Attribute and target based on Cooper et al. (2012), where positive indicator species for five vegetation groups are listed
Vegetation composition: negative indicator species	Occurrence per formation	Negative indicator species, particularly non-native invasive species, absent or under control	Attribute and target based on Cooper et al. (2012), where the list of negative indicator species is presented. Rhododendron ( <i>Rhododendron ponticum</i> ) has been reported from some of the lake islands that support juniper ( <i>Juniperus communis</i> ) scrub in the SAC (NPWS internal files)
Vegetation structure: cone-bearing plants	Percentage per formation	At least 10% of juniper plants are bearing cones	Attribute and target based on Cooper et al. (2012)
Vegetation structure: seedling recruitment	Percentage per formation	At least 10% of juniper plants are seedlings	Attribute and target based on Cooper et al. (2012)
Vegetation structure: dead juniper	Percentage per formation	Mean percentage of each juniper plant dead less than 10%	Attribute and target based on Cooper et al. (2012)

## Conservation Objectives for : Owenduff/Nephin Complex SAC [000534]

### 7130 Blanket bogs (\* if active bog)

**To restore the favourable conservation condition of Blanket bogs in Owenduff/Nephin Complex 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	Blanket bog has not been mapped in detail for Owenduff/Nephin Complex SAC, but from current available data the total area of the qualifying habitat is estimated to be approximately 18,393ha, covering 68% of the SAC (NPWS internal files). Further details on this and the following attributes can be found in the Owenduff/Nephin Complex SAC conservation objectives supporting document for blanket bogs and associated habitats
Habitat distribution	Occurrence	No decline, subject to natural processes	The habitat covers most of the western and northern parts of the SAC, as well as much of the upland areas in the east and south. Large areas of intact blanket bog are also present in the centre of the SAC. Further information can be found within Foss and McGee (1987), Douglas et al. (1989), NPWS internal files and the blanket bogs and associated habitats supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the blanket bogs and associated habitats supporting document for further details
Ecosystem function: peat formation	Active blanket bog as a proportion of the total area of Annex I blanket bog habitat	At least 99% of the total Annex I blanket bog area is active	See the blanket bogs and associated habitats supporting document for further details
Ecosystem function: hydrology	Flow direction, water levels, occurrence of drains and erosion gullies	Natural hydrology unaffected by drains and erosion	Further details and a brief discussion of restoration potential is presented in the blanket bogs and associated habitats supporting document
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	A variety of blanket bog vegetation communities have been recorded in this SAC (Foss and McGee, 1987; Douglas et al., 1989; NPWS internal files), five of which correspond to communities recorded in the National Survey of Upland Habitats and listed in the provisional list of vegetation communities described in Perrin et al. (2014). Further information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species present at each monitoring stop is at least seven	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented
Vegetation composition: lichens and bryophytes	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of bryophytes or lichens, excluding <i>Sphagnum fallax</i> , at least 10%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: potential dominant species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of each of the potential dominant species less than 75%	Attribute and target based on Perrin et al. (2014). See the blanket bogs and associated habitats supporting document for the list of potential dominant species
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014). Rhododendron ( <i>Rhododendron ponticum</i> ) and the non-native moss <i>Campylopus introflexus</i> are present within blanket bog in the SAC (NPWS, 2006; NPWS internal files)

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 Perrin et al. (2014)
Vegetation structure: <i>Sphagnum</i> condition	Condition at a representative number of 2m x 2m monitoring stops	Less than 10% of the <i>Sphagnum</i> cover is crushed, broken and/or pulled up	Attribute and target based on Perrin et al. (2014)
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Last complete growing season's shoots of ericoids, crowberry ( <i>Empetrum nigrum</i> ) and bog-myrtle ( <i>Myrica gale</i> ) showing signs of browsing collectively less than 33%	Attribute and target based on Perrin et al. (2014)
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning	Attribute and target based on Perrin et al. (2014), where the list of sensitive areas for this habitat is also presented
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Attribute and target based on Perrin et al. (2014)
Physical structure: drainage	Percentage area in local vicinity of a representative number of monitoring stops	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	Attribute and target based on Perrin et al. (2014)
Physical structure: erosion	Percentage area in local vicinity of a representative number of monitoring stops	Less than 5% of the greater bog mosaic comprises erosion gullies and eroded areas	Attribute and target based on Perrin et al. (2014)
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	Several rare and threatened species are present in blanket bog flushes in the SAC including the Annex II and Annex IV listed, Flora (Protection) Order, 2015 (FPO) and Near Threatened (NT) marsh saxifrage ( <i>Saxifraga hirculus</i> ), the FPO and Vulnerable (VU) marsh clubmoss ( <i>Lycopodiella inundata</i> ), the FPO and NT bog orchid ( <i>Hammarbya paludosa</i> ), the Annex II listed, FPO and NT slender green feather-moss ( <i>Hamatocaulis (Drepanocladus) vernicosus</i> ) and the VU moss <i>Tomentypnum nitens</i> (NPWS, 2006; Lockhart et al., 2012; Campbell et al., 2015; Muldoon et al., 2015; Wyse Jackson et al., 2016; NPWS internal files). Although some of these species cannot be assigned specifically to blanket bog habitat (i.e. they are flush/fen species) they do occur in association with the habitat. The NT brown beak-sedge ( <i>Rhynchospora fusca</i> ) (Wyse Jackson et al., 2016) is also present within the SAC (NPWS, 2006), but cannot be assigned specifically to blanket bog

## Conservation Objectives for : Owenduff/Nephin Complex SAC [000534]

### 7140 Transition mires and quaking bogs

**To restore the favourable conservation condition of Transition mires and quaking bogs in Owenduff/Nephin Complex 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	Transition mires and quaking bogs have not been mapped in detail for Owenduff/Nephin Complex SAC and thus the total area of the qualifying habitat is unknown. Further details on this and the following attributes can be found in the Owenduff/Nephin Complex SAC conservation objectives supporting document for blanket bogs and associated habitats
Habitat distribution	Occurrence	No decline, subject to natural processes	The habitat occurs in locations where bog vegetation merges with base-rich flushes, and at the interface between water bodies and adjacent bog. Examples can be found at Owenglass West, Uggoon, Sheeanmore and Lagduff. Further information can be found within Foss and McGee (1987), Douglas et al. (1989), NPWS (2006) and the blanket bogs and associated habitats supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the blanket bogs and associated habitats supporting document for further details
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Douglas et al. (1989) recorded one transition mire vegetation community that corresponds to a community recorded in the National Survey of Upland Habitats and listed in the provisional list of vegetation communities described in Perrin et al. (2014). Further information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: number of positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species at each monitoring stop is at least three for infilling pools and flushes and at least six for fens	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented
Vegetation composition: number of core positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	At least one core positive indicator species present	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented
Vegetation composition: cover of positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of positive indicator species is at least 25%	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014)
Vegetation structure: height	Percentage of leaves/shoots at a representative number of 2m x 2m monitoring stops	Proportion of live leaves and/or flowering shoots of vascular plants that are more than 15cm above the ground surface should be at least 50%	Attribute and target based on Perrin et al. (2014). This attribute is only applicable to fen and flush examples of the habitat, not to infilling pool examples



Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Attribute and target based on Perrin et al. (2014)
Physical structure: drainage	Percentage area in local vicinity of a representative number of monitoring stops	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	Attribute and target based on Perrin et al. (2014)
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	This includes species listed in the Flora (Protection) Order, 2015 (FPO) and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016). The FPO listed and Vulnerable marsh clubmoss ( <i>Lycopodiella inundata</i> ), the FPO listed and Near Threatened bog orchid ( <i>Hammarbya paludosa</i> ), the Near Threatened brown beak-sedge ( <i>Rhynchospora fusca</i> ) (Wyse Jackson et al., 2016) and the Vulnerable moss <i>Tomentypnum nitens</i> (Lockhart et al., 2012) are present within the SAC (NPWS, 2006; NPWS internal files), but cannot be assigned specifically to transition mires. The Annex II and FPO listed and Near Threatened slender green feather-moss ( <i>Hamatocaulis (Drepanocladus) vernicosus</i> ) (Lockhart et al., 2012) occurs in the habitat in the SAC (Campbell et al., 2015). See also the conservation objective for slender green feather-moss (1393)

## Conservation Objectives for : Owenduff/Nephin Complex SAC [000534]

### 1106 Salmon *Salmo salar*

**To restore the favourable conservation condition of Atlantic Salmon in Owenduff/Nephin Complex 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
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 Standing Scientific Committee on Salmon (SSCS) annual model output of CL attainment levels. See SSCS (2016). Attainment of CL estimates are derived from direct counts of adults (rod catch, fish counter) or indirectly by fry abundance counts. The Owenmore River is currently below 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	The target is the 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
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 : Owenduff/Nephin Complex SAC [000534]****1355 Otter *Lutra lutra***

**To maintain the favourable conservation condition of Otter in Owenduff/Nephin Complex SAC, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
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 840.63ha along river banks/lake shoreline/around pools	No field survey. Areas mapped to include 10m terrestrial buffer along shorelines and river banks identified as critical for otters (NPWS, 2007)
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 382.65km	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 540.66ha	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

## Conservation Objectives for : Owenduff/Nephin Complex SAC [000534]

1393

### Slender Green Feather-moss *Drepanocladus vernicosus*

**To maintain the favourable conservation condition of Slender Green Feather-moss (Shining Sickie-moss) in Owenduff/Nephin Complex SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Distribution	Number and geographical spread of populations	No decline, subject to natural processes. See map 4 for known location at Uggoon	(Please note that <i>Drepanocladus vernicosus</i> was reclassified as <i>Hamatocaulis vernicosus</i> by Hedenäs (1989)). The known population of slender green feather-moss ( <i>Hamatocaulis vernicosus</i> ) in Owenduff/Nephin Complex SAC occurs in a flush within the blanket bog at Uggoon, in the vicinity of marsh saxifrage ( <i>Saxifraga hirculus</i> ). Data from NPWS survey by N. Lockhart in 1999 (NPWS internal files). See also Campbell et al. (2015)
Population size	Number of individuals	No decline, subject to natural processes	Lockhart estimated the population to be c.320 shoots (NPWS internal files). This is likely to be an underestimate. See Campbell et al. (2015) for further details
Area of suitable habitat	Hectares	No decline, subject to natural processes	The extent of occupancy for the species at Uggoon was estimated by Lockhart to be one square metre; however, only about 4% of this area was suitable i.e. 0.04m <sup>2</sup> (c.0.000004ha) (NPWS internal files). This is likely to be an underestimate. See Campbell et al. (2015) for further details
Hydrological conditions: water table level	Metres	Maintain suitable hydrological conditions	Slender green feather-moss ( <i>Hamatocaulis vernicosus</i> ) is mostly confined to mesotrophic fens, a transitional habitat between acid bog and base-rich fen. This appears to occur in at least two forms in Ireland: upland transitional flushes, where the plants can occur in lawns that rise and fall with fluctuating water table levels, such as at Uggoon; and wet lowland sedge meadows, where plants can be inundated in winter, but may be subject to some desiccation in the summer. Based on Campbell (2013) and Campbell et al. (2015)
Vegetation composition: tree cover	Percentage cover in a representative number of 2m x 2m monitoring plots	Mean percentage tree cover should be less than 15%	Slender green feather-moss ( <i>Hamatocaulis vernicosus</i> ) grows in moss-dominated, open communities, generally with a low cover of trees and shrubs. See Campbell et al. (2015) for further details
Vegetation composition: shrub cover	Percentage cover in a representative number of 2m x 2m monitoring plots	Mean percentage shrub cover should be less than 20%	Slender green feather-moss ( <i>Hamatocaulis vernicosus</i> ) grows in moss-dominated, open communities, generally with a low cover of trees and shrubs. See Campbell et al. (2015) for further details
Vegetation composition: grass cover	Percentage cover in a representative number of 2m x 2m monitoring plots	Mean percentage grass species cover should be less than 25%	Slender green feather-moss ( <i>Hamatocaulis vernicosus</i> ) grows in moss-dominated, open communities, generally with a low cover of grasses, maintained by a low grazing intensity by sheep at Uggoon. See Campbell et al. (2015) for further details
Vegetation composition: bryophyte cover	Percentage cover in a representative number of 2m x 2m monitoring plots	Mean percentage bryophyte cover should be more than 50%	In 1999, Lockhart recorded slender green feather-moss ( <i>Hamatocaulis vernicosus</i> ) at the edge of spring-dominated vegetation, which occurs at the edge of a swelling lawn of mosses, with <i>Aneura pinguis</i> , <i>Cratoneuron filicinum</i> , <i>Palustriella commutata</i> , <i>Philonotis fontana</i> , <i>Scorpidium revolvens</i> and <i>Warnstorfia exannulata</i> (NPWS internal files). See Campbell et al. (2015) for further details
Vegetation composition: cover of <i>Calliergonella cuspidata</i>	Percentage cover in a representative number of 2m x 2m monitoring plots	Mean percentage cover of <i>Calliergonella cuspidata</i> should be less than 15%	<i>Calliergonella cuspidata</i> , a moss species often associated with high nutrient conditions, is usually present, but with low cover and never dominant. See also Campbell et al. (2015)

Vegetation structure: vegetation height	Centimetres in a representative number 2m x 2m monitoring plots	Mean vegetation height should not exceed 40cm	See Campbell et al. (2015) for further details
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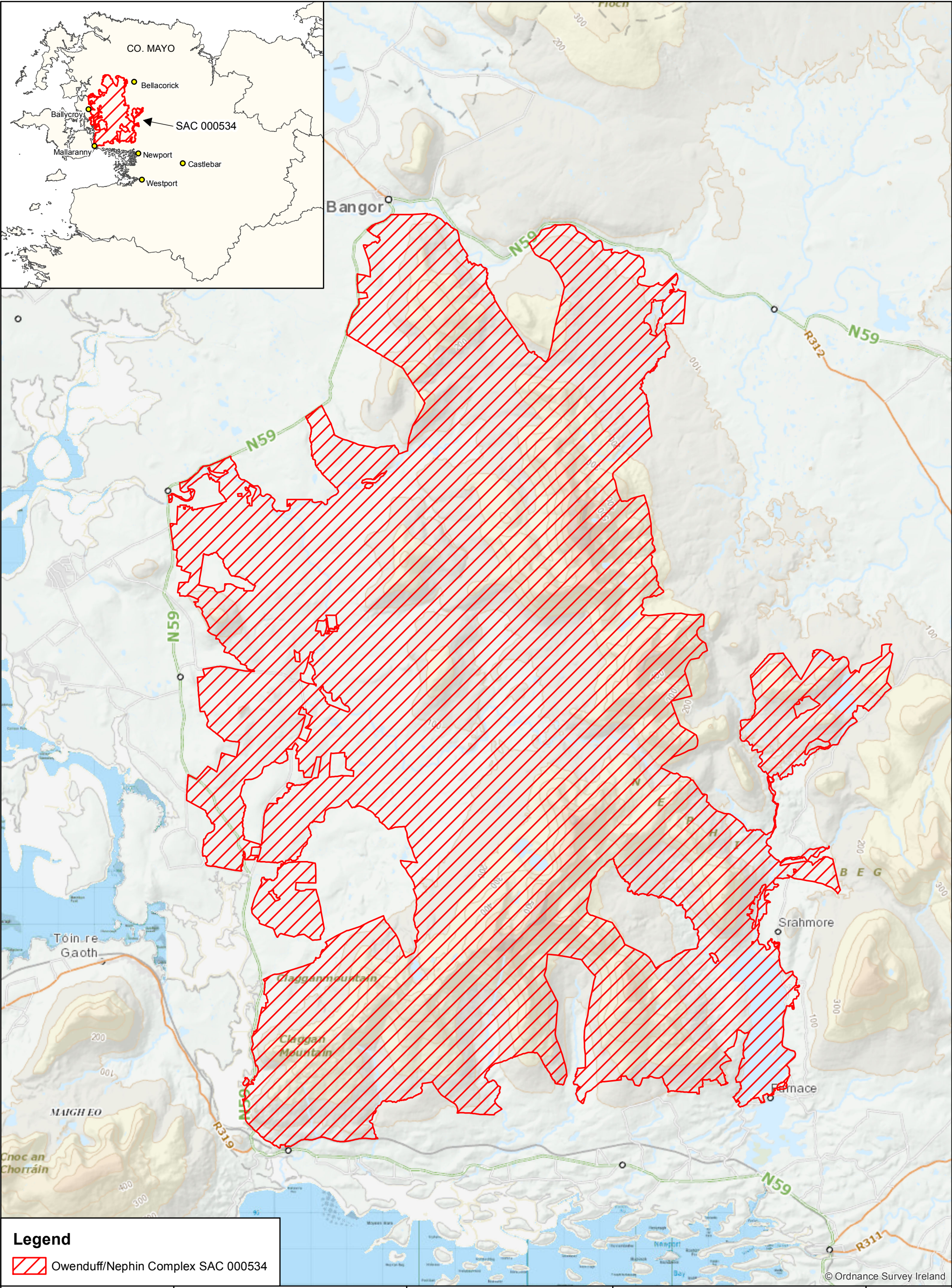
# Conservation Objectives for : Owenduff/Nephin Complex SAC [000534]

## 1528 Marsh Saxifrage *Saxifraga hirculus*


**To maintain the favourable conservation condition of Marsh Saxifrage in Owenduff/Nephin Complex SAC, which is defined by the following list of attributes and targets:**


Attribute	Measure	Target	Notes
Distribution	Number and geographical spread of populations	No loss in geographical spread and number of populations, subject to natural processes. See map 5 for 1km grid square locations	Marsh saxifrage ( <i>Saxifraga hirculus</i> ) is known to occur in the Owenduff/Nephin Complex SAC in five flushes at Sheean A, Sheean B, Sheean C, Sheean D and Uggool. See Lockhart (1989), Muldoon (2011) and Muldoon et al. (2015) for further details
Population size: number of rosettes	Number	Maintain the size of each known population, subject to natural processes. The target numbers of rosettes are: at least 151,200 rosettes at Sheean A, at least 36,000 rosettes at Sheean B, at least 104,000 rosettes at Sheean C, at least 19,200 rosettes at Sheean D and at least 24,000 rosettes at Uggool	The number of rosettes recorded by Muldoon (2011) were: 189,000 at Sheean A, 45,000 at Sheean B, 130,000 at Sheean C, 24,000 at Sheean D and 30,000 at Uggool. The target figures are a 20% reduction of the recorded number to allow for a margin of error and variability over monitoring seasons. See Muldoon et al. (2015) for further details
Population size: area of occupancy	Hectares	Maintain the area of occupancy of each known population, subject to natural processes. The target areas of occupancy are: at least 0.162ha at Sheean A, at least 0.042ha at Sheean B, at least 0.078ha at Sheean C, at least 0.051ha at Sheean D and at least 0.029ha at Uggool	The areas of occupancy for the species estimated by Muldoon (2011) were: 1,800m <sup>2</sup> (0.1800ha) at Sheean A, 470m <sup>2</sup> (0.047ha) at Sheean B, 870m <sup>2</sup> (0.087ha) at Sheean C, 570m <sup>2</sup> (0.057ha) at Sheean D and 315m <sup>2</sup> (0.032ha) at Uggool. The target area figures are a 10% reduction of the recorded areas to allow for a margin of error. See Muldoon et al. (2015) for further details
Hydrological conditions: water level	Occurrence of high or fluctuating water levels	Maintain the appropriate natural hydrological regime necessary to support the habitat for the species	In Ireland, marsh saxifrage ( <i>Saxifraga hirculus</i> ) is now restricted to mineral flushes in blanket bog where rising groundwater forms small streams and seepage areas suitable for the species. Based on Muldoon (2011) and Muldoon et al. (2015)
Vegetation composition: positive indicator species	Occurrence in a number of 1m x 1m monitoring stops	Knotted pearlwort ( <i>Sagina nodosa</i> ) should be present in at least two of five 1m x 1m monitoring stops	The presence of the positive indicator species knotted pearlwort ( <i>Sagina nodosa</i> ) should be maintained (Muldoon, 2011; Muldoon et al., 2015)
Vegetation composition: negative indicator species	Mean percentage cover in five 1m x 1m monitoring stops	Mean percentage cover of purple moor-grass ( <i>Molinia caerulea</i> ) should not exceed 5%; mean percentage cover of Yorkshire fog ( <i>Holcus lanatus</i> ) should not exceed 15%	Low cover of the negative indicator species purple moor-grass ( <i>Molinia caerulea</i> ) and Yorkshire fog ( <i>Holcus lanatus</i> ) should be maintained. Cover of Yorkshire fog was greater than 15% at Uggool (Muldoon, 2011). See Muldoon et al. (2015) for further details
Vegetation structure: sward structure	Centimetres in five 1m x 1m monitoring stops	Maintain a mean vegetation height of less than 15cm	See Muldoon (2011) and Muldoon et al. (2015) for further details
Vegetation structure: grazing level	Evidence of grazing	Maintain grazing at light to moderate levels to ensure an open vegetation structure and to allow flowering to occur	See Muldoon (2011) and Muldoon et al. (2015) for further details





**Legend**

 Owenduff/Nephin Complex SAC 000534



An Roinn Ealaíon, Oidhreacht,  
Gnóthaí Réigiúnacha, Tuaithe agus Gaeltachta

Department of Arts, Heritage,  
Regional, Rural and Gaeltacht Affairs

**MAP 1:**  
**OWENDUFF/NEPHIN COMPLEX SAC**  
**CONSERVATION OBJECTIVES**  
**SAC DESIGNATION**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

**SITE CODE:**  
**SAC 000534; version 1.09. CO. MAYO**

0 1 2 3 4 km

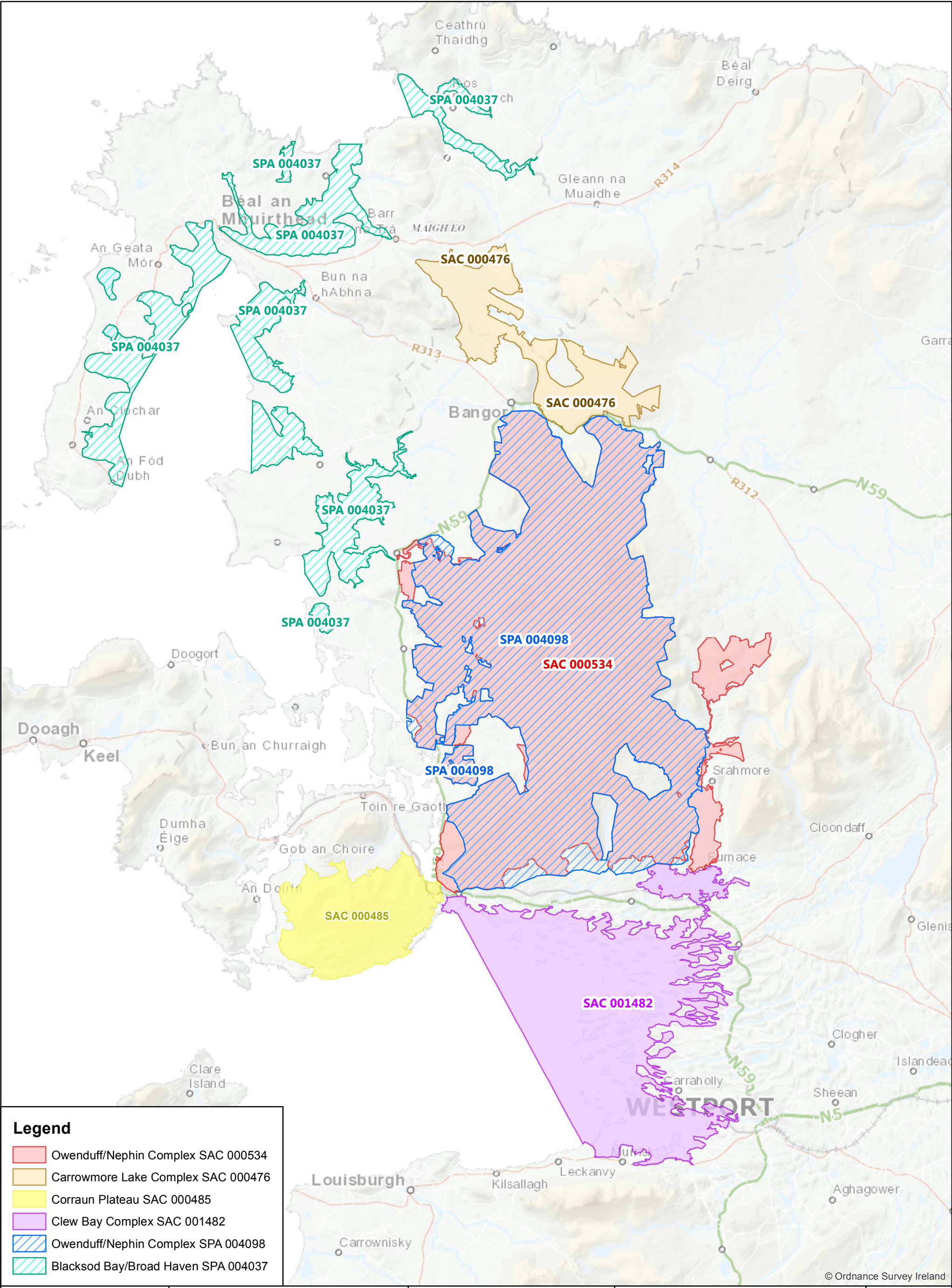
The mapped boundaries are of an indicative and general nature only.  
Boundaries of designated areas are subject to revision.  
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Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta.  
Féadfar athbhreithniú a déanamh ar theorainneacha na gceantar comharthaíthe.  
Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh EN 0059216.  
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**Map Version 1**  
**Date: March 2017**

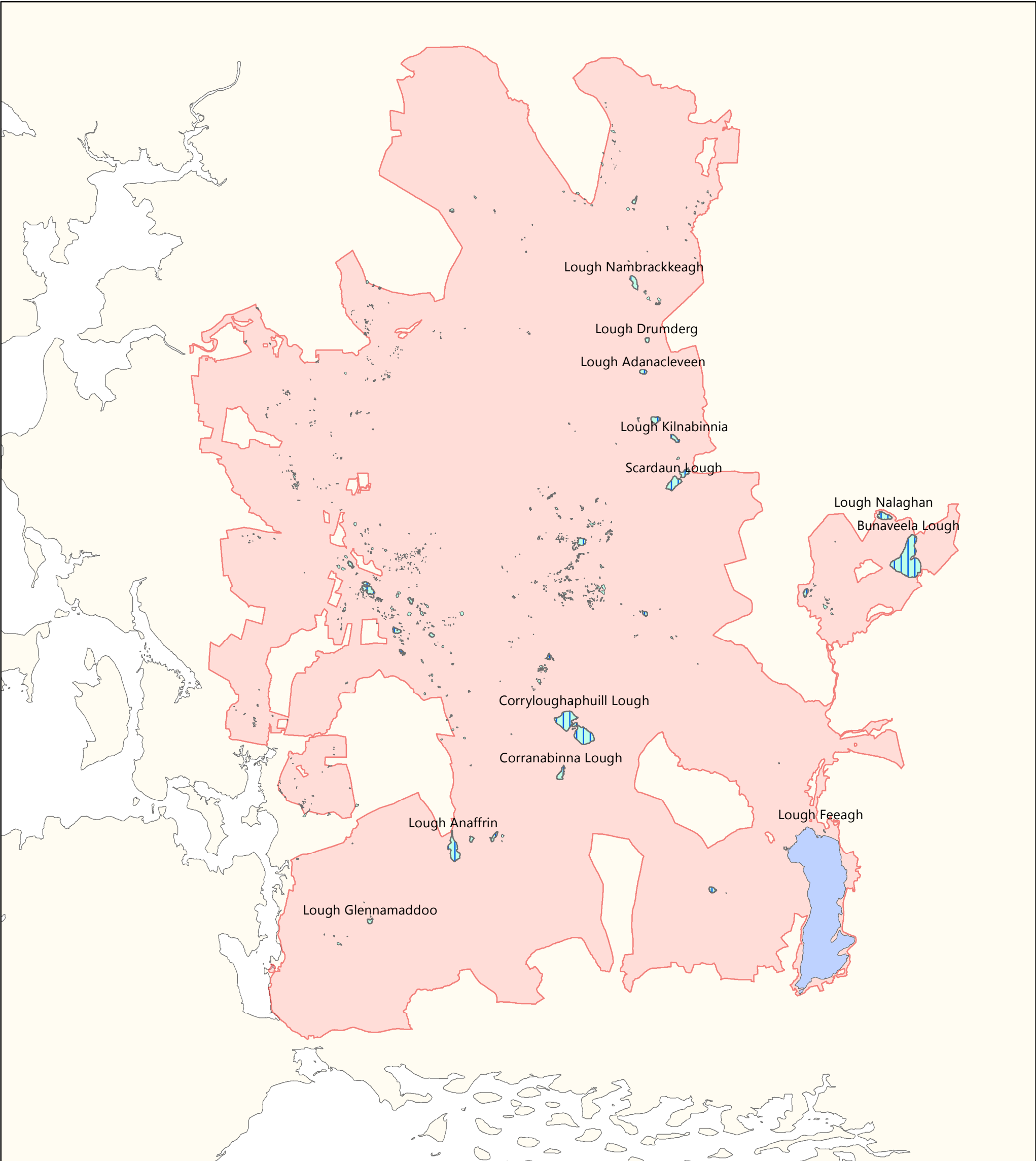




**Legend**

- Owenduff/Nephin Complex SAC 000534
- Carrowmore Lake Complex SAC 000476
- Corraun Plateau SAC 000485
- Clew Bay Complex SAC 001482
- Owenduff/Nephin Complex SPA 004098
- Blacksod Bay/Broad Haven SPA 004037



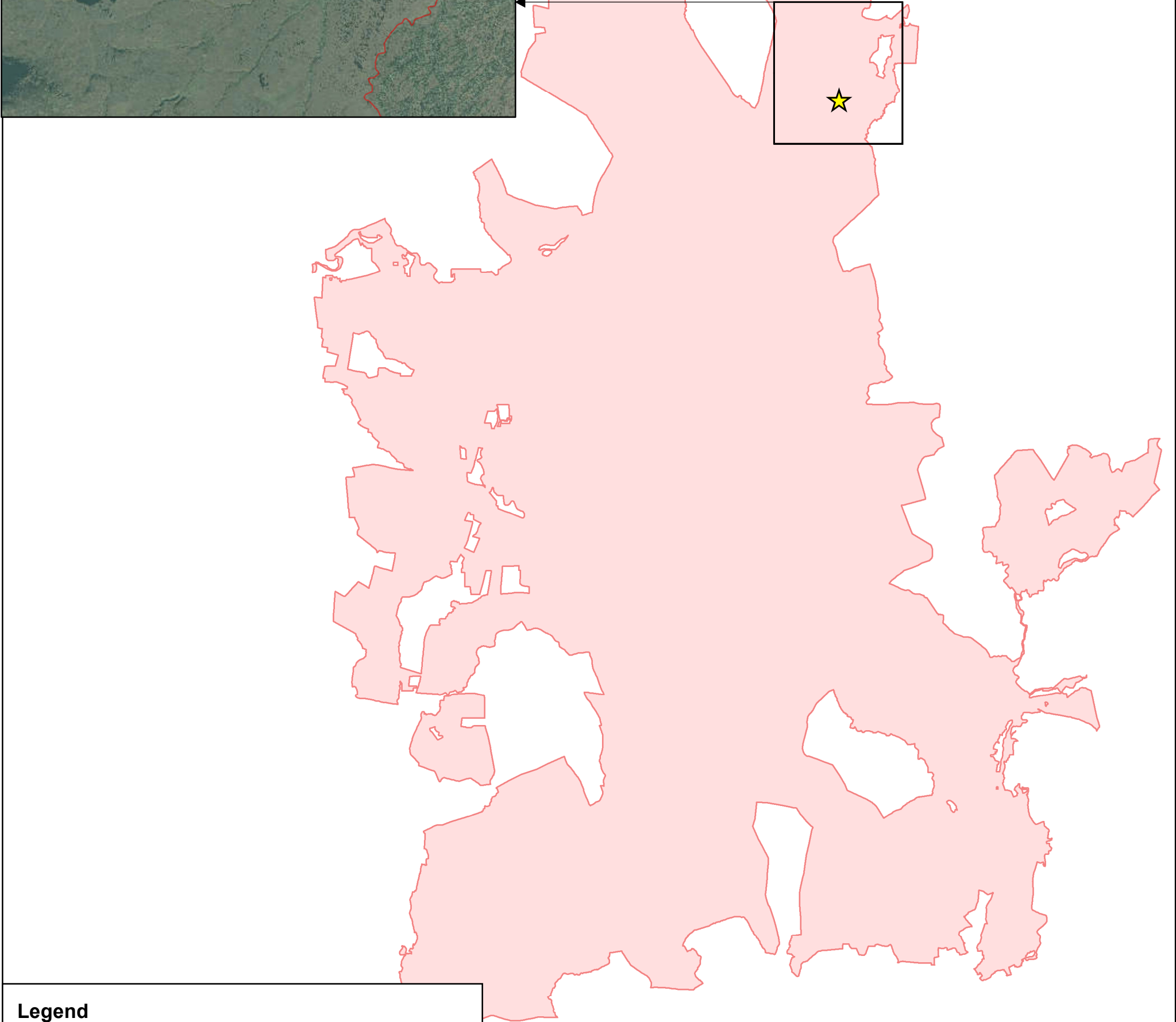
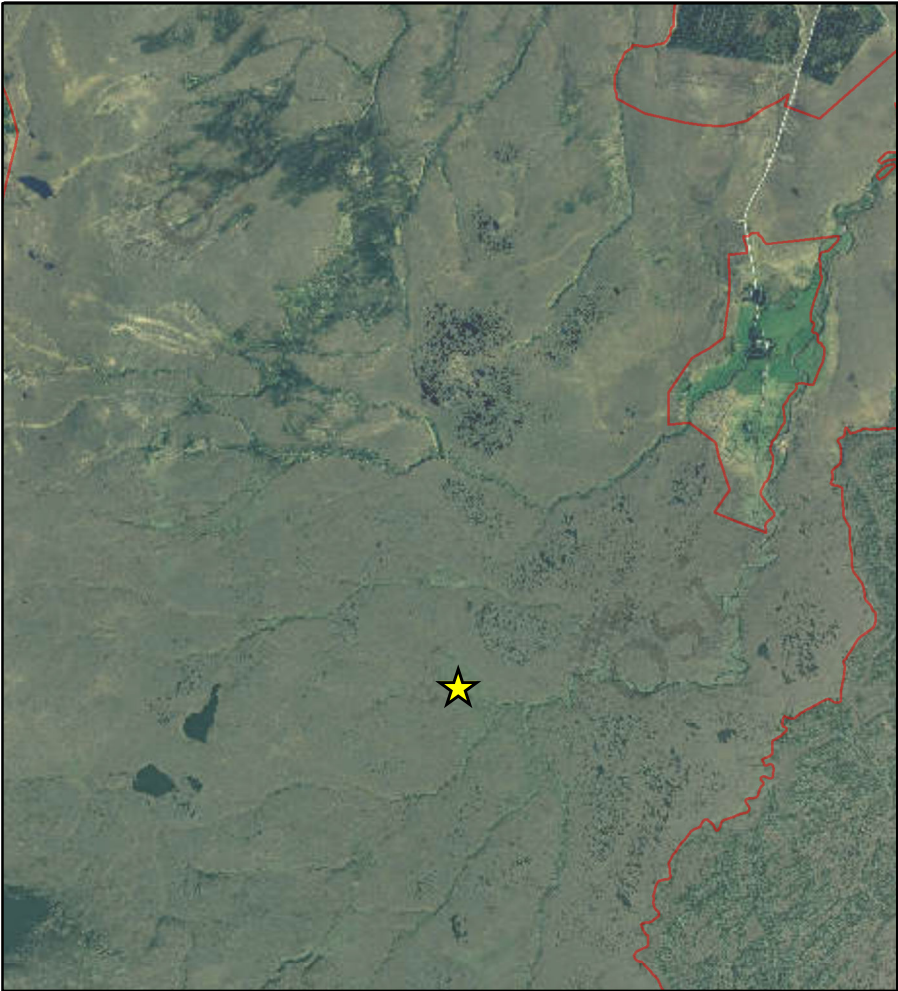


Legend

- Owenduff/Nephrin Complex SAC 000534
- OSi Discovery Series County Boundary

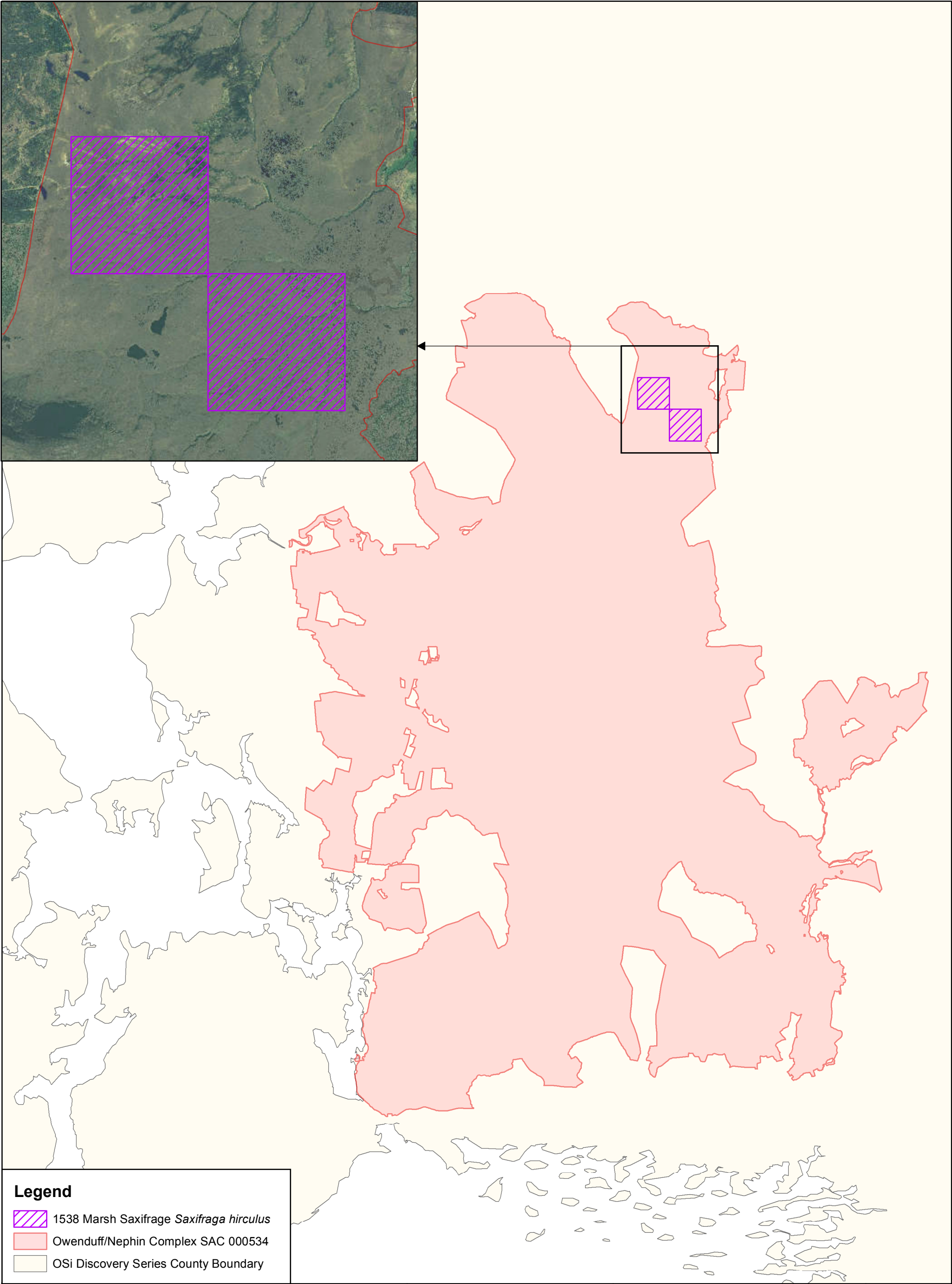
Indicative Lake Habitats

- Potential 3110 Potential oligotrophic waters containing very few minerals of sandy plains: Littorelletalia uniflorae
- Potential 3110 / Potential 3160 Potential oligotrophic waters containing very few minerals of sandy plains: Littorelletalia uniflorae / Potential natural dystrophic lakes and ponds
- Potential 3160 Potential natural dystrophic lakes and ponds






**Legend**

- ★ 1393 Slender Green Feather-moss *Hamatocaulis vernicosus*
- Owenduff/Nephin Complex SAC 000534
- OSi Discovery Series County Boundary



**Legend**

-  1538 Marsh Saxifrage *Saxifraga hirculus*
-  Owenduff/Nephin Complex SAC 000534
-  OSi Discovery Series County Boundary

# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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### Ox Mountains Bogs SAC 002006



An Roinn Ealaíon, Oidhreachta,  
Gnóthaí Réigiúnacha, Tuaithe agus Gaeltachta

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Department of Arts, Heritage,  
Regional, Rural and Gaeltacht Affairs





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1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional,  
Rural and Gaeltacht Affairs.**

**Series Editor: Rebecca Jeffrey  
ISSN 2009-4086**

## 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

002006	Ox Mountains Bogs SAC
1013	Geyer's Whorl Snail <i>Vertigo geyeri</i>
1528	Marsh Saxifrage <i>Saxifraga hirculus</i>
3110	Oligotrophic waters containing very few minerals of sandy plains ( <i>Littorelletalia uniflorae</i> )
3160	Natural dystrophic lakes and ponds
4010	Northern Atlantic wet heaths with <i>Cladonia</i> <del>and</del>
4030	European dry heaths
7130	Blanket bogs (* if active bog)
7140	Transition mires and quaking bogs
7150	Depressions on peat substrates of the Rhynchosporion

**Please note that this SAC adjoins River Moy SAC (002298). See map 2. The conservation objectives for this site should be used in conjunction with those for the adjacent site as appropriate.**



## Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)

### NPWS Documents

<b>Year :</b>	1989
<b>Title :</b>	A survey to locate blanket bogs of scientific interest in County Kerry and County Sligo
<b>Author :</b>	Douglas, C.; Garvey, L.; Kelly, L.; O'Sullivan, A.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2011
<b>Title :</b>	Monitoring and condition assessment of populations of <i>Vertigo geyeri</i> , <i>Vertigo angustior</i> and <i>Vertigo moulinsiana</i> in Ireland
<b>Author :</b>	Moorkens, E.; Killeen, I.
<b>Series :</b>	Irish Wildlife Manual No. 55
<b>Year :</b>	2013
<b>Title :</b>	A survey of the benthic macrophytes of three hard-water lakes: Lough Bunny, Lough Carra and Lough Owel
<b>Author :</b>	Roden, C.; Murphy, P.
<b>Series :</b>	Irish Wildlife Manual No. 70
<b>Year :</b>	2013
<b>Title :</b>	The status of EU protected habitats and species in Ireland. Volume 2. Habitats assessments
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation assessments
<b>Year :</b>	2013
<b>Title :</b>	The status of EU protected habitats and species in Ireland. Volume 3. Species assessments
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation assessments
<b>Year :</b>	2013
<b>Title :</b>	National survey of upland habitats (phase 3, 2012-2013) Site report no. 10: Ox Mountains Bogs cSAC (002006), Cos. Mayo and Sligo
<b>Author :</b>	Perrin, P.M.; Roche, J.R.; Barron, S.J.; Daly, O.H.; Hodd, R.L.; Muldoon, C.S.; Leydon, K.L.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2014
<b>Title :</b>	Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland, Version 2.0
<b>Author :</b>	Perrin, P.M.; Barron, S.J.; Roche, J.R.; O'Hanrahan, B.
<b>Series :</b>	Irish Wildlife Manual No. 79
<b>Year :</b>	2015
<b>Title :</b>	Monitoring recommendations for Marsh Saxifrage ( <i>Saxifraga hirculus</i> L.) in the Republic of Ireland
<b>Author :</b>	Muldoon, C.S.; Waldren, S.; Lynn, D.
<b>Series :</b>	Irish Wildlife Manual No. 88
<b>Year :</b>	2015
<b>Title :</b>	Habitats Directive Annex I lake habitats: a working interpretation for the purposes of site-specific conservation objectives and Article 17 reporting
<b>Author :</b>	O Connor, Á.
<b>Series :</b>	Unpublished document by NPWS
<b>Year :</b>	2016
<b>Title :</b>	Ox Mountains Bogs SAC (site code: 2006) Conservation objectives supporting document-upland habitats V1
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document

## Other References

<b>Year :</b>	1982
<b>Title :</b>	Eutrophication of waters. Monitoring assessment and control
<b>Author :</b>	OECD
<b>Series :</b>	OECD, Paris
<b>Year :</b>	2000
<b>Title :</b>	Colour in Irish lakes
<b>Author :</b>	Free, G.; Allott, N.; Mills, P.; Kennelly, C.; Day, S.
<b>Series :</b>	Verhandlungen Internationale Vereinigung für theoretische und angewandte Limnologie, 27: 2620-2623
<b>Year :</b>	2002
<b>Title :</b>	Deterioration of Atlantic soft water macrophyte communities by acidification, eutrophication and alkalinisation
<b>Author :</b>	Arts, G.H.P.
<b>Series :</b>	Aquatic Botany, 73: 373-393
<b>Year :</b>	2006
<b>Title :</b>	A reference-based typology and ecological assessment system for Irish lakes. Preliminary investigations. Final report. Project 2000-FS-1-M1 Ecological assessment of lakes pilot study to establish monitoring methodologies EU (WFD)
<b>Author :</b>	Free, G.; Little, R.; Tierney, D.; Donnelly, K.; Coroni, R.
<b>Series :</b>	EPA, Wexford
<b>Year :</b>	2008
<b>Title :</b>	Water Quality in Ireland 2004-2006
<b>Author :</b>	Clabby, K.J.; Bradley, C.; Craig, M.; Daly, D.; Lucey, J.; McGarrigle, M.; O'Boyle, S.; Tierney, D.; Bowman, J.
<b>Series :</b>	EPA, Wexford
<b>Year :</b>	2009
<b>Title :</b>	The identification, characterization and conservation value of isoetid lakes in Ireland
<b>Author :</b>	Free, G.; Bowman, J.; McGarrigle, M.; Little, R.; Coroni, R.; Donnelly, K.; Tierney, D.; Trodd, W.
<b>Series :</b>	Aquatic Conservation: Marine and Freshwater Ecosystems, 19 (3): 264–273
<b>Year :</b>	2010
<b>Title :</b>	Water quality in Ireland 2007-2009
<b>Author :</b>	McGarrigle, M.; Lucey, J.; Ó Cinnéide, M.
<b>Series :</b>	EPA, Wexford
<b>Year :</b>	2011
<b>Title :</b>	Conservation biology of <i>Saxifraga hirculus</i> L. in Ireland
<b>Author :</b>	Muldoon, C.S.
<b>Series :</b>	Unpublished Ph.D. Thesis, Trinity College Dublin
<b>Year :</b>	2012
<b>Title :</b>	The impact of conifer plantation forestry on the ecology of peatland lakes
<b>Author :</b>	Drinan, T.J.
<b>Series :</b>	Unpublished PhD thesis, University College Cork
<b>Year :</b>	2013
<b>Title :</b>	Interpretation manual of European Union habitats- Eur 28
<b>Author :</b>	European Commission- DG Environment
<b>Series :</b>	European Commission

**Year :** 2014  
**Title :** New vice-county record for Marsh Saxifrage (*Saxifraga hirculus*) in Sligo (H28)  
**Author :** Muldoon, C.; Hodd, R.; Lockhart, N.; Douglas, C.; Roche, J.  
**Series :** Irish Naturalists' Journal, 33 (2): 130-131

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**Year :** in prep.  
**Title :** Monitoring of hard-water lakes in Ireland using charophytes and other macrophytes  
**Author :** Roden, C.; Murphy, P.  
**Series :** Unpublished report to NPWS

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## Spatial data sources

<b>Year :</b>	2008
<b>Title :</b>	OSi 1:5000 IG vector dataset
<b>GIS Operations :</b>	WaterPolygons feature class clipped to the SAC boundary. Expert opinion used to identify Annex I habitat and to resolve any issues arising
<b>Used For :</b>	3110, 3160 (map 3)
<b>Year :</b>	2013
<b>Title :</b>	National Survey of Upland Habitats
<b>GIS Operations :</b>	Habitat dataset for site clipped to SAC boundary. Relevant QI selected and exported to new dataset. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	4010, 4030, 7130, 7140, 7150 (maps 4-8)
<b>Year :</b>	2016
<b>Title :</b>	NPWS rare and threatened species database
<b>GIS Operations :</b>	Dataset created from spatial references in database records. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	1013 (map 9)

## Conservation Objectives for : Ox Mountains Bogs SAC [002006]

### 3110 Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)

**To maintain the favourable conservation condition of Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) in Ox Mountains Bogs 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	Lake habitat 3110 occurs in Lough Easky. It may also be present in other lakes in the SAC, where it is likely to co-occur with habitat 3160, however the exact distribution of habitat 3110 in the SAC is unknown. In line with Article 17 reporting (NPWS, 2013), all lakes larger than 1ha have been mapped as 'potential 3110' (see map 3). Two measures of extent should be used: 1. the area of the lake itself and; 2. the extent of the vegetation communities/zones that typify the habitat. Further information relating to all attributes is provided in the lake habitats supporting document for the purposes of site-specific conservation objectives and Article 17 reporting (O Connor, 2015)
Habitat distribution	Occurrence	No decline, subject to natural processes	As noted above, the exact distribution of habitat 3110 in the SAC is not known. In map 3, all lakes larger than 1ha (based on 1:5,000 data) have been mapped as potential 3110
Typical species	Occurrence	Typical species present, in good condition, and demonstrating typical abundances and distribution	For lists of typical plant species, see Article 17 habitat assessment for 3110 (NPWS, 2013) and the lake habitats supporting document (O Connor, 2015)
Vegetation composition: characteristic zonation	Occurrence	All characteristic zones should be present, correctly distributed and in good condition	The characteristic zonation of lake habitat 3140 has been described (Roden and Murphy, 2013; in prep.), however, significant further work is necessary to describe the characteristic zonation and other spatial patterns in the remaining four Annex I lake habitats
Vegetation distribution: maximum depth	Metres	Maintain maximum depth of vegetation, subject to natural processes	The maximum depth of vegetation is likely to be specific to the lake shoreline in question. An indicative target has not yet been set for this lake habitat type. Indicative targets will be developed for the other lake habitats with time
Hydrological regime: water level fluctuations	Metres	Maintain appropriate natural hydrological regime necessary to support the habitat	Fluctuations in lake water level are typical in Ireland, but can be amplified by activities such as abstraction and drainage. Increased water level fluctuations can increase wave action, up-root vegetation, increase turbidity, alter the substratum and lead to release of nutrients from the sediment. The hydrological regime of the lakes must be maintained so that the area, distribution and depth of the lake habitat and its constituent/characteristic vegetation zones and communities are not reduced
Lake substratum quality	Various	Maintain appropriate substratum type, extent and chemistry to support the vegetation	Research is required to further characterise the substratum types (particle size and origin) and substratum quality (notably pH, calcium, iron and nutrient concentrations) favoured by each of the five Annex I lake habitats in Ireland. It is likely that the lake habitat 3110 is associated with a range of nutrient-poor substrates, from stones, cobble and gravel, through sands, silt, clay and peat. Substratum particle size is likely to vary with depth and along the shoreline within a single lake

Water quality: transparency	Metres	Maintain appropriate Secchi transparency. There should be no decline in Secchi depth/transparency	Transparency relates to light penetration and, hence, to the depth of colonisation of vegetation. It can be affected by phytoplankton blooms, water colour and turbidity. A specific target has yet to be established for this Annex I lake habitat. Habitat 3110 is associated with very clear water. The OECD fixed boundary system set transparency targets for oligotrophic lakes of $\geq 6\text{m}$ annual mean Secchi disk depth, and $\geq 3\text{m}$ annual minimum Secchi disk depth. Free et al. (2009) found high isoeid abundance in lakes with Secchi depths of more than 3m
Water quality: nutrients	$\mu\text{g/l P}$ ; $\text{mg/l N}$	Maintain the concentration of nutrients in the water column to sufficiently low levels to support the habitat and its typical species	As a nutrient-poor habitat, oligotrophic and Water Framework Directive (WFD) 'high' status targets apply. Where a lake has nutrient concentrations that are lower than these targets, there should be no decline within class, i.e. no upward trend in nutrient concentrations. For lake habitat 3110, annual average TP concentration should be $\leq 10\mu\text{g/l TP}$ , average annual total ammonia concentration should be $\leq 0.040\text{mg/l N}$ and annual 95th percentile for total ammonia should be $\leq 0.090\text{mg/l N}$ . See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009
Water quality: phytoplankton biomass	$\mu\text{g/l Chlorophyll } a$	Maintain appropriate water quality to support the habitat, including high chlorophyll <i>a</i> status	Oligotrophic and WFD 'high' status targets apply to the lake habitat 3110. Where a lake has a chlorophyll <i>a</i> concentration that is lower than this target, there should be no decline within class, i.e. no upward trend in phytoplankton biomass. The average growing season (March-October) chlorophyll <i>a</i> concentration must be $< 5.8\mu\text{g/l}$ . The annual average chlorophyll <i>a</i> concentration should be $< 2.5\mu\text{g/l}$ and the annual peak chlorophyll <i>a</i> concentration should be $\leq 8.0\mu\text{g/l}$ . See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009
Water quality: phytoplankton composition	EPA phytoplankton composition metric	Maintain appropriate water quality to support the habitat, including high phytoplankton composition status	The EPA has developed a phytoplankton composition metric for nutrient enrichment of Irish lakes. As for other water quality indicators, habitat 3110 requires WFD high status
Water quality: attached algal biomass	Algal cover and EPA phytobenthos metric	Maintain trace/ absent attached algal biomass ( $< 5\%$ cover) and high phytobenthos status	Nutrient enrichment can favour epiphytic and epipelagic algae that can out-compete the submerged vegetation. The cover abundance of attached algae in lake habitat 3110 should, therefore, be trace/ absent ( $< 5\%$ cover). EPA phytobenthos can be used as an indicator of changes in attached algal biomass. As for other water quality indicators, habitat 3110 requires high phytobenthos status
Water quality: macrophyte status	EPA macrophyte metric (The Free Index)	Maintain high macrophyte status	Nutrient enrichment can favour more competitive submerged macrophyte species that out-compete the typical and characteristic species for the lake habitat. The EPA monitors macrophyte status for WFD purposes using the 'Free Index'. The target for lake habitat 3110 is high status or an Ecological Quality Ratio (EQR) for lake macrophytes of $\geq 0.90$ , as defined in Schedule Five of the European Communities Environmental Objectives (Surface Waters) Regulations 2009

Acidification status	pH units; mg/l	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the habitat, subject to natural processes	Acidification can impact on species abundance and composition in soft water lake habitats. In Europe, acidification of isoetid lakes can lead to loss of isoetids and dominance by submerged <i>Sphagnum</i> mosses and <i>Juncus bulbosus</i> (Arts, 2002). The specific requirements of lake habitat 3110, in terms of water and sediment pH, alkalinity and cation concentration, have not been determined. For lake habitat 3110, and adopting a precautionary approach based on Arts (2002), minimum pH should not be <5.5 pH units. Maximum pH should be <9.0 pH units, in line with the surface water standards established for soft waters (where water hardness is ≤100mg/l calcium carbonate). See Schedule Five of the European Communities Environmental Objectives (Surface Waters) Regulations 2009
Water colour	mg/l PtCo	Maintain appropriate water colour to support the habitat	Increased water colour and turbidity decrease light penetration and can reduce the area of available habitat for lake macrophytes, particularly at the lower euphotic depths. The primary source of increased water colour in Ireland is disturbance to peatland. No habitat-specific or national standards for water colour currently exist. Studies have shown median colour concentrations in Irish lakes of 38mg/l PtCo (Free et al., 2000) and 33mg/l PtCo (Free et al., 2006). It is likely that the water colour in all Irish lake habitats would naturally be <50mg/l PtCo. Water colour can be very low (<20mg/l PtCo or even <10mg/l PtCo) in lake habitat 3110, where the peatland in the lake's catchment is intact
Dissolved organic carbon (DOC)	mg/l	Maintain appropriate organic carbon levels to support the habitat	Dissolved (and particulate) organic carbon (OC) in the water column is linked to water colour and acidification (organic acids). Increasing DOC in water has been documented across the Northern Hemisphere, including afforested peatland catchments in Ireland. Damage and degradation of peatland, leading to decomposition of peat is likely to be the predominant source of OC in Ireland. OC in water promotes decomposition by fungi and bacteria that, in turn, releases dissolved nutrients. The increased biomass of decomposers can also impact directly on the characteristic lake communities through shading, competition, etc.
Turbidity	Nephelometric turbidity units/ mg/l SS/ other appropriate units	Maintain appropriate turbidity to support the habitat	Turbidity can significantly affect the quantity and quality of light reaching rooted and attached vegetation and can, therefore, impact on lake habitats. The settlement of higher loads of inorganic or organic material on lake vegetation communities may also have impacts on sensitive, delicate species. Turbidity can increase as a result of re-suspension of material within the lake, higher loads entering the lake, or eutrophication. Turbidity measurement and interpretation is challenging. As a result, it is likely to be difficult to set habitat-specific targets for turbidity in lakes
Fringing habitat: area	Hectares	Maintain the area and condition of fringing habitats necessary to support the natural structure and functioning of habitat 3110	Most lake shorelines have fringing habitats of reedswamp, other swamp, fen, marsh or wet-woodland that intergrade with and support the structure and functions of the lake habitat. In this SAC, blanket bog and heath communities are likely to dominate shorelines. Poor fen and flush may also occur. Equally, fringing habitats are dependent on the lake, particularly its water levels, and support wetland communities and species of conservation concern. Many of the fringing wetland habitats support higher invertebrate and plant species richness than the lake habitats themselves



## Conservation Objectives for : Ox Mountains Bogs SAC [002006]

### 3160 Natural dystrophic lakes and ponds

**To maintain the favourable conservation condition of Natural dystrophic lakes and ponds in Ox Mountains Bogs 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	This SAC has extensive blanket bog pool systems. Douglas et al. (1989) said the interconnecting pool system in Letterunshin, NW of L. Easky was the largest recorded in the blanket bog survey and of very high scientific and conservation value. Not all of the pools are mapped in the 1:5,000 OSI data. The 201 pools less than 1ha in area have been mapped as potential 3160 (see map 3). As all lakes in the SAC are surrounded by blanket bog and wet heath, 3160 likely also occurs in the larger lakes. The habitat is considered to be of high conservation value in the site. Two measures of extent should be used: 1. the area of the lake itself and; 2. the extent of the vegetation communities/zones that typify the habitat. Further information relating to all attributes is provided in the lake habitats supporting document for the purposes of site-specific conservation objectives and Article 17 reporting (O Connor, 2015)
Habitat distribution	Occurrence	No decline, subject to natural processes	As noted above, the habitat is widespread and of high conservation value in the SAC (see map 3)
Typical species	Occurrence	Typical species present, in good condition, and demonstrating typical abundances and distribution	For lists of typical plant and invertebrate species, see Article 17 habitat assessment for 3160 (NPWS, 2013) and the lake habitats supporting document for the purposes of site-specific conservation objectives and Article 17 reporting (O Connor, 2015)
Vegetation composition: characteristic zonation	Occurrence	All characteristic zones should be present, correctly distributed and in good condition	The characteristic zonation of lake habitat 3140 has been described (Roden and Murphy, 2013; in prep.), however, significant further work is necessary to describe the characteristic zonation and other spatial patterns in the other four Annex I lake habitats. Spatial patterns are likely to be relatively simple in 3160 lakes and ponds, with limited zonation
Vegetation distribution: maximum depth	Metres	Maintain maximum depth of vegetation, subject to natural processes	The maximum depth of vegetation is likely to be specific to the lake shoreline in question. An indicative target has not yet been set for this lake habitat type. Lakes in the SAC typically have very clear water and, therefore, maximum depth is expected to be large
Hydrological regime: water level fluctuations	Metres	Maintain appropriate natural hydrological regime necessary to support the habitat	Fluctuations in lake water level are typical in Ireland, but can be amplified by activities such as abstraction and drainage. Increased water level fluctuations can increase wave action, up-root vegetation, increase turbidity, alter the substratum and lead to release of nutrients from the sediment. The hydrological regime of the lakes and pools must be maintained so that the area, distribution and depth of the lake habitat and its constituent/characteristic vegetation zones and communities are not reduced. Owing to their size and the sensitivity of peatland, 3160 lakes and pools can easily be damaged or destroyed by drainage
Lake substratum quality	Various	Maintain appropriate substratum type, extent and chemistry to support the vegetation	Research is required to further characterise the substratum types (particle size and origin) and substratum quality (notably pH, calcium, iron and nutrient concentrations) favoured by each of the five Annex I lake habitats in Ireland. It is likely that habitat 3160 is associated with nutrient-poor peat and silt substrates

Water quality: transparency	Metres	Maintain appropriate Secchi transparency. There should be no decline in Secchi depth/transparency	Transparency relates to light penetration and, hence, to the depth of colonisation of vegetation. It can be affected by phytoplankton blooms, water colour and turbidity. A specific target has yet to be established for this Annex I lake habitat. Habitat 3160 is associated with very clear water. The OECD fixed boundary system set transparency targets for ultra-oligotrophic lakes of $\geq 12\text{m}$ annual mean Secchi disk depth, and $\geq 6\text{m}$ annual minimum Secchi disk depth
Water quality: nutrients	$\mu\text{g/l P}$ ; $\text{mg/l N}$	Maintain the concentration of nutrients in the water column to sufficiently low levels to support the habitat and its typical species	As a nutrient-poor habitat, oligotrophic and Water Framework Directive (WFD) 'high' status targets apply. Where a lake has nutrient concentrations that are lower than these targets, there should be no decline within class, i.e. no upward trend in nutrient concentrations. For 3160 lakes and pools, annual average TP concentration should be $\leq 5\mu\text{g/l TP}$ , average annual total ammonia concentration should be $\leq 0.040\text{mg/l N}$ and annual 95th percentile for total ammonia should be $\leq 0.090\text{mg/l N}$ . See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009
Water quality: phytoplankton biomass	$\mu\text{g/l Chlorophyll } a$	Maintain appropriate water quality to support the habitat, including high chlorophyll <i>a</i> status	Oligotrophic and WFD 'high' status targets apply to lake habitat 3160. The average growing season (March-October) chlorophyll <i>a</i> concentration must be $< 5.8\mu\text{g/l}$ (The European Communities Environmental Objectives (Surface Waters) Regulations 2009). Where a lake has a chlorophyll <i>a</i> concentration that is lower than this target, there should be no decline within class, i.e. no upward trend in phytoplankton biomass. The OECD targets may be more appropriate for habitat 3160: annual average chlorophyll <i>a</i> concentration $< 1\mu\text{g/l}$ and annual peak chlorophyll <i>a</i> concentration $\leq 2.5\mu\text{g/l}$ . See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009
Water quality: phytoplankton composition	EPA phytoplankton composition metric	Maintain appropriate water quality to support the habitat, including high phytoplankton composition status	The EPA has developed a phytoplankton composition metric for nutrient enrichment of Irish lakes. As for other water quality indicators, habitat 3160 requires WFD high status
Water quality: attached algal biomass	Algal cover and EPA phytobenthos metric	Maintain trace/ absent attached algal biomass ( $< 5\%$ cover) and high phytobenthos status	Nutrient enrichment can favour epiphytic and epipelic algae that can out-compete the submerged vegetation. The cover abundance of attached algae in 3160 lakes and pools should, therefore, be trace/ absent ( $< 5\%$ cover). EPA phytobenthos can be used as an indicator of changes in attached algal biomass. As for other water quality indicators, habitat 3160 requires high phytobenthos status
Water quality: macrophyte status	EPA macrophyte metric (The Free Index)	Maintain high macrophyte status	Nutrient enrichment can favour more competitive submerged macrophyte species that out-compete the typical and characteristic species for the lake habitat. The EPA monitors macrophyte status for WFD purposes using the 'Free Index'. The target for 3160 lakes and pools is high status or an Ecological Quality Ratio (EQR) for lake macrophytes of $\geq 0.90$ , as defined in Schedule Five of the European Communities Environmental Objectives (Surface Waters) Regulations 2009

Acidification status	pH units; mg/l	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the habitat, subject to natural processes	Acidification can impact on species abundance and composition in soft water lake habitats. Although EC (2013) describes habitat 3160 as having pH 3-6, Drinan (2012) found mean pHs of 5.16 and 5.62 in upland and lowland 3160 lakes, respectively. The target for lake habitat 3160 is pH >4.5 and <9.0, in line with the surface water standards for soft waters (where water hardness is ≤100mg/l calcium carbonate). See Schedule Five of the European Communities Environmental Objectives (Surface Waters) Regulations 2009. The specific requirements of habitat 3160, in terms of water and sediment pH, alkalinity and cation concentration, have not been determined
Water colour	mg/l PtCo	Maintain appropriate water colour to support the habitat	Increased water colour and turbidity decrease light penetration and can reduce the area of available habitat for lake macrophytes, particularly at the lower euphotic depths. The primary source of increased water colour in Ireland is disturbance to peatland. No habitat-specific or national standards for water colour currently exist. Studies have shown median colour concentrations in Irish lakes of 38mg/l PtCo (Free et al., 2000) and 33mg/l PtCo (Free et al., 2006). It is likely that the water colour in all Irish lake habitats would naturally be <50mg/l PtCo. Water colour can be very low (<20mg/l PtCo or even <10mg/l PtCo) in 3160 lakes and pools where the peatland in the catchment is intact
Dissolved organic carbon (DOC)	mg/l	Maintain appropriate organic carbon levels to support the habitat	Dissolved (and particulate) organic carbon (OC) in the water column is linked to water colour and acidification (organic acids). Increasing DOC in water has been documented across the Northern Hemisphere, including afforested peatland catchments in Ireland. Damage and degradation of peatland, leading to decomposition of peat is likely to be the predominant source of OC in Ireland. OC in water promotes decomposition by fungi and bacteria that, in turn, releases dissolved nutrients. The increased biomass of decomposers can also impact directly on the characteristic lake communities through shading, competition, etc.
Turbidity	Nephelometric turbidity units/ mg/l SS/ other appropriate units	Maintain appropriate turbidity to support the habitat	Turbidity can significantly affect the quantity and quality of light reaching rooted and attached vegetation and can, therefore, impact on lake habitats. The settlement of higher loads of inorganic or organic material on lake vegetation communities may also have impacts on sensitive, delicate species. Turbidity can increase as a result of re-suspension of material within the lake, higher loads entering the lake, or eutrophication. Turbidity measurement and interpretation is challenging. As a result, it is likely to be difficult to set habitat-specific targets for turbidity in lakes
Fringing habitat: area	Hectares	Maintain the area and condition of fringing habitats necessary to support the natural structure and functioning of habitat 3160	Most 3160 lake and pool shorelines intergrade with blanket bog, flush, poor-fen or heath habitats and these support the structure and functions of the lake habitat. Equally, fringing habitats are dependent on the lake, particularly its water levels, and can support wetland communities and species of conservation concern

## Conservation Objectives for : Ox Mountains Bogs SAC [002006]

### 4010 Northern Atlantic wet heaths with *Erica tetralix*

**To restore the favourable conservation condition of Northern Atlantic wet heaths with *Erica tetralix* in Ox Mountains Bogs SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area increasing, subject to natural processes	Ox Mountains Bogs SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; see Perrin et al., 2013; 2014). The total current area of wet heath stated by Perrin et al. (2013) is 1083.2ha, covering 10.2% of the SAC. Perrin et al. (2013) report obvious losses of habitat since 1995 of less than 0.01ha through landslides. A summary of the mapping methodology and a brief discussion of restoration potential are presented in the uplands supporting document
Habitat distribution	Occurrence	No decline from current distribution, subject to natural processes. See map 4	Wet heath was recorded by Perrin et al. (2013) throughout the SAC mainly on the lower slopes. Extensive patches occur on the slopes above Cloonacool, and Carrowneden in the east. It also occurs through Fiddenderry and on the slopes above Easkey Lough. A summary of the mapping methodology is presented in the uplands supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the uplands supporting document for further details
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Perrin et al. (2013) recorded six different wet heath communities within this SAC. Data on the abundance of these communities is reproduced in the uplands supporting document. Further information on these communities is presented in Perrin et al. (2014)
Vegetation composition: cross-leaved heath	Occurrence within 20m of a representative number of 2m x 2m monitoring stops	Cross-leaved heath ( <i>Erica tetralix</i> ) present near each monitoring stop	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of positive indicator species at least 50%	Based on Perrin et al. (2014). The list of positive indicator species for this habitat is presented in Perrin et al. (2014). Further details can be found in the uplands supporting document
Vegetation composition: lichens and bryophytes	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of <i>Cladonia</i> and <i>Sphagnum</i> species, <i>Racomitrium lanuginosum</i> and pleurocarpous mosses at least 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: ericoid species and crowberry	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of ericoid species and crowberry ( <i>Empetrum nigrum</i> ) at least 15%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: dwarf shrub species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of dwarf shrubs less than 75%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Based on Perrin et al. (2014). The list of negative indicator species is given in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Based on Perrin et al. (2014). See the uplands supporting document for further details. <i>Campylopus introflexus</i> was recorded within this habitat by Perrin et al. (2013) at two monitoring stops with extensive carpets at one of these. Scattered non-native conifers were also recorded

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 20%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: bracken	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of bracken ( <i>Pteridium aquilinum</i> ) less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: soft rush	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of soft rush ( <i>Juncus effusus</i> ) less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: <i>Sphagnum</i> condition	Condition at a representative number of 2m x 2m monitoring stops	Less than 10% of the <i>Sphagnum</i> cover is crushed, broken and/or pulled up	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Less than 33% collectively of the last complete growing season's shoots of ericoids, crowberry ( <i>Empetrum nigrum</i> ) and bog-myrtle ( <i>Myrica gale</i> ) showing signs of browsing	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: burning	Occurrence in local vicinity of a representative number of 2m x 2m monitoring stops	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning	Based on Perrin et al. (2014). The list of sensitive areas is presented in Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: drainage	Percentage cover in local vicinity of a representative number of monitoring stops	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
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	Perrin et al. (2013) compiled and mapped existing rare and notable plant records for the SAC and added any new records collected during the NSUH survey. No relevant species were recorded in this habitat, however, new records should be considered within this attribute. See the uplands supporting document for further details

## Conservation Objectives for : Ox Mountains Bogs SAC [002006]

### 4030 European dry heaths

**To maintain the favourable conservation condition of European dry heaths in Ox Mountains Bogs 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	Ox Mountains Bogs SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; see Perrin et al., 2013; 2014). The total current area of dry heath stated by Perrin et al. (2013) is 332.9ha, covering 3.1% of the SAC. It occurs at low frequency throughout the SAC, but is locally abundant on the rocky slopes above Easky Lough and above Cloonacool. Perrin et al. (2013) report no significant losses of area since 1995. A summary of the mapping methodology is presented in the uplands supporting document
Habitat distribution	Occurrence	No decline from current distribution, subject to natural processes. See map 5	Dry heath was recorded by Perrin et al. (2013) throughout the SAC, but was most abundant on the eastern slopes above Easky Lough. A summary of the mapping methodology is presented in the uplands supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the uplands supporting document for further details
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Perrin et al. (2013) recorded three different dry heath communities within this SAC. Data on the abundance of these communities is reproduced in the uplands supporting document. Further information on these communities is presented in Perrin et al. (2014)
Vegetation composition: lichens and bryophytes	Number of species at a representative number of 2m x 2m monitoring stops	Number of bryophyte or non-crustose lichen species present at each monitoring stop is at least three, excluding <i>Campylopus</i> and <i>Polytrichum</i> mosses	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: number of positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species present at each monitoring stop is at least two	Based on Perrin et al. (2014). The list of positive indicator species for this habitat, which is composed of dwarf shrubs, is presented in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: cover of positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of positive indicator species at least 50% for siliceous dry heath and 50-75% for calcareous dry heath	Based on Perrin et al. (2014). The list of positive indicator species for this habitat, which is composed of dwarf shrubs, is presented in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: dwarf shrub composition	Percentage cover at a representative number of 2m x 2m monitoring stops	Proportion of dwarf shrub cover composed collectively of bog-myrtle ( <i>Myrica gale</i> ), creeping willow ( <i>Salix repens</i> ) and western gorse ( <i>Ulex gallii</i> ) is less than 50%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Based on Perrin et al. (2014). The list of negative indicator species is given in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Based on Perrin et al. (2014). See the uplands supporting document for further details. Scattered non-native conifers were observed within the habitat but this was limited to a few individuals

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 20%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: bracken	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of bracken ( <i>Pteridium aquilinum</i> ) less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: soft rush	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of soft rush ( <i>Juncus effusus</i> ) less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: senescent ling	Percentage cover at a representative number of 2m x 2m monitoring stops	Senescent proportion of ling ( <i>Calluna vulgaris</i> ) cover less than 50%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Less than 33% collectively of the last complete growing season's shoots of ericoids showing signs of browsing	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas	Based on Perrin et al. (2014). The list of sensitive areas is presented in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: growth phases of ling	Percentage cover in local vicinity of a representative number of monitoring stops	Outside sensitive areas, all growth phases of ling ( <i>Calluna vulgaris</i> ) should occur throughout, with at least 10% of cover in the mature phase	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
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	Perrin et al. (2013) compiled and mapped existing rare and notable plant records for the SAC and added any new records collected during the NSUH survey. No relevant species were recorded in this habitat, however, new records should be considered within this attribute. See the uplands supporting document for further details



## Conservation Objectives for : Ox Mountains Bogs SAC [002006]

### 7130 Blanket bogs (\* if active bog)

**To restore the favourable conservation condition of Blanket bogs in Ox Mountains Bogs SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area increasing, subject to natural processes	Ox Mountains Bogs SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; see Perrin et al., 2013; 2014). Perrin et al. (2013) state that the current total area of blanket bog is 7249.6ha (68.5% of the SAC). This comprises 7097.3ha of active blanket bog area and 152.3ha of inactive blanket bog. Perrin et al. (2014) also report obvious losses of habitat since 1995 of approximately 5.8ha. However, this is almost certainly an under-estimate, as chronic losses due to erosion since 1995 cannot be quantified (106.6ha were mapped as eroding blanket bog by Perrin et al. (2013)). It should be noted that further restoration of blanket bog would be required in order to fulfil the targets for peat formation and hydrology presented below. A summary of the mapping methodology and a brief discussion of restoration potential are presented in the uplands supporting document
Habitat distribution	Occurrence	No decline from current distribution, subject to natural processes. See map 6	Blanket bog was recorded by Perrin et al. (2013) across the SAC and was by far the most dominant habitat type. A summary of the mapping methodology is presented in the uplands supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the uplands supporting document for further details
Ecosystem function: peat formation	Active blanket bog as a proportion of the total area of Annex I blanket bog	At least 99% of the total Annex I blanket bog area is active	From the habitat areas given by Perrin et al. (2013) above, 97.9% of the Annex I blanket bog habitat is currently actively peat-forming. See the uplands supporting document for further details
Ecosystem function: hydrology	Flow direction, water levels, occurrence of drains and erosion gullies	Natural hydrology unaffected by drains and erosion	Further details and a brief discussion of restoration potential is presented in the uplands supporting document
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Perrin et al. (2013) recorded six different active blanket bog communities within this SAC. Data on the abundance of these communities is reproduced in the uplands supporting document. Further information on these communities is presented in Perrin et al. (2014)
Vegetation composition: positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species at each monitoring stop is at least seven	Based on Perrin et al. (2014). The list of positive indicator species for this habitat is presented in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: lichens and bryophytes	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of bryophytes or lichens, excluding <i>Sphagnum fallax</i> , at least 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: potential dominant species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of each of the potential dominant species less than 75%	Based on Perrin et al. (2014). See the uplands supporting document for further details, including the list of potentially dominant species
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Based on Perrin et al. (2014). The list of negative indicator species is given in Perrin et al. (2014). See the uplands supporting document for further details

Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Based on Perrin et al. (2014). See the uplands supporting document for further details. <i>Campylopus introflexus</i> was recorded within this habitat by Perrin et al. (2013) with extensive carpets recorded
Vegetation composition: native trees and scrub	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: <i>Sphagnum</i> condition	Condition at a representative number of 2m x 2m monitoring stops	Less than 10% of the <i>Sphagnum</i> cover is crushed, broken and/or pulled up	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Last complete growing season's shoots of ericoids, crowberry ( <i>Empetrum nigrum</i> ) and bog-myrtle ( <i>Myrica gale</i> ) showing signs of browsing collectively less than 33%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning	Based on Perrin et al. (2014). The list of sensitive areas is presented in Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: drainage	Occurrence in local vicinity of a representative number of monitoring stops	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: erosion	Occurrence in local vicinity of a representative number of monitoring stops	Less than 5% of the greater bog mosaic comprises erosion gullies and eroded areas	Based on Perrin et al. (2014). See the uplands supporting document for further details
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	Perrin et al. (2013) compiled and mapped existing rare and notable plant records for the SAC and added any new records collected during the NSUH survey. No relevant species were recorded in this habitat, however, new records should be considered within this attribute. See the uplands supporting document for further details

## Conservation Objectives for : Ox Mountains Bogs SAC [002006]

### 7140 Transition mires and quaking bogs

**To maintain the favourable conservation condition of Transition mires and quaking bogs in Ox Mountains Bogs 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	Ox Mountains Bogs SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; see Perrin et al., 2013; 2014). The total current area of transition mires and quaking bogs in the SAC stated by Perrin et al. (2013) is 36.6ha. This covers 0.3% of the SAC. Perrin et al. (2013) report no significant losses of area since 1995. A summary of the mapping methodology is presented in the uplands supporting document
Habitat distribution	Occurrence	No decline from current distribution, subject to natural processes. See map 7	Transition mire was recorded by Perrin et al. (2013) scattered throughout the SAC. It is frequent in the small valleys of the upland plateau, along the eastern fringes of the SAC, through Letterunshion Bog and the southern section of Fiddenderry. A summary of the mapping methodology is presented in the uplands supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the uplands supporting document for further details
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Perrin et al. (2013) recorded three different transition mire communities within this SAC. Data on the abundance of these communities is reproduced in the uplands supporting document. Further information on these vegetation communities is presented in Perrin et al. (2014)
Vegetation composition: number of positive indicator species	Number at a representative number of 2m x 2m monitoring stops	Number of positive indicator species at least three for in-filling pools and flushes and at least six for fens	Based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented. See the uplands supporting document for further details
Vegetation composition: number of core positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	At least one core positive indicator species present	Based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented. See the uplands supporting document for further details
Vegetation composition: cover of positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of positive indicator species is at least 25%	Based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented. See the uplands supporting document for further details
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented. See the uplands supporting document for further details
Vegetation composition: non-native species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Based on Perrin et al. (2014). See the uplands supporting document for further details. No non-native species were recorded within this habitat by Perrin et al. (2013)
Vegetation structure: height	Percentage at a representative number of 2m x 2m monitoring stops	Proportion of live leaves and/or flowering shoots of vascular plants that are more than 15cm above the ground surface should be at least 50%	Based on Perrin et al. (2014). This attribute is only applicable to fen and flush examples, not to in-filling pool examples. See the uplands supporting document for further details
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details

Physical structure: drainage	Percentage area in local vicinity of a representative number of monitoring stops	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
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	Perrin et al. (2013) compiled and mapped existing rare and notable plant records for the SAC and added any new records collected during the NSUH survey. No relevant species were recorded in this habitat, however, new records should be considered within this attribute. See the uplands supporting document for further details

## Conservation Objectives for : Ox Mountains Bogs SAC [002006]

### 7150 Depressions on peat substrates of the Rhynchosporion

**To maintain the favourable conservation condition of Depressions on peat substrates of the Rhynchosporion in Ox Mountains Bogs 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	Ox Mountains Bogs SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; see Perrin et al., 2013; 2014). The total current area of Depressions on peat surfaces of the Rhynchosporion in the SAC stated by Perrin et al. (2013) is 49.6ha. This covers 0.5% of the SAC. Perrin et al. (2013) report no significant losses of area since 1995. A summary of the mapping methodology is presented in the uplands supporting document
Habitat distribution	Occurrence	No decline from current distribution, subject to natural processes. See map 8	Rhynchosporion depressions were recorded by Perrin et al. (2013) scattered through the western portion of the SAC, particularly through Letterunshion Bog and at Tawnamore. A summary of the mapping methodology is presented in the uplands supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the uplands supporting document for further details
Vegetation composition: positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species at each monitoring stop is at least five	Based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented. Further details can be found in the uplands supporting document
Vegetation composition: <i>Rhynchospora</i> spp.	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of white beaked sedge ( <i>Rhynchospora alba</i> ) and brown beaked sedge ( <i>R. fusca</i> ) at least 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: potential dominant species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of each of the potential dominant species less than 35%	Based on Perrin et al. (2014). See the uplands supporting document for further details, including the list of potentially dominant species
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Based on Perrin et al. (2014), where the list of negative indicator species is also presented. See the uplands supporting document for further details
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Based on Perrin et al. (2014). See the uplands supporting document for further details. <i>Campylopus introflexus</i> was recorded within this habitat by Perrin et al. (2013) but did not form extensive carpets
Vegetation composition: native trees and scrub	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: <i>Sphagnum</i> condition	Condition at a representative number of 2m x 2m monitoring stops	Less than 10% of the <i>Sphagnum</i> cover is crushed, broken and/or pulled up	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Last complete growing season's shoots of ericoids, crowberry ( <i>Empetrum nigrum</i> ) and bog-myrtle ( <i>Myrica gale</i> ) showing signs of browsing collectively less than 33%	Based on Perrin et al. (2014). See the uplands supporting document for further details

Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning	Based on Perrin et al. (2014), where the list of sensitive areas is also presented. See the uplands supporting document for further details
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: drainage	Percentage area in local vicinity of a representative number of monitoring stops	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: erosion	Occurrence in local vicinity of a representative number of monitoring stops	Less than 5% of the greater bog mosaic comprises erosion gullies and eroded areas	Based on Perrin et al. (2014). See the uplands supporting document for further details
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	Perrin et al. (2013) compiled and mapped existing rare and notable plant records for the SAC and added any new records collected during the NSUH survey. No relevant species were recorded in this habitat, however, new records should be considered within this attribute. See the uplands supporting document for further details

## Conservation Objectives for : Ox Mountains Bogs SAC [002006]

### 1013 Geyer's Whorl Snail *Vertigo geyeri*

**To maintain the favourable conservation condition of Geyer's Whorl Snail in Ox Mountains Bogs SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Distribution: occupied sites	Number	No decline. There is one known site for this species in this SAC within the 1km square G4429. See map 9	From Moorkens and Killeen (2011) (site code VgCAM21)
Presence in suitable habitat	Occurrence	Snails (living or recently dead adults and/or juveniles) are present in at least 60% of samples defined as suitable habitat	Based on Moorkens and Killeen (2011)
Species abundance	Number of individuals per sample	No decline in adult abundance in appropriate number of samples	Based on Moorkens and Killeen (2011). There should be at least five adults detected in 40% of samples
Habitat area	Hectares	Stable or increasing, subject to natural processes. Suitable habitat is defined as areas of flushed fen with small sedges and saturated mosses	Based on Moorkens and Killeen (2011). Optimal habitat is defined as flushed fen with sedge/moss lawns and mounds 5-20cm tall, containing a high diversity of plant species such as small-fruited yellow-sedge ( <i>Carex viridula</i> ), grass-of-Parnassus ( <i>Parnassia palustris</i> ), marsh horsetail ( <i>Equisetum palustre</i> ), jointed rush ( <i>Juncus articulatus</i> ) and the mosses <i>Scorpidium revolvens</i> and <i>Campyllum stellatum</i> , with scattered tussocks of black bog-rush ( <i>Schoenus nigricans</i> ) no greater than 80cm tall
Habitat quality: optimal habitat	Hectares	At least 0.3ha of optimal habitat present	Based on Moorkens and Killeen (2011). There should be at least 0.3ha of optimal habitat present at the site to maintain the species. See description of optimal habitat above
Habitat quality: soil wetness	Water table level	Water table should be between 0-5cm of the soil surface, but not above ground level at time of sampling	Based on Moorkens and Killeen (2011)

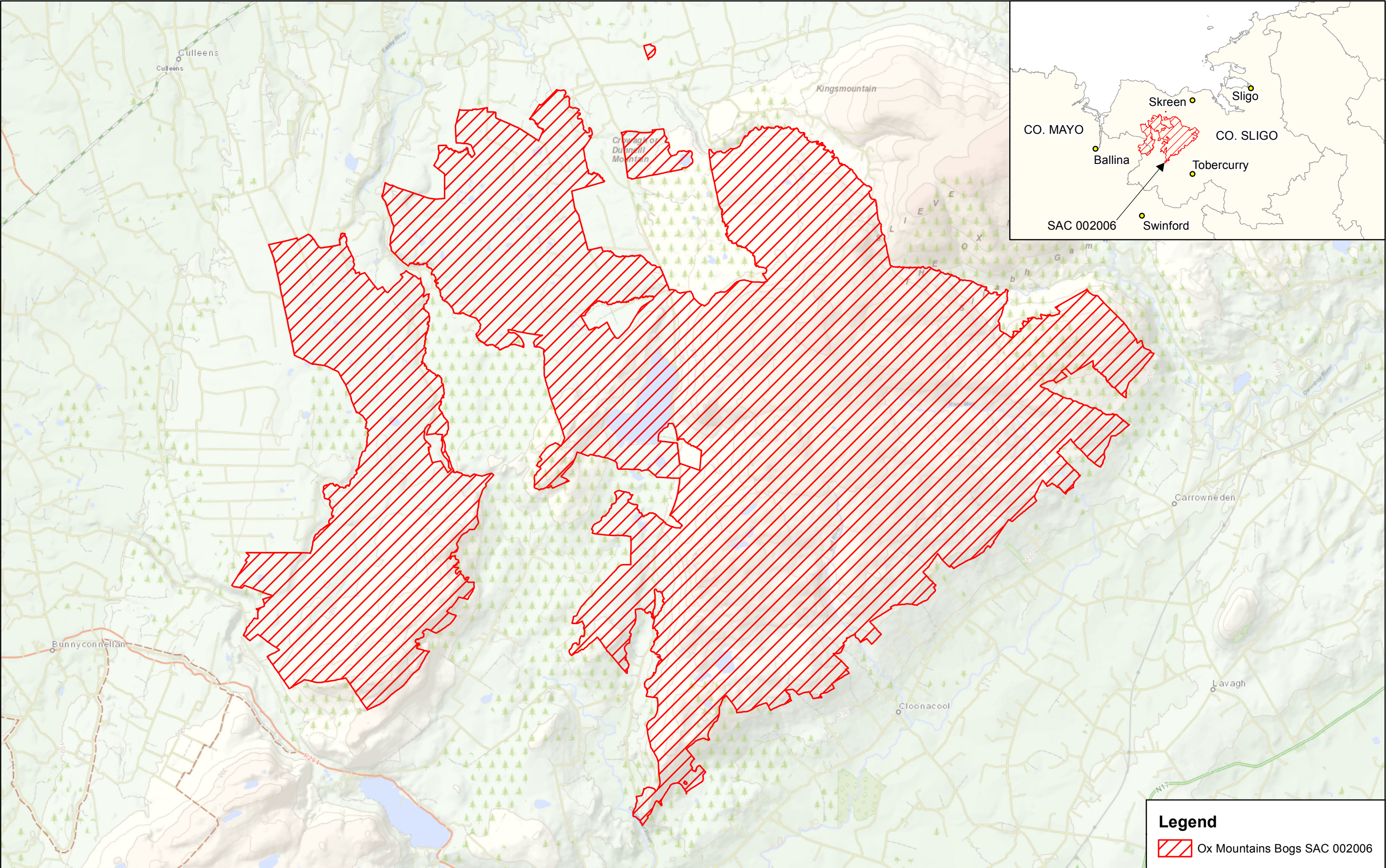


**1528 Marsh Saxifrage *Saxifraga hirculus***

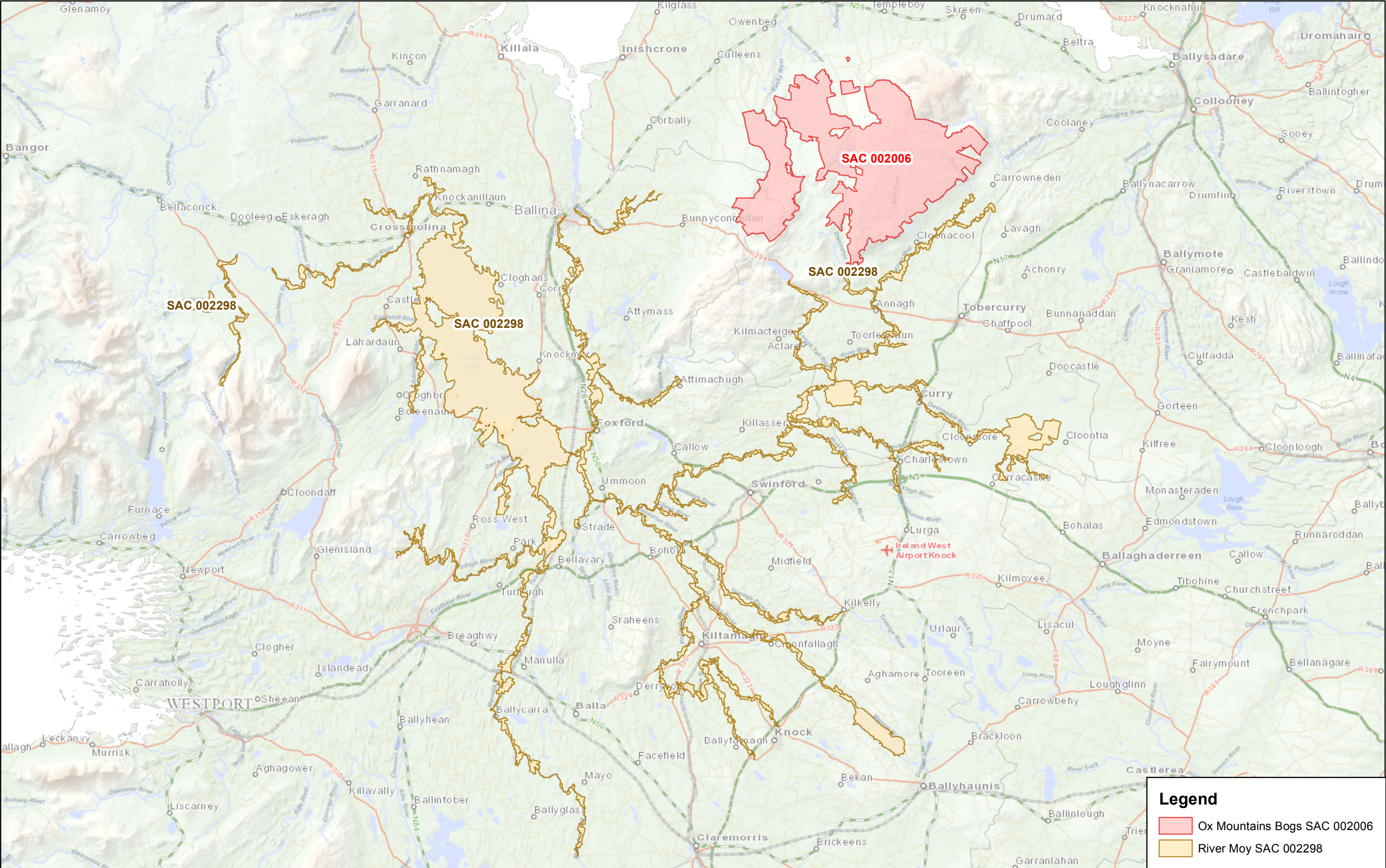
**To maintain the favourable conservation condition of *Saxifraga hirculus* in Ox Mountains Bogs SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Distribution	Number and geographical spread	No loss in geographical spread and number of populations, subject to natural processes	Three populations of <i>Saxifraga hirculus</i> , in three flushes (A-C) lying in close proximity to each other, were discovered in the Ox Mountains Bogs SAC in June 2012. See Muldoon et al. (2014) for further details
Population size: number of rosettes	Number	Maintain the size of each population, subject to natural processes. The target numbers of rosettes are: >40,000 rosettes in Flush A; >4,800 rosettes in Flush B; >480 rosettes in Flush C	The number of rosettes was estimated to be: c.50,000 in Flush A; c.6,000 in Flush B and c.600 in Flush C. The target figures are a 20% reduction of the recorded number to allow for a margin of error and variability over monitoring seasons
Population size: area of occupancy	Hectares	Maintain the extent of each population, subject to natural processes. The target areas are: > 0.0234 ha (> 234 m <sup>2</sup> ) in Flush A, > 0.0053 ha (> 52.5 m <sup>2</sup> ) in Flush B and > 0.0016 ha (> 16.2 m <sup>2</sup> ) in Flush C	The area of cover of <i>Saxifraga hirculus</i> was estimated as 260 m <sup>2</sup> in Flush A, 58.3 m <sup>2</sup> in Flush B and 18 m <sup>2</sup> in Flush C. The target area figures are a 10% reduction of the recorded areas to allow for a margin of error
Hydrological conditions: water levels	Occurrence of high or fluctuating water levels	Maintain appropriate natural hydrological regime necessary to support the habitat for the species	In Ireland, <i>Saxifraga hirculus</i> is now restricted to mineral flushes in blanket bog where rising groundwater forms small streams and seepage areas suitable for the species. Based on Muldoon (2011) and Muldoon et al. (2015)
Vegetation structure: sward height	Centimetres	Maintain a mean vegetation height of less than 15cm	See Muldoon (2011) and Muldoon et al. (2015) for further details
Vegetation composition: associated species	Species composition and abundance	Maintain appropriate associated species and vegetation communities to support the populations of <i>Saxifraga hirculus</i>	Presence of knotted pearlwort ( <i>Sagina nodosa</i> ), a positive indicator species and low cover of purple moor-grass ( <i>Molinia caerulea</i> ) and Yorkshire-fog ( <i>Holcus lanatus</i> ), both negative indicator species, should be maintained. See Muldoon (2011) and Muldoon et al. (2015) for further details
Vegetation structure: grazing levels	Evidence of grazing	Maintain grazing at light to moderate levels to ensure an open vegetation structure and to allow flowering to occur	See Muldoon (2011) and Muldoon et al. (2015) for further details

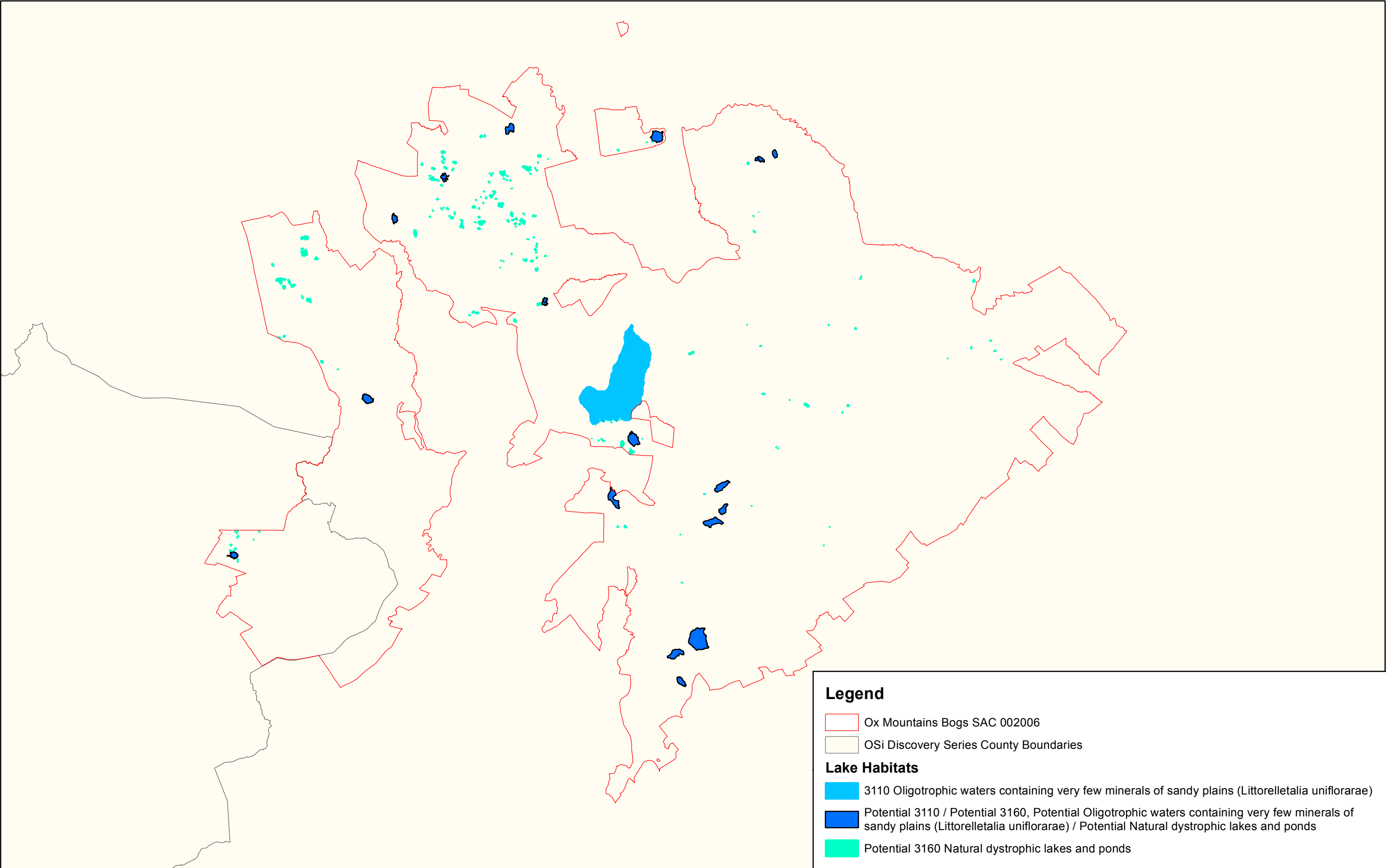


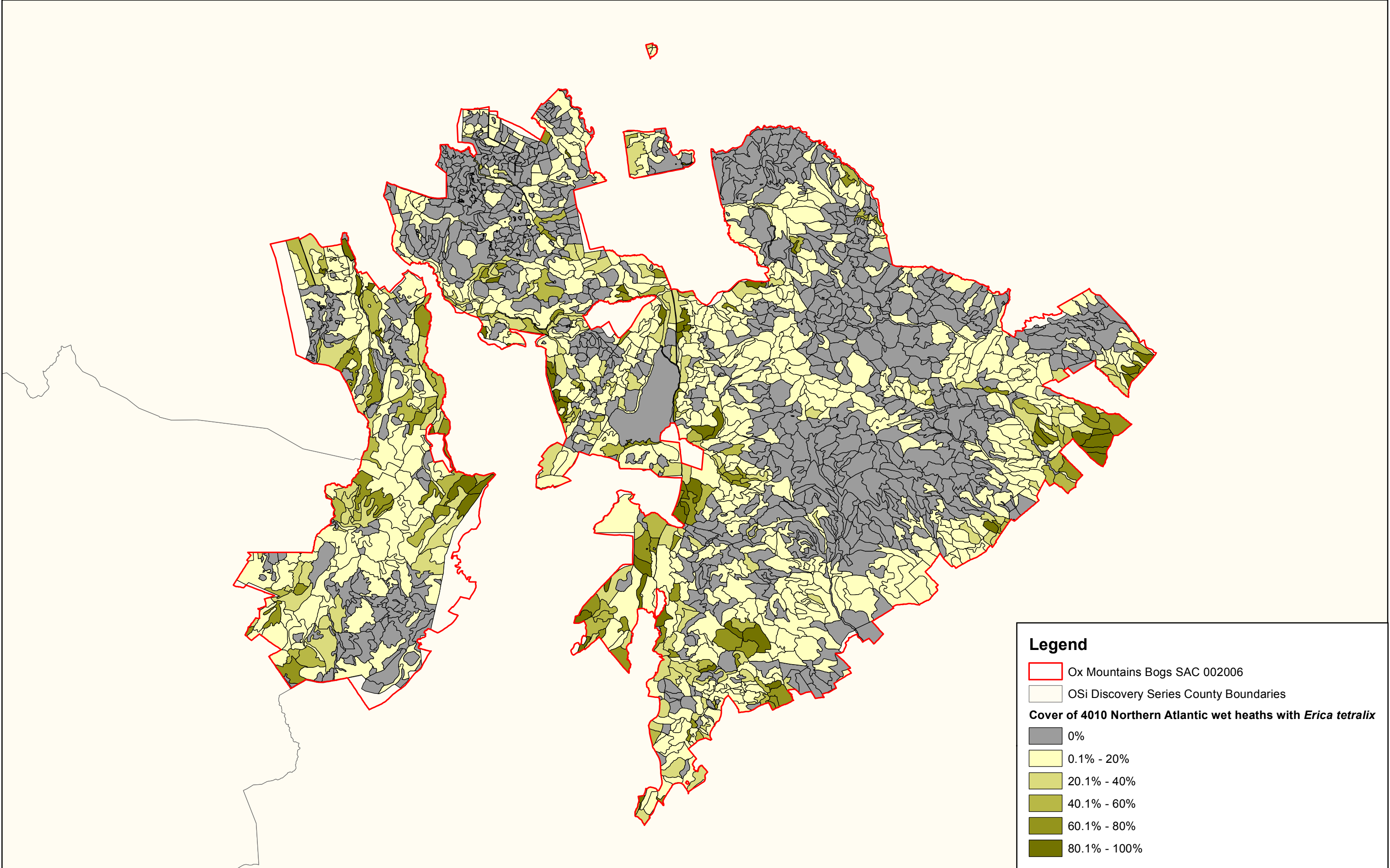


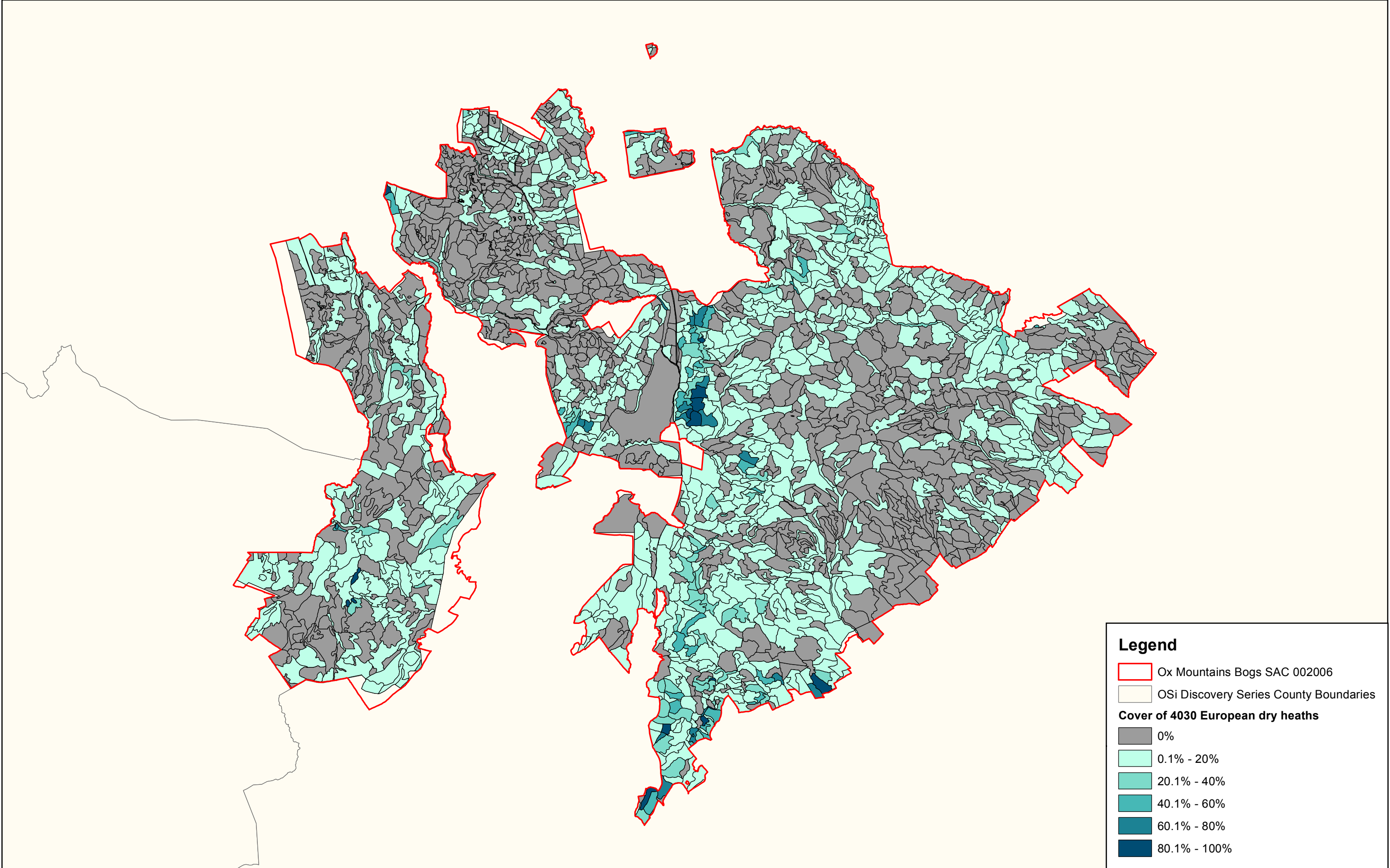




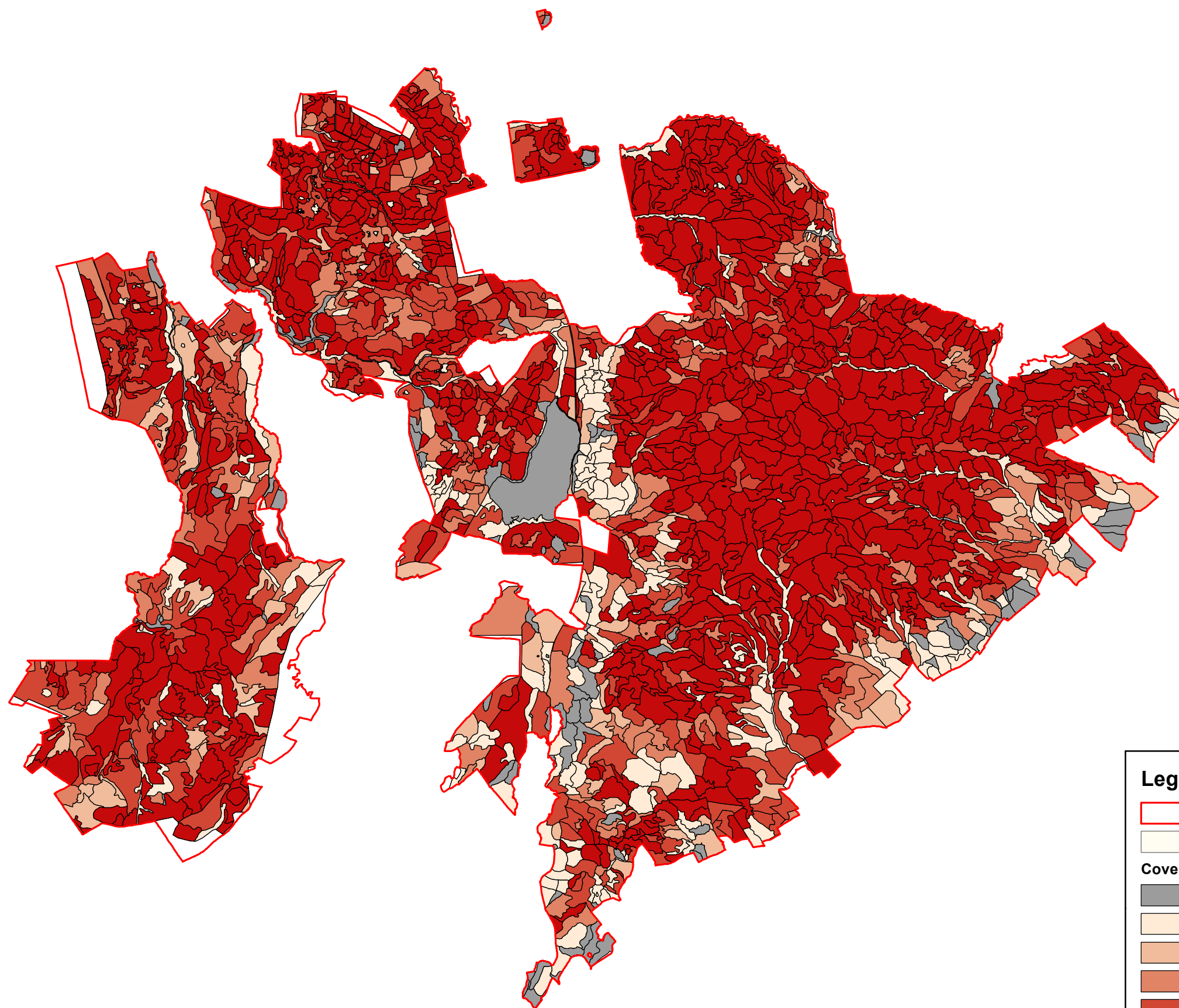
















**Legend**


 Ox Mountains Bogs SAC 002006


 OSi Discovery Series County Boundaries


**Cover of 7130 Blanket bogs (\* if active bog)**


 0%

 0.1% - 20%

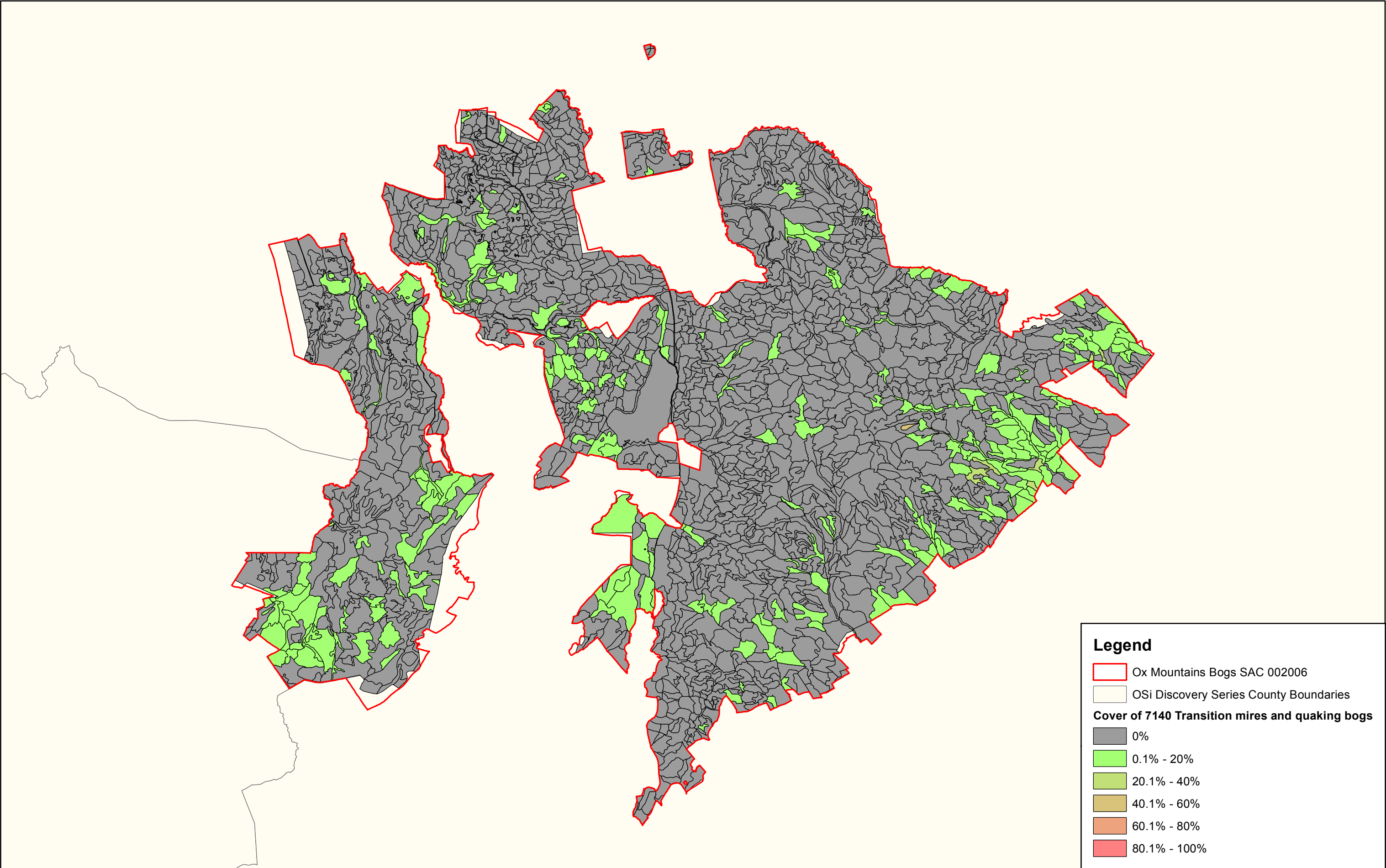
 20.1% - 40%

 40.1% - 60%

 60.1% - 80%

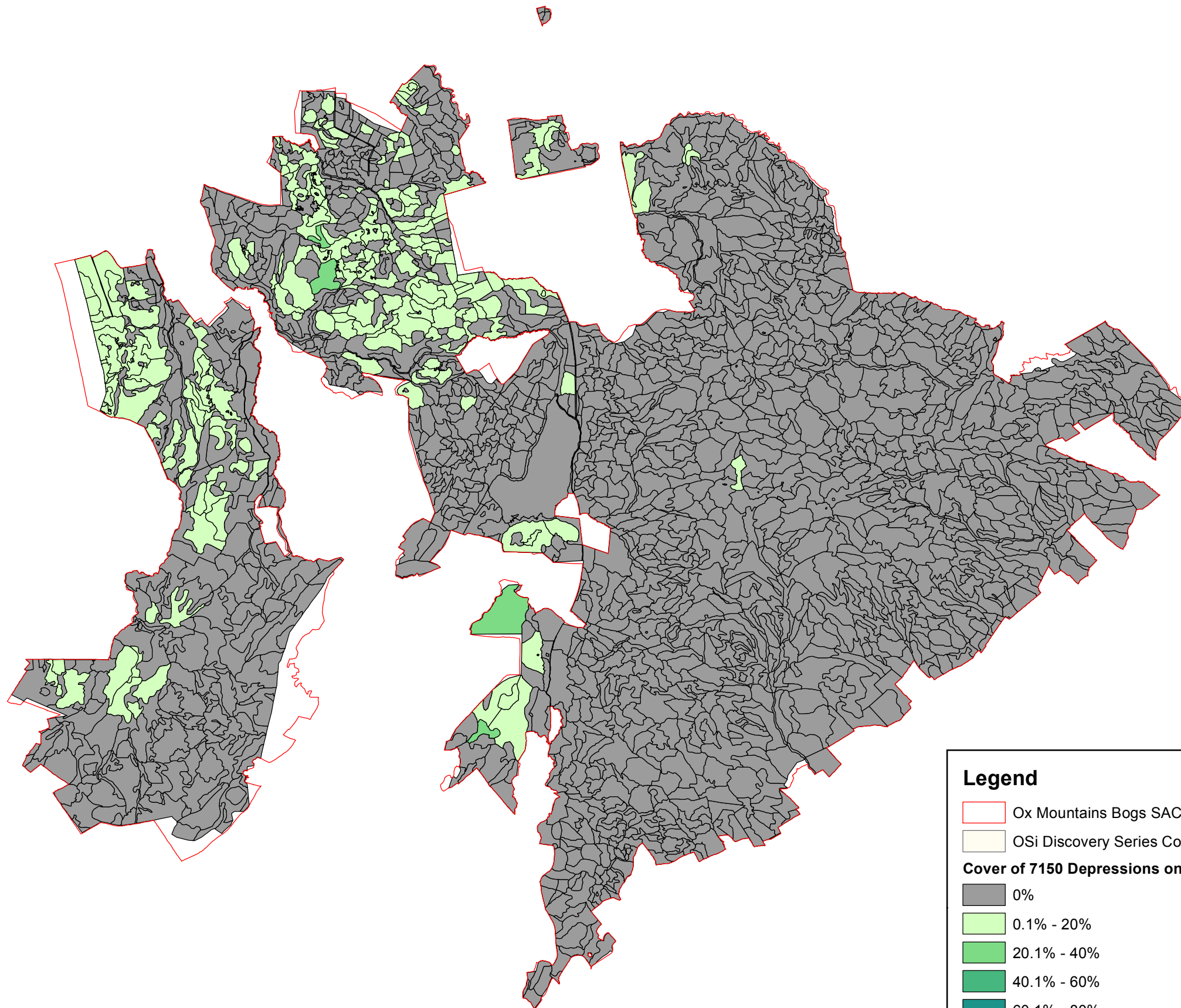
 80.1% - 100%





**Legend**

- Ox Mountains Bogs SAC 002006
- OSi Discovery Series County Boundaries
- Cover of 7140 Transition mires and quaking bogs**
  - 0%
  - 0.1% - 20%
  - 20.1% - 40%
  - 40.1% - 60%
  - 60.1% - 80%
  - 80.1% - 100%



### Legend

Ox Mountains Bogs SAC 002006

OSi Discovery Series County Boundaries

#### Cover of 7150 Depressions on peat substrates of the Rhynchosporion

- 0%
- 0.1% - 20%
- 20.1% - 40%
- 40.1% - 60%
- 60.1% - 80%
- 80.1% - 100%

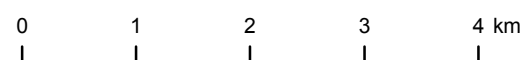


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Department of Arts, Heritage,  
Regional, Rural and Gaeltacht Affairs

### MAP 8: OX MOUNTAINS BOGS SAC CONSERVATION OBJECTIVES RHYNCHOSPORION DEPRESSIONS

Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:  
SAC 002006; version 3.01. Counties Sligo / Mayo

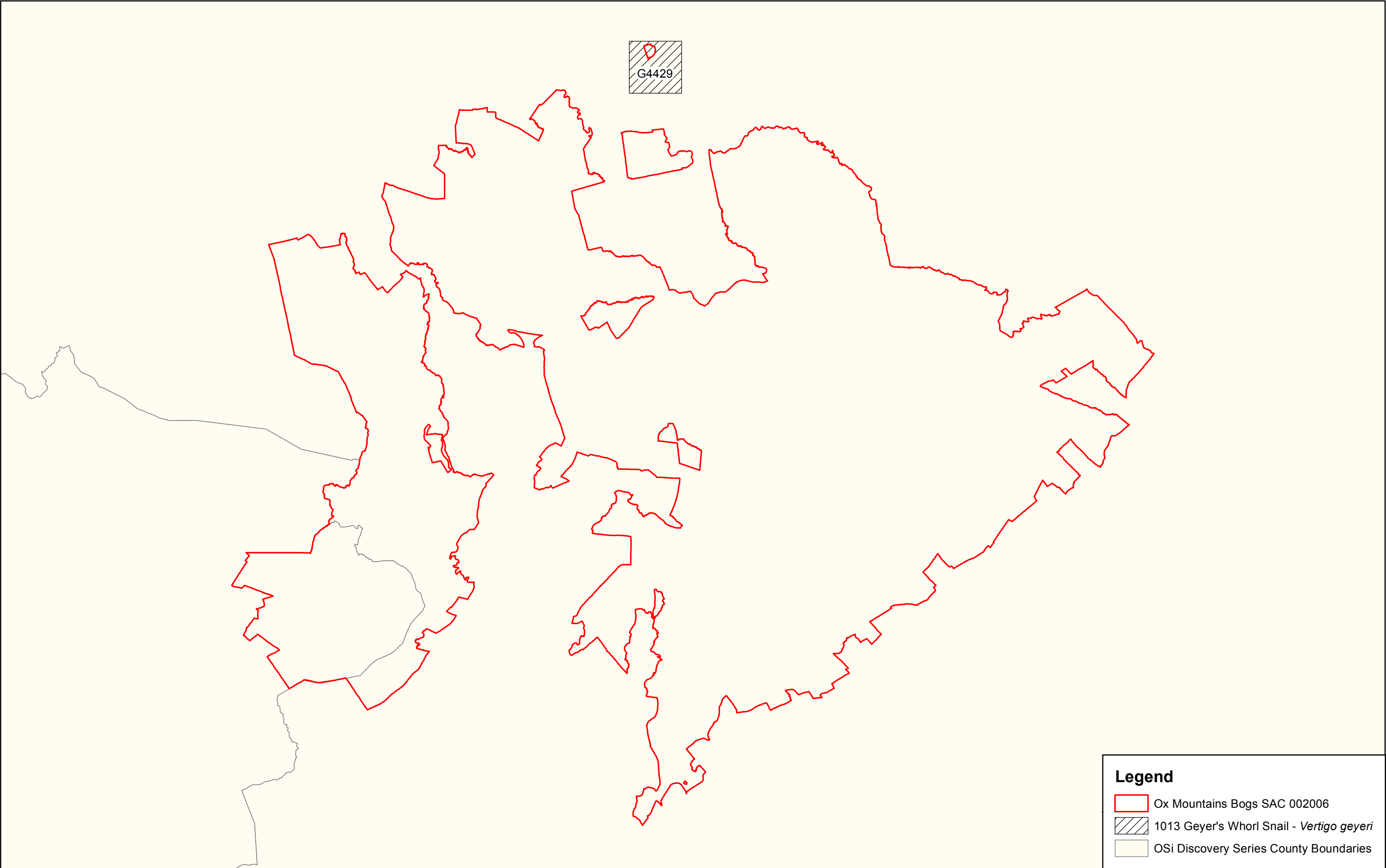


The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
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Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh EN 0059216. © Suirbhéarachta Ordonáis na hÉireann Rialtas na hÉireann.



Map Version 1  
Date: July 2016



# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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### River Moy SAC 002298



An Roinn Ealaíon, Oidhreachta,  
Gnóthaí Réigiúnacha, Tuaithe agus Gaeltachta

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Department of Arts, Heritage,  
Regional, Rural and Gaeltacht Affairs



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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

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### 002298 River Moy SAC

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1092	White-clawed Crayfish <i>Austropotamobius pallipes</i>
1095	Sea Lamprey <i>Petromyzon marinus</i>
1096	Brook Lamprey <i>Lampetra planeri</i>
1106	Salmon <i>Salmo salar</i>
1355	Otter <i>Lutra lutra</i>
7110	Active raised bogs*
7120	Degraded raised bogs still capable of natural regeneration
7150	Depressions on peat substrates of the Rhynchosporion
7230	Alkaline fens
91A0	Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles
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 Killala Bay/Moy Estuary SPA (004036) and Lough Conn and Lough Cullin SPA (004228). It is adjacent to Killala Bay/Moy Estuary SAC (000458), Lough Hoe Bog SAC (000633), Bellacorick Bog Complex SAC (001922) and Ox Mountains Bogs SAC (002006). See map 2. The conservation objectives for this site should be used in conjunction with those for 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](http://www.npws.ie/Publications)

### NPWS Documents

<b>Year :</b>	1998
<b>Title :</b>	Conservation management of the white-clawed crayfish, ( <i>Austropotamobius pallipes</i> )
<b>Author :</b>	Reynolds, J.D.
<b>Series :</b>	Irish Wildlife Manual No. 1
<b>Year :</b>	2004
<b>Title :</b>	The status and distribution of lamprey and shad in the Slaney and Munster Blackwater SACs
<b>Author :</b>	King, J.J.; Linnane, S.M.
<b>Series :</b>	Irish Wildlife Manuals No. 14
<b>Year :</b>	2004
<b>Title :</b>	A survey of juvenile lamprey populations in the Moy catchment
<b>Author :</b>	O'Connor, W.
<b>Series :</b>	Irish Wildlife Manuals No. 15
<b>Year :</b>	2006
<b>Title :</b>	Otter survey of Ireland 2004/2005
<b>Author :</b>	Bailey, M.; Rochford, J.
<b>Series :</b>	Irish Wildlife Manual No. 23
<b>Year :</b>	2006
<b>Title :</b>	Assessment of impacts of turf cutting on designated raised bogs
<b>Author :</b>	Fernandez Valverde, F.; MacGowan, F.; Farrell, M.; Crowley, W.; Croal, Y.; Fanning, M.; McKee, A-M.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2007
<b>Title :</b>	Supporting documentation for the Habitats Directive Conservation Status Assessment - backing documents. Article 17 forms and supporting maps
<b>Author :</b>	NPWS
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2008
<b>Title :</b>	National survey of native woodlands 2003-2008
<b>Author :</b>	Perrin, P.M.; Martin, J.; Barron, S.; O'Neill, F.H.; McNutt, K.E.; Delaney, A.
<b>Series :</b>	Unpublished Report to NPWS
<b>Year :</b>	2010
<b>Title :</b>	A provisional inventory of ancient and long-established woodland in Ireland
<b>Author :</b>	Perrin, P.M.; Daly, O.H.
<b>Series :</b>	Irish Wildlife Manual No. 46
<b>Year :</b>	2010
<b>Title :</b>	A technical manual for monitoring white-clawed crayfish ( <i>Austropotamobius pallipes</i> ) in Irish lakes
<b>Author :</b>	Reynolds, J., O'Connor, W., O'Keeffe, C.; Lynn, D.
<b>Series :</b>	Irish Wildlife Manual No.45
<b>Year :</b>	2012
<b>Title :</b>	Killala Bay/Moy Estuary SAC (00458) Coastal Supporting doc V1
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document

<b>Year :</b>	2012
<b>Title :</b>	Killala Bay/Moy Estuary SAC (000458) Marine supporting doc v.1
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document
<b>Year :</b>	2013
<b>Title :</b>	National otter survey of Ireland 2010/12
<b>Author :</b>	Reid, N.; Hayden, B.; Lundy, M.G.; Pietravalle, S.; McDonald, R.A.; Montgomery, W.I.
<b>Series :</b>	Irish Wildlife Manual No. 76
<b>Year :</b>	2014
<b>Title :</b>	Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland, Version 2.0
<b>Author :</b>	Perrin, P.M.; Barron, S.J.; Roche, J.R.; O'Hanrahan, B.
<b>Series :</b>	Irish Wildlife Manual No. 79
<b>Year :</b>	2014
<b>Title :</b>	Raised Bog Monitoring and Assessment Survey 2013
<b>Author :</b>	Fernandez, F.; Connolly K.; Crowley W.; Denyer J.; Duff K.; Smith G.
<b>Series :</b>	Irish Wildlife Manual No. 81
<b>Year :</b>	2014
<b>Title :</b>	National raised bog SAC management plan
<b>Author :</b>	Department of Arts, Heritage and the Gaeltacht
<b>Series :</b>	Draft for consultation. 15 January 2014
<b>Year :</b>	2014
<b>Title :</b>	Derrynabrock Bog (SAC 002298), Co.Roscommon/Mayo, Site Report
<b>Author :</b>	Fernandez, F.; Connolly, K.; Crowley, W.; Denyer J.; Duff K.; Smith G.
<b>Series :</b>	Raised bog monitoring and assessment survey 2013
<b>Year :</b>	2014
<b>Title :</b>	Tawnaghbeg Bog (SAC 002298), Co. Mayo, Site Report
<b>Author :</b>	Fernandez, F.; Connolly, K.; Crowley, W.; Denyer J.; Duff K.; Smith G.
<b>Series :</b>	Raised bog monitoring and assessment survey 2013
<b>Year :</b>	2016
<b>Title :</b>	River Moy SAC (site code: 2298) Conservation objectives supporting document- raised bog habitats V1
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document

## Other References

<b>Year :</b>	1982
<b>Title :</b>	Otter survey of Ireland
<b>Author :</b>	Chapman, P.J.; Chapman, L.L.
<b>Series :</b>	Unpublished report to Vincent Wildlife Trust
<b>Year :</b>	2002
<b>Title :</b>	Reversing the habitat fragmentation of British woodlands
<b>Author :</b>	Peterken, G.
<b>Series :</b>	WWF-UK, London

<b>Year :</b>	2003
<b>Title :</b>	Monitoring the river, sea and brook lamprey, <i>Lampetra fluviatilis</i> , <i>L. planeri</i> and <i>Petromyzon marinus</i>
<b>Author :</b>	Harvey, J.; Cowx, I.
<b>Series :</b>	Conserving Natura 2000 Rivers Monitoring Series No. 5. English Nature, Peterborough
<b>Year :</b>	2003
<b>Title :</b>	Identifying lamprey. A field key for sea, river and brook lamprey
<b>Author :</b>	Gardiner, R.
<b>Series :</b>	Conserving Natura 2000 rivers, Conservation techniques No. 4. English Nature, Peterborough
<b>Year :</b>	2007
<b>Title :</b>	Evolutionary history of lamprey paired species <i>Lampetra fluviatilis</i> L. and <i>Lampetra planeri</i> Bloch as inferred from mitochondrial DNA variation
<b>Author :</b>	Espanhol, R.; Almeida, P.R.; Alves, M.J.
<b>Series :</b>	Molecular Ecology 16, 1909-1924
<b>Year :</b>	2010
<b>Title :</b>	Otter tracking study of Roaringwater Bay
<b>Author :</b>	De Jongh, A.; O'Neill, L.
<b>Series :</b>	Unpublished draft report to NPWS
<b>Year :</b>	2015
<b>Title :</b>	Behaviour of sea lamprey ( <i>Petromyzon marinus</i> L.) at man-made obstacles during upriver spawning migration: use of telemetry to assess efficacy of weir modifications for improved passage
<b>Author :</b>	Rooney, S.M.; Wightman, G.D.; O Conchuir, R.; King, J.J.
<b>Series :</b>	Biology and Environment: Proc. R. Ir. Acad. 115 B, 1-12
<b>Year :</b>	2015
<b>Title :</b>	River engineering works and lamprey ammocoetes; impacts, recovery, mitigation
<b>Author :</b>	King, J.J.; Wightman, G.D.; Hanna, G.; Gilligan, N.
<b>Series :</b>	Water and Environment Journal, 29, 482-488
<b>Year :</b>	2016
<b>Title :</b>	The status of Irish salmon stocks in 2015 with precautionary catch advice for 2016
<b>Author :</b>	Standing Scientific Committee on Salmon
<b>Series :</b>	Independent scientific report to Inland Fisheries Ireland

## Spatial data sources

<b>Year :</b>	2014
<b>Title :</b>	Scientific Basis for Raised Bog Conservation in Ireland
<b>GIS Operations :</b>	RBSB13_SACs_ARB_DRB dataset, RBSB13_SACs_2012_HB dataset, RBSB13_SACs_DrainagePatterns_5k dataset and RBSB13_SAC_LIDAR_DTMs dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	Potential 7110; digital elevation model; drainage patterns (maps 3 and 5)
<b>Year :</b>	2013
<b>Title :</b>	Raised Bog Monitoring and Assessment Survey 2013
<b>GIS Operations :</b>	RBMA13_ecotope_map dataset clipped to SAC boundary. Appropriate ecotopes selected and exported to new dataset. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	7110 ecotopes (map 4)
<b>Year :</b>	Digitised 2003
<b>Title :</b>	Raised Bog Restoration Project 1999
<b>GIS Operations :</b>	Ecotope dataset clipped to SAC boundary. Appropriate ecotopes selected and exported to new dataset. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	7110 ecotopes (map 4)
<b>Year :</b>	Revision 2010
<b>Title :</b>	National Survey of Native Woodlands 2003-2008. Version 1
<b>GIS Operations :</b>	QIs selected; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	91A0, 91E0 (map 6)
<b>Year :</b>	2005
<b>Title :</b>	OSi Discovery series vector data
<b>GIS Operations :</b>	Creation of a 10m buffer on the terrestrial side of river banks data; creation of 20m buffer applied to canal centreline data. Creation of a 20m buffer applied to river and stream centreline data; These datasets combined with the derived OSI 1:5000 vector lake buffer data. Overlapping regions investigated and resolved; resulting dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	1355 (no map)
<b>Year :</b>	2010
<b>Title :</b>	OSi 1:5000 IG vector dataset
<b>GIS Operations :</b>	Creation of 80m buffer on the aquatic side of lake data; creation of 10m buffer on the terrestrial side of lake data. These datasets combined with the derived OSi Discovery Series river and canal datasets. Overlapping regions investigated and resolved; resulting dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising. Creation of 250m buffer on aquatic side of the lake boundary to highlight potential commuting points
<b>Used For :</b>	1355 (map 8)
<b>Year :</b>	2016
<b>Title :</b>	NPWS rare and threatened species database
<b>GIS Operations :</b>	Dataset created from spatial references in database records. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	1092 (map 7)

## Conservation Objectives for : River Moy SAC [002298]

### 7110 Active raised bogs

**To restore the favourable conservation condition of Active raised bogs in River Moy SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Restore area of active raised bog to 132.4ha, subject to natural processes	There are five raised bogs listed for River Moy SAC. The total area of Active Raised Bog (ARB) habitat for these five bogs was mapped at 45.3ha. Area of Degraded Raised Bog (DRB) on the High Bog (HB) has been modelled as 152.4ha. See map 3. However, it is estimated that only 82.1ha is potentially restorable to ARB by drain blocking. The total potential ARB on the HB is therefore estimated to be 127.4ha. Eco-hydrological assessments of the cutover estimates that an additional 5.0ha of bog forming habitats could be restored. The long term target for ARB is therefore 132.4ha. See raised bog supporting document for further details on this and following attributes
Habitat distribution	Occurrence	Restore the distribution and variability of active raised bog across the SAC. See map 4 for most recently mapped distribution	ARB occurs on most of the bogs in the River Moy SAC. DRB occurs on all five bogs in the River Moy SAC. There is also potential for ARB restoration on cutover areas surrounding the bogs (see area target above)
High bog area	Hectares	No decline in extent of high bog necessary to support the development and maintenance of active raised bog. See map 3	The area of high bog within the five raised bogs listed for River Moy SAC in 2012 (latest figure available) was 498.4ha (DAHG 2014)
Hydrological regime: water levels	Centimetres	Restore appropriate water levels throughout the site	For ARB, mean water level needs to be near or above the surface of the bog lawns for most of the year. Seasonal fluctuations should not exceed 20cm, and should only be 10cm below the surface, except for very short periods of time. Open water is often characteristic of soak systems
Hydrological regime: flow patterns	Flow direction; slope	Restore, where possible, appropriate high bog topography, flow directions and slopes. See map 5 for current situation	ARB depends on mean water levels being near or above the surface of bog lawns for most of the year. Long and gentle slopes are the most favourable to achieve these conditions. Changes to flow directions due to subsidence of bogs can radically change water regimes and cause drying out of high quality ARB areas and soak systems
Transitional areas between high bog and adjacent mineral soils (including cutover areas)	Hectares; distribution	Restore adequate transitional areas to support/protect active raised bog and the services it provides	ARB is threatened due to effects of past drainage and peat-cutting around the margins of the bogs within the River Moy SAC. Natural marginal habitats no longer exist. Eco-hydrological assessments have evaluated the potential for ARB restoration on cutover areas (see note for habitat area attribute above)
Vegetation quality: central ecotope, active flush, soaks, bog woodland	Hectares	Restore 66.2ha of central ecotope/active flush/soaks/bog woodland as appropriate	At least 50% of ARB habitat should be high quality (i.e. central ecotope, active flush, soaks, bog woodland). Target area of active raised bog for the site has been set at 132.4ha (see area target above)
Vegetation quality: microtopographical features	Hectares	Restore adequate cover of high quality microtopographical features	High quality microtopography (hummocks, hollows and pools) is well developed in less disturbed parts of the bogs in River Moy SAC
Vegetation quality: bog moss ( <i>Sphagnum</i> ) species	Percentage cover	Restore adequate cover of bog moss ( <i>Sphagnum</i> ) species to ensure peat-forming capacity	<i>Sphagnum</i> cover varies naturally across Ireland with relatively high cover in the east to lower cover in the west. Hummock forming species such as <i>Sphagnum austinii</i> are particularly good peat formers. <i>Sphagnum</i> cover and distribution also varies naturally across a site

Typical ARB species: flora	Occurrence	Restore, where appropriate, typical active raised bog flora	Typical flora species include widespread species, as well as those with more restricted distributions but typical of the habitat's subtypes or geographical range
Typical ARB species: fauna	Occurrence	Restore, where appropriate, typical active raised bog fauna	Typical fauna species include widespread species, as well as those with more restricted distributions but typical of the habitat's subtypes or geographical range
Elements of local distinctiveness	Occurrence	Maintain features of local distinctiveness, subject to natural processes	An important feature of interest in relation to the raised bogs in the River Moy SAC is the fact that they occur at the north-western edge of the geographic range of the habitat in Ireland
Negative physical indicators	Percentage cover	Negative physical features absent or insignificant	Negative physical indicators include: bare peat, algae dominated pools and hollows, marginal cracks, tear patterns, subsidence features such as dry mineral mounds/ridges emerging or expanding and evidence of burning
Vegetation composition: native negative indicator species	Percentage cover	Native negative indicator species at insignificant levels	Disturbance indicators include species indicative of conditions drying out such as abundant bog asphodel ( <i>Narthecium ossifragum</i> ), deergrass ( <i>Trichophorum germanicum</i> ) and harestail cotton-grass ( <i>Eriophorum vaginatum</i> ) forming tussocks; abundant magellanic bog-moss ( <i>Sphagnum magellanicum</i> ) in pools previously dominated by <i>Sphagnum</i> species typical of very wet conditions (e.g. feathery bog-moss ( <i>S. cuspidatum</i> )); and indicators of frequent burning events such as abundant <i>Cladonia floerkeana</i> and high cover of carnation sedge ( <i>Carex panicea</i> ) (particularly in true midlands raised bogs)
Vegetation composition: non-native invasive species	Percentage cover	Non-native invasive species at insignificant levels and not more than 1% cover	Most common non-native invasive species include lodgepole pine ( <i>Pinus contorta</i> ), rhododendron ( <i>Rhododendron ponticum</i> ), and pitcherplant ( <i>Sarracenia purpurea</i> )
Air quality: nitrogen deposition	kg N/ha/year	Air quality surrounding bog close to natural reference conditions. The total N deposition should not exceed 5kg N/ha/yr	Change in air quality can result from fertiliser drift; adjacent quarry activities; or other atmospheric inputs. The critical load range for ombrotrophic bogs has been set as between 5 and 10kg N/ha/yr (Bobbink and Hettelingh, 2011). The latest N deposition figures for the area around the bogs in River Moy SAC suggests that the current level is approximately 8.5kg N/ha/yr (Henry and Aherne, 2014)
Water quality	Hydrochemical measures	Water quality on the high bog and in transitional areas close to natural reference conditions	Water chemistry within raised bogs is influenced by atmospheric inputs (rainwater). However, within soak systems, water chemistry is influenced by other inputs such as focused flow or interaction with underlying substrates. Water chemistry in areas surrounding the high bog varies due to influences of different water types (bog water, regional groundwater and run-off from surrounding mineral lands)

## Conservation Objectives for : River Moy SAC [002298]

### **7120                      Degraded raised bogs still capable of natural regeneration**

The long-term aim for Degraded raised bogs still capable of natural regeneration is that its peat-forming capability is re-established; therefore, the conservation objective for this habitat is inherently linked to that of Active raised bogs (7110) and a separate conservation objective has not been set in River Moy SAC

Attribute	Measure	Target	Notes
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## Conservation Objectives for : River Moy SAC [002298]

### 7150 Depressions on peat substrates of the Rhynchosporion

Depressions on peat substrates of the Rhynchosporion is an integral part of good quality Active raised bogs (7110) and thus a separate conservation objective has not been set for the habitat in River Moy SAC

Attribute	Measure	Target	Notes
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**7230 Alkaline fens**

**To maintain the favourable conservation condition of Alkaline fens in River Moy 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	The full extent of of this habitat within the SAC is unknown. An extensive area is known to occur as part of a wetland complex on the Glone River, north-west of Ballyhaunis but there are likely to be other areas present in the SAC
Habitat distribution	Occurrence	No decline, subject to natural processes	Full distribution of the habitat in this SAC is currently unknown- see note above
Hydrological regime	Metres	Appropriate natural hydrological regimes necessary to support the natural structure and functioning of the habitat	Maintenance of groundwater, surface water flows and water table levels within natural ranges is essential for this wetland habitat
Peat formation	Flood duration	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 (Jim Ryan, pers. comm.)
Water quality: nutrients	Water chemistry measures	Appropriate water quality 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
Vegetation structure: typical species	Percentage	Maintain vegetation cover of typical species including brown mosses and vascular plants	Mosses listed for fen in this SAC include <i>Campyllum stellatum</i> , <i>Aneura pinguis</i> and <i>Scorpidium scorpioides</i> while vascular plants include long-stalked yellow sedge ( <i>Carex lepidocarpa</i> ), black bog rush ( <i>Schoenus nigricans</i> ), blunt-flowered rush ( <i>Juncus subnodulosus</i> ), purple moor-grass ( <i>Molinia caerulea</i> ), grass of Parnassus ( <i>Parnassia palustris</i> ), butterwort ( <i>Pinguicula vulgaris</i> ), marsh helleborine ( <i>Epipactis palustris</i> ) and meadow thistle ( <i>Cirsium dissectum</i> ) (internal NPWS files)
Vegetation composition: trees and shrubs	Percentage	Cover of scattered native trees and shrubs less than 10%	Scrub and trees will tend to invade if fen conditions become drier. Attribute and target based on upland habitat conservation assessment criteria (Perrin et al., 2014)
Physical structure: disturbed bare ground	Percentage	Cover of disturbed bare ground less than 10%. Where tufa is present, disturbed bare ground less than 1%	While grazing may be appropriate in this habitat, excessive areas of disturbed bare ground may develop due to unsuitable grazing regimes. Attribute and target based on upland habitat conservation assessment criteria (Perrin et al., 2014)
Physical structure: drainage	Percentage	Areas showing signs of drainage as a result of drainage ditches or heavy trampling less than 10%	Attribute and target based on upland habitat conservation assessment criteria (Perrin et al., 2014)

## Conservation Objectives for : River Moy SAC [002298]

### 91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles

**To maintain the favourable conservation condition of Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles in River Moy 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	Old sessile oakwoods are likely to occur as mosaics with other woodland types and the total extent within the SAC is unknown. Two sites (1763, 1800) in the SAC were surveyed as part of the the National Survey of Native Woodlands (NSNW) (Perrin et al., 2008). Site 1763 (Pontoon) is an extensive area of woodland and 106.3ha was mapped as this Annex I habitat type (or mosaics containing it). See map 6. NB further areas are likely to be present within the SAC
Habitat distribution	Occurrence	No decline. Woodlands surveyed as part of the NSNW are shown on map 6	The main location of this woodland type in the SAC is Pontoon Woods. See note on area above
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 sizes of at least some of the existing woodlands need to be increased in order to reduce habitat fragmentation and benefit those species requiring "deep" woodland conditions (Peterken, 2002). Topographical and land ownership constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer	Described in Perrin et al (2008)
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008)
Woodland structure: natural regeneration	Seedling: sapling: pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Oak ( <i>Quercus</i> spp.) regenerates poorly. In suitable sites ash ( <i>Fraxinus excelsior</i> ) can regenerate in large numbers although few seedlings reach pole size
Woodland structure: dead wood	m <sup>3</sup> per hectare; number per hectare	At least 30m <sup>3</sup> /ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm 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	Mature and 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	No decline	Includes ancient or long-established woodlands, archaeological and geological features as well as red-data and other rare or localised species. Perrin and Daly (2010) list Pontoon Wood as possible ancient woodland
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008)

Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including oak ( <i>Quercus petraea</i> ) and birch ( <i>Betula pubescens</i> )	Species reported in Perrin et al. (2008)
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	The following are the most common invasive species in this woodland type: beech ( <i>Fagus sylvatica</i> ), sycamore ( <i>Acer pseudoplatanus</i> ), rhododendron ( <i>Rhododendron ponticum</i> ) and cherry laurel ( <i>Prunus laurocerasus</i> )

## Conservation Objectives for : River Moy SAC [002298]

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

To maintain the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) in River Moy 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	Total extent of this habitat within the SAC is unknown and it may occur in mosaics with other woodland types. Two sites (1763, 1800) within the SAC were surveyed as part of the the National Survey of Native Woodlands (NSNW) (Perrin et al., 2008). Map 6 shows surveyed woodlands including areas classified as 91E0 (2.76ha). NB areas mapped as other wet woodland types may also correspond with this Annex I woodland type. There are also likely to be additional areas of this Annex I woodland type within the SAC
Habitat distribution	Occurrence	No decline. Woodlands surveyed as part of the NSNW are shown on map 6	The area of this habitat identified by the NSNW occurs at Prospect (site 1800) on the western shore of Lough Conn. See note on area above
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 sizes of at least some of the existing woodlands need to be increased in order to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). Topographical and land-ownership constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer	Described in Perrin et al. (2008)
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008)
Woodland structure: natural regeneration	Seedling: sapling: pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Alder ( <i>Alnus glutinosa</i> ) and oak ( <i>Quercus</i> spp.) regenerate poorly. Ash ( <i>Fraxinus excelsior</i> ) often regenerates in large numbers although few seedlings reach pole size
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 floodplains and lakeshores
Woodland structure: dead wood	m <sup>3</sup> per hectare; number per hectare	At least 30m <sup>3</sup> /ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder)	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	Mature and 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	No decline	Includes ancient or long-established woodlands, archaeological and geological features as well as red-data and other rare or localised species

Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008)
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including including alder ( <i>Alnus glutinosa</i> ), willows ( <i>Salix</i> spp.), oak ( <i>Quercus robur</i> ) and ash ( <i>Fraxinus excelsior</i> )	Species reported in Perrin et al. (2008)
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	The following are the most common invasive species in this woodland type: sycamore ( <i>Acer pseudoplatanus</i> ) and Himalayan balsam ( <i>Impatiens glandulifera</i> ). The NSNW notes rhododendron ( <i>Rhododendron ponticum</i> ) clearance in site 1800

## Conservation Objectives for : River Moy SAC [002298]

### 1092 White-clawed Crayfish *Austropotamobius pallipes*

**To maintain the favourable conservation condition of White-clawed Crayfish in River Moy SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Distribution	Occurrence	No reduction from baseline. See map 7	The general distribution of white-clawed crayfish in the SAC is that it is widespread in the upper tributaries of the River Moy and the rivers which feed Loughs Conn and Cullin. It is absent from the main River Moy. The named tributaries that it is recorded from are the following: Upstream of Lough Conn: River Deel and its tributaries of the Tureen River, Rathnamagh River and Rappa Stream; Fiddaunglass; Addergoole River. Upstream of Lough Cullin: Tobergal River; Clydagh; tributaries of the Toormore and Manulla Rivers. Moy tributaries: Gweeston River; tributaries of the Pollagh, Glore, Yellow and Geestaun Rivers; Killeen River; Spaddagh River; Sonnagh River; Owenaher River; Owengarve River
Population structure: recruitment	Occurrence of juveniles and females with eggs	Juveniles and/or females with eggs in all occupied tributaries	See Reynolds et al. (2010) for further details
Negative indicator species	Occurrence	No alien crayfish species	Alien crayfish species are identified as a major direct threat to this species and as a disease vector. See Reynolds (1998) for further details. Ireland is currently free of non-native invasive crayfish species
Disease	Occurrence	No instances of disease	Crayfish plague is identified as major threat and has occurred in Ireland even in the absence of alien vectors. See Reynolds (1998) for further details. Disease can in some circumstances be introduced through contaminated equipment and water in the absence of vector species
Water quality	EPA Q value	At least Q3-4 at all sites sampled by EPA	Target taken from Demers and Reynolds (2002). Q values based on triennial water quality surveys carried out by the EPA
Habitat quality: heterogeneity	Occurrence of positive habitat features	No decline in heterogeneity or habitat quality	Crayfish need high habitat heterogeneity. Larger crayfish must have stones to hide under, or an earthen bank in which to burrow. Hatchlings shelter in vegetation, gravel and among fine tree-roots. Smaller crayfish are typically found among weed and debris in shallow water. Larger juveniles in particular may also be found among cobbles and detritus such as leaf litter. These conditions must be available on the whole length of occupied habitat



**Conservation Objectives for : River Moy SAC [002298]****1095 Sea Lamprey *Petromyzon marinus***

**To maintain the favourable conservation condition of Sea Lamprey in River Moy SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	Percentage of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	This SAC only covers the freshwater portion of the River Moy. The adjacent Killala Bay/Moy Estuary SAC (site code: 000485) encompasses the estuarine elements of sea lamprey habitat. Artificial barriers can block or cause difficulties to lampreys' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas (Rooney et al. 2015), however, there are no artificial barriers in the Moy catchment limiting lamprey access
Population structure of juveniles	Number of age/size groups	At least three age/size groups present	Attribute and target based on Harvey and Cowx (2003) and O'Connor (2007)
Juvenile density in fine sediment	Juveniles/m <sup>2</sup>	Mean catchment juvenile density at least 1/m <sup>2</sup>	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on Harvey and Cowx (2003)
Extent and distribution of spawning habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by Inland Fisheries Ireland (IFI). Lampreys spawn in clean gravels
Availability of juvenile habitat	Number of positive sites in 3rd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Silting habitat is essential for larval lamprey and they can be severely impacted by sediment removal. Recovery can be rapid and newly-created habitat can be rapidly colonised (King et al., 2015). However, it is vital that such sedimenting habitats are retained. Occupancy in excess of 50% of sites would be 'reasonable' for the Irish catchments examined to date. (King and Linnane, 2004; King et al., unpublished data)

**Conservation Objectives for : River Moy SAC [002298]****1096 Brook Lamprey *Lampetra planeri***

**To maintain the favourable conservation condition of Brook Lamprey in River Moy SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Distribution	Percentage of river accessible	Access to all watercourses down to first order streams	Artificial barriers can block lampreys' migration both up- and downstream, thereby possibly limiting species to specific stretches, restricting access to spawning areas and creating genetically isolated populations (Espanhol et al., 2007). However, there are no artificial barriers in the Moy catchment limiting lamprey access
Population structure of juveniles	Number of age/size groups	At least three age/size groups of brook/river lamprey present	Attribute and target based on data from Harvey and Cowx (2003). It is impossible to distinguish between brook and river lamprey juveniles in the field (Gardiner, 2003), hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m <sup>2</sup>	Mean catchment juvenile density of brook/river lamprey at least 2/m <sup>2</sup>	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003) who state 10/m <sup>2</sup> in optimal conditions and more than 2/m <sup>2</sup> on a catchment basis
Extent and distribution of spawning habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by Inland Fisheries Ireland (IFI). Lampreys spawn in clean gravels
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Silting habitat is essential for larval lamprey and they can be severely impacted by sediment removal. Recovery can be rapid and newly-created habitat can be rapidly colonised (King et al., 2015). However, it is vital that such sedimenting habitats are retained. Occupancy in excess of 50% of sites would be 'reasonable' for the Irish catchments examined to date. (King and Linnane, 2004; King et al., unpublished data)

## Conservation Objectives for : River Moy SAC [002298]

1106

Salmon *Salmo salar*

**To maintain the favourable conservation condition of Salmon in River Moy SAC, which is defined by the following list of attributes and targets:**

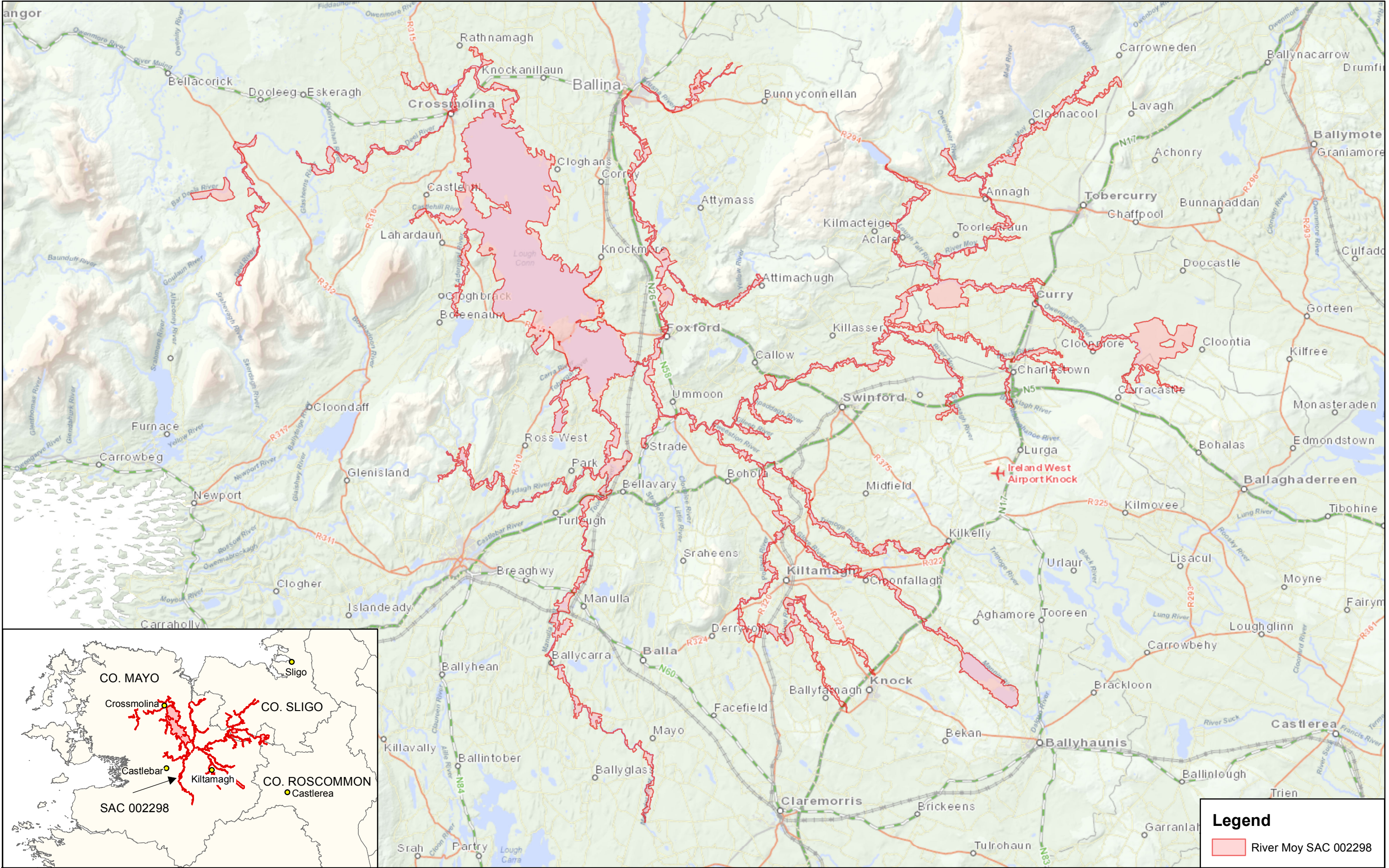
Attribute	Measure	Target	Notes
Distribution: extent of anadromy	Percentage of river accessible	100% of river channels down to second order accessible from estuary	Artificial barriers block salmon's upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. There are no artificial barriers on the Moy catchment limiting salmon access
Adult spawning fish	Number	Conservation Limit (CL) for each system consistently exceeded	A conservation limit 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 Standing Scientific Committee of the National Salmon Commission's annual model output of CL attainment levels. See SSC (2016). Stock estimates are either derived from direct counts of adults (rod catch, fish counter) or indirectly by fry abundance counts. For the 2016 SSC advice, the Moy is currently exceeding its CL by 19,012 salmon
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 are no artificial barriers preventing salmon from accessing suitable spawning habitat in this SAC
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 Moy SAC [002298]****1355 Otter *Lutra lutra***

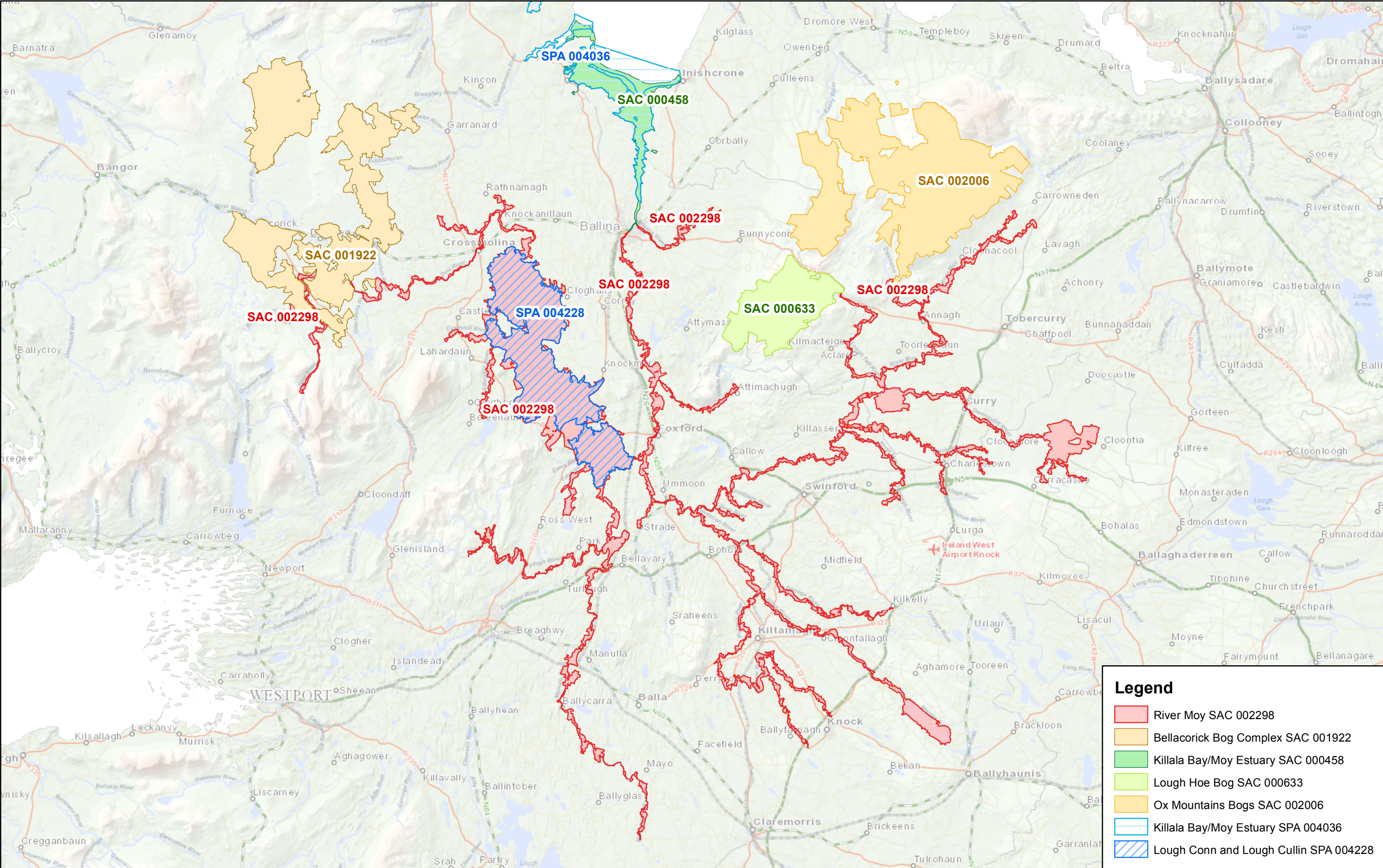
**To maintain the favourable conservation condition of Otter in River Moy SAC, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Distribution	Percentage positive survey sites	No significant decline	Measure based on standard otter survey technique. 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 1068.8ha	No field survey. Areas mapped to include 10m terrestrial buffer along lake shorelines and along river banks identified as critical for otters (NPWS, 2007)
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 479.4km	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 1248.2ha	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, 2006; Kruuk and Moorhouse, 1991)
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. For guidance, see map 8	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 Moy SAC 002298

Bellacorick Bog Complex SAC 001922

Killala Bay/Moy Estuary SAC 000458

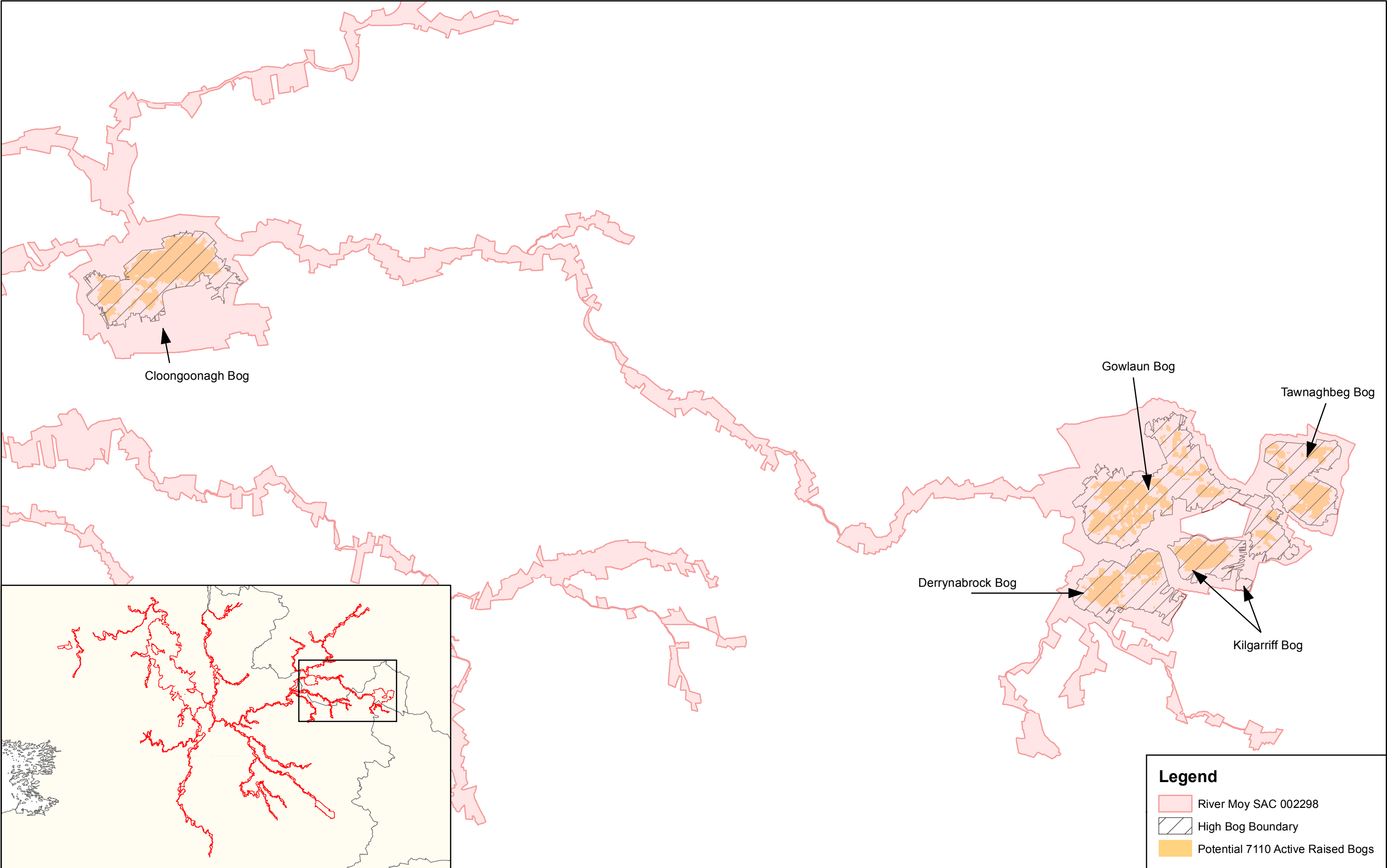
Lough Hoe Bog SAC 000633

Ox Mountains Bogs SAC 002006

Killala Bay/Moy Estuary SPA 004036

Lough Conn and Lough Cullin SPA 004228

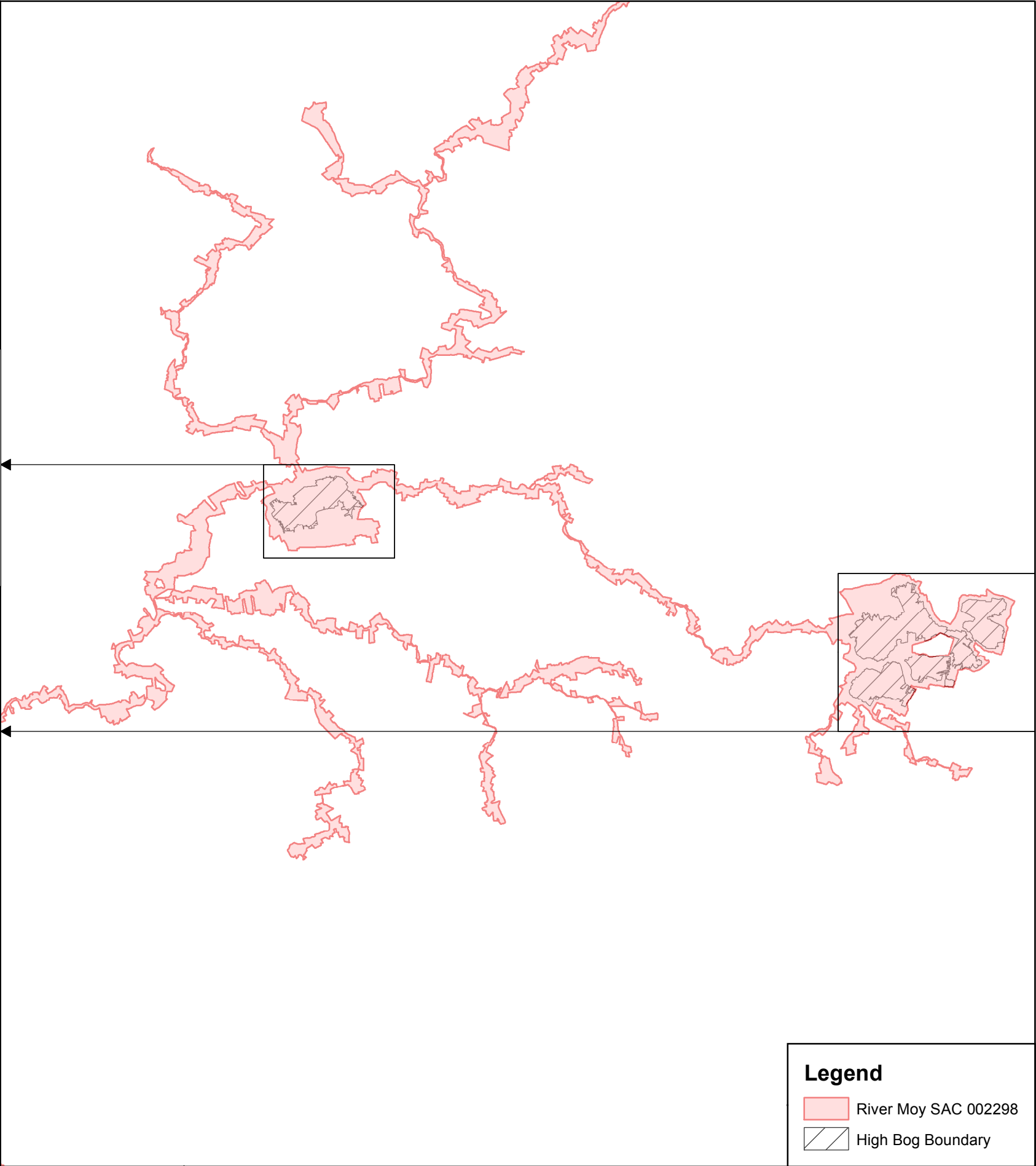
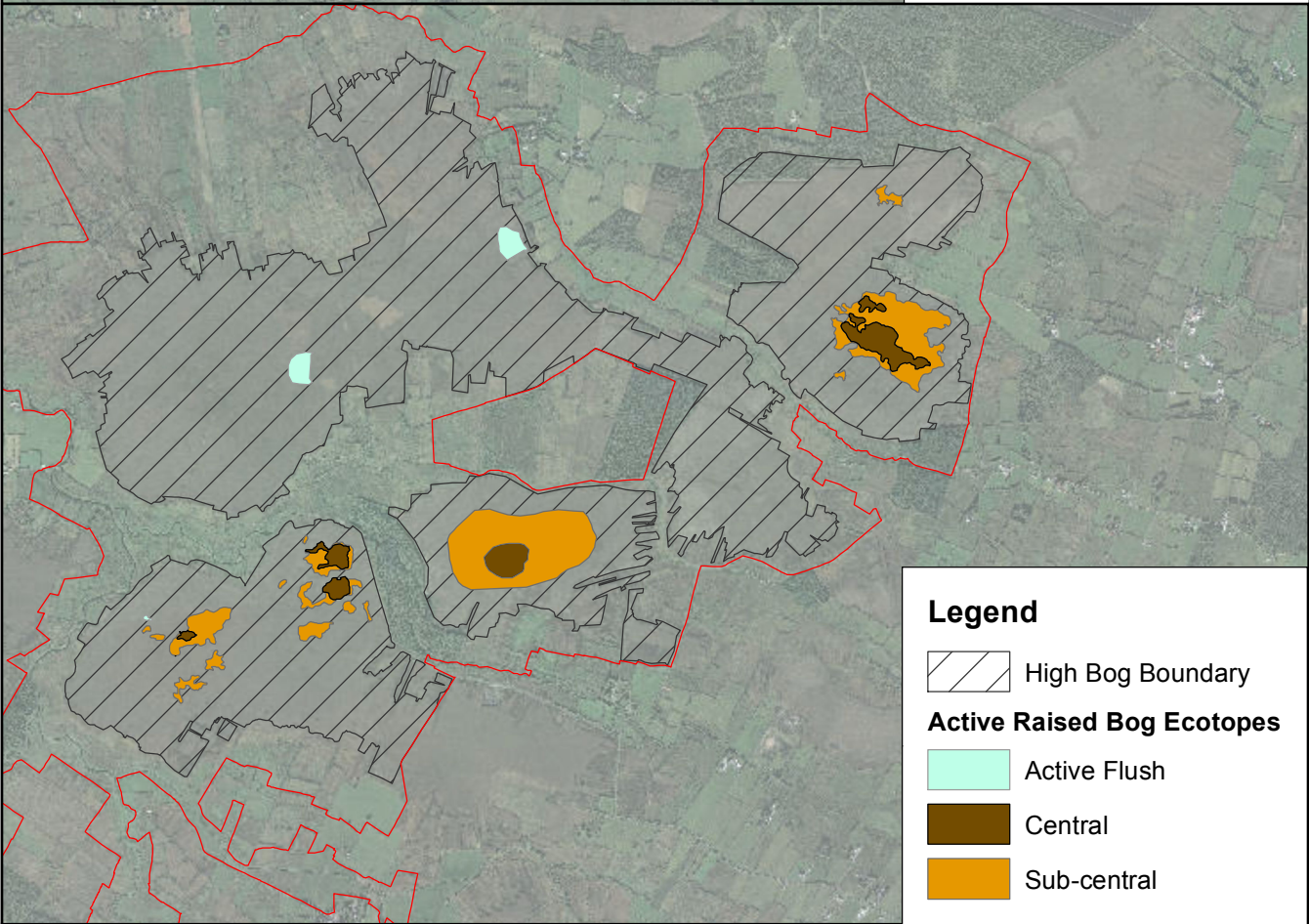
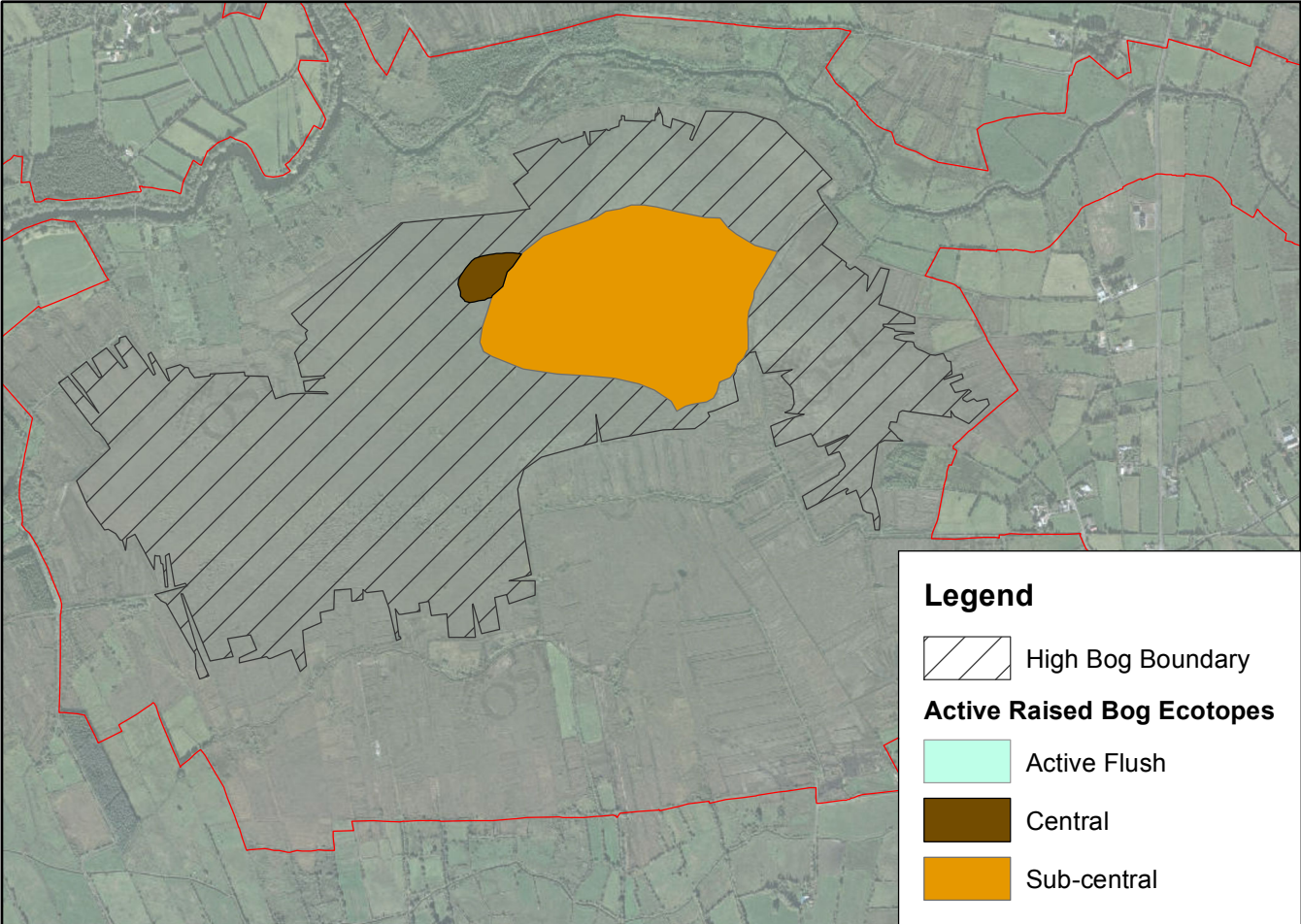




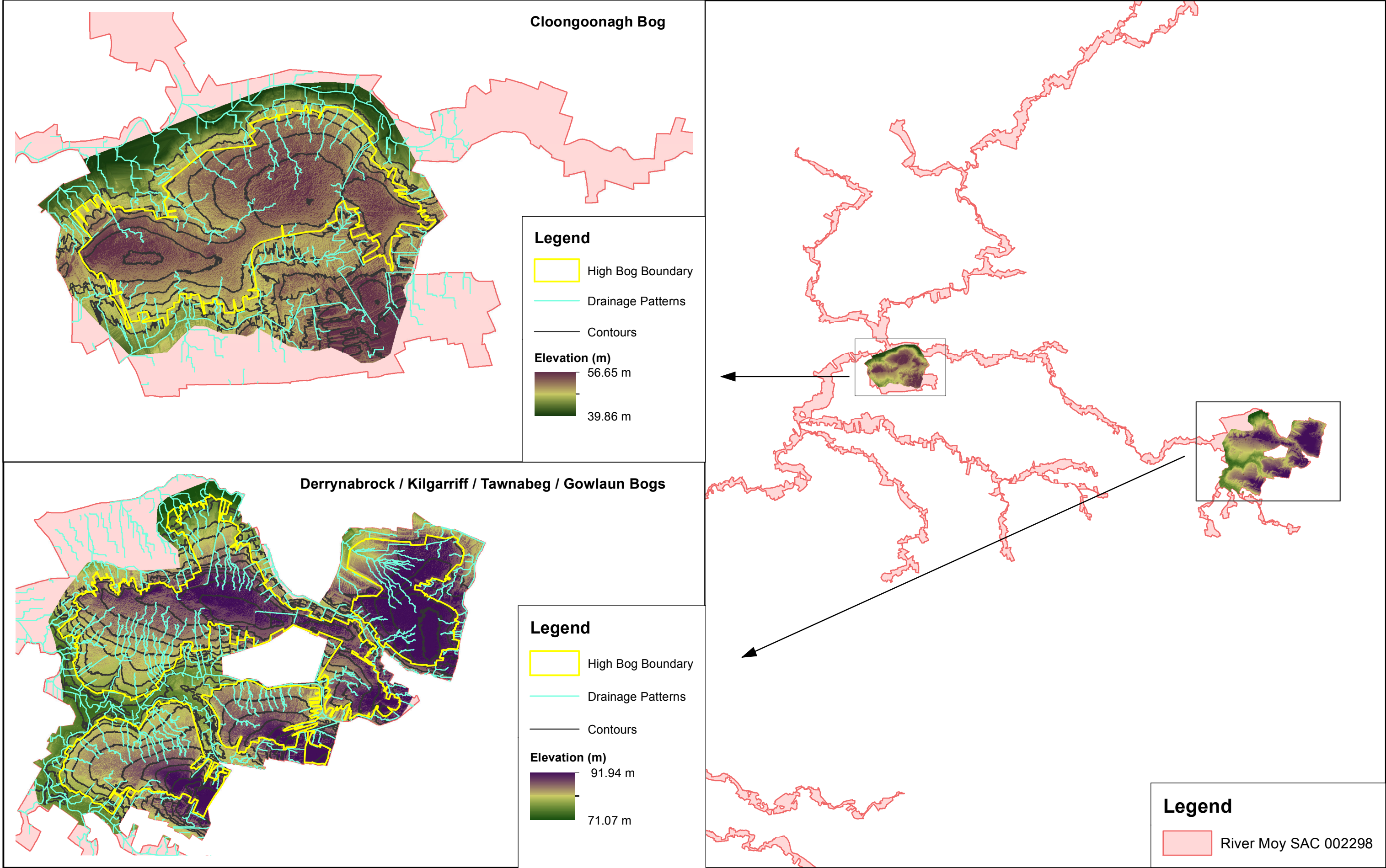
**Legend**

- River Moy SAC 002298
- High Bog Boundary
- Potential 7110 Active Raised Bogs

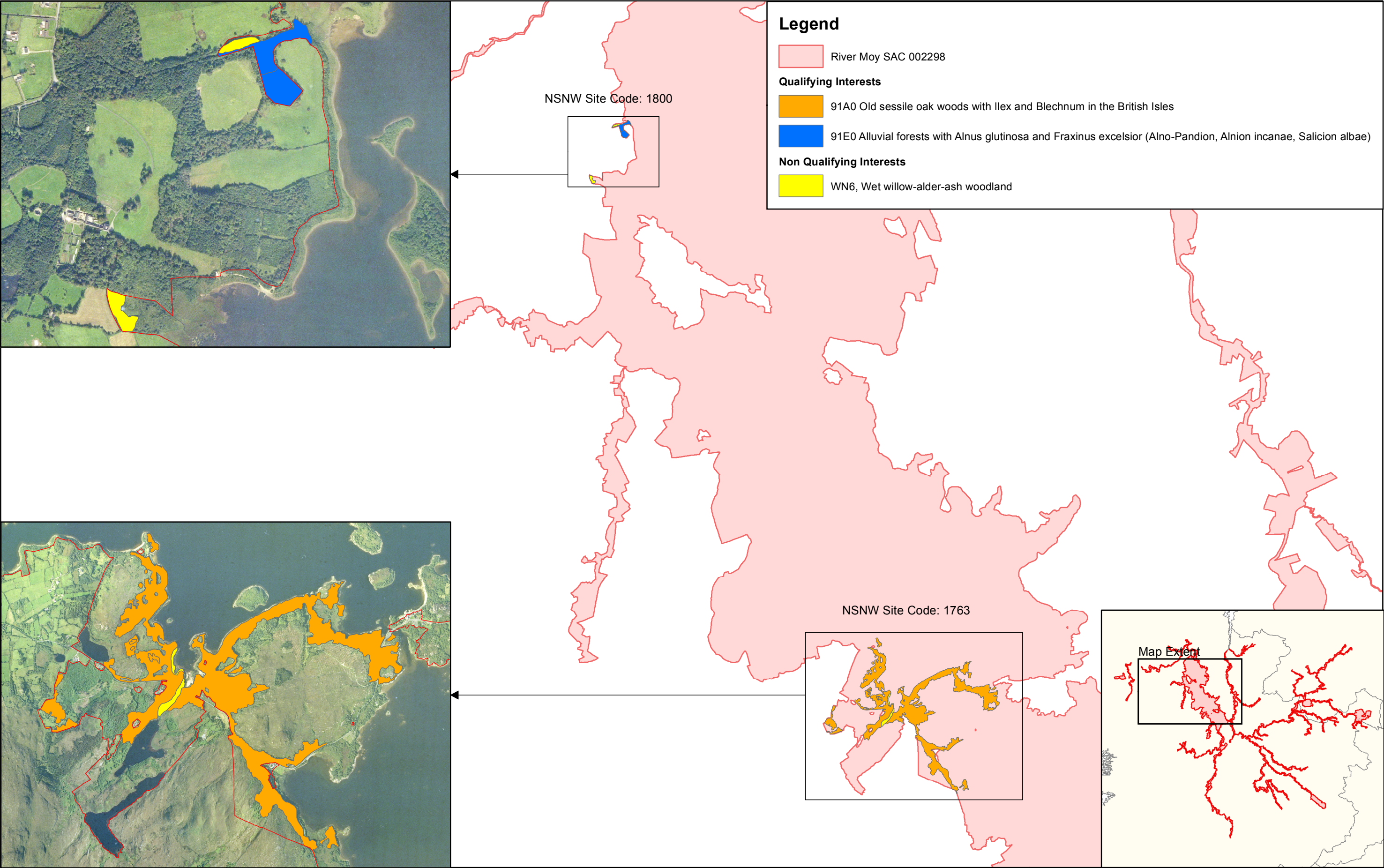




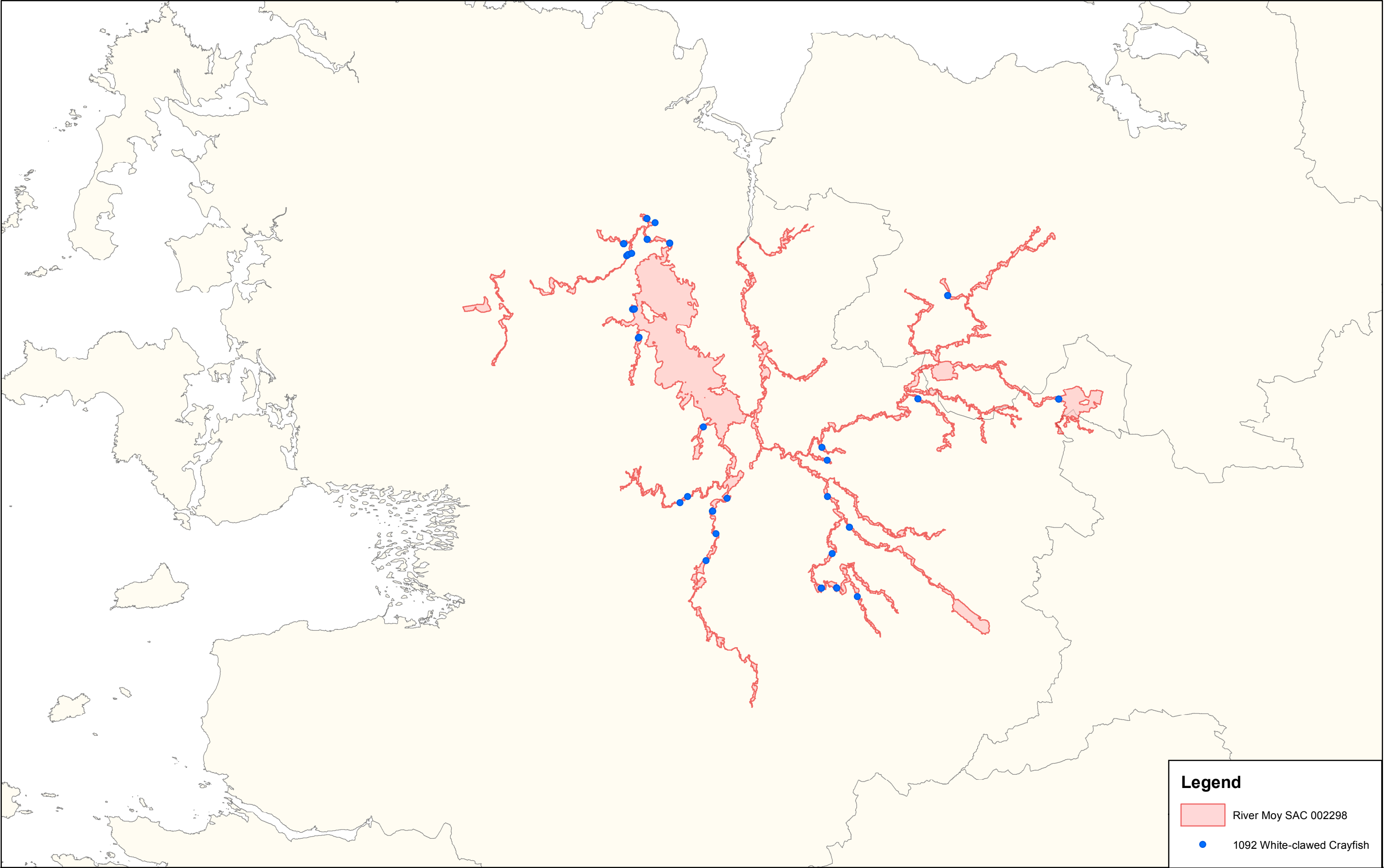













**Legend**

River Moy SAC 002298

1092 White-clawed Crayfish



An Roinn Ealaíon, Oidhreachta,  
Gnóthaí Réigiúnacha, Tuaithe agus Gaeltachta

Department of Arts, Heritage,  
Regional, Rural and Gaeltacht Affairs

**MAP 7:  
RIVER MOY SAC  
CONSERVATION OBJECTIVES  
WHITE-CLAWED CRAYFISH**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

**SITE CODE:  
SAC 002298; version 3.01. CO. MAYO,  
CO. SLIGO & CO. ROSCOMMON**

05.51116.522

km

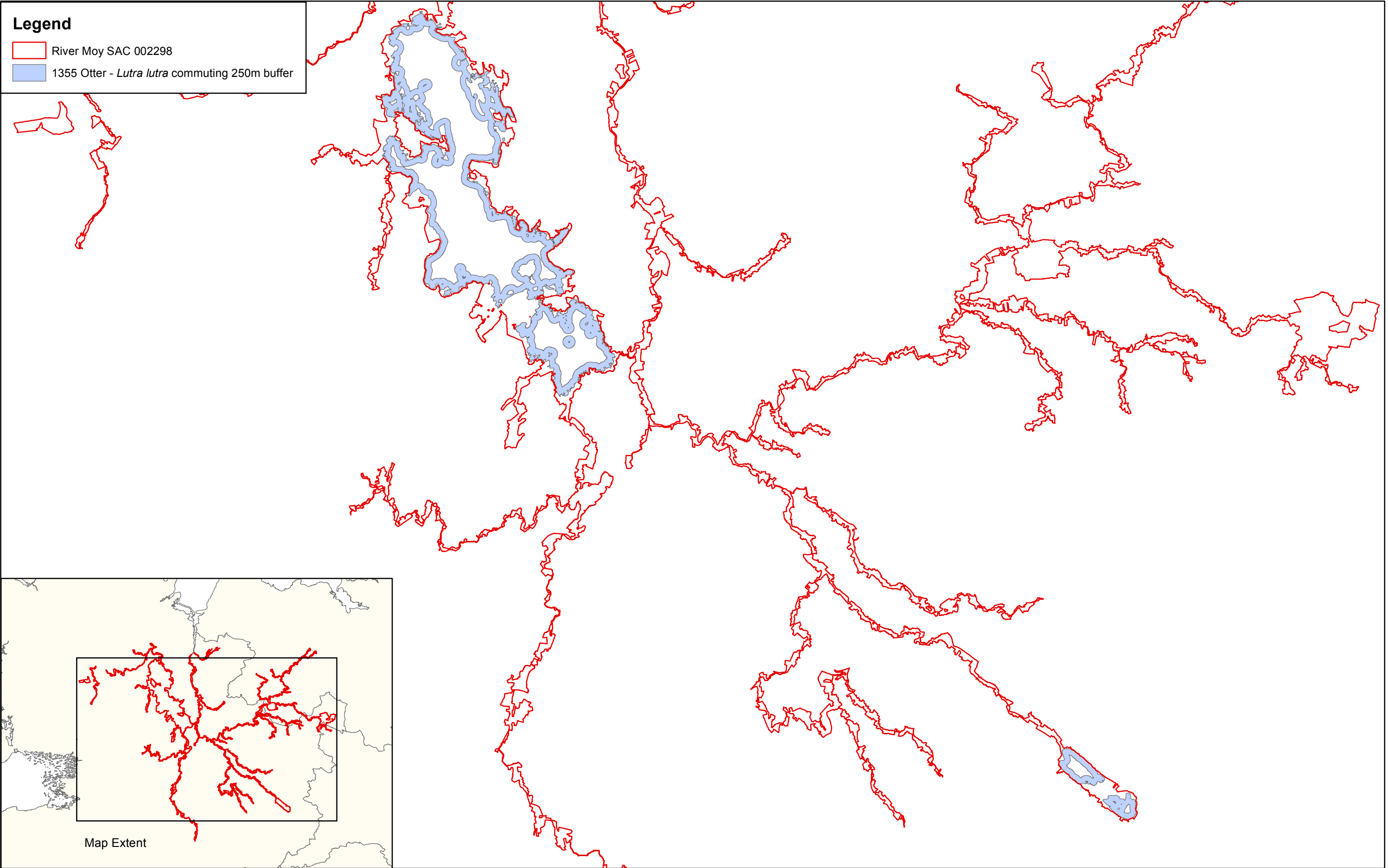
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
Ordnance Survey of Ireland Licence No EN 0059216. © Ordnance Survey of Ireland Government of Ireland

Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas

N



**Map Version 1**  
**Date: July 2016**





## Conservation objectives for Turloughmore (Sligo) SAC [000637]

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.

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.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

Code	Description
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3180	Turloughs*
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\* denotes a priority habitat





**Citation:** NPWS (2016) *Conservation objectives for Turloughmore (Sligo) SAC [000637]. Generic Version 5.0. Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.*

## Conservation objectives for Unshin River SAC [001898]

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.

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.

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected:

Code	Description
3260	Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates ( <i>Festuco Brometalia</i> ) (* important orchid sites)*
6410	<i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils ( <i>Molinion caeruleae</i> )
91E0	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> ( <i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i> )*

\* denotes a priority habitat



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<b>Code</b>	<b>Common Name</b>	<b>Scientific Name</b>
1106	Salmon	<i>Salmo salar</i>
1355	Otter	<i>Lutra lutra</i>

**Citation:** NPWS (2016) Conservation objectives for Unshin River SAC [001898]. Generic Version 5.0.  
Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.



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