

# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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Durnesh Lough SAC 000138



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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Rural and Gaeltacht Affairs.**

**Series Editor: Rebecca Jeffrey  
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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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000138	Durnesh Lough SAC
1150	Coastal lagoonsE
6410	<i>Tilā</i> meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)

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**Please note that this SAC overlaps Durnesh Lough SPA (004145) and Donegal Bay SPA (004151). 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

<b>Year :</b>	2007
<b>Title :</b>	Inventory of Irish coastal lagoons (version 2)
<b>Author :</b>	Oliver, G.
<b>Series :</b>	Unpublished report to NPWS
<hr/>	
<b>Year :</b>	2013
<b>Title :</b>	Irish semi-natural grasslands survey 2007-2012
<b>Author :</b>	O'Neill, F.H.; Martin, J.R.; Devaney, F.M.; Perrin, P.M.
<b>Series :</b>	Irish Wildlife Manual No. 78
<hr/>	
<b>Year :</b>	2016
<b>Title :</b>	Durnesh Lough SAC (site code: 138) Conservation objectives supporting document- coastal lagoons V1
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document

### Other References

<b>Year :</b>	2013
<b>Title :</b>	Monitoring and assessment of Irish lagoons for the purposes of the EU Water Framework Directive, 2009-2011. Parts 1 and 2
<b>Author :</b>	Roden, C.M; Oliver, G.A.
<b>Series :</b>	Unpublished report to the Environmental Protection Agency

## Spatial data sources

**Year :** Revision 2011

**Title :** Inventory of Irish Coastal Lagoons. Version 3

**GIS Operations :** Clipped to SAC boundary

**Used For :** 1150 (map 3)

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**Year :** 2013

**Title :** Irish Semi-Natural Grassland Survey

**GIS Operations :** Dataset clipped to the SAC boundary. Expert opinion used as necessary to resolve any issues arising

**Used For :** 6410 (map 4)

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## Conservation Objectives for : Durnesh Lough SAC [000138]

### 1150 Coastal lagoons

**To restore the favourable conservation condition of Coastal lagoons in Durnesh Lough SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable, subject to slight natural variation. Favourable reference area 73.8ha. See map 3	Area calculated from spatial data derived from Oliver (2007). Site code IL079 (Durnesh Lough). See lagoons supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 3	Site IL079 in Oliver (2007). See lagoons supporting document for further details
Salinity regime	Practical salinity units (psu)	Median annual salinity and temporal variation within natural ranges	Durnesh Lough is recorded as an oligohaline lagoon. See lagoons supporting document for further details
Hydrological regime	Metres	Annual water level fluctuations and minima within natural ranges	Maximum depth of Durnesh Lough is recorded as less than 2m. See lagoons supporting document for further details
Barrier: connectivity between lagoon and sea	Permeability	Appropriate hydrological connections between lagoon and sea, including where necessary, appropriate management	Drongawn Lough is a natural sedimentary lagoon with a sand dune barrier and artificial outlet. See lagoons supporting document for further details
Water quality: Chlorophyll <i>a</i>	µg/L	Annual median chlorophyll <i>a</i> within natural range and less than 5µg/L	Target based on Roden and Oliver (2013). See lagoons supporting document for further details
Water quality: Molybdate Reactive Phosphorus (MRP)	mg/L	Annual median MRP within natural ranges 0.1mg/L	Target based on Roden and Oliver (2013). See lagoons supporting document for further details
Water quality: Dissolved Inorganic Nitrogen (DIN)	mg/L	Annual median DIN within natural ranges and less than 0.15mg/L.	Target based on Roden and Oliver (2013). See lagoons supporting document for further details
Depth of macrophyte colonisation	Metres	Macrophyte colonisation to full depth of lagoon	As the lagoon is less than 2m deep, it is expected that macrophyte colonisation would extend to its full depth. See lagoons supporting document for further details
Typical plant species	Number and m <sup>2</sup>	Maintain number and extent of listed lagoonal specialists, subject to natural variation	Species listed in Oliver (2007). See lagoons supporting document for further details
Typical animal species	Number	Maintain listed lagoon specialists, subject to natural variation	Species listed in Oliver (2007). See lagoons supporting document for further details
Negative indicator species	Number and percentage cover	Negative indicator species absent or under control	Low salinity, shallow water and elevated nutrient levels increase the threat of unnatural encroachment by reedbeds. See lagoons supporting document for further details

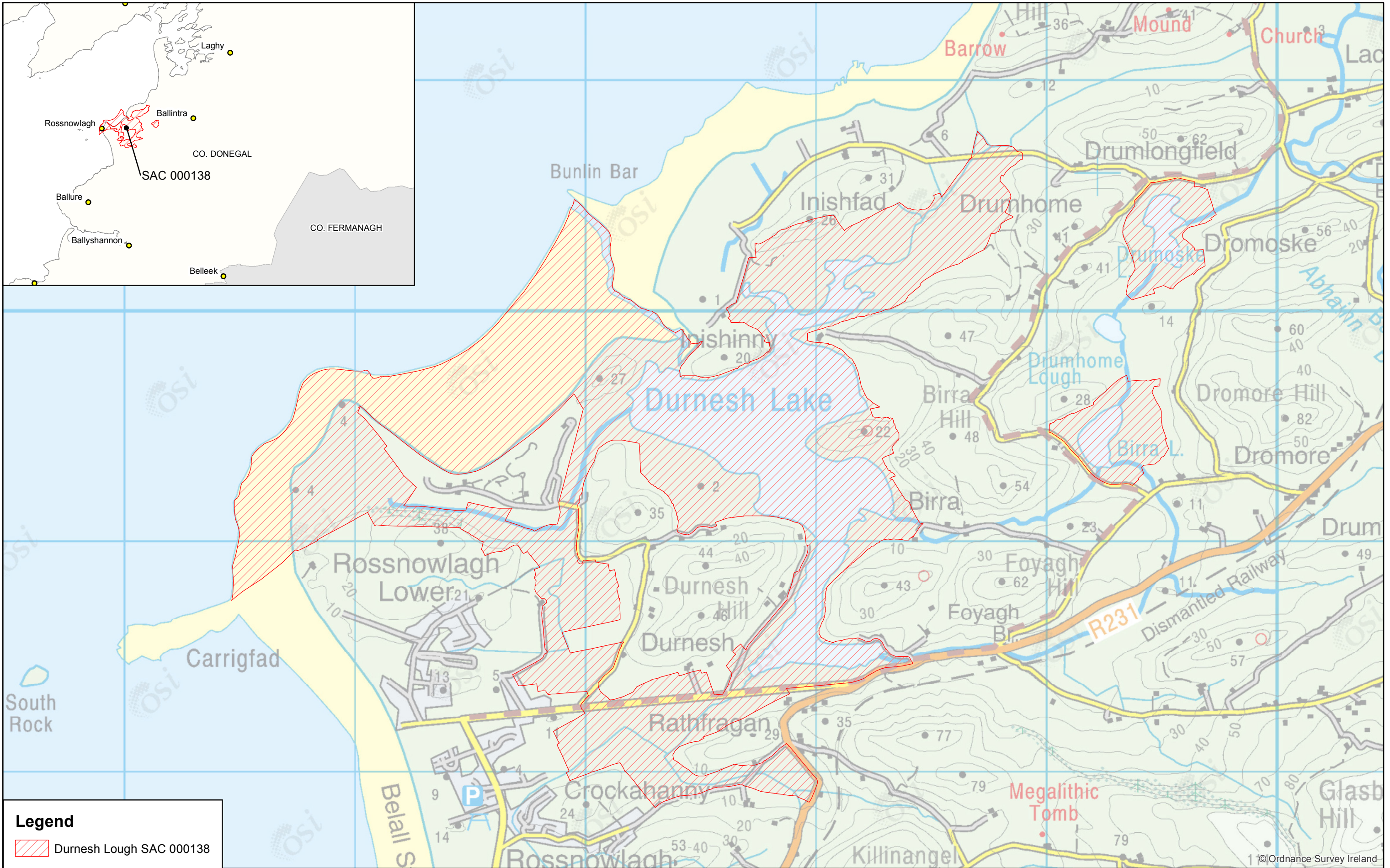
## Conservation Objectives for : Durnesh Lough SAC [000138]

### 6410 *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)


To restore the favourable conservation condition of *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) in Durnesh Lough 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>Molinia</i> meadows occurs in close association with other grassland habitats as well as wetland habitats including swamp and fen. The Irish semi-natural grasslands survey (ISGS) (O'Neill et al., 2013) recorded 1.02ha of this Annex I habitat at site 1249 (see map 3). Other semi-natural grassland types occur in the SAC and there may be more, as yet unmapped, areas of the Annex I habitat type present
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 3 for mapped area	See note for area above
Vegetation composition: typical species	Number at a representative number of monitoring stops	At least seven positive indicator species present, including one "high quality" species as listed in O'Neill et al. (2013)	List of positive indicator species, including high quality species, identified by O'Neill et al. (2013). Note that purple moor-grass ( <i>Molinia caerulea</i> ) is a positive indicator species, but not necessarily an essential component of the habitat
Vegetation composition: negative indicator species	Percentage at a representative number of monitoring stops	Negative indicator species collectively not more than 20% cover, with cover by an individual species less than 10%	Attribute and target based on O'Neill et al. (2013)
Vegetation composition: non-native species	Percentage at a representative number of monitoring stops	Cover of non-native species not more than 1%	Attribute and target based on O'Neill et al. (2013)
Vegetation composition: moss species	Percentage at a representative number of monitoring stops	Hair mosses ( <i>Polytrichum</i> spp.) not more than 25% cover	Attribute and target based on O'Neill et al. (2013)
Vegetation structure: woody species and bracken	Percentage at a representative number of monitoring stops	Cover of woody species and bracken ( <i>Pteridium aquilinum</i> ) not more than 5% cover	Attribute and target based on O'Neill et al. (2010)
Vegetation structure: broadleaf herb: grass ratio	Percentage at a representative number of monitoring stops	Broadleaf herb component of vegetation between 40 and 90%	Attribute and target based on O'Neill et al. (2013)
Vegetation structure: sward height	Percentage at a representative number of monitoring stops	At least 30% of sward between 10 and 80cm tall	Attribute and target based on O'Neill et al. (2013)
Physical structure: bare soil	Percentage at a representative number of monitoring stops	Not more than 10% bare soil	Attribute and target based on O'Neill et al. (2013)





**Legend**

 Durnesh Lough SAC 000138



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

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

**MAP 1:  
DURNESH LOUGH SAC  
CONSERVATION OBJECTIVES  
SAC DESIGNATION**

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

**SITE CODE:  
SAC 000138; version 3.  
CO. DONEGAL**

0 0.15 0.3 0.45 0.6 0.75 km

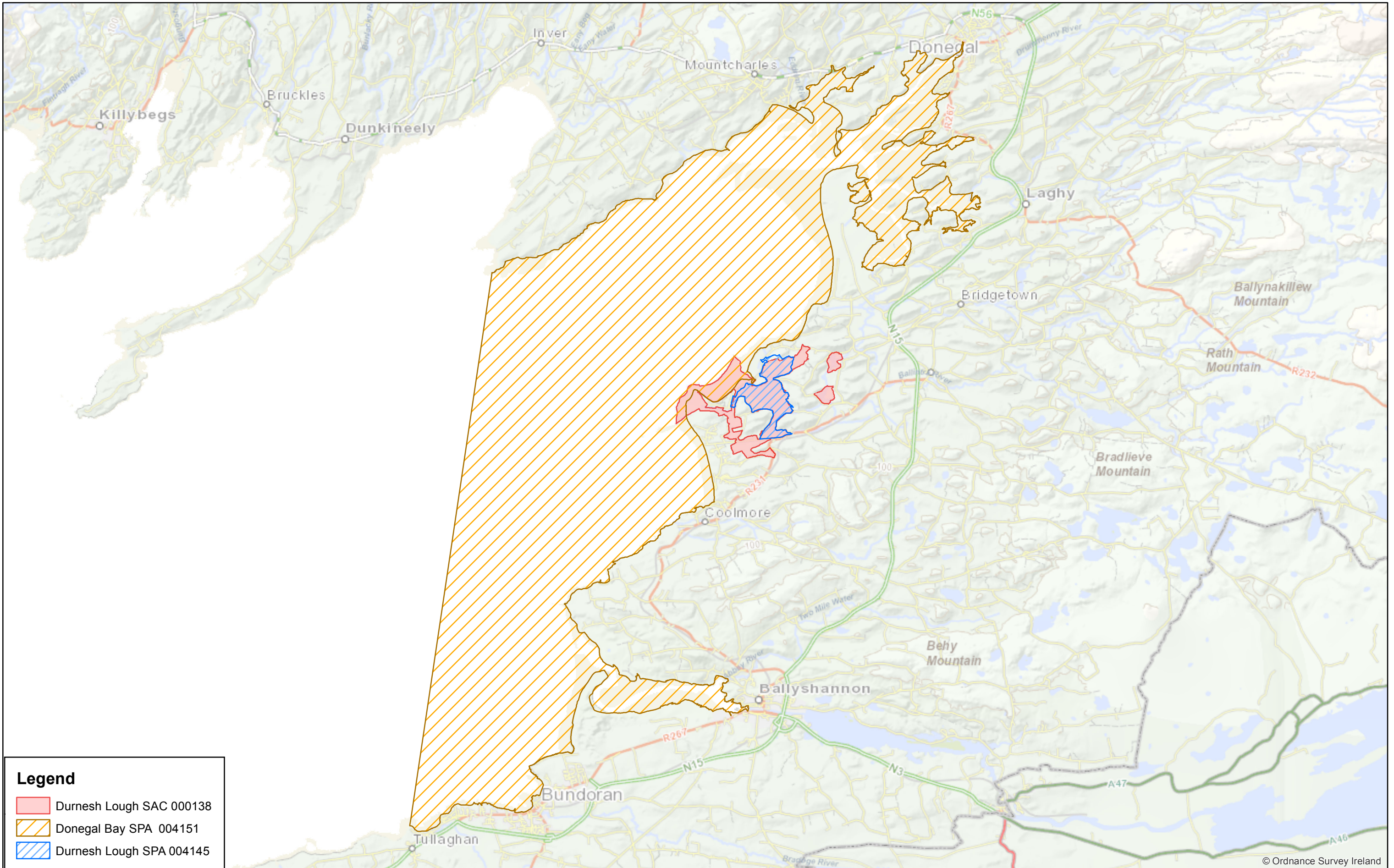
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
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Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbheithnithe a déanamh ar theorainneacha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



**Map Version 1  
Date: Aug 2016**



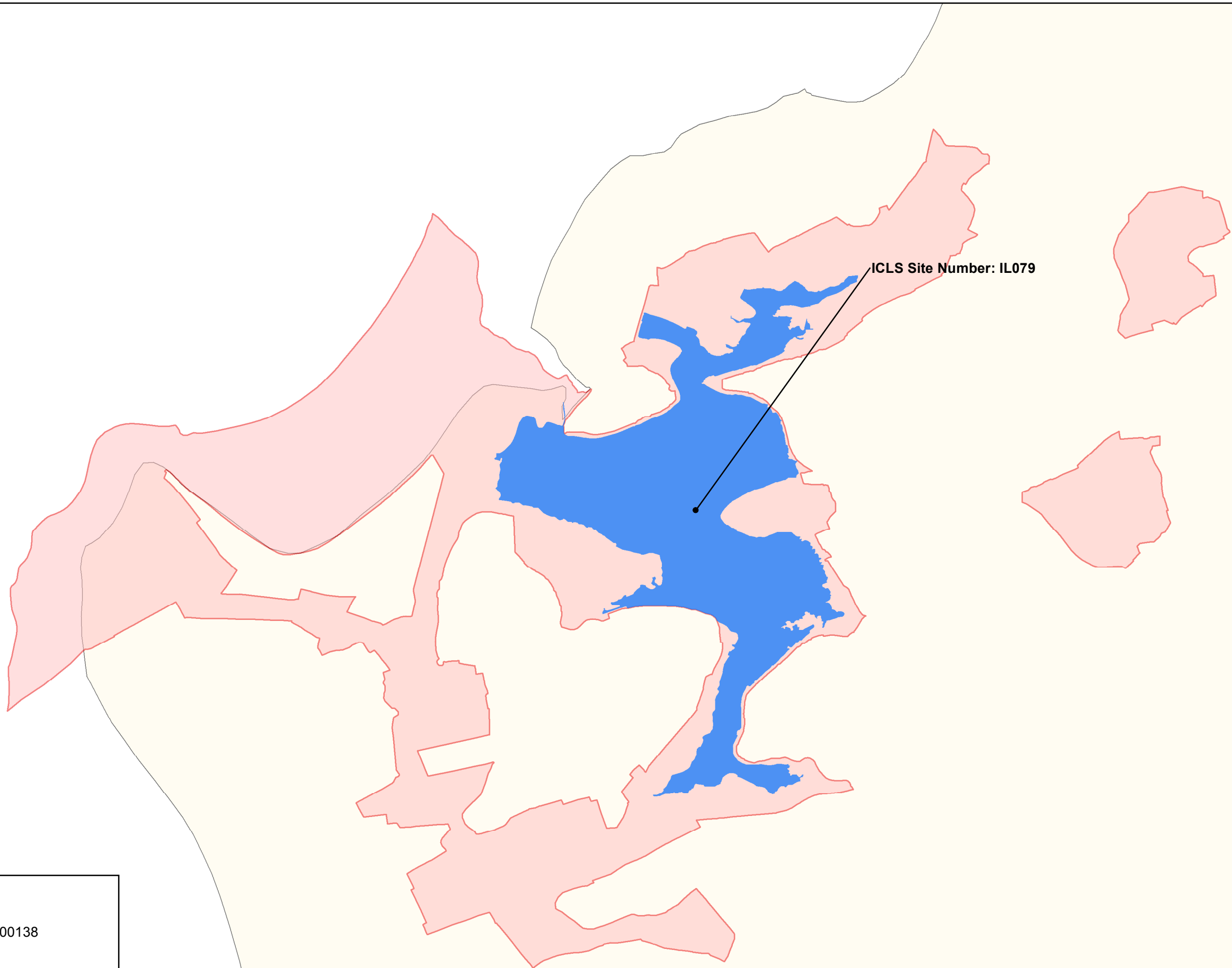


**Legend**

- Durnesh Lough SAC 000138
- Donegal Bay SPA 004151
- Durnesh Lough SPA 004145

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**Legend**

- Durnesh Lough SAC 000138
- 1150 Coastal Lagoons
- OSi Discovery Series County Boundary

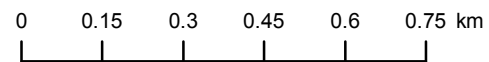


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 Gnóthaí Réigiúnacha, Tuaithe agus Gaeltachta  
 Department of Arts, Heritage,  
 Regional, Rural and Gaeltacht Affairs

**MAP 3:  
 DURNESH LOUGH SAC  
 CONSERVATION OBJECTIVES  
 COASTAL LAGOON HABITAT**

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

**SITE CODE:  
 SAC 000138; version 3.  
 CO. DONEGAL**

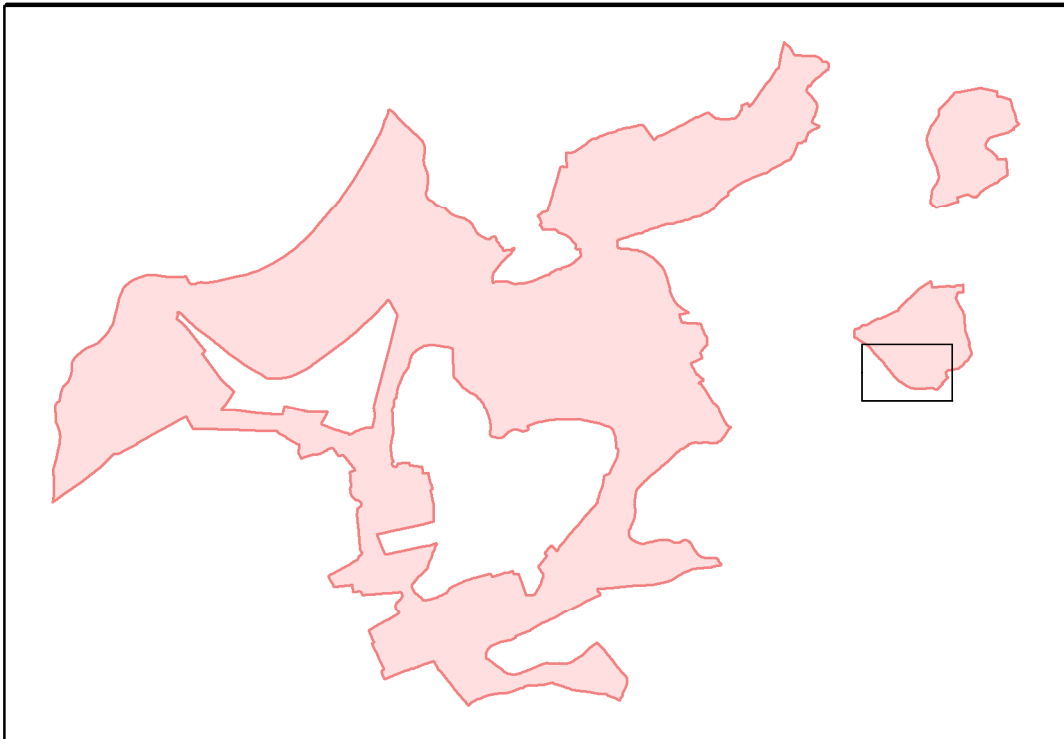


The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
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Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha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



**Map Version 1  
 Date: Aug 2016**



**Legend**

Durnesh Lough SAC 000138

**Annex I Grassland Habitats**

6410 6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinia caerulea*)

# National Parks and Wildlife Service

## *Conservation Objectives Series*

### Lough Melvin SAC 000428



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

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**Citation:**

**NPWS (2021) Conservation Objectives: Lough Melvin SAC 000428. Version 1.  
National Parks and Wildlife Service, Department of Housing, Local Government  
and Heritage.**

**Series Editors: Rebecca Jeffrey and Christina Campbell  
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:

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- 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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000428	Lough Melvin SAC
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1106	Salmon <i>Salmo salar</i>
1355	Otter <i>Lutra lutra</i>
3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoëto-Nanojuncetea
6410	<i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)

**Please note that this SAC overlaps with Donegal Bay SPA (004151). 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>	2006
<b>Title :</b>	Otter survey of Ireland 2004/2005
<b>Author :</b>	Bailey, M.; Rochford, J.
<b>Series :</b>	Irish Wildlife Manuals, No. 23
<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>	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 Manuals, No. 76
<b>Year :</b>	2013
<b>Title :</b>	Irish semi-natural grasslands survey 2007-2012
<b>Author :</b>	O'Neill, F.H.; Martin, J.R.; Devaney, F.M.; Perrin, P.M.
<b>Series :</b>	Irish Wildlife Manuals, No. 78
<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>	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
<b>Year :</b>	2018
<b>Title :</b>	The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats
<b>Author :</b>	Martin, J.R.; O'Neill, F.H.; Daly, O.H.
<b>Series :</b>	Irish Wildlife Manuals, No. 102
<b>Year :</b>	2019
<b>Title :</b>	The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation assessments
<b>Year :</b>	in prep.
<b>Title :</b>	A study of lakes with Slender Naiad ( <i>Najas flexilis</i> )
<b>Author :</b>	Roden, C.; Murphy, P.; Ryan, J.B.
<b>Series :</b>	Irish Wildlife Manuals



## 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>	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>	1992
<b>Title :</b>	The Northern Ireland Lakes Survey
<b>Author :</b>	Wolfe-Murphy, S.A.; Lawrie, E.W.; Smith, S.J.; Gibson, C.E.
<b>Series :</b>	Report to Countryside and Wildlife Branch, Department of the Environment for Northern Ireland
<b>Year :</b>	1997
<b>Title :</b>	Lough Melvin ASSI Citation and Views about Management
<b>Author :</b>	Environment and Heritage Services (EHS)
<b>Series :</b>	EHS, Department of the Environment for Northern Ireland
<b>Year :</b>	1999
<b>Title :</b>	Diet of otters ( <i>Lutra lutra</i> ) on Inishmore, Aran Islands, west coast of Ireland
<b>Author :</b>	Kingston, S.; O'Connell, M.; Fairley, J.S.
<b>Series :</b>	Biology and Environment: Proceedings of the Royal Irish Academy, 99B: 173-182
<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>	Environmental Protection Agency, Wexford
<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>	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>	2021
<b>Title :</b>	The Status of Irish Salmon Stocks in 2020 with Catch Advice for 2021
<b>Author :</b>	Gargan, P.; Fitzgerald, C.; Kennedy, R.; Maxwell, H.; McLean, S.; Millane, M.
<b>Series :</b>	Report of the Technical Expert Group on Salmon (TEGOS) to the North-South Standing Scientific Committee for Inland Fisheries



## 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>	3130 (map 3)
<hr/>	
<b>Year :</b>	2013
<b>Title :</b>	Irish Semi-Natural Grassland Survey
<b>GIS Operations :</b>	Dataset clipped to the SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	6410 (map 4)
<hr/>	
<b>Year :</b>	2018
<b>Title :</b>	Grasslands Monitoring Survey 2015-2017
<b>GIS Operations :</b>	Dataset clipped to the SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	6410 (map 4)
<hr/>	
<b>Year :</b>	2010
<b>Title :</b>	OSi 1:5000 IG vector dataset
<b>GIS Operations :</b>	Creation of 80m buffer on aquatic side of lake data; creation of 10m buffer on terrestrial side of lake data. Datasets combined with derived OSi Prime 2 water dataset. 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 5)
<hr/>	
<b>Year :</b>	2021
<b>Title :</b>	OSi Prime 2 water polygon file
<b>GIS Operations :</b>	Creation of 10m buffer on terrestrial side of river banks data. Dataset combined with derived OSi 1:5000 vector lake buffer data and OSi Discovery series vector marine 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 (map 5)
<hr/>	
<b>Year :</b>	2005
<b>Title :</b>	OSi Discovery series vector data
<b>GIS Operations :</b>	Creation of 80m buffer on marine side of high water mark (HWM); creation of 10m buffer on terrestrial side of HWM; combination of 80m and 10m HWM buffer datasets; Datasets combined with the derived OSi Prime 2 water dataset. 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 marine side of HWM to highlight potential commuting points
<b>Used For :</b>	1355 (map 5)

## Conservation Objectives for : Lough Melvin SAC [000428]

### 3130 Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoëto-Nanojuncetea

To restore the favourable conservation condition of Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea in Lough Melvin 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	Habitat 3130 is found in Lough Melvin. The habitat occurs in clear-water lakes of intermediate alkalinity where <i>Isoetes lacustris</i> and <i>Potamogeton perfoliatus/praelongus</i> co-occur and is characterised by high species richness and a deep-water flora that can include <i>Najas flexilis</i> (slender naiad) (Roden et al., in prep.). Lough Melvin was considered significantly altered in 2017 (Roden et al., in prep.). The lake was assessed as in bad conservation condition, while overall habitat 3130 was in poor deteriorating conservation status across Ireland in 2013-2018 (NPWS, 2019). The majority of lakes with 3130 appear to be damaged and high conservation value 3130 lakes in good condition are extremely rare (Roden et al., in prep.). The lake surface area is the simplest measure of extent and should be stable or increasing. See map 3. For further information on all attributes and an overview of slender naiad-type lakes see Roden et al. (in prep.). See also O Connor (2015)
Habitat distribution	Occurrence	No decline, subject to natural processes	Lough Melvin occupies a basin partly on Carboniferous sandstone, shale and limestone. Roden et al. (in prep.), during a brief survey in 2017 from the southern shore, found a depauperate flora in Lough Melvin and considered it had changed significantly since the survey by Wolfe-Murphy et al. (1992). Further data are also available from the Environmental Protection Agency (EPA) and Northern Ireland Environment Agency (NIEA) (Water Framework Directive (WFD) monitoring). Lough Melvin is also an SAC in Northern Ireland (UK0030047)
Vegetation species richness	Occurrence	Restore appropriate species richness	Lough Melvin had a depauperate flora (10 species) and low euphotic depth for a large lake when examined in 2017 (Roden et al., in prep.), apparently significantly changed since the Northern Ireland Lakes Survey (Wolfe-Murphy et al., 1992). There should be no decline in species richness (see Roden et al., in prep.). Roden et al. (in prep.) found that habitat 3130 has a varied and species-rich flora, with high conservation value examples having more than 30 species of aquatic macrophytes. Almost all lakes with more than 30 species had euphotic depth >3m (Roden et al., in prep.). The number of species recorded increases with sampling effort (Roden et al., in prep.)
Vegetation composition: typical species	Occurrence	Restore typical species, in good condition, and demonstrating typical abundances and distribution	Restore condition and extent of typical plant species of habitat 3130. The post-glacial fish community of Lough Melvin is considered to be important and unique. Roden et al. (in prep.) described the typical species of habitat 3130 and those present in lakes in good condition. Habitat 3130 has a varied and species-rich flora with several rare species that can include <i>Baldellia ranunculoides</i> subsp. <i>repens</i> , <i>Hydrilla verticillata</i> , <i>Isoetes echinospora</i> , <i>Najas flexilis</i> , <i>Pilularia globulifera</i> , <i>Fissidens fontanus</i> , and also two uncertain charophyte taxa: <i>Chara muscosa</i> ; <i>Nitella spanioclema</i> . See also NPWS (2013, 2019) and O Connor (2015)

Vegetation composition: characteristic zonation	Occurrence	Restore characteristic deep-water vegetation	Roden et al. (in prep.) did not record either <i>Isoetes</i> or deep-water vegetation zones in Lough Melvin. The characteristic zonation (3 or more zones) is described in Roden et al. (in prep.). Shallow water has a <i>Lobelia-Littorella</i> zone (0-1.5m), then an <i>Isoetes lacustris</i> zone (0.5-3m), both also typical of oligotrophic lakes and habitat 3110. The characteristic deep-water community is the most sensitive element and consists of some or all of <i>Callitriche hermaphroditica</i> , <i>Hydrilla verticillata</i> , <i>Najas flexilis</i> , <i>Potamogeton berchtoldii</i> , <i>P. perfoliatus</i> , <i>P. pusillus</i> , <i>Nitella confervacea</i> , <i>Nitella flexilis</i> , <i>Nitella translucens</i> . Full development is when a distinct deep-water zone is present, with one or more of its typical species having >25% cover
Vegetation distribution: maximum (euphotic) depth	Metres	Restore maximum depth of vegetation, subject to natural processes	Maximum depth of vegetation was 2.5m in Lough Melvin in 2017 (Roden et al., in prep.). Euphotic depth ranged from 5.2m to 1.9m in lakes surveyed 2016-2018 and the target for maximum depth of vegetation colonisation (euphotic depth) in 3130 lakes was set as at least >3m (Roden et al., in prep.). Site-specific targets must be considered, however, as euphotic depths of >4m or >5m have been recorded in species-rich lakes in good condition. Maximum depth is considered to have declined in many lakes, owing to increased water colour. Lakes within undisturbed peatland are expected to have clear water and large maximum vegetation depth
Hydrological regime: water level fluctuations	Metres	Maintain appropriate hydrological regime necessary to support the habitat	Roden et al. (in prep.) found that, in summer, the <i>Littorella</i> zone is typically submerged and stated that if more than half is exposed it is a matter of concern and water level should never be lower than the top of the <i>Isoetes</i> zone. 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. Groundwater inputs are likely to be important for the characteristic deep-water zone. Groundwater inflow was noted at the southern shore of Lough Melvin in 2017 (Roden, pers. comm.). The hydrological regime of the lake 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/restore appropriate substratum type, extent and chemistry to support the vegetation	The southern shore of Lough Melvin examined in 2017 had sandy substratum. Roden et al. (in prep.) found that the habitat is generally dominated by bedrock, sand and loose stones, silt mud or hard peat, and stated that the appearance of large expanses of unconsolidated peat would indicate excessive sediment input. Groundwater inputs are likely to be important for the substratum of the characteristic deep-water zone. Research is required to further characterise the chemical composition of the substratum

pH and Alkalinity	pH units, mg/l	Maintain/restore appropriate water and sediment pH, alkalinity and cation concentrations to support the habitat, subject to natural processes	EPA data show average alkalinity of 58-64mg/l at Lough Melvin and pH of 7.3-8.3 The habitat is associated with intermediate alkalinity, largely between 20-80mg/l, but lower values may occur on Old Red Sandstone (Roden et al., in prep.). Surveyed lakes had average alkalinity of 25mg/l (range 5.5-73mg/l) (Roden et al., in prep.). In line with targets for <i>Najas flexilis</i> , median pH values should be greater than 7 pH units. Groundwater may influence sediment and water chemistry and be important for characteristic flora, contributing base-poor water to obligate carbon dioxide photosynthesisers in more calcareous lakes and more base-rich water to highly oligotrophic lakes (ORS). Acidification by organic acids released from degraded peatland and conifer plantations may impact on the habitat. See also The European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2019
Nutrients	mg/l P; mg/l N	Restore the concentration of nutrients in the water column to sufficiently low levels to support the habitat and its typical species	EPA average total phosphorus (TP) for Lough Melvin was 0.020mg/l for 2013-15. Roden et al. (in prep.) found that the best quality 3130 lakes surveyed had average total phosphorus of <0.015mg/l TP. Lakes in good condition with high-frequency nutrient data had an overall average of 0.011mg/l TP (lake averages ranged 0.008-0.015mg/l TP). While Roden et al. (in prep.) suggests a target of <0.015mg/l TP, a precautionary target for good condition is set as ≤0.010mg/l or WFD High Status; however, vegetation attributes determine the overall conservation condition. See also The European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2019). WFD High Status targets for total ammonia (annual average ≤0.04mg/l N and annual 95th percentile ≤0.09mg/l N) may also be appropriate
Water colour	mg/l PtCo	Restore appropriate water colour to support the habitat	Water colour in Lough Melvin was 73mg/l PtCo in 2001/2 (Free et al., 2006). The habitat is found in clear water, and water colour (dissolved light-absorbing compounds) is negatively correlated with maximum vegetation (euphotic) depth; lakes with euphotic depth >3m had colour <40mg/l PtCo, while those with euphotic depth >3.5m had <35mg/l PtCo (Roden et al., in prep.). Water colour directly controls light penetration and, therefore, euphotic depth and vegetation extent. Roden et al. (in prep.) set good condition at <40mg/l PtCo; however, this was considered to be an impacted state some distance from reference condition. The primary source of increased colour in Ireland is peatland disturbance, e.g. through turf-cutting, overgrazing, plantation forestry. Further work is necessary to determine water colour in intact peatland catchments and sustainable levels for the habitat, which may be <30 or even <20mg/l PtCo
Dissolved organic carbon (DOC)	mg/l	Maintain/restore appropriate organic carbon levels to support the habitat	Dissolved organic carbon (DOC) in the water column is linked to water colour and acidification (organic acids). It can provide a substrate (food source) for heterotrophic organisms, which can impact directly (e.g. shading) and indirectly (e.g. nutrient release) on the characteristic lake communities. Damage and degradation of peatland, e.g. through afforestation or turf-cutting, leading to decomposition of peat is likely to be the predominant source of dissolved and particulate organic carbon in Ireland

Turbidity	Nephelometric turbidity units/ mg/l SS/ other appropriate unit	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. Particulate loads from peatlands are the most likely sources of increased turbidity in lakes with the habitat. Turbidity measurement and interpretation is challenging. As a result, it is likely to be difficult to set habitat-specific targets for turbidity in lakes
Transparency	Metres	Restore appropriate Secchi transparency. There should be no decline in Secchi depth/transparency	Secchi depth in Lough Melvin was 1.5m in 2001/2 (Free et al., 2006). Transparency relates to light penetration and, hence, to the depth of colonisation of vegetation. Roden et al. (in prep.) advised it is preferable to measure euphotic depth directly by observation, but noted that a decreasing trend in Secchi depth indicates declining water quality. Transparency can be affected by phytoplankton blooms, water colour and turbidity. Secchi depth in marl lakes in Good condition is generally >6m. The OECD fixed boundary system set transparency targets for oligotrophic lakes of ≥6m annual mean Secchi disk depth and ≥3m annual minimum Secchi disk depth
Attached algal biomass	Algal cover	Maintain trace/absent attached algal biomass (<5% cover)	Nutrient enrichment can favour epiphytic and epipelic algae that can out-compete the submerged vegetation. Roden et al. (in prep.) noted that occasional blooms of filamentous algae occur in 3130 lakes in the absence of excess nutrients, especially species of the orders Zygnematales or Oedogoniales, but that drifting masses of <i>Cladophora</i> species may indicate a decline in water quality. In general, the cover abundance of attached algae in lakes with 3130 should be trace/absent (<5% cover)
Fringing habitat: area and condition	Hectares	Maintain the area and condition of fringing habitats necessary to support the natural structure and functioning of habitat 3130	Lough Melvin's shoreline has sparse swamp communities often backed by fen, wet grassland, alder and willow-dominated wet woodland and dry woodland (EHS, 1997). Its wooded islands are an Irish stronghold for the Flora (Protection) Order, 2015 listed and Near Threatened (Wyse Jackson et al., 2016) globeflower ( <i>Trollius europaeus</i> ). Marsh helleborine ( <i>Epipactis palustris</i> ) and blue-eyed-grass ( <i>Sisyrinchium bermudiana</i> ) also occur. Heterogeneous lake fringes with a range of natural and semi-natural habitats are preferable. Restoration or maintenance of open, species-rich fen, marsh and grassland can be particularly important. Fringing habitats along lakes intergrade with and support the structure and functions of the lake habitat. Equally, fringing wetland habitats are dependent on the lake, particularly its water levels, and support invertebrate and plant communities and species of high diversity and conservation concern. See also Mainstone et al. (2016)

## Conservation Objectives for : Lough Melvin SAC [000428]

### 6410 *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)

To restore the favourable conservation condition of *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) in Lough Melvin 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	Two areas supporting <i>Molinia</i> meadows within Lough Melvin SAC were surveyed as part of the Irish Semi-natural Grassland Survey (ISGS; O'Neill et al., 2013) and the Grassland Monitoring Survey (GMS; Martin et al., 2018). These were grassland survey site Gubalaun (site code 804), on Ross Point at the southern end, and grassland survey site Gubacreeny (site code 802), along the Drowes River at the northern end of the SAC. An area of 1.35ha of the habitat was mapped within the SAC in the most recent survey, the GMS (Martin et al., 2018), at Gubacreeny (site code 802) and an area of 0.57ha was mapped by the ISGS (O'Neill et al., 2008) at Gubalaun (site code 804). See map 4 for the recorded extent. It is important to note that further unsurveyed areas may be present within this large SAC
Habitat distribution	Occurrence	No decline, subject to natural processes	Distribution is based on the ISGS (O'Neill et al., 2013) and the GMS (Martin et al., 2018). See map 4. Note that further unsurveyed areas of the habitat may be present within this large SAC
Vegetation composition: positive indicator species	Number at a representative number of 2m x 2m monitoring stops; within 20m surrounding area of monitoring stops	At least 7 positive indicator species present in monitoring stop or, if 5–6 present in stop, additional species within 20m of stop; this includes at least one 'high quality' positive indicator species present in the stop or within 20m of stop	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018), where lists of positive indicator species, including high quality positive indicator species, are also presented. These documents should be consulted for further details. Note that purple moor-grass ( <i>Molinia caerulea</i> ) is a positive indicator species and should be present in at least one monitoring stop, or within 20m of a monitoring stop, for the attribute to pass (Martin et al., 2018). Note that Martin et al. (2018) mention two additional species which may be considered, should stops fail marginally on presence of indicators. The following positive indicators were dominant at the ISGS site Gubalaun: devil's-bit scabious ( <i>Succisa pratensis</i> ), sharp-flowered rush ( <i>Juncus acutiflorus</i> ), tormentil ( <i>Potentilla erecta</i> ) and purple moor-grass. The GMS reports that compact rush ( <i>Juncus conglomeratus</i> ) and flea sedge ( <i>Carex pulicaris</i> ) were occasional at Gubalaun
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Negative indicator species collectively not more than 20% cover, with cover by an individual species not more than 10%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018), where the list of negative indicator species is presented
Vegetation composition: non-native species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of non-native species not more than 1%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Vegetation composition: moss species	Percentage cover at a representative number of 2m x 2m monitoring stops	Hair mosses ( <i>Polytrichum</i> spp.) not more than 25% cover	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)

Vegetation composition: woody species and bracken	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of woody species and bracken ( <i>Pteridium aquilinum</i> ) not more than 5% cover	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018). Significant scrub encroachment was noted throughout the Gubalaun site (804), and in some areas in Gubacreeny (802) by the ISGS (O'Neill et al., 2013). The GMS (Martin et al., 2018) report that the area of 6410 which falls within the SAC at Gubacreeny is managed adequately by extensive horse-grazing, and scrub encroachment was not an issue there
Vegetation structure: broadleaf herb:grass ratio	Percentage at a representative number of 2m x 2m monitoring stops	Broadleaf herb component of vegetation between 40% and 90%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018). Broadleaf herb component of vegetation between 30% and 40% may be allowed to pass on expert judgement (Martin et al., 2018)
Vegetation structure: sward height	Percentage at a representative number of 2m x 2m monitoring stops	At least 30% of sward between 10cm and 80cm tall	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Vegetation structure: litter	Percentage cover at a representative number of 2m x 2m monitoring stops	Litter cover not more than 25%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018). The sward was noted as being quite rank due to lack of mowing at Gubalaun (O'Neill et al., 2013)
Physical structure: bare ground	Percentage cover at a representative number of 2m x 2m monitoring stops	Not more than 10% bare ground	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Physical structure: grazing or disturbance	Area in local vicinity of a representative number of monitoring stops	Area of the habitat showing signs of serious grazing or disturbance less than 20m <sup>2</sup>	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)

## Conservation Objectives for : Lough Melvin SAC [000428]

### 1106 Salmon *Salmo salar*

To maintain the favourable conservation condition of Atlantic Salmon (*Salmo salar*) in Lough Melvin 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 Technical Expert Group on Salmon's (TEGOS) annual model output of CL attainment levels. See Gargan et al. (2021) for further details. Stock estimates are either derived from direct counts of adults (rod catch, fish counter) or indirectly by fry abundance counts. Lough Melvin and the Drowes river are currently above CL for both one-sea-winter (1SW) and multi-sea-winter (MSW) 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
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)

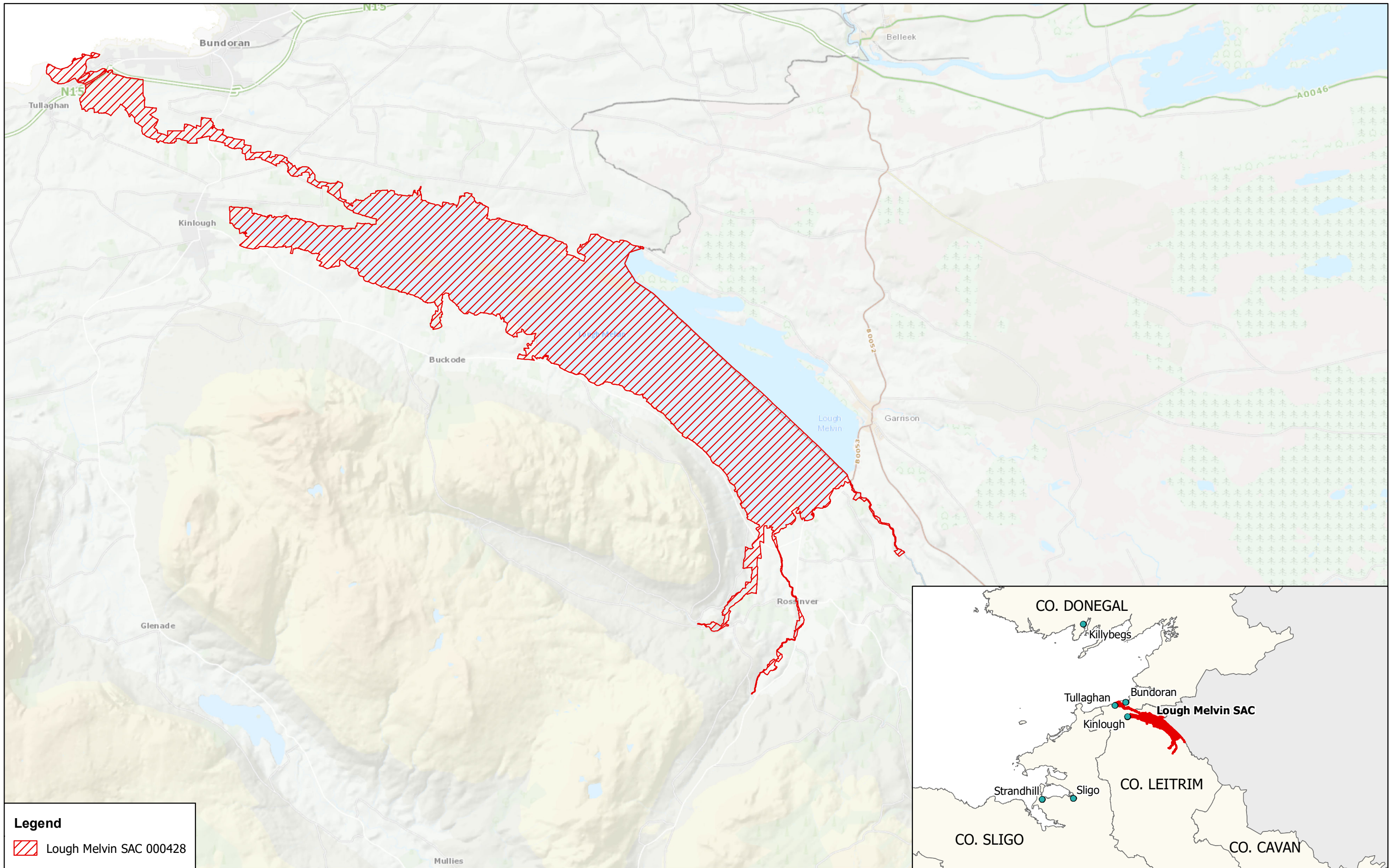


## Conservation Objectives for : Lough Melvin SAC [000428]


### 1355 Otter *Lutra lutra*

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

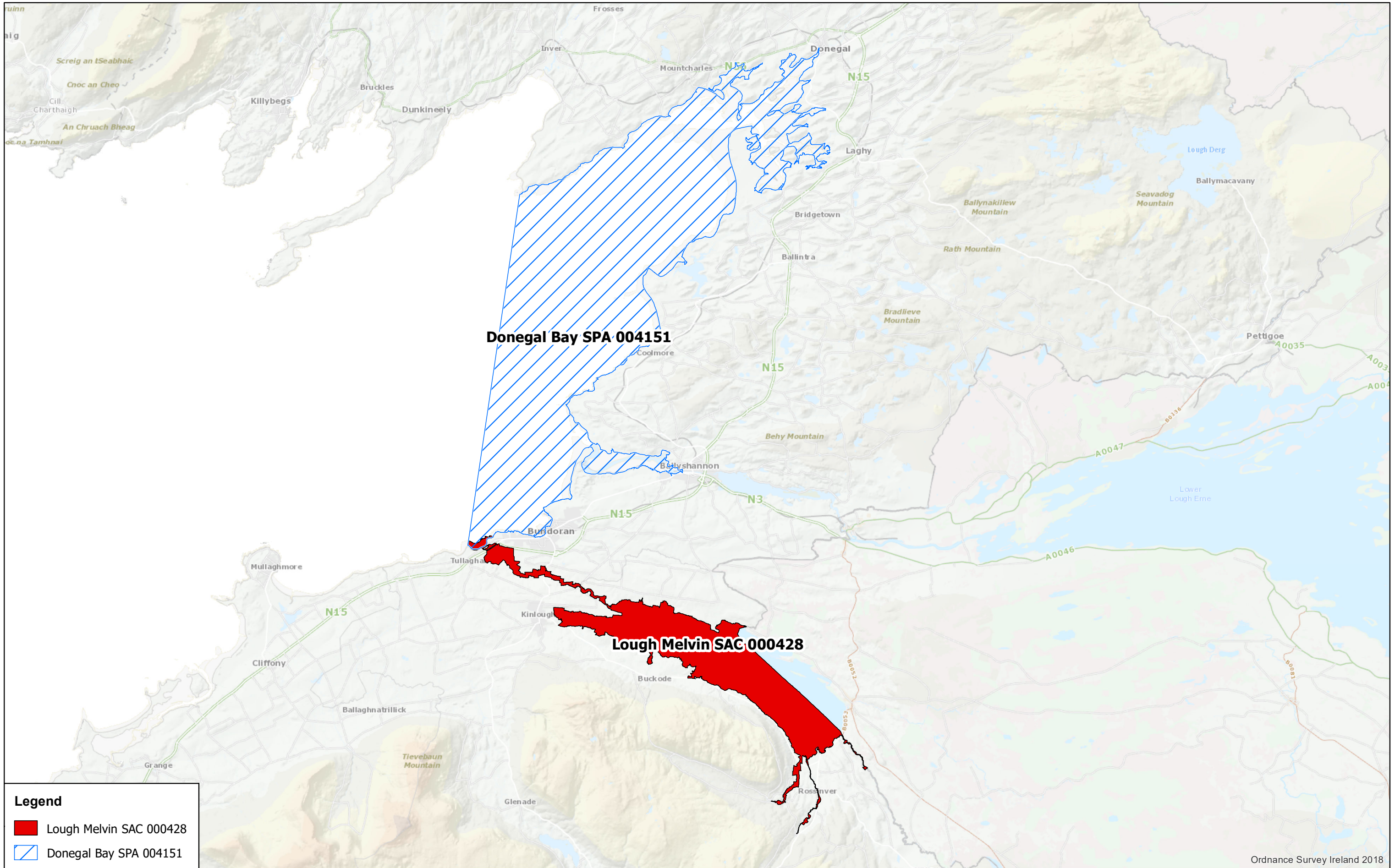
Attribute	Measure	Target	Notes
Distribution	Percentage positive survey sites	No significant decline	Measure based on standard otter survey technique. Favourable Conservation Status (FCS) target, based on 1980/81 survey findings, is 88% in SACs. Current range is estimated at 93.6% (Reid et al., 2013)
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 75.64ha	No field survey. Areas mapped to include 10m terrestrial buffer along shoreline (above high water mark (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 5.87ha	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 20.89km	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 317.55ha	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) and wrasse and rockling in coastal waters (Kingston et al., 1999)
Barriers to connectivity	Number	No significant increase. For guidance, see map 5	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**

 Lough Melvin SAC 000428





**Legend**

- Lough Melvin SAC 000428
- Donegal Bay SPA 004151

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Department of Housing,  
Local Government and Heritage

**MAP 2:  
LOUGH MELVIN SAC  
CONSERVATION OBJECTIVES  
OVERLAPPING SITE**

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

**SITE CODE:  
SAC 000428; version 3.03.  
CO. LEITRIM / DONEGAL**

0 1.25 2.5 5 Kilometres

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 comharthaite. Suirbhéarachtá Ordoanáis na hÉireann Ceadúnas Uimh OSI-NMA-014. © Suirbhéarachtá Ordoanáis na hÉireann Rialtas na hÉireann

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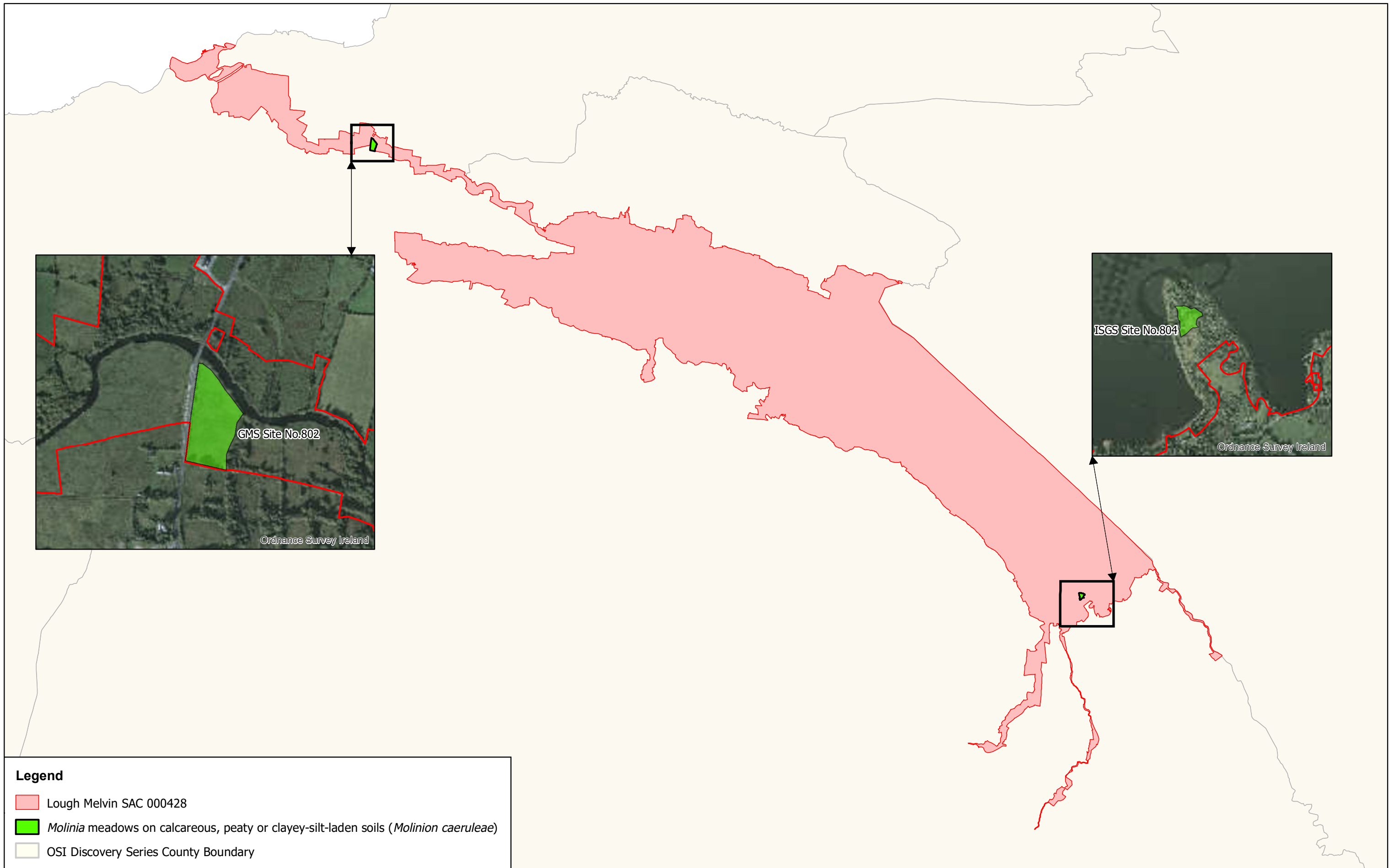
Date: September 2021



**Legend**

- 3130 Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto- Nanojuncetea*
- Lough Melvin SAC 000428
- OSI Discovery Series County Boundary





**Legend**

- Lough Melvin SAC 000428
- Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinia caeruleae*)
- OSI Discovery Series County Boundary

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Department of Housing,  
Local Government and Heritage

**MAP 4:  
LOUGH MELVIN SAC  
CONSERVATION OBJECTIVES  
GRASSLAND HABITATS**

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

**SITE CODE:  
SAC 000428; version 3.03.  
CO. LEITRIM / DONEGAL**

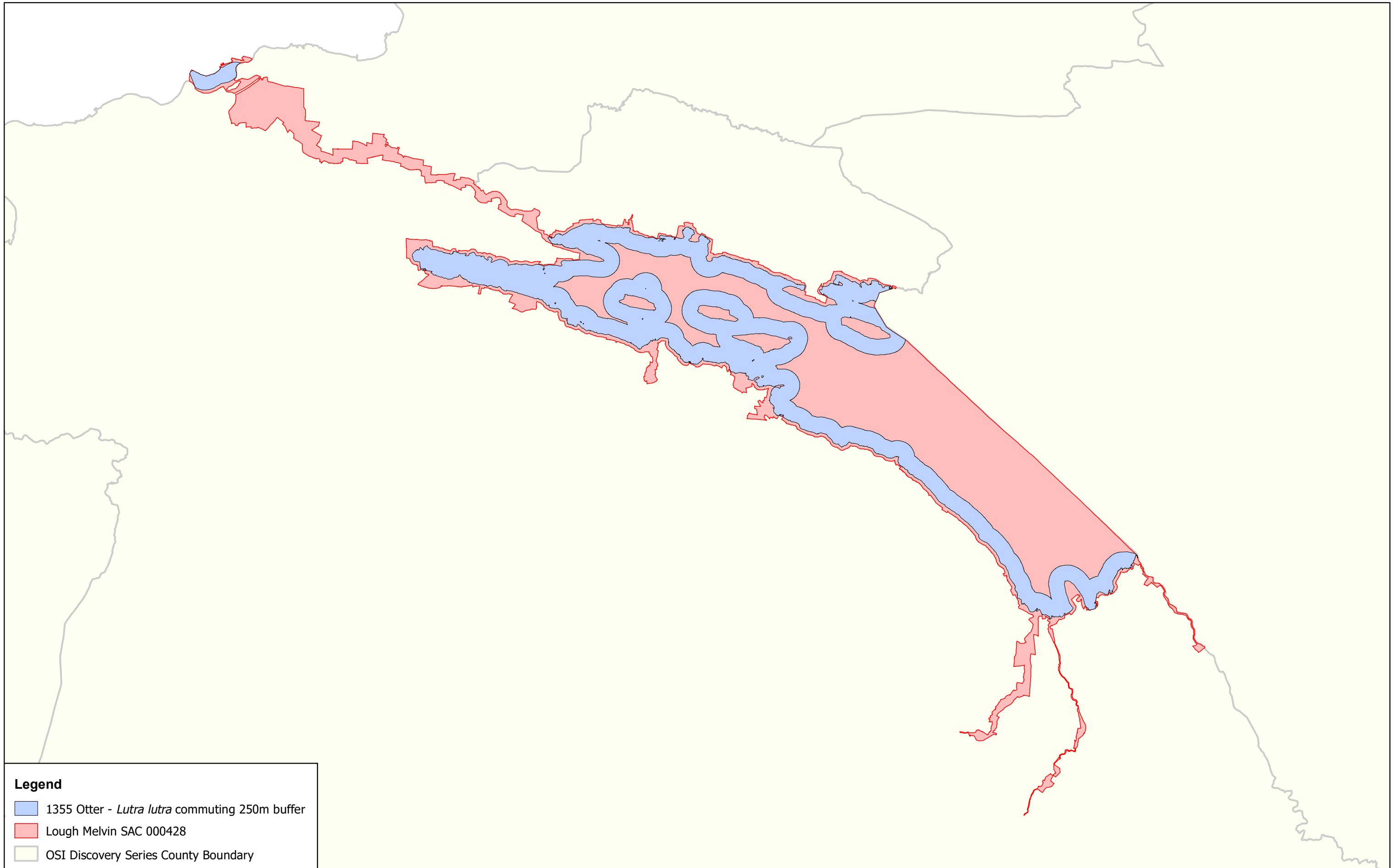


The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
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Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaíthe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh OSI-NMA-014. © Suirbhéarachta Ordonáis na hÉireann Rialtas na hÉireann



**Date: September 2021**



**Legend**

- 1355 Otter - *Lutra lutra* commuting 250m buffer
- Lough Melvin SAC 000428
- OSI Discovery Series County Boundary

# National Parks and Wildlife Service

## *Conservation Objectives Series*

Ben Bulbin, Gleniff and Glenade Complex SAC  
000623



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

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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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000623	Ben Bulbin, Gleniff and Glenade Complex SAC
1013	Geyer's Whorl Snail <i>Vertigo geyeri</i>
1355	Otter <i>Lutra lutra</i>
3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation
4010	Northern Atlantic wet heaths with <i>Erica tetralix</i>
4030	European dry heaths
4060	Alpine and Boreal heaths
5130	<i>Juniperus communis</i> formations on heaths or calcareous grasslands
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
6230	Species-rich <i>Nardus</i> grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)*
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
7130	Blanket bogs (* if active bog)
7140	Transition mires and quaking bogs
7220	Petrifying springs with tufa formation (Cratoneurion)*
7230	Alkaline fens
8110	Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani)
8120	Calcareous and calcshist screes of the montane to alpine levels (Thlaspietea rotundifolii)
8210	Calcareous rocky slopes with chasmophytic vegetation

**Please note that this SAC is adjacent to Glenade Lough SAC (001919) and overlaps with Sligo/Leitrim Uplands SPA (004187). See map 2. The conservation objectives for this site should be used in conjunction with those for the adjacent and 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

<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>	2006
<b>Title :</b>	Otter survey of Ireland 2004/2005
<b>Author :</b>	Bailey, M.; Rochford, J.
<b>Series :</b>	Irish Wildlife Manuals, No. 23
<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>	2009
<b>Title :</b>	Ireland Red List No. 2: Non-marine molluscs
<b>Author :</b>	Byrne, A.; Moorkens, E.A.; Anderson, R.; Killeen, I.J.; Regan, E.C.
<b>Series :</b>	Ireland Red List series, NPWS
<b>Year :</b>	2009
<b>Title :</b>	Irish semi-natural grasslands survey. Annual report No. 2
<b>Author :</b>	O'Neill, F.H.; Martin, J.R.; Perrin, P.M.; Delaney, A.M.; McNutt, K.E.; Devaney, F.M.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2010
<b>Title :</b>	Ireland Red List No. 4: Butterflies
<b>Author :</b>	Regan, E.C.; Nelson, B.; Aldwell, B.; Bertrand, C.; Bond, K.; Harding, J.; Nash, D.; Nixon, D.; Wilson, C.J.
<b>Series :</b>	Ireland Red List series, 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 Manuals, No. 55
<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 Manuals, 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>	Conservation status assessment for petrifying springs
<b>Author :</b>	Lyons, M.D.; Kelly, D.L.
<b>Series :</b>	Unpublished report to 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.; Pietravalle, S.; McDonald, R.A.; Montgomery, W.I.
<b>Series :</b>	Irish Wildlife Manuals, No. 76
<b>Year :</b>	2013
<b>Title :</b>	Irish semi-natural grasslands survey 2007-2012
<b>Author :</b>	O'Neill, F.H.; Martin, J.R.; Devaney, F.M.; Perrin, P.M.
<b>Series :</b>	Irish Wildlife Manuals, No. 78
<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>	National Survey of Upland Habitats (Phase 3, 2012-2013), Draft Site Report No. 11: Ben Bulbin, Gleniff and Glenade Complex cSAC (000623), Co. Sligo
<b>Author :</b>	Perrin, P.M.; Roche, J.R.; Barron, S.J.; Daly, O.H.; Hodd, R.L.; Muldoon, C.S.; Leyden, K.J.
<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 Manuals, No. 79
<b>Year :</b>	2016
<b>Title :</b>	Monitoring guidelines for the assessment of petrifying springs in Ireland
<b>Author :</b>	Lyons, M.D.; Kelly, D.L.
<b>Series :</b>	Irish Wildlife Manuals, No. 94
<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>	2016
<b>Title :</b>	Survey of Flora Protection Order Bryophytes 2016
<b>Author :</b>	Hodd, R.L.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2018
<b>Title :</b>	The Irish Juniper Monitoring Survey 2017
<b>Author :</b>	O'Neill, F.H.; Martin, J.R.
<b>Series :</b>	Irish Wildlife Manuals, No. 101
<b>Year :</b>	2018
<b>Title :</b>	The Irish Juniper Monitoring Survey 2017 - Appendices
<b>Author :</b>	O'Neill, F.H.; Martin, J.R.
<b>Series :</b>	Irish Wildlife Manuals, No. 101
<b>Year :</b>	2018
<b>Title :</b>	The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats
<b>Author :</b>	Martin, J.R.; O'Neill, F.H.; Daly, O.H.
<b>Series :</b>	Irish Wildlife Manuals, No. 102

<b>Year :</b>	2019
<b>Title :</b>	The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation assessments
<b>Year :</b>	2019
<b>Title :</b>	Monitoring of sites and habitat for three Annex II species of whorl snail ( <i>Vertigo</i> )
<b>Author :</b>	Long, M.P.; Brophy, J.T.
<b>Series :</b>	Irish Wildlife Manuals, No. 104
<b>Year :</b>	2019
<b>Title :</b>	Monitoring of sites and habitat for three Annex II species of whorl snail ( <i>Vertigo</i> ). Appendix V. <i>Vertigo geyeri</i> site reports
<b>Author :</b>	Brophy, J.T.; Long, M.P.
<b>Series :</b>	Irish Wildlife Manuals, No. 104
<b>Year :</b>	2019
<b>Title :</b>	Checklists Protected and Threatened Species in Ireland 2019
<b>Author :</b>	Nelson, B.; Cummins, S.; Fay, L.; Jeffrey, R.; Kelly, S.; Kingston, N.; Lockhart, N.; Marnell, F.; Tierney, D.; Wyse Jackson, M.
<b>Series :</b>	Irish Wildlife Manuals, No. 116
<b>Year :</b>	2021
<b>Title :</b>	Checklists Protected and Threatened Species in Ireland. Version 2.1. 3 December 2021
<b>Author :</b>	Nelson, B.; Cummins, S.; Fay, L.; Jeffrey, R.; Kelly, S.; Kingston, N.; Lockhart, N.; Marnell, F.; Tierney, D.; Wyse Jackson, M.
<b>Series :</b>	Irish Wildlife Manuals, No. 116
<b>Year :</b>	2021
<b>Title :</b>	Ben Bulbin, Gleniff and Glenade Complex SAC (site code: 623) 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>	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>	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>	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>	2004
<b>Title :</b>	The Geological Heritage of Sligo. An audit of County Geological Sites in Sligo
<b>Author :</b>	McAteer, C.; Parkes, M.
<b>Series :</b>	Geological Survey of Ireland

<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>	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>	2011
<b>Title :</b>	The Fen Management Handbook
<b>Author :</b>	McBride, A.; Diack, I.; Droy, N.; Hamill, B.; Jones, P.; Schutten, J.; Skinner, A.; Street, M. (eds.)
<b>Series :</b>	Scottish Natural Heritage, Perth
<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>	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>	2015
<b>Title :</b>	The flora and conservation status of petrifying springs in Ireland
<b>Author :</b>	Lyons, M.D.
<b>Series :</b>	Unpublished Ph.D. thesis, Trinity College Dublin
<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>	2017
<b>Title :</b>	Irish Vegetation Classification: Technical Progress Report No. 3
<b>Author :</b>	Perrin, P.
<b>Series :</b>	Report submitted to National Biodiversity Data Centre
<b>Year :</b>	2018
<b>Title :</b>	Irish Vegetation Classification: Technical Progress Report No. 4
<b>Author :</b>	Perrin, P.
<b>Series :</b>	Report submitted to National Biodiversity Data Centre

## Spatial data sources

<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, 4060, 6210, 6430, 7130, 7140, 7220, 7230, 8110, 8120, 8210 (maps 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14)
<b>Year :</b>	2013
<b>Title :</b>	Irish Semi-Natural Grassland Survey
<b>GIS Operations :</b>	Dataset clipped to the SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	6210 (map 6)
<b>Year :</b>	2016
<b>Title :</b>	Point file associated with Lyons (2015)
<b>GIS Operations :</b>	Dataset created from spatial references; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	7220 (map 10)
<b>Year :</b>	2021
<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 15)
<b>Year :</b>	2005
<b>Title :</b>	OSi Discovery series vector data
<b>GIS Operations :</b>	Creation of 80m buffer on aquatic side of lake data; creation of 10m buffer on terrestrial side of lake data Datasets are combined with the derived EPA WFD Waterbodies data. 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 16)
<b>Year :</b>	2010
<b>Title :</b>	EPA WFD Waterbodies data
<b>GIS Operations :</b>	Creation of 10m buffer on terrestrial side of river banks data. Dataset combined with 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 (map 16)

**3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation**

**To maintain the favourable conservation condition of Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation in Ben Bulben, Gleniff and Glenade 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>
Habitat area	Kilometres	Area stable or increasing, subject to natural processes	Conservation objectives concentrate on the high conservation value sub-types of the habitat. Selection of Ben Bulben, Gleniff and Glenade Complex SAC was based on the occurrence of a variety of rare upland stream types. Many streams rise on the plateau and form cascades as they flow over the steep slopes. Some have intermittent flow. Some disappear down swallow holes on the plateau. The SAC is an Important Bryophyte Area with many protected and threatened species, many of which are associated with intermittent streams, splash-zones and stream edges (Lockhart et al., 2012). Many headwaters are base-rich and contain a species-rich bryophyte flora accompanied by tufa deposits, i.e. have petrifying springs. Some base-poor streams have been noted, with a poorly-developed flora mainly composed of calcifuge bryophytes. Further study is required to fully document the habitat sub-types in this SAC
Habitat distribution	Occurrence	No decline, subject to natural processes	The SAC contains the headwaters of many rivers, including the Ballaghtrillick-Black-Duff River, Carney River, Grange River, Diffreen River, Glencar Lough and Drumcillf River. The Glencar waterfall is particularly notable for bryophytes. The Diffreen was surveyed, downstream of the SAC, by Heuff (1987). McAteer and Parkes (2004) stated that the gradual upward transition from the Benbulben Shale Formation to the Glencar Limestone Formation is well exposed in a stream section at Tievebaun and the alternating, fossil-rich shales and limestones are well exposed in other rivers. Further study of Irish rivers is needed to interpret the broad description of 3260 which covers from upland bryophyte/macroalgal dominated to lowland depositing rivers with pondweeds and starworts (European Commission, 2013)
Hydrological regime: river flow	Metres per second	Maintain appropriate hydrological regimes	As noted above, the streams in the SAC display a wide range of upland hydrological regimes from headwaters of petrifying springs and flushes, to slower flows on the plateau, swallow holes and underground stretches, cascades and waterfalls, pools, permanent and intermittent flow. Heuff (1987) described the Diffreen at Aghmore as a high-level karst stream, very few of which occur in Ireland, and a 'turlough among rivers'. Hydrology is a key driver of the high conservation value, bryophyte-rich sub-types found in the SAC. 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



Hydrological regime: groundwater discharge	Metres per second	Maintain appropriate hydrological regime	Groundwater makes significant contributions to the streams in the SAC, with petrifying springs and tufaceous deposits occurring, and some streams disappearing into swallow holes and flowing underground for part of their length. It is essential that the appropriate groundwater contributions necessary for the natural functioning of the habitat be maintained and that there is no significant disturbance of the catchments' groundwater regimes
Substratum composition: particle size range	Millimetres	Maintain appropriate substratum particle size range, quantity and quality, subject to natural processes	Substratum type is variable within the streams in the SAC; however, bedrock is frequent and calcareous groundwater springs and seepages exert a significant influence on many streams through the precipitation of tufa. Boulders and rock dominated the upland stretch of the Diffreen surveyed by Heuff (1987). Although many high conservation value sub-types are dominated by coarse substrata and bedrock, certain sub-types, notably those associated with lake inflows/outflows and peatlands, are dominated by fine substrata. The size and distribution of particles is largely determined by the river flow and geology. The chemical composition (particularly minerals and nutrients) of the substratum is also important. The quality of finer sediment particles is a notable driver of rooted plant communities
Water quality	Various	Maintain appropriate water quality to support the natural structure and functioning of the habitat	The rivers within the SAC are naturally very nutrient-poor and, therefore, require Water Framework Directive (WFD) high status or reference condition. However, some of the methods, e.g. EQRs (Ecological Quality Ratios) for macroinvertebrates and phytobenthos, may not be appropriate to the upland streams such as those found in the SAC, and there are no WFD river monitoring stations within the SAC. A station on the Grange River immediately downstream of the SAC boundary has had consistently high status (Q4-5 or Q5) 1990-2018. See also The European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2019
Typical species	Occurrence	Typical species of the relevant habitat sub-type should be present and in good condition	Typical species have not been fully defined, but may include higher plants, bryophytes, algae and invertebrates. The habitat in the SAC is dominated by bryophytes. Some bryophytes are fully aquatic; however, many are associated with intermittent streams, splash-zones and stream edges: <i>Marchantia polymorpha</i> subsp. <i>montivagans</i> (FPO) is an Endangered species found on a small, tufaceous rock in the river below Glencar waterfall; <i>Campylostelium saxicola</i> (FPO) is Endangered and occurs on rocks at edge of Glencar river (Lockhart et al., 2012). Other species that may be associated with waterfalls and/or temporary streams/cascades include the Near Threatened species <i>Didymodon maximus</i> (FPO), <i>Dumortiera hirsuta</i> and <i>Hymenostylium recurvirostrum</i> (Lockhart et al., 2012). Species with FPO are protected under the Flora (Protection) Order, 2015. <i>Saxifraga aizoides</i> , a spring and stream-side species, is frequent in the SAC

Floodplain connectivity: area	Hectares	Maintain the area of active floodplain at and upstream of the habitat	As the SAC has upland streams, natural floodplains are unlikely to occur. River connectivity with natural floodplains is important for habitat functioning. 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)
Riparian habitat: area and condition	Hectares	Maintain the area and condition of fringing habitats necessary to support the habitat and its sub-types	Riparian habitats (e.g. woodlands and wetlands) are integral to the structure and functioning of rivers, even where not part of a floodplain. Fringing habitats can contribute to the aquatic food web (e.g. allochthonous matter such as leaf fall), provide habitat 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 be important in suppressing algal growth and moderating temperatures. Equally, fringing habitats are dependent on rivers, particularly their water levels, and support wetland communities and species of conservation concern. See Mainstone et al. (2016). A variety of upland and woodland habitats fringe the streams in the SAC. Trees and rock outcrops are important for many typical species as they provide shade and maintain high moisture levels

## Conservation Objectives for : Ben Bulben, Gleniff and Glenade Complex SAC [000623]

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

**To restore the favourable conservation condition of Northern Atlantic wet heaths with *Erica tetralix* in Ben Bulben, Gleniff and Glenade 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	Ben Bulben, Gleniff and Glenade Complex SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; Perrin et al., 2013, 2014). Northern Atlantic wet heaths with <i>Erica tetralix</i> was mapped in detail for the SAC and the total area of the qualifying habitat stated by Perrin et al. (2013) is 44.4ha, covering 0.7% of the SAC. Perrin et al. (2013) report no significant losses of area of the habitat since 1995. Further information can be found in Perrin et al. (2013). Further details on this and the following attributes can be found in the Ben Bulben, Gleniff and Glenade Complex SAC conservation objectives supporting document for upland habitats where a summary of the mapping methodology and a brief discussion of restoration potential are also presented
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 3	Wet heath was recorded with a fragmented distribution and in intimate mosaic with blanket bog within Ben Bulben, Gleniff and Glenade Complex SAC by Perrin et al. (2013). See Perrin et al. (2013) for further information. 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 pH and nutrient status within natural ranges	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 five different wet heath communities within this SAC. Data on the abundance of these communities is reproduced in the uplands supporting document. Further information on the vegetation communities associated with this habitat is presented in Perrin et al. (2014). See also the Irish Vegetation Classification (Perrin, 2017; <a href="http://www.biodiversityireland.ie/projects/ivc-classification-explorer">www.biodiversityireland.ie/projects/ivc-classification-explorer</a> )
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 within a 20m radius of each monitoring stop	Attribute and target 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%	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is presented. 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%	Attribute and target 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%	Attribute and target 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%	Attribute and target 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%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species for this habitat is 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%	Attribute and target based on Perrin et al. (2014). See the uplands supporting document for further details
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). 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%	Attribute and target 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%	Attribute and target 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	Attribute and target 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	Attribute and target 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	Attribute and target based on Perrin et al. (2014), where the list of sensitive areas for this habitat is 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%	Attribute and target 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%	Attribute and target 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 and no decline in status of hepatic mats associated with this habitat	This includes species on the Flora (Protection) Order, 2015 and/or Red Lists (Byrne et al., 2009; Regan et al., 2010; Lockhart et al., 2012; Wyse Jackson et al., 2016, etc.; see Nelson et al., 2019, 2021). 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. Any new records should be considered within this attribute. See the uplands supporting document for further details

## Conservation Objectives for : Ben Bulben, Gleniff and Glenade Complex SAC [000623]

### 4030 European dry heaths

**To restore the favourable conservation condition of European dry heaths in Ben Bulben, Gleniff and Glenade Complex 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	Ben Bulben, Gleniff and Glenade Complex SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; Perrin et al., 2013, 2014). European dry heaths was mapped in detail for the SAC and the total area of the qualifying habitat stated by Perrin et al. (2013) is 648.9ha, covering 10.8% of the SAC. Perrin et al. (2013) report obvious losses of habitat since 1995 of approximately 0.02ha. Further information can be found in Perrin et al. (2013). Further details on this and the following attributes can be found in the Ben Bulben, Gleniff and Glenade Complex SAC conservation objectives supporting document for upland habitats where a summary of the mapping methodology and a brief discussion of restoration potential are also presented
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 4	Dry heath was recorded by Perrin et al. (2013) throughout Ben Bulben, Gleniff and Glenade Complex SAC, particularly on the summit of Ben Bulben, on and around the summit and King's Mountain, the upper slopes of Truskmore, east of the summit of Tievebaun Mountain, in the Gortnagarn and Largy townlands and around the bluffs of the Dooneens. See Perrin et al. (2013) for further information. 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 pH and nutrient status within natural ranges	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 four different dry heath communities within this SAC. Data on the abundance of these communities is reproduced in the uplands supporting document. Further information on the vegetation communities associated with this habitat is presented in Perrin et al. (2014). See also the Irish Vegetation Classification (Perrin, 2017; <a href="http://www.biodiversityireland.ie/projects/ivc-classification-explorer">www.biodiversityireland.ie/projects/ivc-classification-explorer</a> )
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 at least three, excluding <i>Campylopus</i> and <i>Polytrichum</i> mosses	Attribute and target 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 at least two	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat, which is composed of dwarf shrubs, is 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	Cover of positive indicator species at least 50% for siliceous dry heath and 50-75% for calcareous dry heath	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat, which is composed of dwarf shrubs, is presented. 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%	Attribute and target 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%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species is 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%	Attribute and target based on Perrin et al. (2014). See the uplands supporting document for further details. The non-native moss <i>Campylopus introflexus</i> was recorded by Perrin et al. (2013) within this habitat in the SAC
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). 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%	Attribute and target 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%	Attribute and target 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%	Attribute and target 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	Attribute and target 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	Attribute and target based on Perrin et al. (2014), where the list of sensitive areas is presented. 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	Attribute and target 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%	Attribute and target 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 and no decline in status of hepatic mats associated with this habitat	This includes species on the Flora (Protection) Order, 2015 and/or Red Lists (Byrne et al., 2009; Regan et al., 2010; Lockhart et al., 2012; Wyse Jackson et al., 2016, etc.; see Nelson et al., 2019, 2021). 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. Hepatic mats of the <i>Calluna vulgaris</i> - <i>Herbertus aduncus</i> community were recorded within this habitat during the NSUH (Perrin et al., 2013). Any new records should also be considered within this attribute. See the uplands supporting document for further details

## Conservation Objectives for : Ben Bulben, Gleniff and Glenade Complex SAC [000623]

### 4060 Alpine and Boreal heaths

**To restore the favourable conservation condition of Alpine and Boreal heaths in Ben Bulben, Gleniff and Glenade 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	Ben Bulben, Gleniff and Glenade Complex SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; Perrin et al., 2013, 2014). Alpine and Boreal heath was mapped in detail for the SAC and the total area of the qualifying habitat stated by Perrin et al. (2013) is 202.6ha, covering 3.4% of the SAC. Perrin et al. (2013) report no significant losses of area since 1995. Further information can be found in Perrin et al. (2013). Further details on this and the following attributes can be found in the Ben Bulben, Gleniff and Glenade Complex SAC conservation objectives supporting document for upland habitats where a summary of the mapping methodology is also presented
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 5	Alpine and Boreal heath was recorded by Perrin et al. (2013) throughout the SAC, particularly around the summit areas of Ben Bulben and Truskmore and the summit and surrounding slopes of Tievebaun with patches of the habitat occurring around the summit of King's Mountain. See Perrin et al. (2013) for further information. 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 pH and nutrient status within natural ranges	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 two Alpine and Boreal heath communities within this SAC. Data on the abundance of these communities is reproduced in the uplands supporting document. Further information on the vegetation communities associated with this habitat is presented in Perrin et al. (2014). See also the Irish Vegetation Classification (Perrin, 2017; <a href="http://www.biodiversityireland.ie/projects/ivc-classification-explorer">www.biodiversityireland.ie/projects/ivc-classification-explorer</a> )
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 at least three	Attribute and target 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 66%	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is presented. 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 shrub species at least 10%	Attribute and target 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 10%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species is 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%	Attribute and target 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: 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 uplands supporting document for further details, including 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). 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 within the habitat	Attribute and target 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%	Attribute and target 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 and no decline in status of hepatic mats associated with this habitat	This includes species on the Flora (Protection Order, 2015 and/or Red Lists (Byrne et al., 2009; Regan et al., 2010; Lockhart et al., 2012; Wyse Jackson et al., 2016, etc.; see Nelson et al., 2019, 2021). 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. Hepatic mats of the <i>Calluna vulgaris</i> - <i>Herbertus aduncus</i> community were recorded within this habitat during the NSUH (Perrin et al., 2013). Any new records should also be considered within this attribute. See the uplands supporting document for further details

## Conservation Objectives for : Ben Bulben, Gleniff and Glenade Complex SAC [000623]

### 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 Ben Bulben, Gleniff and Glenade 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	The total area of <i>Juniperus communis</i> formations on heath or calcareous grasslands in Ben Bulben, Gleniff and Glenade Complex SAC is unknown. The habitat was not recorded in the SAC during the National Survey of Upland Habitats (NSUH) by Perrin et al. (2013); although specimens of juniper ( <i>Juniperus communis</i> ) were recorded in the SAC, they were not abundant enough to create a formation
Habitat distribution	Occurrence	No decline, subject to natural processes	See the notes for Habitat area above
Juniper formation size	Number and proximity of juniper plants	At least 50 juniper plants present with each plant separated by no more than 20m	Attribute and target based on O'Neill and Martin (2018). A juniper formation is defined by O'Neill and Martin (2018) as any cluster of $\geq 50$ juniper plants where no plant is more than 20m from another. In practice, this means that juniper plants should achieve a minimum density of 25 plants per hectare to qualify as a formation
Vegetation structure: female fruiting plants	Percentage in a representative number of 5m x 5m monitoring stops or in an <i>ad hoc</i> count of 50 plants	Fruiting females comprise at least 10% of juniper plants rooted in plot in at least 50% of stops or in an <i>ad hoc</i> count of 50 plants	Attribute and target based on Cooper et al. (2012) and O'Neill and Martin (2018)
Vegetation structure: seedling recruitment	Presence in a representative number of 5m x 5m monitoring stops	At least one seedling recorded in at least one monitoring stop	Attribute and target based on O'Neill and Martin (2018). Juniper seedlings are defined as plants less than 15cm high that are still flexible and single-stemmed, or with only two branches at most
Vegetation structure: live juniper	Percentage in a representative number of 5m x 5m monitoring stops or across the site as a whole	At least 90% of juniper plants rooted in plot alive in at least 75% of stops or across the site as a whole	Attribute and target based on Cooper et al. (2012) and O'Neill and Martin (2018)
Vegetation composition: negative indicator species	Percentage in a representative number of 5m x 5m monitoring stops	Total cover of negative indicator species to be less than 10% in at least 50% of stops	Attribute and target based on O'Neill and Martin (2018) where the list of negative indicator species is also presented
Physical structure: germination niches	Percentage in a representative number of 5m x 5m monitoring stops	At least 5% bare soil and/or at least 5% bare rock in at least 25% of stops	Attribute and target based on O'Neill and Martin (2018). Bare soil is important as a germination micro-site and bare rock can also contribute, particularly at the soil-rock interface and in limestone pavement grikes
Formation structure: browning/die-back of plants	Percentage of juniper cover in a representative number of 5m x 5m monitoring stops	Browning or dead juniper branches (excluding fully dead plants) comprise no more than 20% of total juniper cover in plot in at least 75% of stops	Attribute and target based on O'Neill and Martin (2018)
Formation structure: evidence of browsing and bark stripping	Occurrence across a representative number of 5m x 5m monitoring stops	Recent browsing of juniper plants and bark stripping and trampling due to browsers evident in no more than 75% of stops	Attribute and target based on O'Neill and Martin (2018). This attribute concerns bark stripping by animals. Bark stripping or damage from abrasion by rock is not included here. It should be noted, however, that distinguishing between the two may be difficult
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 on the Flora (Protection) Order, 2015 and/or Red Lists (Byrne et al., 2009; Regan et al., 2010; Lockhart et al., 2012; Wyse Jackson et al., 2016, etc.; see Nelson et al., 2019, 2021)

## Conservation Objectives for : Ben Bulben, Gleniff and Glenade Complex SAC [000623]

### 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (\* important orchid sites)

To restore the favourable conservation condition of Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (\* important orchid sites) in Ben Bulben, Gleniff and Glenade 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	The National Survey of Upland Habitats (NSUH; Perrin et al., 2013) surveyed Ben Bulben, Gleniff and Glenade Complex SAC in 2012, mapping large areas which contain this habitat. The Irish Semi-natural Grassland Survey (ISGS; O'Neill et al., 2013) surveyed seven sites in the SAC in 2009 and 2010. Combining the results from both of these surveys gives an area of 96.56ha of 6210 within this SAC (see map 6). It is important to note that further unsurveyed areas of the habitat may be present within the SAC. It should also be noted that the habitat occurs in intimate association with other habitats, including other Annex I habitats, and therefore, these habitats sometimes cannot easily be mapped or considered separately. Conservation objectives for all co-occurring habitats should be used in conjunction with each other as appropriate
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 6	The distribution is based on the mapping of the NSUH (Perrin et al., 2013) and the ISGS (O'Neill et al., 2013). The habitat is widespread across the SAC, but is most common on the grassy slopes. In places its occurrence is patchy. Note that further unsurveyed areas of the habitat may be present within the SAC
Vegetation composition: positive indicator species	Number at a representative number of 2m x 2m monitoring stops; within 20m surrounding area of monitoring stops	At least 7 positive indicator species present in monitoring stop or, if 5–6 present in stop, additional species within 20m of stop; this includes at least two 'high quality' positive indicator species present in stop or within 20m of stop	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018), where the lists of positive indicator species, including high quality indicators, are also presented. A small number of additional positive indicators for upland examples of this habitat are also provided (Martin et al., 2018). These documents should be consulted for further details
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Negative indicator species collectively not more than 20% cover, with cover of an individual species not more than 10%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018), where the list of negative indicator species is presented
Vegetation composition: non-native species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of non-native species not more than 1%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Vegetation composition: woody species and bracken	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of woody species (except certain listed species) and bracken ( <i>Pteridium aquilinum</i> ) not more than 5%	Woody species that can occur above 5% cover are juniper ( <i>Juniperus communis</i> ), burnet rose ( <i>Rosa spinosissima</i> ), mountain avens ( <i>Dryas octopetala</i> ) and hoary rock-rose ( <i>Helianthemum oelandicum</i> ). However, cover of these species above 25% may indicate transition to another Annex I habitat such as Alpine and Boreal heaths (4060) or <i>Juniperus communis</i> formations (5130). Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018). Scrub and bracken encroachment has been noted as an issue for this habitat in some areas in this SAC (O'Neill et al., 2013)
Vegetation structure: broadleaf herb:grass ratio	Percentage at a representative number of 2m x 2m monitoring stops	Broadleaf herb component of vegetation between 40% and 90%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018). Broadleaf herb component of vegetation between 30% and 40% may be allowed to pass on expert judgement (Martin et al., 2018)



Vegetation structure: sward height	Percentage at a representative number of 2m x 2m monitoring stops	At least 30% of sward between 5cm and 40cm tall	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Vegetation structure: litter	Percentage cover at a representative number of 2m x 2m monitoring stops	Litter cover not more than 25%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018). The sward becoming rank, with high litter cover, has been mentioned as an issue for this habitat in some areas in the SAC (O'Neill et al., 2013)
Physical structure: bare soil	Percentage cover at a representative number of 2m x 2m monitoring stops	Not more than 10% bare soil	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Physical structure: grazing or disturbance	Area in local vicinity of a representative number of monitoring stops	Area of the habitat showing signs of serious grazing or disturbance less than 20m <sup>2</sup>	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)

## Conservation Objectives for : Ben Bulben, Gleniff and Glenade Complex SAC [000623]

### 6230 Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)\*

To restore the favourable conservation condition of Species-rich *Nardus* grassland, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)\* in Ben Bulben, Gleniff and Glenade 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	Areas of habitat referable to Species-rich <i>Nardus</i> grassland* have been mapped at both the Sligo and Leitrim sides of this large SAC (NPWS internal files; O'Neill et al., 2009), but further data are needed in both cases to confirm the nature and extent of the habitat area. The total area of the habitat is thus not currently known for Ben Bulben, Gleniff and Glenade Complex SAC
Habitat distribution	Occurrence	No decline, subject to natural processes	See the notes for habitat area above
Vegetation composition: positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	At least 7 positive indicator species present in monitoring stop	Attribute and target based on O'Neill et al. (2013) and Perrin et al. (2014), both of which present the list of positive indicator species for this habitat. A range of positive indicator species are known to occur in the habitat in the SAC
Vegetation composition: high quality indicator species	Number of species at a representative number of 2m x 2m monitoring stops	The list of positive indicators for a monitoring stop to include at least 2 'high quality' indicator species for base-rich examples of the habitat, and at least 1 for base-poor examples	Attribute and target based on O'Neill et al. (2013) and Perrin et al. (2014), both of which present the list of positive indicator species for this habitat
Vegetation composition: species richness	Number of species at a representative number of 2m x 2m monitoring stops	Species richness at each monitoring stop at least 25 species, with bryophytes and lichens included	Attribute and target based on O'Neill et al. (2013) and Perrin et al. (2014). Species richness is a key characteristic of 6230 <i>Nardus</i> grasslands* which distinguishes it from species-poor <i>Nardus</i> swards that are very common in the uplands of Ireland and the UK. All vascular plants, bryophytes and terricolous macrolichens are counted
Vegetation composition: non-native species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of non-native species not more than 1%	Attribute and target based on O'Neill et al. (2013) and Perrin et al. (2014). Non-native species can be invasive and have deleterious effects on native vegetation. A low target is set as non-native species can spread rapidly and are most easily dealt with when still at lower abundances
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Negative indicator species collectively not more than 20% cover, with cover of an individual species not more than 10%	Attribute and target based on O'Neill et al. (2013) and Perrin et al. (2014), both of which present the list of negative indicator species for this habitat
Vegetation composition: <i>Sphagnum</i> cover	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of <i>Sphagnum</i> species not more than 10%	Attribute and target based on O'Neill et al. (2013) and Perrin et al. (2014). High cover of <i>Sphagnum</i> mosses is not characteristic of 6230 <i>Nardus</i> grasslands* and may indicate changes in hydrology or soil nutrients within the habitat, but is more likely to indicate that the community is inherently a marginal example of the habitat
Vegetation composition: <i>Polytrichum</i> cover	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of <i>Polytrichum</i> species not more than 25%	Attribute and target based on O'Neill et al. (2013) and Perrin et al. (2014). High cover of <i>Polytrichum</i> mosses is not characteristic of 6230 <i>Nardus</i> grasslands*. Such levels may indicate changes in hydrology or soil nutrients within the habitat, but are more likely to indicate that the community is inherently a marginal example of the habitat

Vegetation composition: shrubs, bracken and heath cover	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of woody species (shrubs, heathers) and bracken ( <i>Pteridium aquilinum</i> ) collectively not more than 5%	Attribute and target based on O'Neill et al. (2013) and Perrin et al. (2014). High cover of bracken indicates that the habitat may be undergoing succession towards a dense bracken community, and high cover of native trees and shrubs may indicate that the habitat is moving towards scrub or woodland due to lack of grazing. High cover of heather species (above 25%) may indicate transition to a heathland habitat
Vegetation structure: forb to graminoid ratio	Percentage at a representative number of 2m x 2m monitoring stops	Forb component of forb:graminoid ratio is 20-90%	Attribute and target based on O'Neill et al. (2013) and Perrin et al. (2014). Forb richness is characteristic of conservation value swards
Vegetation structure: sward height	Percentage at a representative number of 2m x 2m monitoring stops	At least 25% of sward between 5cm and 50cm tall	Attribute and target based on O'Neill et al. (2013) and Perrin et al. (2014). The lower and upper height limits aim to record overgrazing and undergrazing respectively
Vegetation structure: litter cover	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of litter not more than 20%	Attribute and target based on O'Neill et al. (2013) and Perrin et al. (2014). High levels of leaf litter can be indicative of undergrazing, with a resulting impact on species richness
Physical structure: bare ground	Percentage cover at a representative number of 2m x 2m monitoring stops	Not more than 10% bare ground	Attribute and target based on O'Neill et al. (2013) and Perrin et al. (2014). Notable areas of bare ground can result from overgrazing, use of machinery, human trampling, etc. If excessive, this can result in loss of characteristic species and habitat damage
Physical structure: grazing or disturbance	Area in local vicinity of a representative number of monitoring stops	Area of the habitat showing signs of serious grazing or disturbance less than 20m <sup>2</sup>	Attribute and target based on O'Neill et al. (2013) and Perrin et al. (2014). Serious overgrazing or disturbance can impact on species richness, nutrient status, soil stability and habitat integrity
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil pH and nutrient status within natural ranges	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat (NPWS, 2013)

## Conservation Objectives for : Ben Bulben, Gleniff and Glenade Complex SAC [000623]

### 6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels

To maintain the favourable conservation condition of Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels in Ben Bulben, Gleniff and Glenade 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	Ben Bulben, Gleniff and Glenade Complex SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; Perrin et al., 2013, 2014). Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels was mapped in detail for the SAC and the total area of the qualifying habitat stated by Perrin et al. (2013) is 1.9ha. The upland cliff ledge variant of the habitat was recorded on many of the limestone cliffs in the SAC by Perrin et al. (2013). Further information can be found in Perrin et al. (2013). A summary of the mapping methodology can be found in the Ben Bulben, Gleniff and Glenade Complex SAC conservation objectives supporting document for upland habitats. An additional area of 0.21ha of this habitat was mapped by the Irish Semi-natural Grasslands Survey (O'Neill et al., 2013) on the south side of Glencar Lough. This brings the total area of the habitat known from the SAC to c.2.1ha
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 7	The distribution is based on the mapping of the NSUH (Perrin et al., 2013) and the ISGS (O'Neill et al., 2013)
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil pH and nutrient status within natural ranges	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat (NPWS, 2013)
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Perrin et al. (2013) recorded two tall herb communities of the upland ledge variant of the habitat within this SAC, namely TH2 - <i>Cochlearia pyrenaica</i> tall herb vegetation and TH3 - <i>Sedum rosea-Angelica sylvestris</i> tall herb vegetation. Further information on these communities is presented in Perrin et al. (2014)
Vegetation composition: number of positive indicator species	Number of species at a representative number of monitoring stops	At least one positive indicator species at each monitoring stop	The list of positive indicator species for the upland variant of this habitat can be found in the Article 17 habitat assessment for 6430 (NPWS, 2019). See Perrin et al. (2013, 2014) for further details
Vegetation composition: cover of positive indicator species	Percentage cover at a representative number of monitoring stops	Cover of positive indicator species at least 25%	The list of positive indicator species for the upland variant of this habitat can be found in the Article 17 habitat assessment for 6430 (NPWS, 2019). See Perrin et al. (2013, 2014) for further details
Vegetation composition: non-native species	Percentage cover at a representative number of monitoring stops	Cover of non-native species less than 1%	See NPWS (2019) and Perrin et al. (2013, 2014) for further details
Vegetation structure: height/flowering	Percentage/occurrence at a representative number of monitoring stops	At least 50% of tall herb stems should be greater than 20cm tall or signs of flowering/ability to flower should be present	See NPWS (2019) and Perrin et al. (2013, 2014) for further details
Vegetation structure: grazing	Percentage of flowering tall herb shoots grazed at a representative number of monitoring stops	Live shoots of flowering tall herb shoots showing signs of grazing less than 50%	See NPWS (2019) and Perrin et al. (2013, 2014) for further details

Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of monitoring stops	Cover of disturbed bare ground in monitoring stop less than 25% and less than 10% in local vicinity of monitoring stop	See NPWS (2019) and Perrin et al. (2013, 2014) 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	This includes species on the Flora (Protection) Order, 2015 and/or Red Lists (Byrne et al., 2009; Regan et al., 2010; Lockhart et al., 2012; Wyse Jackson et al., 2016, etc.; see Nelson et al., 2019, 2021). 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. Any new records should be considered within this attribute



## Conservation Objectives for : Ben Bulben, Gleniff and Glenade Complex SAC [000623]

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

**To restore the favourable conservation condition of Blanket bogs (\* if active bog) in Ben Bulben, Gleniff and Glenade Complex 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	Ben Bulben, Gleniff and Glenade Complex SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; Perrin et al., 2013, 2014). Perrin et al. (2013) state that the total area of blanket bog in the SAC is 2,134.5ha (35.6% of the SAC). This comprises 2,083.5ha of active blanket bog and 51.0ha of inactive blanket bog. Perrin et al. (2013) report obvious losses of habitat since 1995 of approximately 0.86ha. However, this is almost certainly an underestimate, as chronic losses due to erosion since 1995 cannot be quantified (106.5ha were mapped as eroding blanket bog by Perrin et al., 2013). It should be noted also that further restoration of blanket bog would be required in order to fulfil the targets for peat formation and hydrology presented below. See the Ben Bulben, Gleniff and Glenade Complex SAC conservation objectives supporting document for upland habitats for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 8	Blanket bog was recorded by Perrin et al. (2013) throughout Ben Bulben, Gleniff and Glenade Complex SAC. See Perrin et al. (2013) for further information. 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 pH and nutrient status within natural ranges	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 habitat	At least 99% of the total Annex I blanket bog area is active	From the areas given by Perrin et al. (2013) above, 97.6% of the Annex I blanket bog habitat is currently active. 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 five 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 the vegetation communities associated with this habitat is presented in Perrin et al. (2014). See also the Irish Vegetation Classification (Perrin, 2017; <a href="http://www.biodiversityireland.ie/projects/ivc-classification-explorer">www.biodiversityireland.ie/projects/ivc-classification-explorer</a> )
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 at least seven	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is presented. 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%	Attribute and target 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%	Attribute and target 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%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species is 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%	Attribute and target based on Perrin et al. (2014). See the uplands supporting document for further details. Rhododendron ( <i>Rhododendron ponticum</i> ) and the non-native moss <i>Campylopus introflexus</i> were recorded within this habitat in the SAC by Perrin et al. (2013)
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). 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	Attribute and target 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%	Attribute and target 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	Attribute and target based on Perrin et al. (2014), where the list of sensitive areas is 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%	Attribute and target 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%	Attribute and target based on Perrin et al. (2014). See the uplands supporting document for further details
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). 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	This includes species on the Flora (Protection) Order, 2015 and/or Red Lists (Byrne et al., 2009; Regan et al., 2010; Lockhart et al., 2012; Wyse Jackson et al., 2016, etc.; see Nelson et al., 2019, 2021). 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. Any new records should be considered within this attribute. See the uplands supporting document for further details

## Conservation Objectives for : Ben Bulben, Gleniff and Glenade Complex SAC [000623]

### 7140 Transition mires and quaking bogs

**To maintain the favourable conservation condition of Transition mires and quaking bogs in Ben Bulben, Gleniff and Glenade 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	Ben Bulben, Gleniff and Glenade Complex SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; Perrin et al., 2013, 2014). Transition mire was mapped in detail for the SAC and the total area of the qualifying habitat stated by Perrin et al. (2013) is 4.1ha, covering only c.0.1% of the SAC. Perrin et al. (2013) report no significant losses of area since 1995. Further details on this and the following attributes can be found in the Ben Bulben, Gleniff and Glenade Complex SAC conservation objectives supporting document for upland habitats where a summary of the mapping methodology is also presented
Habitat distribution	Occurrence	No decline from current distribution, subject to natural processes. See map 9	Transition mire was recorded by Perrin et al. (2013) scattered throughout the SAC. See Perrin et al. (2013) for further information. 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 pH and nutrient status within natural ranges	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 vegetation communities associated with this habitat is presented in Perrin et al. (2014). See also the Irish Vegetation Classification (Perrin, 2018; <a href="http://www.biodiversityireland.ie/projects/ivc-classification-explorer">www.biodiversityireland.ie/projects/ivc-classification-explorer</a> )
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	Attribute and target 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	Attribute and target 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%	Attribute and target 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%	Attribute and target 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, 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). See the uplands supporting document for further details
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%	Attribute and target based on Perrin et al. (2014). This attribute is only applicable to fen and flush examples of the habitat, 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%	Attribute and target 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%	Attribute and target 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	This includes species on the Flora (Protection) Order, 2015 and/or Red Lists (Byrne et al., 2009; Regan et al., 2010; Lockhart et al., 2012; Wyse Jackson et al., 2016, etc.; see Nelson et al., 2019, 2021). 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. Any new records should be considered within this attribute. See the uplands supporting document for further details

## Conservation Objectives for : Ben Bulben, Gleniff and Glenade Complex SAC [000623]

### 7220 Petrifying springs with tufa formation (Cratoneurion)\*

**To maintain the favourable conservation condition of Petrifying springs with tufa formation (Cratoneurion)\* in Ben Bulben, Gleniff and Glenade Complex SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Square metres	Area stable or increasing, subject to natural processes	Within Ben Bulben, Gleniff and Glenade Complex SAC, 71 polygons were recorded as containing petrifying springs during the National Survey of Upland Habitats (NSUH; Perrin et al., 2013), with an area of 2.6ha (c.26,000m <sup>2</sup> ). The approach to mapping conducted during the NSUH is detailed in Perrin et al. (2014). Note that the NSUH did not undertake a conservation status assessment of the habitat in the SAC; thus, it is not included in the 000623 uplands supporting document. Lyons (2015) mapped 17 springs in total: at Glencar (sub-sites PS038a and PS038b), Glenade, below Eagle's Rock (PS040a-e), Gleniff, Annacoona (PS058a-e), Cormac Reagh's Hole (PS106), Benbulbin Corrie (PS107), Benwiskin (PS108), Eagle's Rock, Glenade (PS113) and Larganavaddoge (PS115), totalling c.10,840m <sup>2</sup> . See Perrin et al. (2013) and Lyons (2015) for further details. See Lyons and Kelly (2016) for further details on this and all attributes. It is important to note that further unmapped springs may be present in the SAC
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 10	See map 10 for the point locations mapped by Lyons (2015) and the point locations of the centroids of the polygons containing the habitat recorded by Perrin et al. (2013)
Hydrological regime: height of water table; water flow	Metres; metres per second	Maintain appropriate hydrological regimes	Petrifying springs rely on permanent irrigation, usually from upwelling groundwater sources or seepage sources (Lyons and Kelly, 2013). In karst areas, water tends to flow away rapidly over bare rock surfaces, even on fairly flat ground (Lyons and Kelly, 2013). Water flow should not be altered anthropogenically. See Lyons and Kelly (2016) for further details. Conifer plantations adjoin the sub-sites PS058e and PS106; harvesting of trees poses a potential risk to the wetland habitats due to disturbance and run-off associated with felling and removing trees (Lyons, 2015)
Physical structure: tufa formations	Seepage rate to the spring and groundwater quality (saturated calcium carbonate, pH, temperature and alkalinity conditions)	Maintain appropriate levels of tufa formation	Petrifying springs are springs that typically form small calcareous or 'tufa' deposits. On contact with the atmosphere at the spring head, carbon dioxide is lost from calcium saturated water to the atmosphere or is depleted by the photosynthetic activities of plants. This results in the precipitation of a calcium carbonate marl or tufa. Seepage flow rates are crucial for the development of tufa. See Lyons (2015) for the main tufa types at the sub-sites surveyed in the SAC
Ecosystem function: water quality - nitrate level	mg/l	Maintain nitrate level at less than 10mg/l	Attribute and target based on Lyons and Kelly (2016). Lyons (2015) recorded baseline nitrate levels of: 2.58mg/l at PS038b; 1.87mg/l at PS040d; <0.07mg/l at PS058b; 1.34mg/l at PS058d; 0.20mg/l at PS058e; 0.39mg/l at PS106; 0.81mg/l at PS107; 0.94mg/l at PS108; 0.32mg/l at PS113 and <0.07mg/l at PS115
Ecosystem function: water quality - phosphate level	µg/l	Maintain phosphate level to less than 15µg/l	Attribute and target based on Lyons and Kelly (2016). Lyons (2015) recorded baseline phosphate levels of: 9µg/l at PS038b; 12µg/l at PS040d; 6µg/l at PS058b; 9µg/l at PS058d; 5µg/l at PS058e; 6µg/l at PS106; 5µg/l at PS107; 5µg/l at PS108; 8µg/l at PS113 and 11µg/l at PS115

Vegetation composition: community diversity	Variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Lyons and Kelly (2016) describe eight plant communities of petrifying springs in Ireland based on relevé data. At PS038a and PS038b, the main community type recorded by Lyons (2015) was <i>Palustriella commutata-Geranium robertianum</i> springheads; that at PS040d and PS040e was <i>Palustriella falcata-Carex panicea</i> springs; that at PS058e was <i>Eucladium verticillatum-Pellia endiviifolia</i> tufa cascades; <i>Saxifraga aizoides-Seligeria oelandica</i> springs were recorded at PS058b, PS058c, PS058d, PS107, PS108, PS113 and PS115; and, at PS106, <i>Palustriella commutata-Agrostis stolonifera</i> springheads, with <i>Schoenus nigricans</i> springs were recorded. Further information on the vegetation communities associated with the habitat is presented in Lyons and Kelly (2016)
Vegetation composition: positive indicator species	Number per spring	At least three positive/high quality indicator species as listed in Lyons and Kelly (2016) and no loss from baseline number	Attribute and target based on Lyons and Kelly (2016), where the lists of positive and high quality indicator species are presented. See Lyons (2015) for baseline numbers and lists of species recorded in the surveyed springs in the SAC
Vegetation composition: negative indicator species	Cover (DAFOR scale)	Potentially negative indicator species should not be Dominant or Abundant; potentially negative woody species should be absent in unwooded springs; invasive species should be absent	Based on Lyons and Kelly (2016), where the lists of potentially negative herbaceous, bryophyte, algal and woody species are presented. See Lyons and Kelly (2016) for further details on potentially negative and potentially invasive species. The potentially negative woody species ash ( <i>Fraxinus excelsior</i> ) was recorded at PS040d, and hawthorn ( <i>Crataegus monogyna</i> ) at PS040d and PS040e, both unwooded springs, but were very rare overall. Lyons (2015) recorded the potentially negative bryophytes <i>Brachythecium rivulare</i> at PS058a and PS106, <i>Cratoneuron filicinum</i> at PS058b, PS058d and PS058e and <i>Platyhypnidium riparioides</i> at PS038a and the potentially negative herbaceous species soft rush ( <i>Juncus effusus</i> ) at PS058b and PS107 and the non-native New Zealand willowherb ( <i>Epilobium brunnescens</i> ) at PS038b, PS058b, PS058e, PS107 and PS113, but none were Dominant or Abundant alone or in combination and the attribute was passed by Lyons (2015)
Vegetation composition: algal cover	Percentage cover at, and in local vicinity of, a representative number of monitoring stops	Cover of algae less than 2%	Algal cover is indicative of nutrient enrichment from multiple sources (McBride et al., 2011)
Vegetation structure: sward height	Centimetres	Field layer height between 10cm and 50cm (except for bryophyte-dominated ground <10cm)	Attribute and target based on Lyons and Kelly (2016)
Physical structure: trampling/dung	Cover (DAFOR scale)	Cover should not be Dominant or Abundant	Attribute and target based on Lyons and Kelly (2016)
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat; maintain features of local distinctiveness, subject to natural processes	This includes species on the Flora (Protection) Order, 2015 and/or Red Lists (Byrne et al., 2009; Regan et al., 2010; Lockhart et al., 2012; Wyse Jackson et al., 2016, etc.; see Nelson et al., 2019, 2021). Of particular note, the Near Threatened liverwort <i>Leiocolea bantriensis</i> (Lockhart et al., 2012) was recorded at PS058b. The Near Threatened mosses <i>Hymenostylium recurvirostrum</i> var. <i>insigne</i> , <i>Orthothecium rufescens</i> and <i>Seligeria patula</i> and the Vulnerable moss <i>Seligeria oelandica</i> (Lockhart et al., 2012) were recorded at various sub-sites in the SAC by Lyons (2015). See also the conservation objective for Geyer's whorl snail ( <i>Vertigo geyeri</i> ; Annex II species code 1013) in this volume



## Conservation Objectives for : Ben Bulben, Gleniff and Glenade Complex SAC [000623]

### 7230 Alkaline fens

**To restore the favourable conservation condition of Alkaline fens in Ben Bulben, Gleniff and Glenade Complex 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	Ben Bulben, Gleniff and Glenade Complex SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; Perrin et al., 2013, 2014). Alkaline fen was mapped in detail for the SAC and the total area of the qualifying habitat stated by Perrin et al. (2013) is 22.7ha, covering only 0.4% of the SAC. Perrin et al. (2013) report obvious losses of habitat of <0.01ha since 1995. Further details on this and the following attributes can be found in the Ben Bulben, Gleniff and Glenade Complex SAC conservation objectives supporting document for upland habitats where a summary of the mapping methodology is also presented
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 11	Perrin et al. (2013) recorded alkaline fen across the SAC on lower slopes, most frequently below the cliffs at Annacoona. See Perrin et al. (2013) for further details. 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 pH and nutrient status within natural ranges	See the uplands supporting document for further details
Ecosystem function: peat formation	Percentage cover of peat-forming vegetation and water table levels	Maintain active peat formation, where appropriate	In order for peat to form, water levels need to be slightly below or above the soil surface for c.90% of the time
Ecosystem function: hydrology	Metres	Maintain, or where necessary restore, 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
Ecosystem function: water quality	Water chemistry measures	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of the habitat	Fens receive natural levels of nutrients (e.g. iron, magnesium and calcium) from water sources. However, they are generally poor in nitrogen and phosphorus, with the latter tending to be the limiting nutrient under natural conditions. Water supply should be also relatively calcium-rich
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Perrin et al. (2013) recorded four different alkaline fen vegetation communities within this SAC. Data on the abundance of these communities is reproduced in the uplands supporting document. Further information on vegetation communities associated with this habitat is presented in Perrin et al. (2014). See also the Irish Vegetation Classification (Perrin, 2018; <a href="http://www.biodiversityireland.ie/projects/ivc-classification-explorer">www.biodiversityireland.ie/projects/ivc-classification-explorer</a> )
Vegetation composition: number of positive indicator species (brown mosses)	Number of species at a representative number of 2m x 2m monitoring stops	Number of brown moss species present at each monitoring stop at least one	Attribute and target 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 positive indicator species (vascular plants)	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive vascular plant indicator species present at each monitoring stop is at least two for small-sedge flushes and at least three for black bog-rush ( <i>Schoenus nigricans</i> ) flush and bottle sedge ( <i>Carex rostrata</i> ) fen	Attribute and target 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 brown moss species and positive vascular plant indicator species at least 20% for small-sedge flushes and at least 75% cover for black bog-rush ( <i>Schoenus nigricans</i> ) flush and bottle sedge ( <i>Carex rostrata</i> ) fen	Attribute and target 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%	Attribute and target 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, 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). See the uplands supporting document for further details. No non-native species were recorded within this habitat during the NSUH (Perrin et al., 2013)
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). See the uplands supporting document for further details
Vegetation composition: soft rush and common reed cover	Percentage cover in local vicinity of a representative number of monitoring stops	Total cover of soft rush ( <i>Juncus effusus</i> ) and common reed ( <i>Phragmites australis</i> ) less than 10%	Attribute and target based on Perrin et al. (2014). See the uplands supporting document for further details
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 5cm above the ground surface should be at least 50%	Attribute and target 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%	Attribute and target 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%	Attribute and target based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: tufa formations	Percentage cover in local vicinity of a representative number of 2m x 2m monitoring stops	Disturbed proportion of vegetation cover where tufa is present is less than 1%	Attribute and target 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	This includes species on the Flora (Protection) Order, 2015 and/or Red Lists (Byrne et al., 2009; Regan et al., 2010; Lockhart et al., 2012; Wyse Jackson et al., 2016, etc.; see Nelson et al., 2019, 2021). 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. Any new records should be considered within this attribute. See the uplands supporting document for further details

## Conservation Objectives for : Ben Bulben, Gleniff and Glenade Complex SAC [000623]

### 8110 Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*)

**To maintain the favourable conservation condition of Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) in Ben Bulben, Gleniff and Glenade 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	Ben Bulben, Gleniff and Glenade Complex SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; Perrin et al., 2013, 2014). Siliceous scree of the montane to snow levels ( <i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i> ) was mapped in detail for the SAC and the total area of the qualifying habitat stated by Perrin et al. (2013) is 37.6ha. This covers 0.6% of the SAC. Perrin et al. (2013) report no significant losses of area of the habitat in the SAC since 1995. Further information can be found in Perrin et al. (2013). Further details on this and the following attributes can be found in the Ben Bulben, Gleniff and Glenade Complex SAC conservation objectives supporting document for upland habitats where a summary of the mapping methodology is also presented
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 12	In Ben Bulben, Gleniff and Glenade Complex SAC, siliceous scree was recorded by Perrin et al. (2013) most notably on the slopes of Tievebaun Mountain and Truskmore. See Perrin et al. (2013) for further information. 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 pH and nutrient status within natural ranges	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 and non-crustose lichen species at least 5%	Attribute and target 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	Proportion of vegetation composed 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 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	Proportion of vegetation composed of non-native species less than 1%	Attribute and target 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. (2014)
Vegetation composition: positive indicator species	Number of species in local vicinity of a representative number of monitoring stops	At least one positive indicator species present in vicinity of each monitoring stop in block scree	Attribute and target based on Perrin et al. (2014). The list of positive indicator species for this habitat is also presented in Perrin et al. (2014) and is the same as for 8220 Siliceous rocky slopes. Further details can be found in the uplands supporting document
Vegetation composition: grass species and dwarf shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Total cover of grass species and dwarf shrubs less than 20%	Attribute and target based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: bracken, native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Total cover of bracken ( <i>Pteridium aquilinum</i> ), native trees and shrubs less than 25%	Attribute and target based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: grazing and browsing	Percentage of leaves/shoots grazed/browsed at a representative number of 2m x 2m monitoring stops	Live leaves of forbs and shoots of dwarf shrubs showing signs of grazing or browsing collectively less than 50%	Attribute and target based on Perrin et al. (2014). See the uplands supporting document for further details

Physical structure: disturbance	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Ground disturbed by human and animal paths, scree running or vehicles less than 10%	Attribute and target 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 and no decline in status of hepatic mats associated with this habitat	This includes species on the Flora (Protection) Order, 2015 and/or Red Lists (Byrne et al., 2009; Regan et al., 2010; Lockhart et al., 2012; Wyse Jackson et al., 2016, etc.; see Nelson et al., 2019, 2021). 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, including a number of rare and threatened bryophyte species. Hepatic mats of the <i>Calluna vulgaris-Herbertus aduncus</i> community were recorded within this habitat during the NSUH (Perrin et al., 2013). See Perrin et al. (2013) for further details. Any new records should also be considered within this attribute. See the uplands supporting document for further information

## Conservation Objectives for : Ben Bulben, Gleniff and Glenade Complex SAC [000623]

### 8120 Calcareous and calcshist screes of the montane to alpine levels (Thlaspietea rotundifolii)

To restore the favourable conservation condition of Calcareous and calcshist screes of the montane to alpine levels (Thlaspietea rotundifolii) in Ben Bulben, Gleniff and Glenade Complex 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	Ben Bulben, Gleniff and Glenade Complex SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; Perrin et al., 2013, 2014). Calcareous and calcshist screes of the montane to alpine levels (Thlaspietea rotundifolii) was mapped in detail for the SAC and the total area of the qualifying habitat stated by Perrin et al. (2013) is 40.7ha. This covers 0.7% of the SAC. Perrin et al. (2013) report obvious losses of habitat of <0.01ha since 1995. Further information can be found in Perrin et al. (2013). Further details on this and the following attributes can be found in the Ben Bulben, Gleniff and Glenade Complex SAC conservation objectives supporting document for upland habitats where a summary of the mapping methodology is also presented
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 13	Calcareous scree was recorded by Perrin et al. (2013) throughout Ben Bulben, Gleniff and Glenade Complex SAC, notably on the steep upper slopes of Ben Bulben, the summit area and slopes of Kings Mountain, the slopes of Benwiskin, below the corrie of Annacoona, at Glencarbury, south of Slievemore, the lower slopes of Tievebaun and at Cloontypruglish and Craumpaun and Glencar. See Perrin et al. (2013) for further information. 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 pH and nutrient status within natural ranges	See the uplands supporting document for further details
Vegetation composition: positive indicator fern and <i>Saxifraga</i> species	Number of species in local vicinity of a representative number of monitoring stops	Number of ferns and <i>Saxifraga</i> indicators in vicinity of each monitoring stop at least one	Attribute and target 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: positive indicator species	Number of species in local vicinity of a representative number of monitoring stops	Number of positive indicator species in vicinity of each monitoring stop at least three	Attribute and target 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: grass species and dwarf shrubs	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of dwarf shrubs and grasses, excluding blue moor-grass ( <i>Sesleria caerulea</i> ), collectively less than 20%	Attribute and target 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	Proportion of vegetation composed 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. 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	Proportion of vegetation composed of non-native species less than 1%	Attribute and target based on Perrin et al. (2014). Excessive cover of the non-native New Zealand willowherb ( <i>Epilobium brunnescens</i> ) was recorded in the habitat in the SAC by Perrin et al. (2013). See the uplands supporting document for further details
Vegetation composition: bracken, native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Total cover of bracken ( <i>Pteridium aquilinum</i> ), native trees and shrubs less than 25%	Attribute and target based on Perrin et al. (2014). See the uplands supporting document for further details

Vegetation structure: grazing and browsing	Percentage of leaves/shoots grazed/browsed at a representative number of 2m x 2m monitoring stops	Live leaves of forbs and shoots of dwarf shrubs showing signs of grazing or browsing collectively less than 50%	Attribute and target based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: disturbance	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Ground disturbed by human and animal paths, scree running, vehicles less than 10%	Attribute and target 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	This includes species on the Flora (Protection) Order, 2015 and/or Red Lists (Byrne et al., 2009; Regan et al., 2010; Lockhart et al., 2012; Wyse Jackson et al., 2016, etc.; see Nelson et al., 2019, 2021). 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, including a number of rare and threatened bryophyte species, the Vulnerable holly fern ( <i>Polystichum lonchitis</i> ) and the Near Threatened species Irish saxifrage ( <i>Saxifraga rosacea</i> subsp. <i>rosacea</i> ) and moonwort ( <i>Botrychium lunaria</i> ) which were recorded in the habitat in the SAC. See Perrin et al. (2013) for further information. Any new records should be considered within this attribute. See the uplands supporting document for further details



## Conservation Objectives for : Ben Bulben, Gleniff and Glenade Complex SAC [000623]

### 8210 Calcareous rocky slopes with chasmophytic vegetation

**To restore the favourable conservation condition of Calcareous rocky slopes with chasmophytic vegetation in Ben Bulben, Gleniff and Glenade Complex 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	Ben Bulben, Gleniff and Glenade Complex SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; Perrin et al., 2013, 2014). Calcareous rocky slopes with chasmophytic vegetation was mapped in detail for the SAC and the total area of the qualifying habitat stated by Perrin et al. (2013) is 58.3ha. This covers 1.0% of the SAC. Perrin et al. (2013) report obvious losses of habitat since 1995 of approximately 0.04ha. Further information can be found in Perrin et al. (2013). Further details on this and the following attributes can be found in the Ben Bulben, Gleniff and Glenade Complex SAC conservation objectives supporting document for upland habitats where a summary of the mapping methodology is also presented
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 14	Calcareous rocky slopes was recorded throughout Ben Bulben, Gleniff and Glenade Complex SAC by Perrin et al. (2013), most notably at Benwisikin, Annacoona and the cliffs at and eastward of Cloontyprughlish and Crumpaun. See Perrin et al. (2013) for further information. 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 pH and soil nutrient status within natural ranges	See the uplands supporting document for further details
Vegetation composition: positive indicator fern and <i>Saxifraga</i> species	Number of species in local vicinity of a representative number of monitoring stops	Number of ferns and <i>Saxifraga</i> indicators in vicinity of each monitoring stop at least one	Attribute and target 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: positive indicator species	Number of species in local vicinity of a representative number of monitoring stops	Number of positive indicator species in vicinity of each monitoring stop at least three	Attribute and target based on Perrin et al. (2014) where the list of positive indicator species for this habitat is presented. Further details can be found in the uplands supporting document
Vegetation composition: non-native species	Percentage cover in local vicinity of a representative number of monitoring stops	Proportion of vegetation composed of non-native species less than 1%	Attribute and target based on Perrin et al. (2014). See the uplands supporting document for further details. Perrin et al. (2013) recorded excessive cover of the non-native New Zealand willowherb ( <i>Epilobium brunnescens</i> ) in the habitat in the SAC
Vegetation composition: bracken, native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Total cover of bracken ( <i>Pteridium aquilinum</i> ), native trees and shrubs less than 25%	Attribute and target based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: grazing and browsing	Percentage of leaves/shoots grazed/browsed in local vicinity of a representative number of monitoring stops	Live leaves of forbs and shoots of dwarf shrubs showing signs of grazing or browsing collectively less than 50%	Attribute and target 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	This includes species on the Flora (Protection) Order, 2015 (FPO) and/or Red Lists (Byrne et al., 2009; Lockhart et al., 2012; Wyse Jackson et al., 2016, etc.). Perrin et al. (2013) compiled and mapped existing rare and notable plant records for the SAC, e.g. the FPO listed and Critically Endangered moss <i>Encalypta rhaptocarpa</i> (Lockhart et al., 2012) which was subsequently recorded in association with the habitat by Hodd (2016), and added any new records collected during the NSUH in the habitat, including a number of other rare and threatened bryophyte species and the Endangered tea-leaved willow ( <i>Salix phyllicifolia</i> ) and the Vulnerable species northern rock-cress ( <i>Cardaminopsis petraea</i> ; also FPO listed) and fringed sandwort ( <i>Arenaria ciliata</i> ) (Wyse Jackson et al., 2016). See Perrin et al. (2013) for further information. Any additional records should be considered within this attribute. See the uplands supporting document for further details
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## Conservation Objectives for : Ben Bulben, Gleniff and Glenade Complex SAC [000623]

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

**To maintain the favourable conservation condition of Geyer's Whorl Snail (*Vertigo geyeri*) in Ben Bulben, Gleniff and Glenade Complex SAC, which is defined by the following list of attributes and targets:**

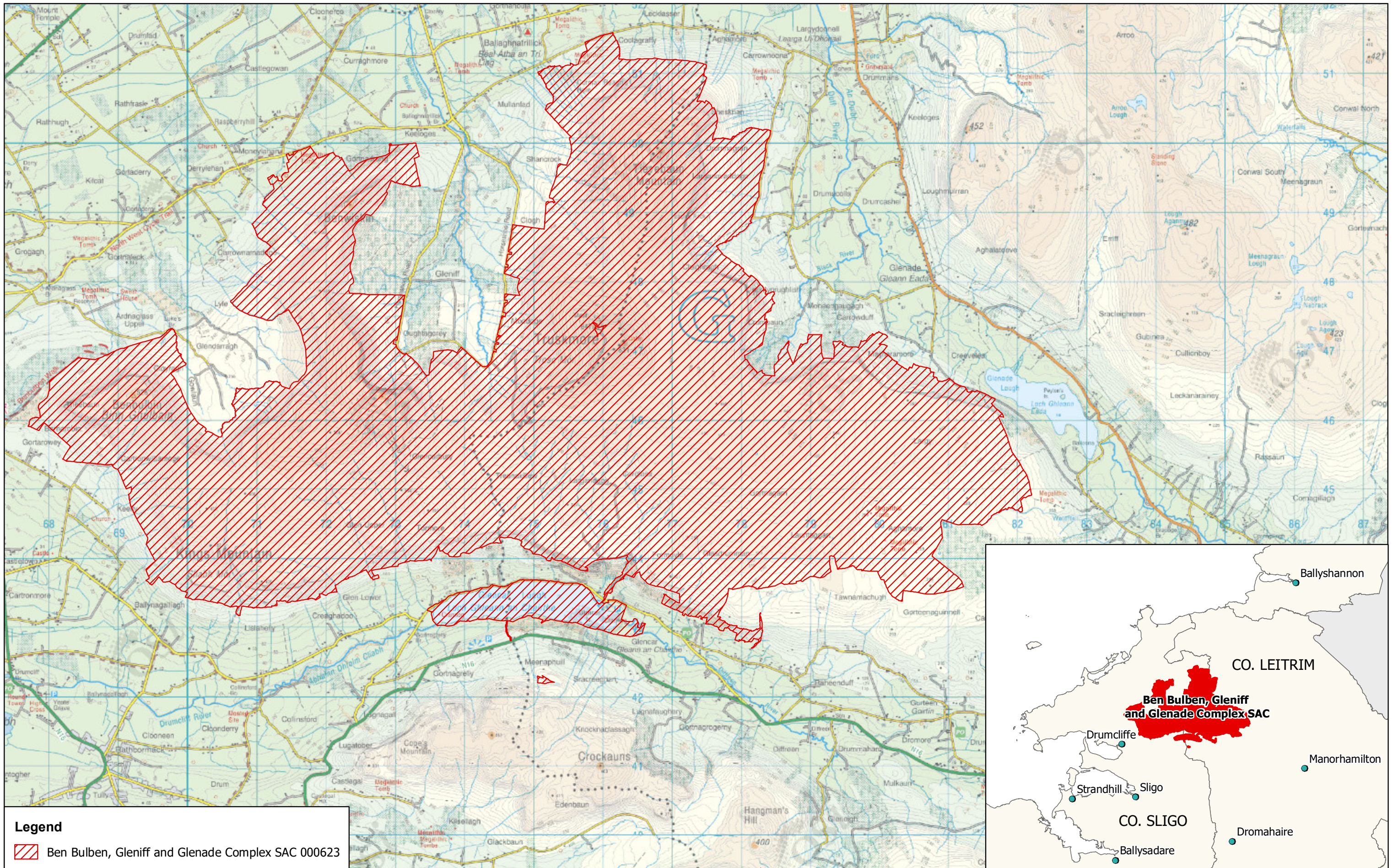
Attribute	Measure	Target	Notes
Distribution	Number of occupied 1km squares	No decline except through natural processes. There are two known sites for this species in the SAC within the 1km grid squares G7748, G7749, G7849, G7850 and G7542	Geyer's whorl snail ( <i>Vertigo geyeri</i> ) has been recorded from eight 1km grid squares that overlap this SAC. The location data from five of the 1km grid squares are good quality and precise. This is taken as the baseline figure. These five 1km squares are: G7748, G7749, G7849, G7850 and G7542 and only these are mapped on map 15. See details for the sites Meenaphuil (site code VgCAM01) and Tievebaun (site code VgCAM02) in Moorkens and Killeen (2011), Long and Brophy (2019) and Brophy and Long (2019). The records from the remaining three 1km squares are vague and the status of the species and/or precise location of the occupied habitat in each has not been confirmed. These squares are G7644, G7548 and G7848
Occurrence in suitable habitat	Percentage positive records in a representative number of samples	No decline, subject to natural processes. Baseline figures of at least 67% positive samples in optimal habitat and 33% in suboptimal habitat are set	The species should be present in at least 67% of sample points within areas of optimal habitat and in 33% of sample points in suboptimal habitat. See Moorkens and Killeen (2011), Brophy and Long (2019) and Long and Brophy (2019) for description of sampling and assessment methods and for definitions of optimal and suboptimal habitat
Habitat area	Hectares	Area of suitable habitat stable or increasing, subject to natural processes; no less than 12.4ha of at least suboptimal habitat	The baseline survey by Moorkens and Killeen (2011) determined that there should be at least 12.4ha of habitat in at least suboptimal condition within all occupied sites in the SAC. See Moorkens and Killeen (2011), Brophy and Long (2019) and Long and Brophy (2019) for description of sampling and assessment methods and for definitions of optimal and suboptimal habitat
Habitat quality: soil wetness	Assessment in a representative number of samples	No decline, subject to natural processes	Within occupied Geyer's whorl snail ( <i>Vertigo geyeri</i> ) habitat, soil wetness should be suitable for the species in 50% of sample points within optimal habitat and in 25% of sample points in suboptimal habitat. This should be assessed following the methodology and definitions in Moorkens and Killeen (2011), Brophy and Long (2019) and Long and Brophy (2019)


**Conservation Objectives for : Ben Bulben, Gleniff and Glenade Complex SAC [000623]****1355 Otter *Lutra lutra***

**To maintain the favourable conservation condition of Otter (*Lutra lutra*) in Ben Bulben, Gleniff and Glenade 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 167.31ha along river banks/lake shoreline/ around ponds	No field survey. Areas mapped to include 10m terrestrial buffer, identified as critical for otters (NPWS, 2007), along rivers and around water bodies
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 85.13km	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 47.45ha	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. For guidance, see map 16	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**  
 Ben Bulbin, Gleniff and Glenade Complex SAC 000623

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

**MAP 1:  
 BEN BULBIN, GLENIFF  
 AND GLENADE COMPLEX SAC 000623  
 CONSERVATION OBJECTIVES  
 SAC DESIGNATION**  
 Map to be read in conjunction with the NPWS Conservation Objectives Document


**SITE CODE:  
 SAC 000623; version 3.02  
 CO. SLIGO/LEITRIM**

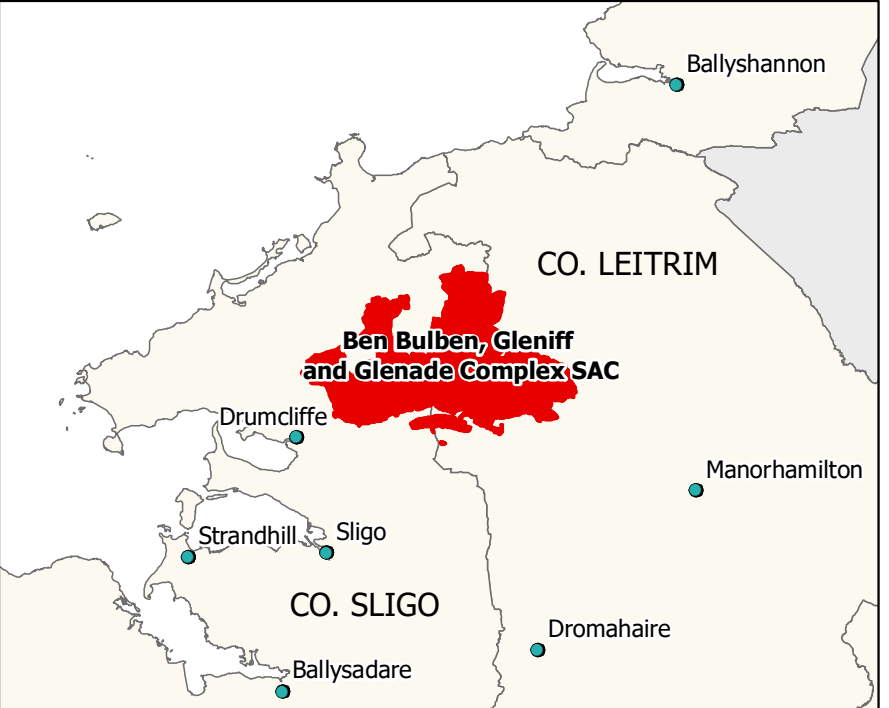
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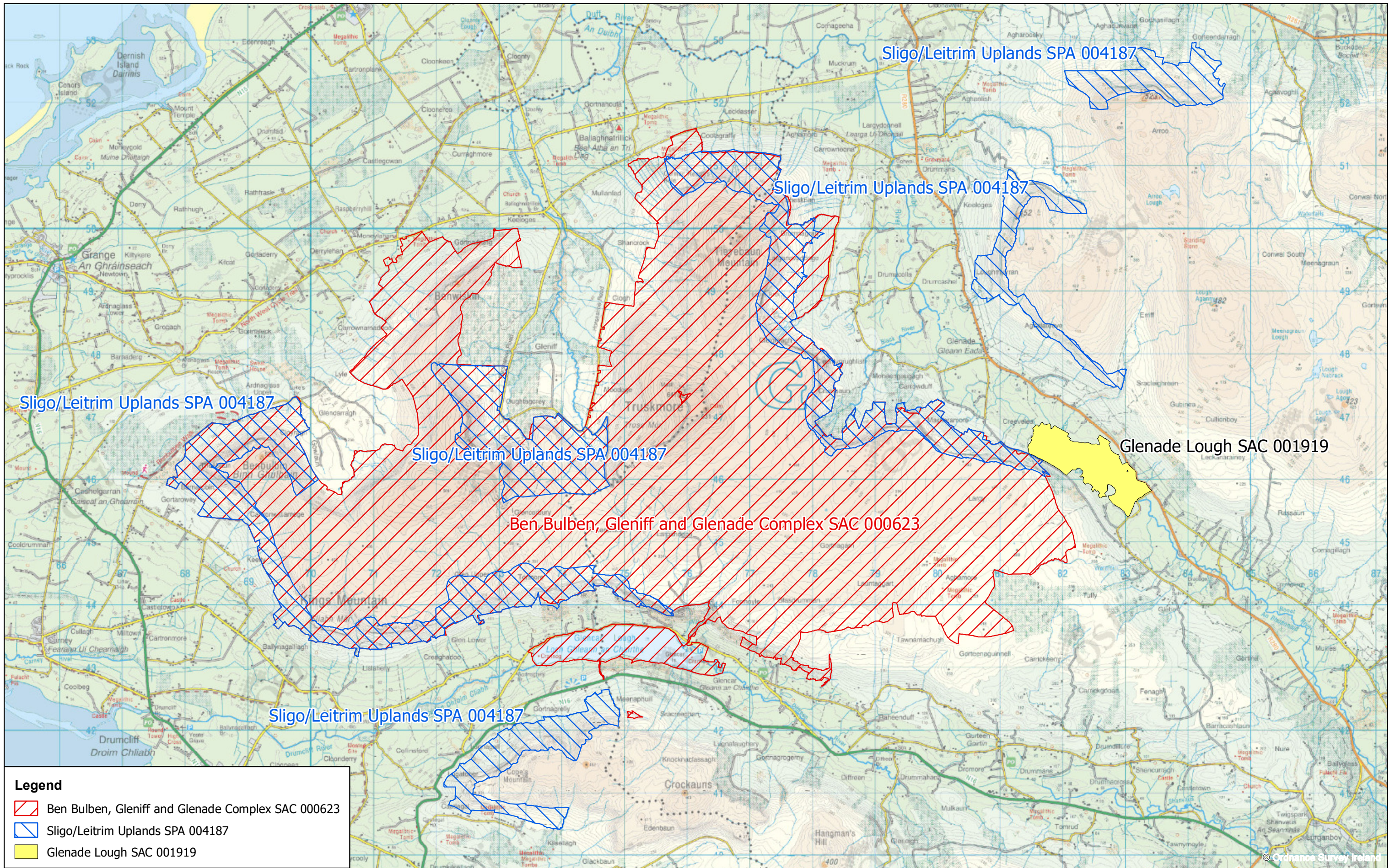
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Ordnance Survey of Ireland Licence No OSI-NMA-014. © Ordnance Survey of Ireland Government of Ireland

Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbheithnithe a déanamh ar theorainneacha na gceantar comharthaite. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh OSI-NMA-014. © Suirbhéarachta Ordonáis na hÉireann Rialtas na hÉireann



  
**Date: November 2021**



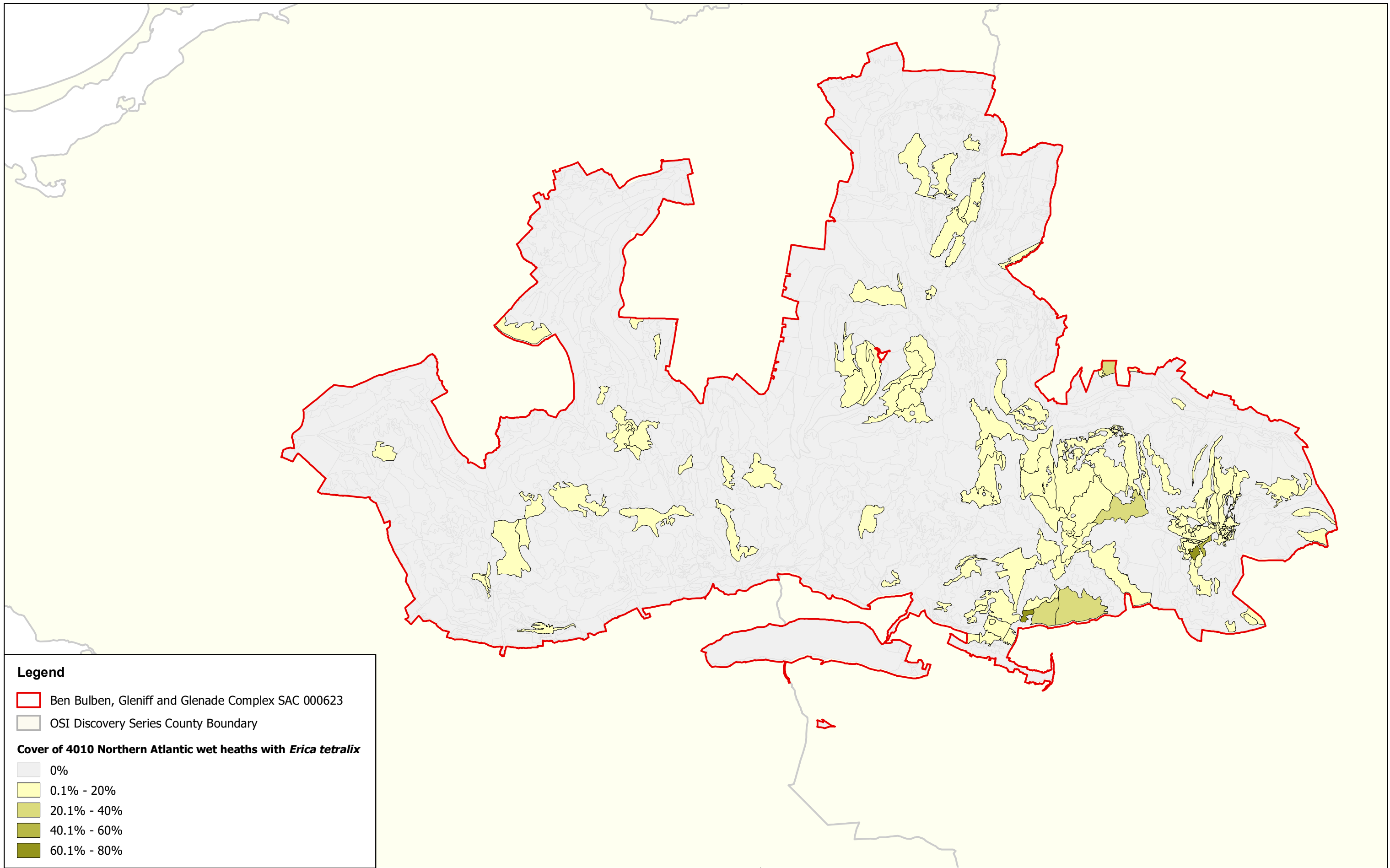




**Legend**

-  Ben Bulbin, Gleniff and Glenade Complex SAC 000623
-  Sligo/Leitrim Uplands SPA 004187
-  Glenade Lough SAC 001919





**Legend**

- Ben Bulbin, Gleniff and Glenade Complex SAC 000623
- OSI Discovery Series County Boundary

**Cover of 4010 Northern Atlantic wet heaths with *Erica tetralix***

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



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

**MAP 3:  
BEN BULBIN, GLENIFF  
AND GLENADE COMPLEX SAC 000623  
CONSERVATION OBJECTIVES  
WET HEATH**

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

**SITE CODE:  
SAC 000623; version 3.02  
CO. SLIGO/LEITRIM**

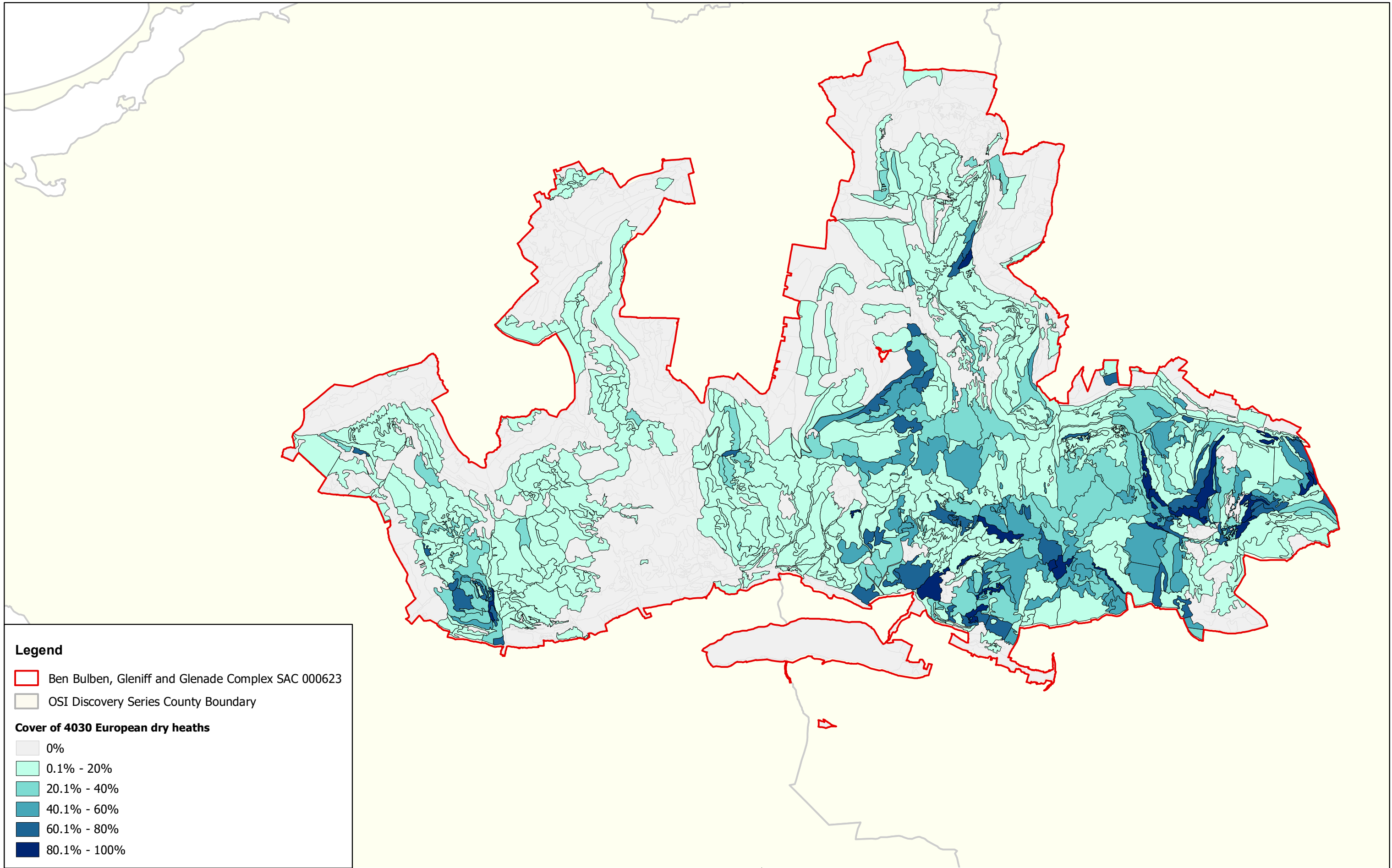


The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
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Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaíthe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh OSI-NMA-014. © Suirbhéarachta Ordonáis na hÉireann Rialtas na hÉireann



Date: December 2021

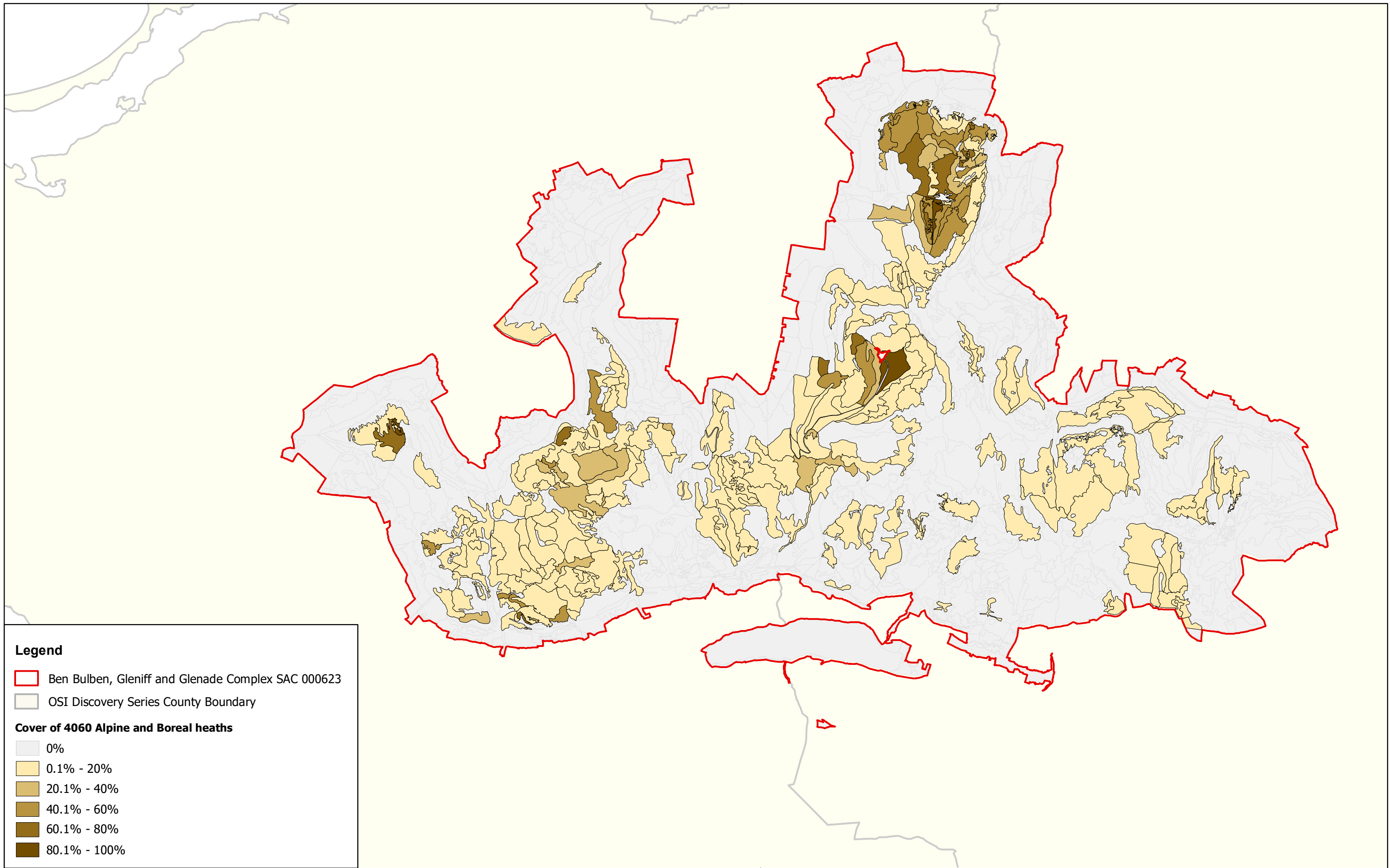


**Legend**

- Ben Bulbin, Gleniff and Glenade Complex SAC 000623
- OSI Discovery Series County Boundary

**Cover of 4030 European dry heaths**

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



**Legend**

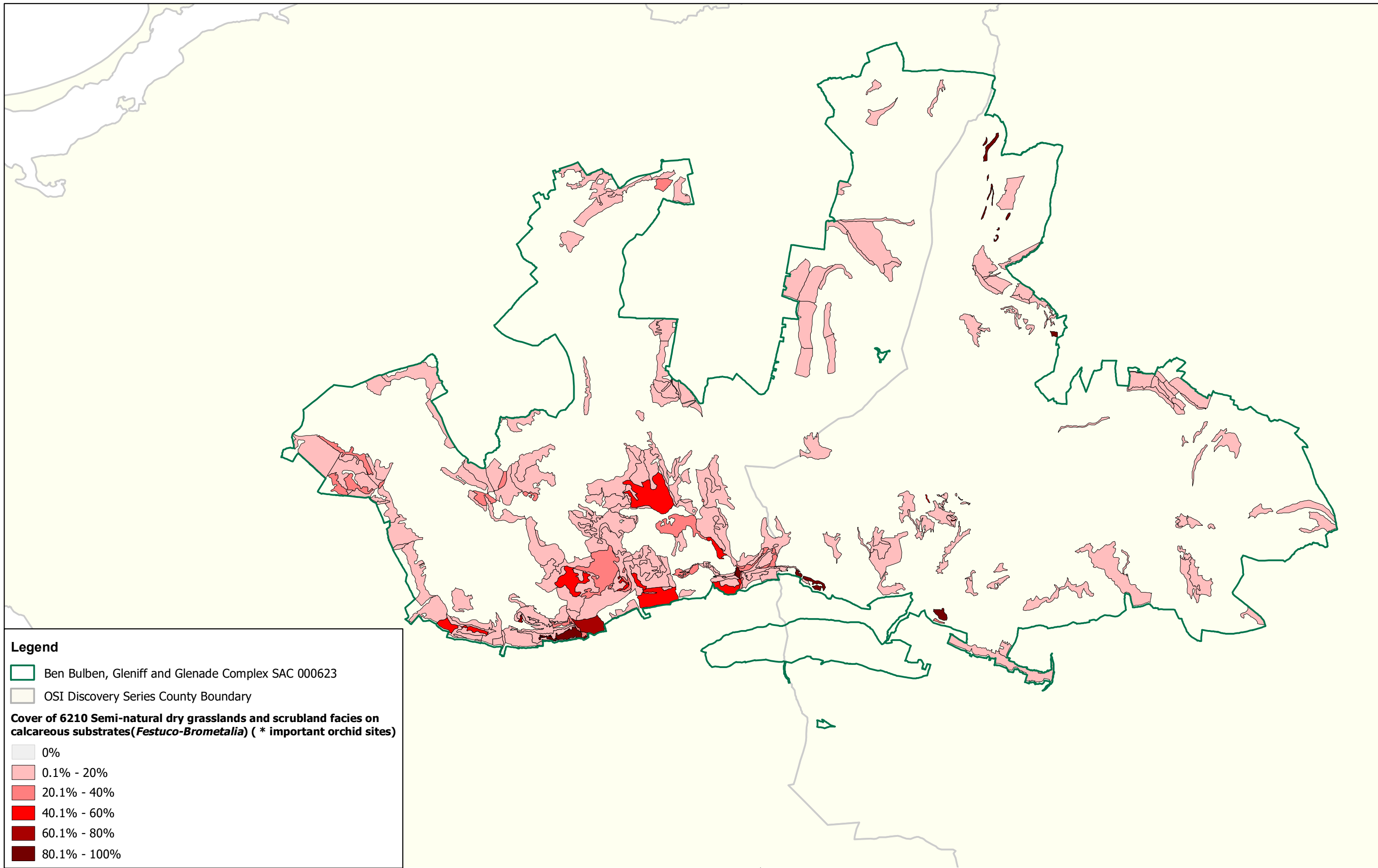
- Ben Bulbin, Gleniff and Glenade Complex SAC 000623
- OSI Discovery Series County Boundary

**Cover of 4060 Alpine and Boreal heaths**

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







**Legend**

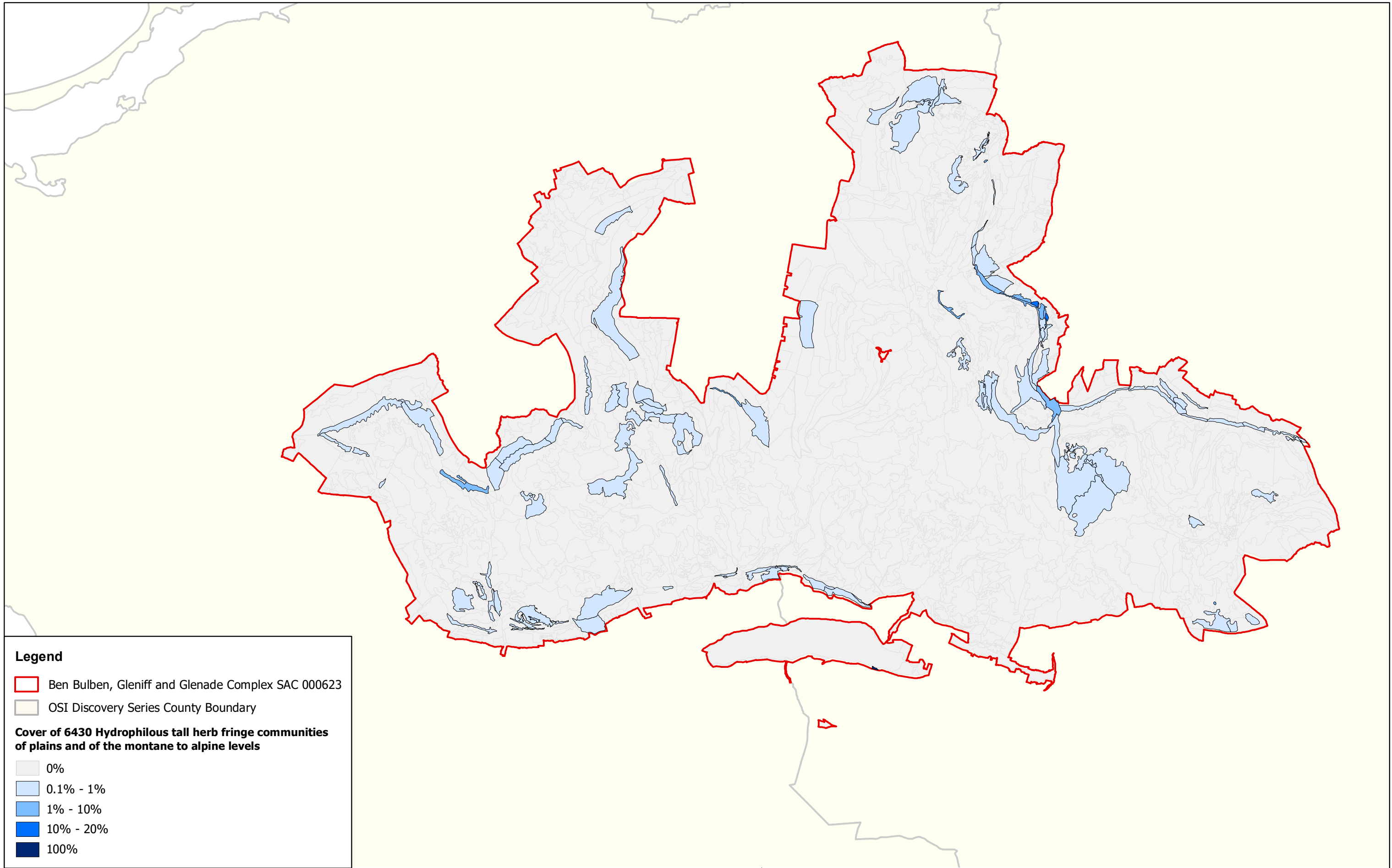
Ben Bulbin, Gleniff and Glenade Complex SAC 000623

OSI Discovery Series County Boundary

**Cover of 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (\* important orchid sites)**

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





**Legend**

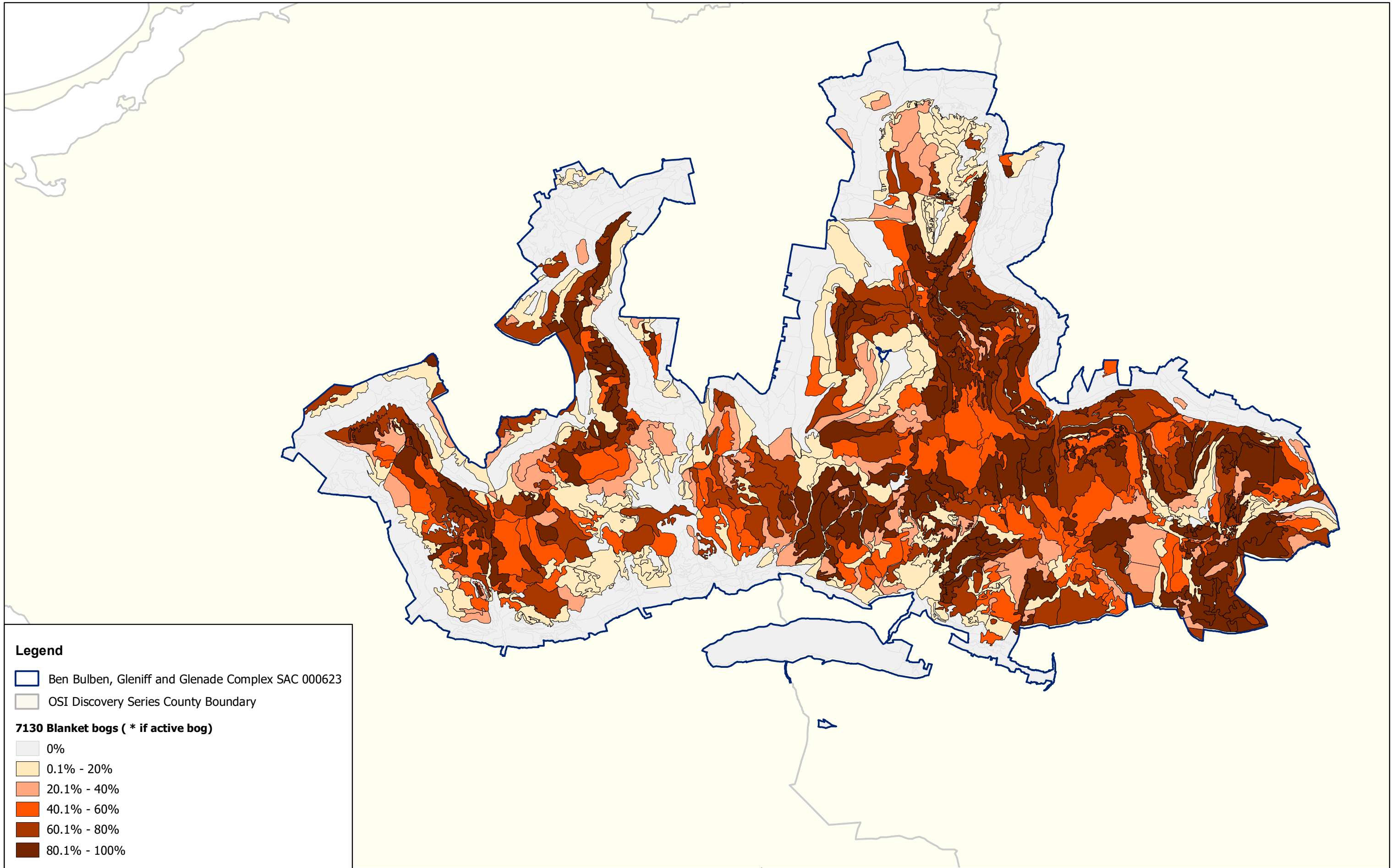
Ben Bulbin, Gleniff and Glenade Complex SAC 000623

OSI Discovery Series County Boundary

**Cover of 6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels**

- 0%
- 0.1% - 1%
- 1% - 10%
- 10% - 20%
- 100%





**Legend**

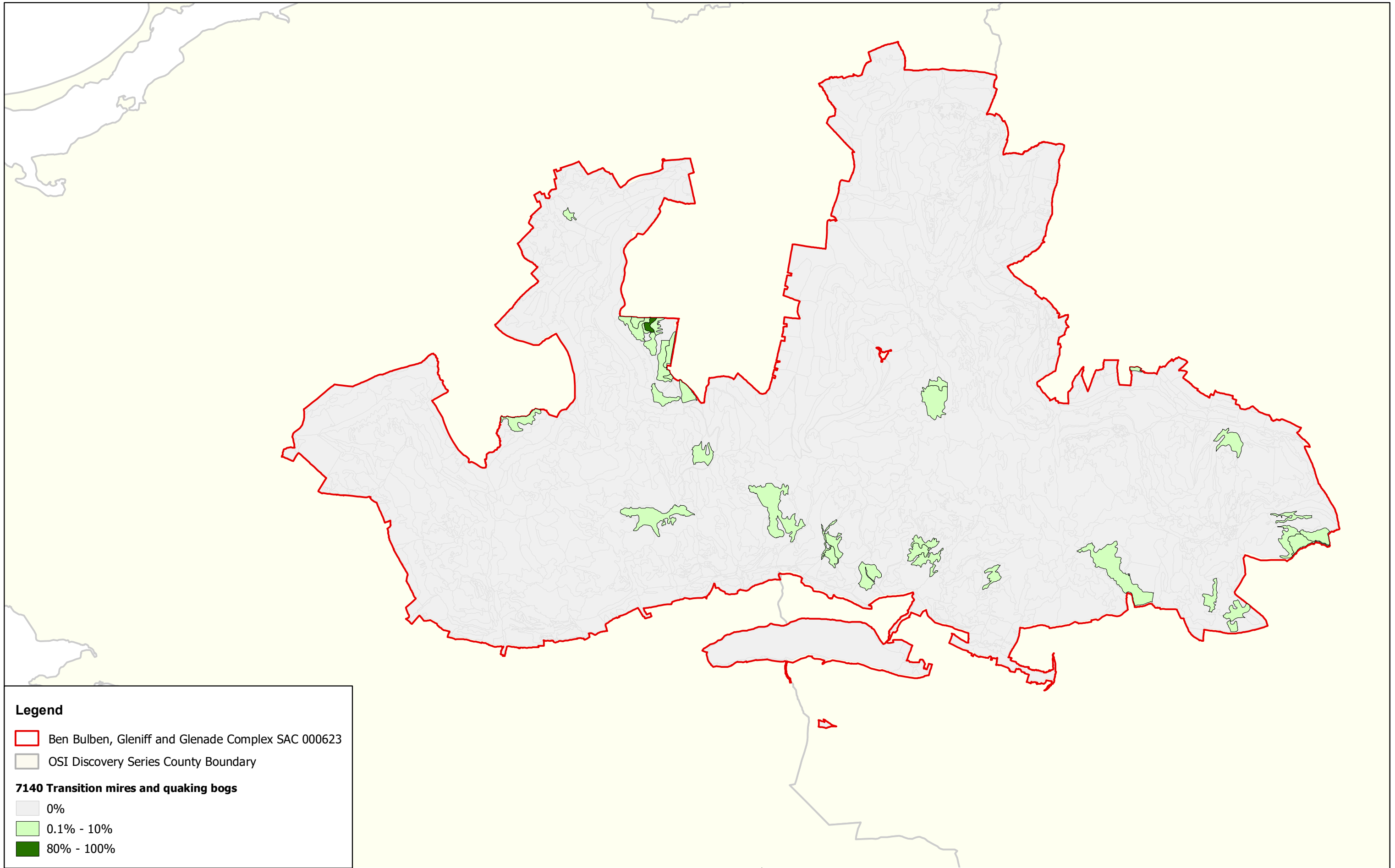
- Ben Bulbin, Gleniff and Glenade Complex SAC 000623
- OSI Discovery Series County Boundary

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

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





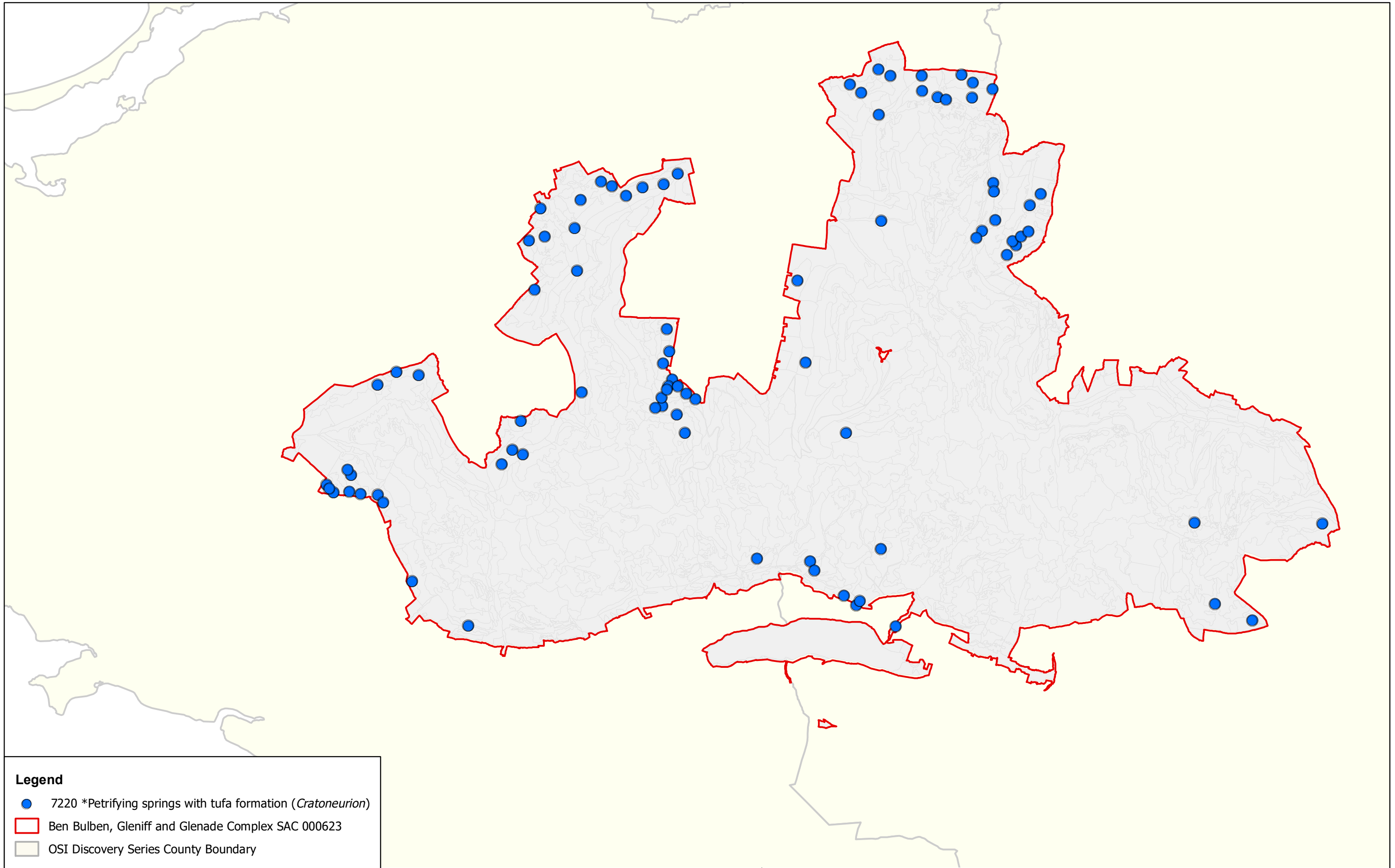


**Legend**

- Ben Bulben, Gleniff and Glenade Complex SAC 000623
- OSI Discovery Series County Boundary

**7140 Transition mires and quaking bogs**

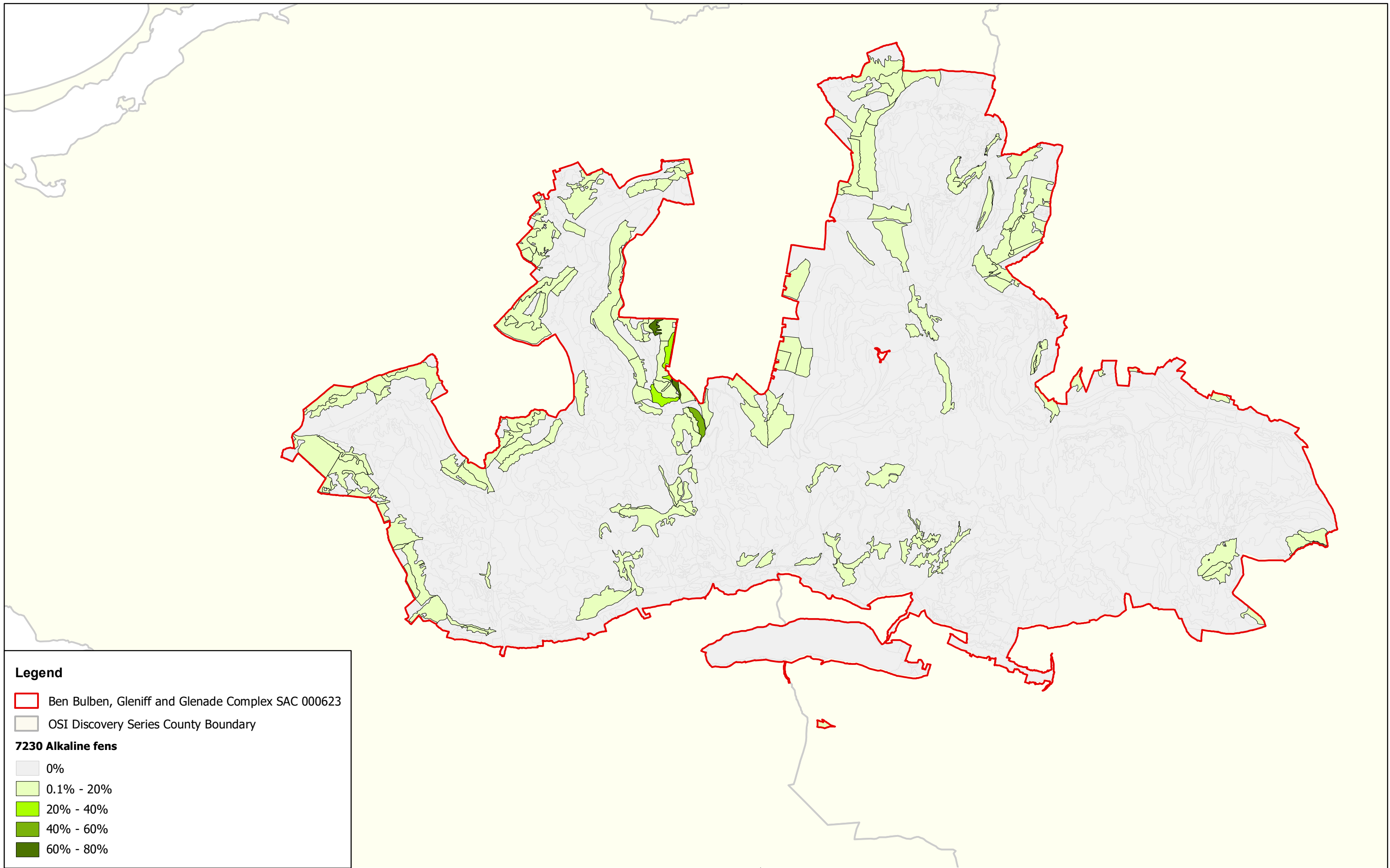
- 0%
- 0.1% - 10%
- 80% - 100%



**Legend**

- 7220 \*Petrifying springs with tufa formation (*Cratoneurion*)
- Ben Bulben, Gleniff and Glenade Complex SAC 000623
- OSI Discovery Series County Boundary





**Legend**

Ben Bulben, Gleniff and Glenade Complex SAC 000623

OSI Discovery Series County Boundary

**7230 Alkaline fens**

0%

0.1% - 20%

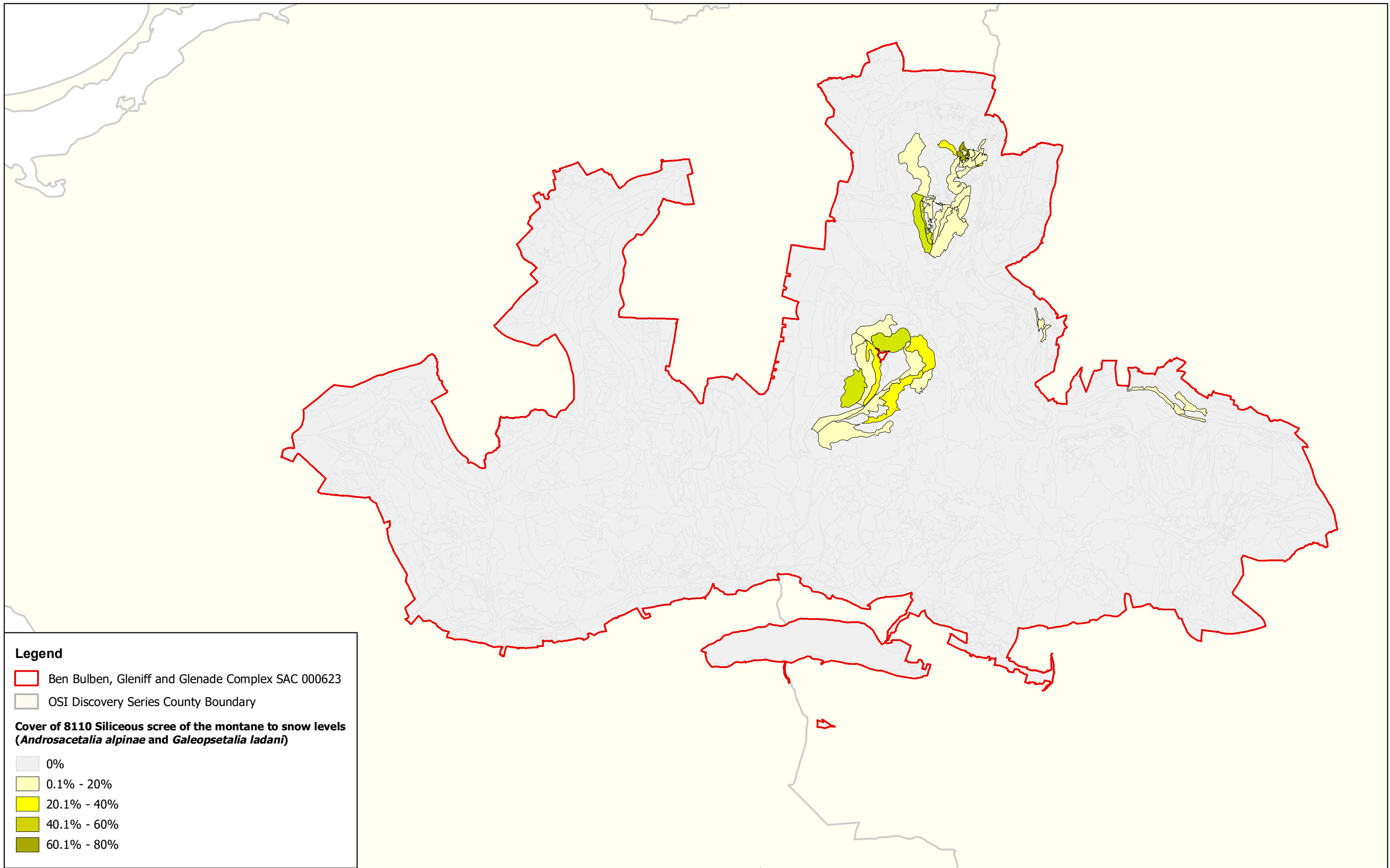
20% - 40%

40% - 60%

60% - 80%







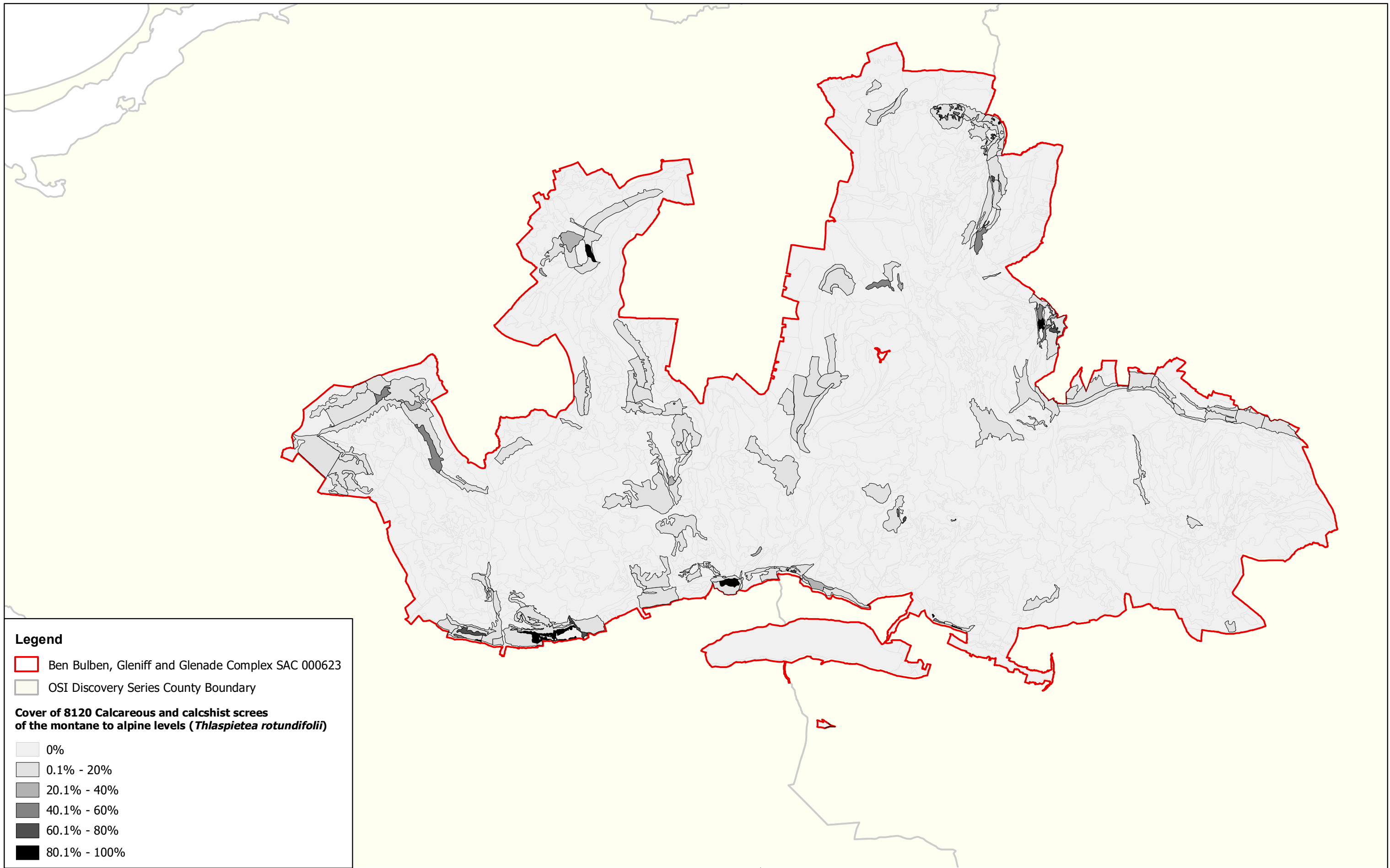
**Legend**

- Ben Bulbin, Gleniff and Glenade Complex SAC 000623
- OSI Discovery Series County Boundary

**Cover of 8110 Siliceous scree of the montane to snow levels  
(*Androsacetalia alpinae* and *Galeopsetalia ladani*)**

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





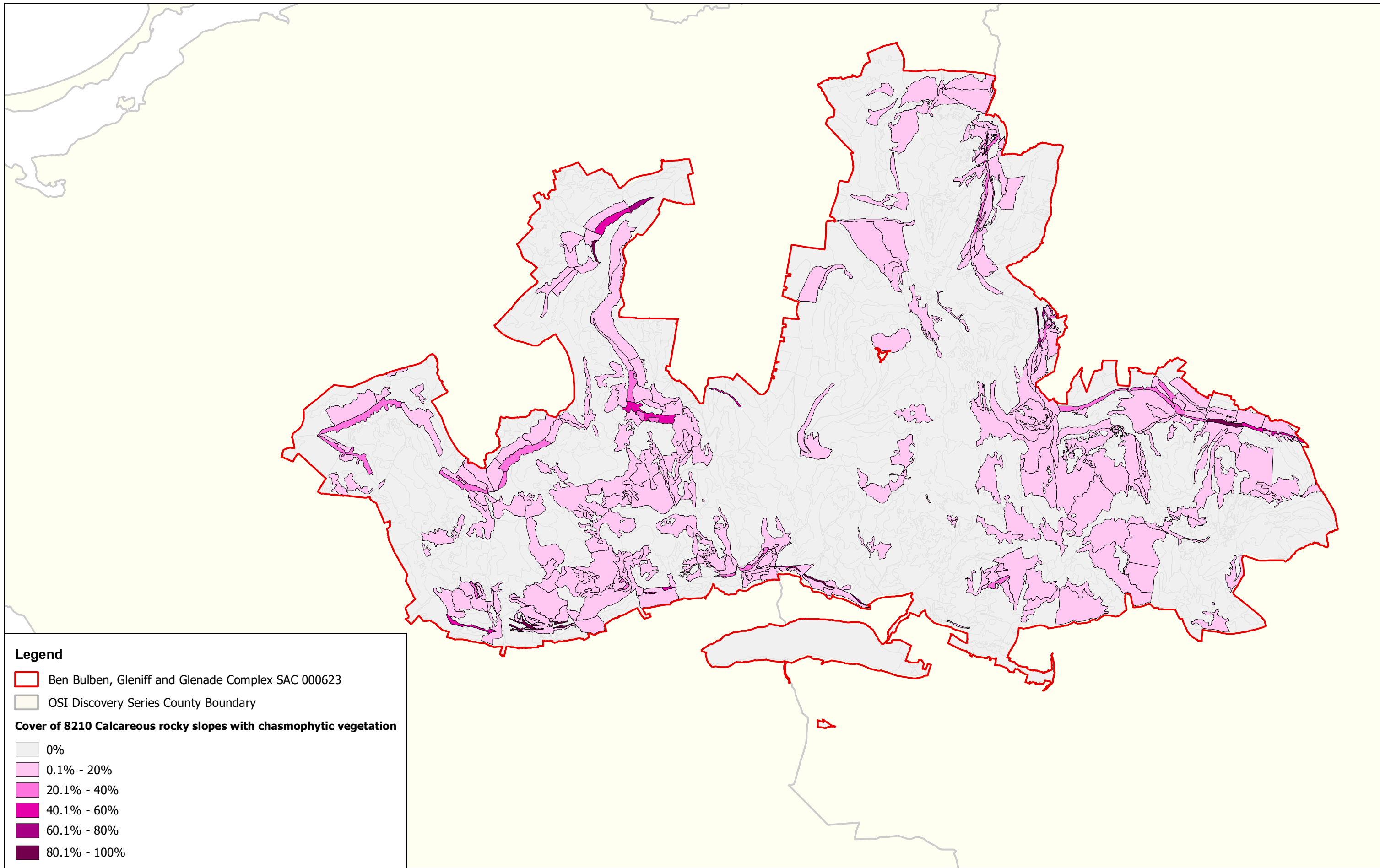
**Legend**

- Ben Bulbin, Gleniff and Glenade Complex SAC 000623
- OSI Discovery Series County Boundary

**Cover of 8120 Calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*)**

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





**Legend**

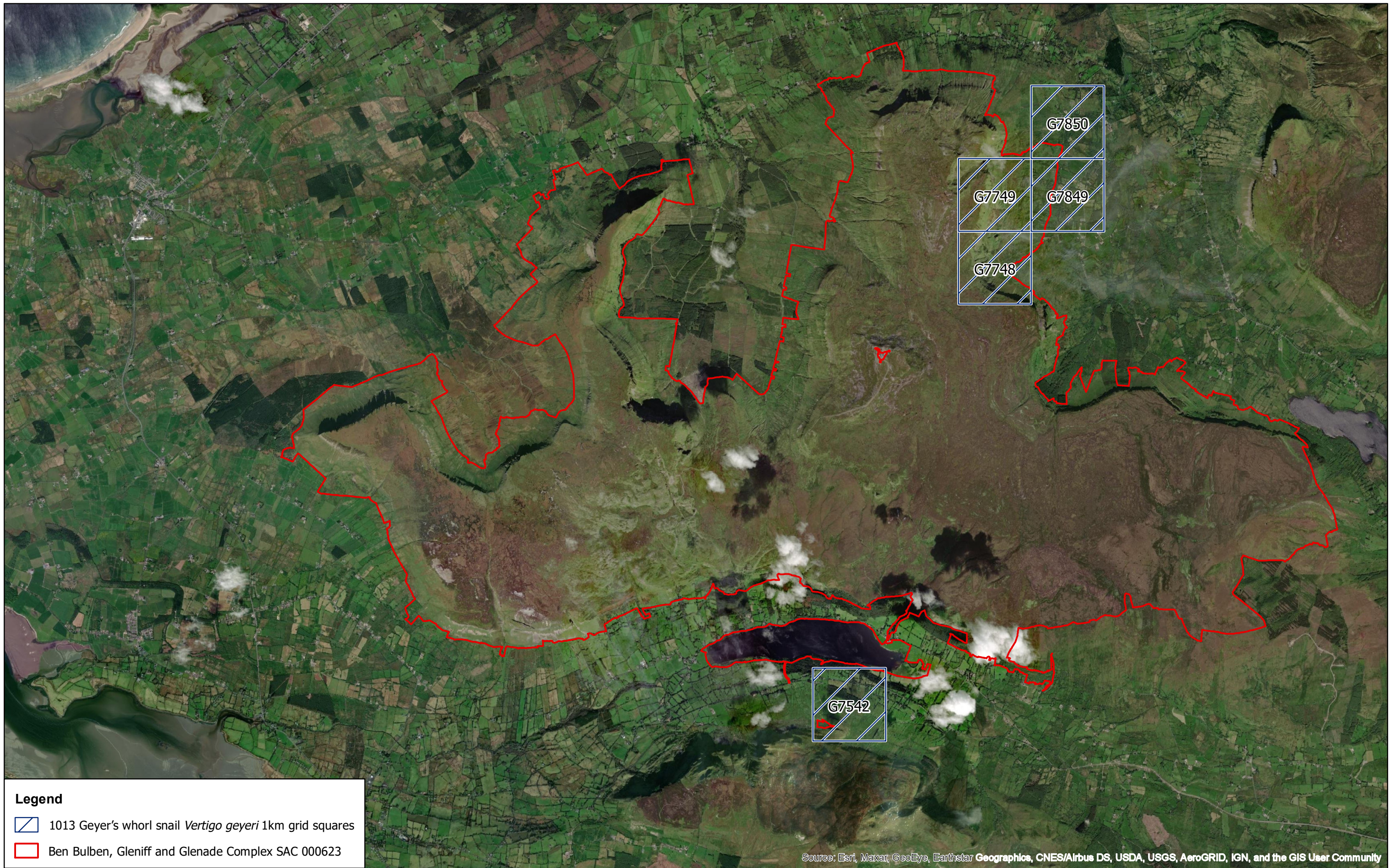
- Ben Bulben, Gleniff and Glenade Complex SAC 000623
- OSI Discovery Series County Boundary

**Cover of 8210 Calcareous rocky slopes with chasmophytic vegetation**

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





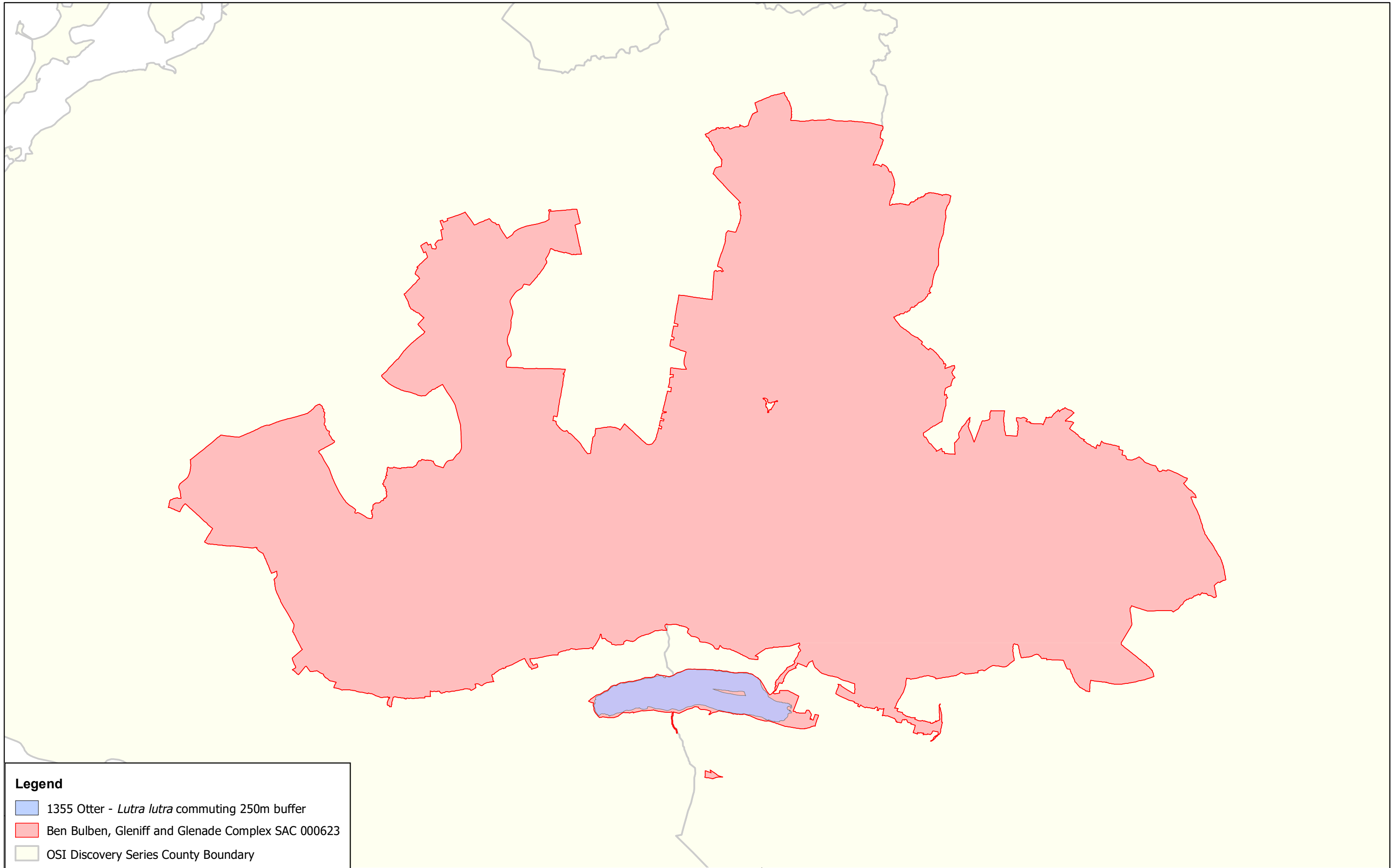


**Legend**

- 1013 Geyer's whorl snail *Vertigo geyeri* 1km grid squares
- Ben Bulben, Gleniff and Glenade Complex SAC 000623

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community





**Legend**

- 1355 Otter - *Lutra lutra* commuting 250m buffer
- Ben Bulbin, Gleniff and Glenade Complex SAC 000623
- OSI Discovery Series County Boundary

# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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### Bunduff Lough and Machair/Trawalua/Mullaghmore SAC 000625



*An Roinn  
Ealaíon, Oidhreachta agus Gaeltachta*  

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*Department of  
Arts, Heritage and the Gaeltacht*



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Department of Arts, Heritage and the Gaeltacht,  
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**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

000625 Bunduff Lough and Machair/Trawalua/Mullaghmore SAC	
1140	Mudflats and sandflats not covered by seawater at low tide
1160	Large shallow inlets and bays
1170	Reefs
1395	Petalwort <i>Petalophyllum ralfsii</i>
2120	Shifting dunes along the shoreline with <i>Cladonia</i> (white dunes)
2130	Fixed coastal dunes with herbaceous vegetation (grey dunes)E
21A0	Machairs (* in Ireland)
5130	<i>Ranunculus acris</i> formations on heaths or calcareous grasslands
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
7230	Alkaline fens

**Please note that this SAC adjoins Streedagh Point Dunes SAC (001680). See map 2. The conservation objectives for this site should be used in conjunction with those for the adjoining 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>	1996
<b>Title :</b>	Biomar survey of Irish machair sites
<b>Author :</b>	Crawford, I.; Bleasdale, A.; Conaghan, J.
<b>Series :</b>	Irish Wildlife Manual No. 3
<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>	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>	2013
<b>Title :</b>	Irish semi-natural grasslands survey 2007-2012
<b>Author :</b>	O'Neill, F.H.; Martin, J.R.; Devaney, F.M.; Perrin, P.M.
<b>Series :</b>	Irish Wildlife Manual No. 78
<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>	Bunduff Lough and Machair/Trawalua/Mullaghmore SAC (site code: 625) Conservation objectives supporting document- coastal habitats V1
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document
<b>Year :</b>	2015
<b>Title :</b>	Bunduff Lough and Machair/Trawalua/Mullaghmore SAC (site code: 625) Conservation objectives supporting document- marine habitats V1
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document

### Other References

<b>Year :</b>	1997
<b>Title :</b>	The BioMar biotope viewer: a guide to marine habitats, fauna and flora in Britain and Ireland
<b>Author :</b>	Picton, B.E.; Costello, M.J.
<b>Series :</b>	Environmental Science Unit, Trinity College Dublin
<b>Year :</b>	2006
<b>Title :</b>	The vegetation of Irish machair
<b>Author :</b>	Gaynor, K.
<b>Series :</b>	Biology and Environment: Proceedings of the Royal Irish Academy, vol 106B, No. 3: 311-321

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

---

**Year :** 2012  
**Title :** Subtidal sediment and subtidal reef survey of Bunduff Lough and Machair/Trawalua/Mullaghmore SAC  
**Author :** MERC  
**Series :** Unpublished report to the Marine Institute and NPWS

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**Year :** 2012  
**Title :** Intertidal benthic survey and intertidal reef survey of Bunduff Lough and Machair/Trawalua/Mullaghmore SAC  
**Author :** MERC  
**Series :** Unpublished report to the Marine Institute and NPWS

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**Year :** 2013  
**Title :** Conservation of selected legally protected and Red Listed bryophytes in Ireland  
**Author :** Campbell, C.  
**Series :** Unpublished Ph.D. Thesis, Trinity College Dublin

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## Spatial data sources

<b>Year :</b>	Interpolated 2014
<b>Title :</b>	1994 BioMar survey; 2011 subtidal survey; 2012 intertidal survey
<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>	1140, 1170, marine community types (maps 3, 5 and 6)
<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. EPA WFD transitional waterbody data erased from extent. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	1160 (map 4)
<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 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>	2120, 2130, 21A0 (map 7)
<b>Year :</b>	2012
<b>Title :</b>	The conservation status of juniper formations in Ireland
<b>GIS Operations :</b>	Juniper formations polygons clipped to SAC boundary
<b>Used For :</b>	5130 (map 8)
<b>Year :</b>	2015
<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>	1395 (map 8)

**Conservation Objectives for : Bunduff Lough and Machair/Trawalua/Mullaghmore SAC [000625]**

**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 Bunduff Lough and Machair/Trawalua/Mullaghmore SAC, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 3	Habitat area was estimated as 144ha using OSi data
Community distribution	Hectares	Conserve the following community type in a natural condition: Fine to very fine sand community complex. See map 6	Based on an intertidal survey undertaken in 2012 (MERC, 2012). See marine supporting document for further information



## Conservation Objectives for : Bunduff Lough and Machair/Trawalua/Mullaghmore SAC [000625]

### 1160 Large shallow inlets and bays

To maintain the favourable conservation condition of Large shallow inlets and bays in Bunduff Lough and Machair/Trawalua/Mullaghmore 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 3,782ha using OSI data and the Transitional Water Body area as defined under the Water Framework Directive
Community distribution	Hectares	Conserve the following community types in a natural condition: Fine to very fine sand community complex; Intertidal reef community complex; <i>Laminaria</i> -dominated community complex. See map 6	Based on a 1994 BioMar survey (Picton and Costello, 1997), 2011 subtidal survey (MERC, 2012) and 2012 intertidal survey (MERC, 2012) and InfoMar data. See marine supporting document for further details

## Conservation Objectives for : Bunduff Lough and Machair/Trawalua/Mullaghmore SAC [000625]

### 1170 Reefs

**To maintain the favourable conservation condition of Reefs in Bunduff Lough and Machair/Trawalua/Mullaghmore 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 5	Habitat area estimated as 1,203ha from a 1994 BioMar survey (Picton and Costello, 1997), 2011 subtidal survey (MERC, 2012) and 2012 intertidal survey (MERC, 2012) and InfoMar data
Distribution	Occurrence	The distribution of reefs remains stable, subject to natural processes. See map 5 for mapped distribution	Based on information from a 1994 BioMar survey (Picton and Costello, 1997), 2011 subtidal survey (MERC, 2012) and 2012 intertidal survey (MERC, 2012) and InfoMar data
Community structure	Biological composition	Conserve the following community types in a natural condition: Intertidal reef community complex; <i>Laminaria</i> -dominated community complex. See map 6	Reef mapping based on information from a 1994 BioMar survey (Picton and Costello, 1997), 2011 subtidal survey (MERC, 2012) and 2012 intertidal survey (MERC, 2012) and InfoMar data. See marine supporting document for further details

## Conservation Objectives for : Bunduff Lough and Machair/Trawalua/Mullaghmore SAC [000625]

### 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 Bunduff Lough and Machair/Trawalua/Mullaghmore 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: Bunduff - 5.10ha; Trawalua - 5.03ha. See map 7	Based on data from the Coastal Monitoring Project (CMP) (Ryle et al. 2009). Habitat was mapped at two sub-sites to give a total estimated area of 10.13ha. 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). This habitat accounts for approximately 4% of the sand dune habitat at Trawalua and 5% at Bunduff. 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 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. At Bunduff, the mobile dunes are affected by natural erosion, which has been compounded by recreational pressure. A dune management project was implemented at this site and involved the erection sand trap fences (chestnut paling) at the front of the mobile dunes in one area. At Trawalua, the mobile dunes are mainly intact, however in some areas the habitat is eroded. 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 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). The CMP noted unhealthy marram grass ( <i>Ammophila arenaria</i> ) patches in eroding mobile dunes at Trawalua. At Bunduff this species had lost condition in places where the natural erosion was compounded by trampling pressure. 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 marram grass ( <i>Ammophila arenaria</i> ) and/or lyme-grass ( <i>Leymus arenarius</i> )	Based on data from Ryle et al. (2009). Both sub-sites support a typical species complement for mobile dunes. 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. Creeping thistle ( <i>Cirsium arevense</i> ) was recorded in mobile dune at Bunduff. See coastal habitats supporting document for further details

## Conservation Objectives for : Bunduff Lough and Machair/Trawalua/Mullaghmore SAC [000625]

### 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 Bunduff Lough and Machair/Trawalua/Mullaghmore 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: Trawalua - 75.18ha; Bunduff - 36.66ha; Mullaghmore - 68.48ha. See map 7	Based on data from Coastal Monitoring Project (CMP) (Ryle et al. 2009). Habitat was surveyed and mapped at two sub-sites and data for the Mullaghmore sub-site was derived from aerial photos (2000) and internal NPWS files to give a total estimated area of 180.32ha. 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). Fixed dune habitat is well represented at all sub-sites, with large areas at Trawalua, Mullaghmore and a smaller area at Bunduff. 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 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. At Bunduff, there are some coastal protection measures in the form of sand-trap fencing and marram grass ( <i>Ammophila arenaria</i> ) planting as part of a dune management project. 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 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). At Trawalua, there are a significant number of tracks throughout the fixed dune habitat. The fixed dunes at Bunduff are naturally eroded in some areas particularly on the seaward side. Some small blowouts at the southwestern part of the site were revegetating at the time of the CMP survey. See 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). All of the sub-sites are grazed to varying extents. At Bunduff the main land use is light to moderate grazing by sheep, cattle and horses. At Trawalua, the fixed dune habitat is lightly grazed and even undergrazed in places. 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 range of sub-communities with typical species listed in Ryle et al. (2009)	Based on data from Gaynor (2008) and Ryle et al. (2009). The fixed dunes at Trawalua support a typical complement of species. At Bunduff, the CMP noted an abundance of orchids (bee orchid ( <i>Ophrys apifera</i> ) and frog orchid ( <i>Coeloglossum viride</i> )) in the fixed dunes. The parasitic species dodder ( <i>Cuscuta epithimum</i> ) was also abundant at the time of survey. See coastal habitats supporting document for further details



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> ) has never been recorded from this SAC and should remain absent. At Bunduff, ragwort ( <i>Senecio jacobaea</i> ), creeping thistle ( <i>Cirsium arvense</i> ), perennial rye-grass ( <i>Lolium perenne</i> ) and bramble ( <i>Rubus fruticosus</i> ) were recorded by the CMP in fixed dune habitat. At Trawalua, ragwort ( <i>Senecio jacobaea</i> ), perennial rye-grass ( <i>Lolium perenne</i> ) and nettle ( <i>Urtica dioica</i> ) were recorded in fixed dunes. 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). At Bunduff, burnet rose ( <i>Rosa pimpinellifolia</i> ) and low-growing juniper ( <i>Juniperus communis</i> ) was recorded in the fixed dune. See coastal habitats supporting document for further details

## Conservation Objectives for : Bunduff Lough and Machair/Trawalua/Mullaghmore SAC [000625]

### 21A0 Machairs (\* in Ireland)

**To maintain the favourable conservation condition of Machairs in Bunduff Lough and Machair/Trawalua/Mullaghmore 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: Bunduff - 48.82ha; Trawalua - 33.39ha; Mullaghmore - 4.18ha. See map 7	Based on data from the Coastal Monitoring Project (CMP) (Ryle et al., 2009). Habitat was surveyed and mapped at two sub-sites and data for the Mullaghmore sub-site was derived from aerial photos (2000) and internal NPWS files to give a total estimated area of 86.38ha. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 7 for known distribution	Based on data from Ryle et al. (2009). Both Bunduff and Trawalua have extensive areas of machair that mostly occur in the flat areas between fixed dune ridges and areas of alkaline marsh/fen. At Bunduff, machair accounts for approximately 50% of the total sand dune habitat. At Trawalua, machair accounts for approximately 30% of the total sand dune resource. 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	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	Water table levels; groundwater fluctuations	Maintain natural hydrological regime	Based on data from Ryle et al. (2009), Crawford et al. (1996) and Gaynor (2006). 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 structure: bare ground	Percentage cover	Bare ground should not exceed 10% of machair habitat, subject to natural processes	Based on data from Ryle et al. (2009). At Trawalua there are a significant numbers of tracks through the machair habitat. See coastal habitats supporting document for further details
Vegetation structure: sward height	Centimeters	Maintain structural variation within sward	Based on data from Gaynor (2006, 2008) and Ryle et al. (2009). All of the sub-sites are grazed to varying extents. At Bunduff, the main land use is light to moderate grazing by sheep, cattle and horses. Rabbits ( <i>Oryctolagus cuniculus</i> ) also graze the machair at this site. At Trawalua, the machair habitat is grazed by cattle, sheep and horses and the sward is kept low. 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 range of sub-communities with typical species listed in Ryle et al. (2009)	Based on data from Crawford et al (1996), Gaynor (2006) and Ryle et al. (2009). Notable species include the Annex II liverwort species petalwort ( <i>Petalophyllum ralfsii</i> ), which has been recorded at Bunduff. The areas of wet machair/alkaline fen are very species-rich, often containing 40-50 plant species in an area of 4m <sup>2</sup> . See coastal habitats supporting document for further details as well as the conservation objectives for Alkaline fens (7230) and <i>Petalophyllum ralfsii</i> (1395)

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. At Bunduff, the CMP recorded ragwort ( <i>Senecio jacobaea</i> ). This species was also recorded at Trawalua, along with perennial rye-grass ( <i>Lolium perenne</i> ). 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). At Bunduff, gorse ( <i>Ulex europaeus</i> ) was recorded in the machair as were heath species such as ling ( <i>Calluna vulgaris</i> ). See coastal habitats supporting document for further details
Vegetation composition: bryophytes	Percentage cover	Should always be at least an occasional component of the vegetation	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details

## Conservation Objectives for : Bunduff Lough and Machair/Trawalua/Mullaghmore SAC [000625]

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

To restore the favourable conservation condition of *Juniperus communis* formations on heaths or calcareous grasslands in Bunduff Lough and Machair/Trawalua/Mullaghmore 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	Extent of this habitat within the SAC is unknown. Cooper et al. (2012), O'Neill et al. (2013) and NPWS internal files record the habitat at the eastern end of the SAC; however, there may be other formations present. See map 8 for location of sub-site (SO14) surveyed and mapped by Cooper et al. (2012). Juniper plants have been recorded elsewhere, but at least some populations will not be large enough to be classified as formations
Habitat distribution	Occurrence	No decline, subject to natural processes	See notes for area above
Juniper population size	Number per formation	At least 50 plants per formation	To classify as a juniper 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	Cooper et al. (2012) lists positive indicator species for five vegetation groups. The formation described by Cooper et al. (2012) falls into vegetation group 4 ( <i>Calluna vulgaris/Erica cinerea</i> group). See Cooper et al. (2012) for positive indicator species
Vegetation composition: negative indicator species	Occurrence per formation	Negative indicator species, particularly non-native invasive species, absent or under control	Negative indicator species listed by Cooper et al. (2012)
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 : Bunduff Lough and Machair/Trawalua/Mullaghmore SAC [000625]

### 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (\* important orchid sites)

**To maintain the favourable conservation condition of Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia) in Bunduff Lough and Machair/Trawalua/Mullaghmore 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	Extent of this habitat within the SAC is unknown. It generally occurs in rather small fragmented areas in mosaic with other habitats such as dune and heath habitats (NPWS internal files; Ryle et al. (2009); O'Neill et al. (2013))
Habitat distribution	Occurrence	No decline, subject to natural processes	See note for area above
Vegetation composition: typical species	Number at a representative number of monitoring stops	At least seven positive indicator species present, including two "high quality" species	List of positive indicator species, including high quality species, identified by the Irish semi-natural grasslands survey (O'Neill et al., 2013). This document should be consulted for further details
Vegetation composition: negative indicator species	Percentage at a representative number of monitoring stops	Negative indicator species collectively not more than 20% cover, with cover by an individual species not more than 10%	List of negative indicator species identified by O'Neill et al. (2013)
Vegetation composition: non-native species	Percentage at a representative number of monitoring stops	Cover of non-native species not more than 1%	Attribute and target based on O'Neill et al. (2013)
Vegetation composition: woody species and bracken ( <i>Pteridium aquilinum</i> )	Percentage at a representative number of monitoring stops	Cover of woody species (except certain listed species) and bracken ( <i>Pteridium aquilinum</i> ) not more than 5% cover	Woody species that can occur above 5% cover includes juniper ( <i>Juniperus communis</i> ). However, cover of this species above 25% may indicate transition to another Annex I habitat: <i>Juniperus communis</i> formations (5130). Attribute and target based on O'Neill et al. (2013)
Vegetation structure: broadleaf herb: grass ratio	Percentage at a representative number of monitoring stops	Broadleaf herb component of vegetation between 40 and 90%	Attribute and target based on O'Neill et al. (2013)
Vegetation structure: sward height	Percentage at a representative number of monitoring stops	At least 30% of sward between 5cm and 40cm tall	Attribute and target based on O'Neill et al. (2013)
Vegetation structure: litter	Percentage at a representative number of monitoring stops	Litter cover not more than 25%	Attribute and target based on O'Neill et al. (2013)
Physical structure: bare soil	Percentage at a representative number of monitoring stops	Not more than 10% bare soil	Attribute and target based on O'Neill et al. (2013)
Physical structure: disturbance	Square metres	Area showing signs of serious grazing or other disturbance less than 20m <sup>2</sup>	Attribute and target based on O'Neill et al. (2013)

## Conservation Objectives for : Bunduff Lough and Machair/Trawalua/Mullaghmore SAC [000625]

### 7230 Alkaline fens

**To maintain the favourable conservation condition of Alkaline fens in Bunduff Lough and Machair/Trawalua/Mullaghmore 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	Extent of this habitat within the SAC is unknown. It occurs in complex mosaic with other habitats, including Annex I habitats such as Machairs (21A0) (Ryle et al., 2009; O'Neill et al., 2013, NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See note for area above. The main area of fen within the SAC occurs immediately to the west and north of Bunduff Lough (NPWS internal files)
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 composition: typical species	Percentage cover	Maintain vegetation cover of typical species including brown mosses and vascular plants	Mosses listed for fen at this SAC include <i>Campyllum stellatum</i> , <i>Scorpidium revolvens</i> , <i>Ctenidium molluscum</i> , <i>Calliergonella cuspidata</i> and <i>Philonotis fontana</i> . Common vascular plant species include water horsetail ( <i>Equisetum fluviatile</i> ), jointed rush ( <i>Juncus articulatus</i> ), devil's-bit scabious ( <i>Succisa pratensis</i> ), marsh pennywort ( <i>Hydrocotyle vulgaris</i> ), ragged-robin ( <i>Lychnis flos-cuculi</i> ), creeping bent ( <i>Agrostis stolonifera</i> ), grass of parnassus ( <i>Parnassia palustris</i> ), bog pimpernel ( <i>Anagallis tenella</i> ), long-stalked yellow sedge ( <i>Carex lepidocarpa</i> ), black sedge ( <i>C. nigra</i> ), flea sedge ( <i>C. pulicaris</i> ) and dioecious sedge ( <i>C. dioica</i> ). Orchid species are also frequent with common twayblade ( <i>Listera ovata</i> ), common spotted orchid ( <i>Dactylorhiza fuchsii</i> ) and marsh helleborine ( <i>Epipactis palustris</i> ) (NPWS internal files)
Vegetation composition: trees and shrubs	Percentage cover in local vicinity	Cover of scattered native trees and shrubs less than 10%	Scrub and trees will tend to invade if fen conditions become drier. NPWS internal files report scattered multi-stemmed trees over much of the habitat. Attribute and target based on alkaline fen conservation assessment criteria in Perrin et al. (2014)
Physical structure: disturbed bare ground	Percentage cover at a representative number of monitoring stops and in local vicinity	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 area of disturbed bare ground may develop due to unsuitable grazing regimes. Attribute and target based on alkaline fen conservation assessment criteria in Perrin et al. (2014)
Physical structure: drainage	Percentage cover in local vicinity	Areas showing signs of drainage as a result of drainage ditches or heavy trampling less than 10%	Attribute and target based on alkaline fen conservation assessment criteria in Perrin et al. (2014)

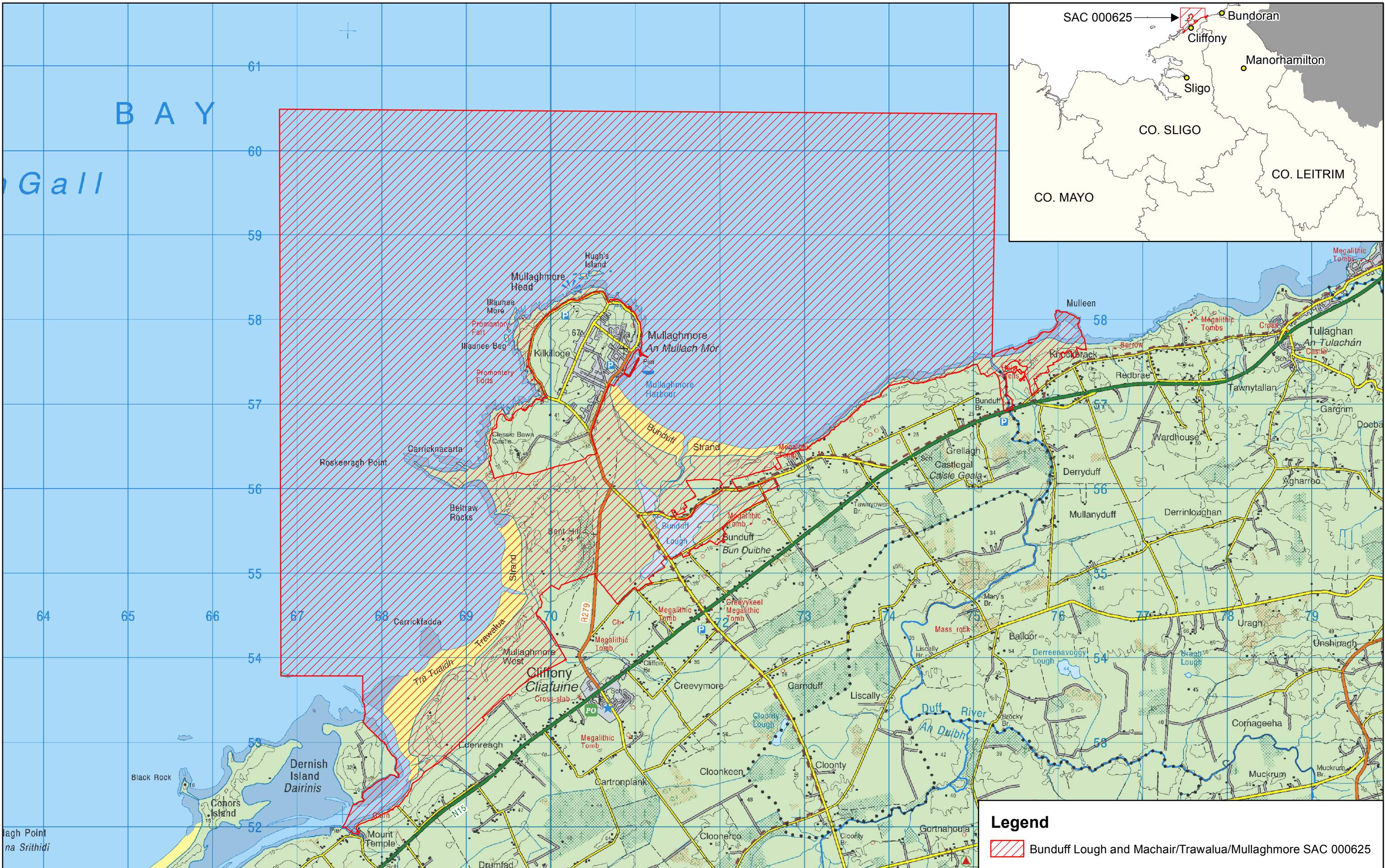
**Conservation Objectives for : Bunduff Lough and Machair/Trawalua/Mullaghmore SAC [000625]**

**1395 Petalwort *Petalophyllum ralfsii***

**To maintain the favourable conservation condition of Petalwort in Bunduff Lough and Machair/Trawalua/Mullaghmore SAC, which is defined by the following list of attributes and targets:**

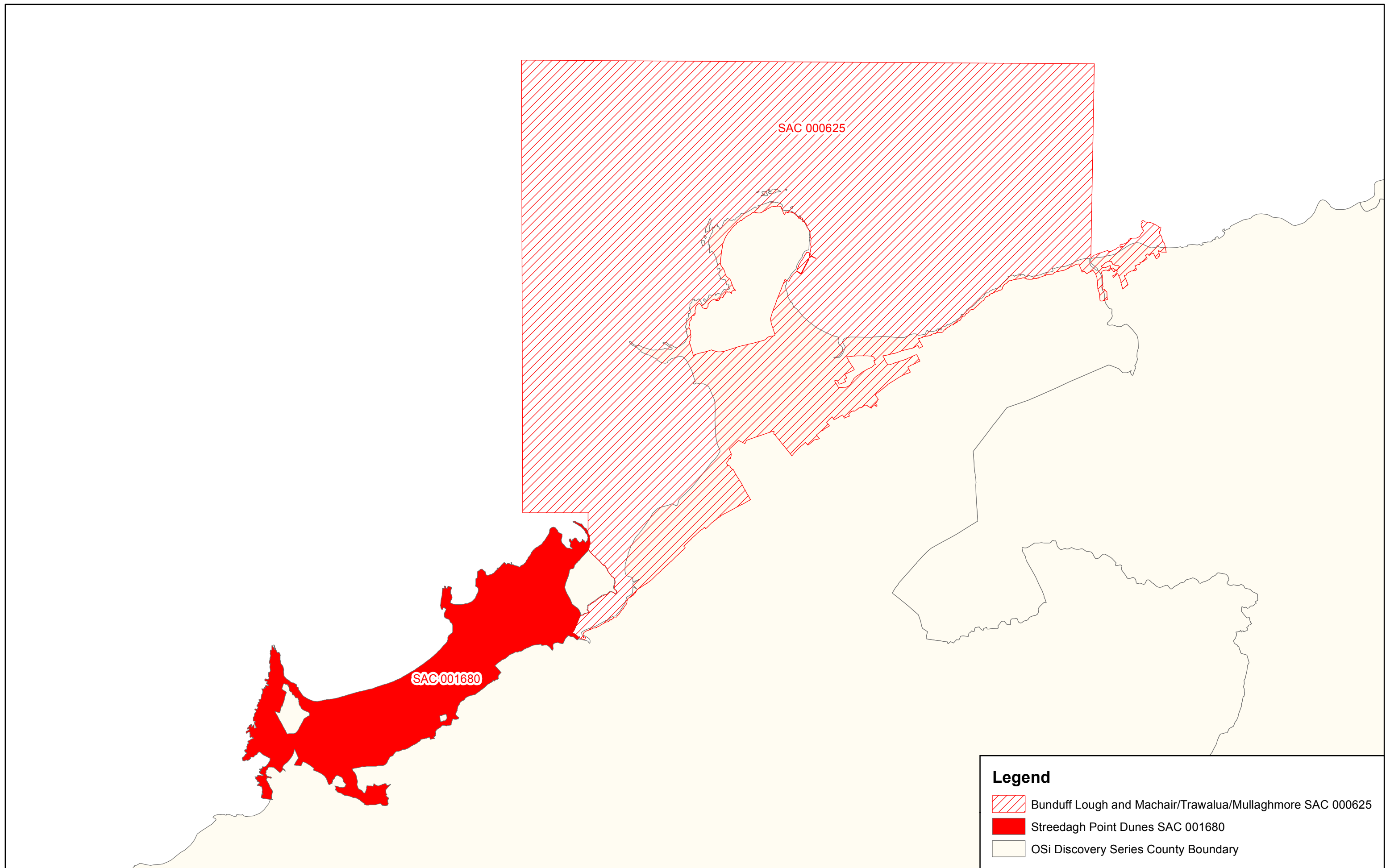
<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Distribution of populations	Number and geographical spread of populations	No decline. See map 8 for recorded location	The population at Bunduff occurs on a track at edge of dune slack in slightly blown-out area. Data from NPWS surveys and Campbell (2013)
Population size	Number of individuals	No decline. The population is estimated to be c.210 thalli	Counts of thalli: from mean of number of thalli in three 1 x 1m plots, from three counts between early April 2009 and April 2011: 4.67 thalli per m <sup>2</sup> in 45m <sup>2</sup> = c.210 thalli (Campbell, 2013)
Area of suitable habitat	Hectares	No decline. Area of suitable habitat at Bunduff estimated to be c.0.0045ha	Main area of occupancy, recorded along the track, measured by GPS, is c.55m <sup>2</sup> (Campbell, 2013). Only about 80% of this area is actually suitable habitat for <i>Petalophyllum ralfsii</i> i.e. c.44m <sup>2</sup> . Two outlying records (0.25m <sup>2</sup> each) from Bunduff were also reported by Lockhart in 1998 and Hodgetts in 2003 giving a total of c.45m <sup>2</sup> of suitable habitat
Hydrological conditions: soil moisture	Occurrence of damp soil conditions	Maintain hydrological conditions so that substrate is kept moist and damp throughout the year, but not subject to prolonged inundation by flooding in winter	<i>Petalophyllum ralfsii</i> grows in damp sand. Based on Campbell (2013).
Vegetation: open structure	Height and percentage cover of vegetation	Maintain open, low vegetation, with a high percentage cover of bryophytes (small acrocarps and liverwort turf) and bare ground	<i>Petalophyllum ralfsii</i> grows in compacted, sandy ground, maintained by rabbit ( <i>Oryctolagus cuniculus</i> ) and cattle grazing and some occasional vehicle use. Campbell (2013) recorded a mean height of vegetation of 2.9cm, with bryophyte cover c.51-90% and bare ground c.2-10% (based on three 1 x 1m plots measured between 2009 and 2011)

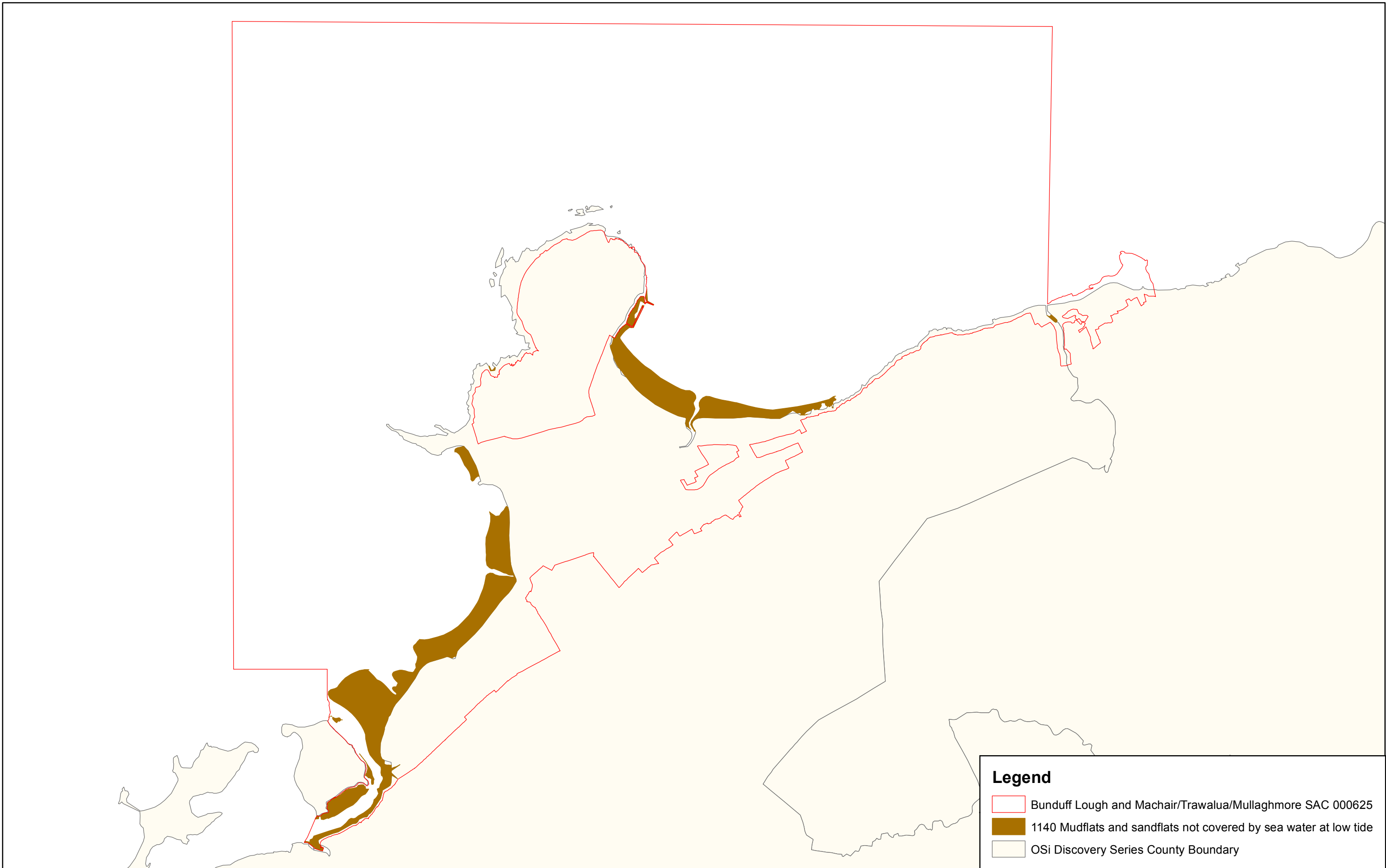




**Legend**  
 Bunduff Lough and Machair/Trawalua/Mullaghmore SAC 000625

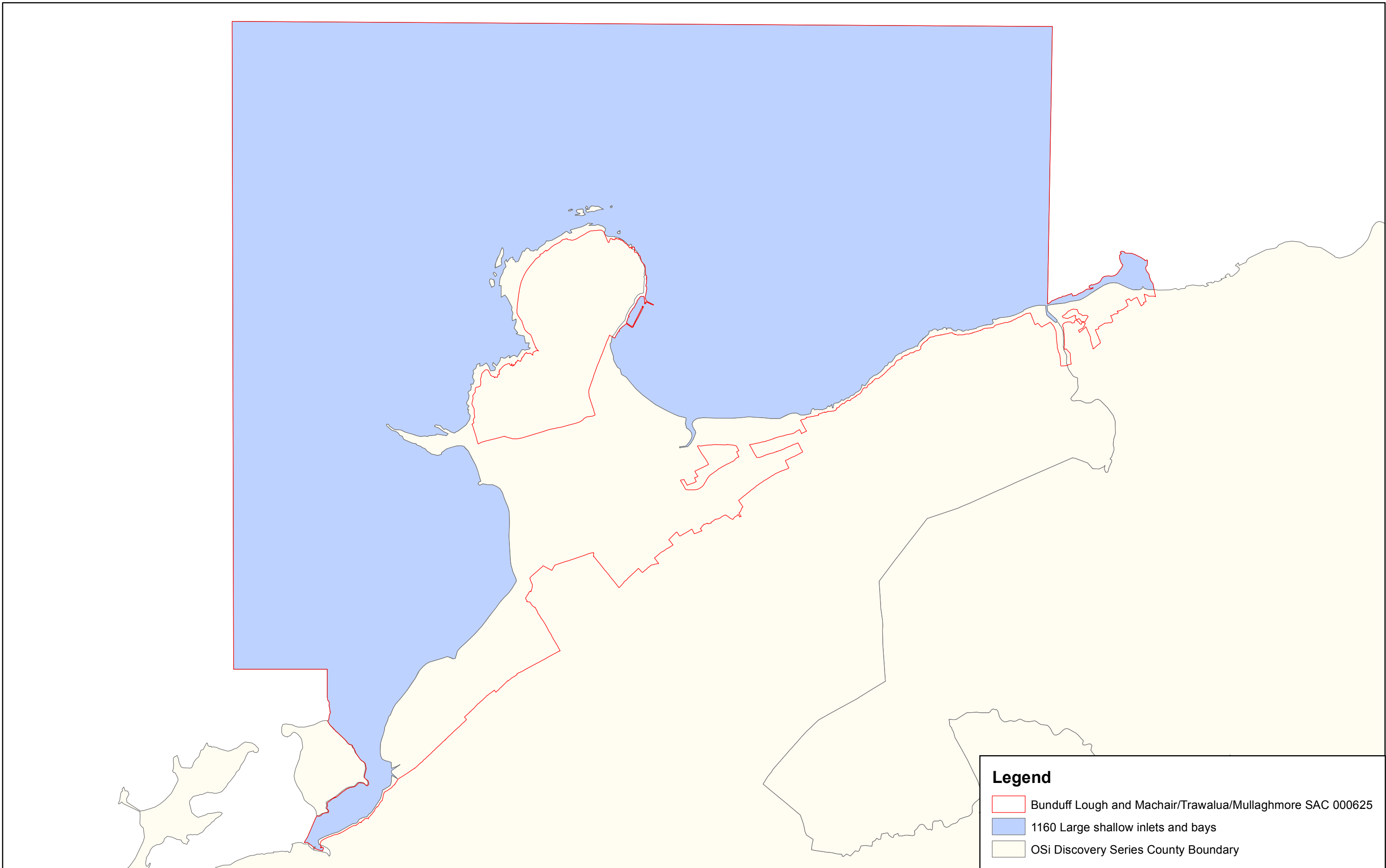






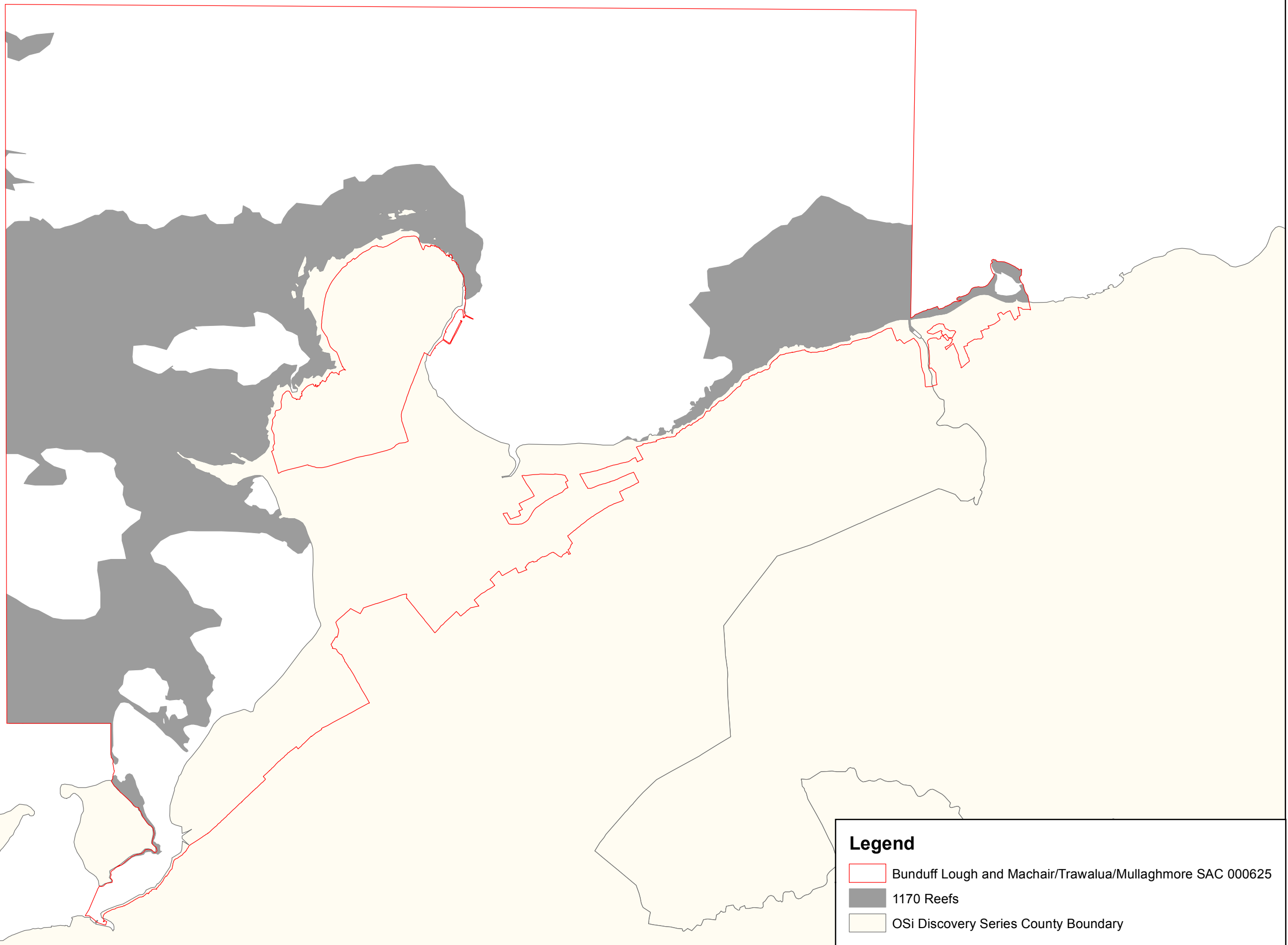
**Legend**

- Bunduff Lough and Machair/Trawalua/Mullaghmore SAC 000625
- 1140 Mudflats and sandflats not covered by sea water at low tide
- OSi Discovery Series County Boundary



**Legend**

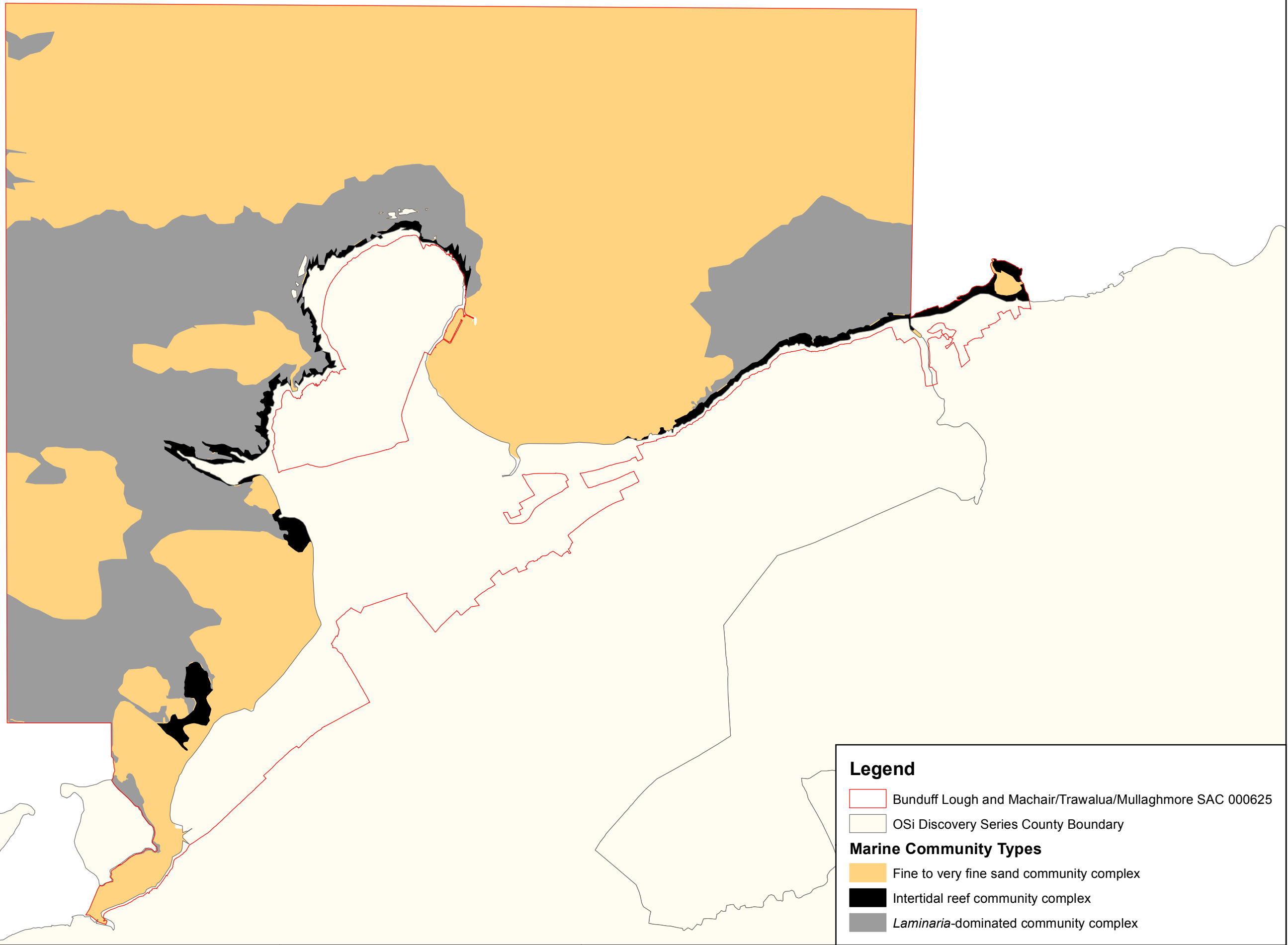
- Bunduff Lough and Machair/Trawalua/Mullaghmore SAC 000625
- 1160 Large shallow inlets and bays
- OSi Discovery Series County Boundary



**Legend**

- Bunduff Lough and Machair/Trawalua/Mullaghmore SAC 000625
- 1170 Reefs
- OSi Discovery Series County Boundary



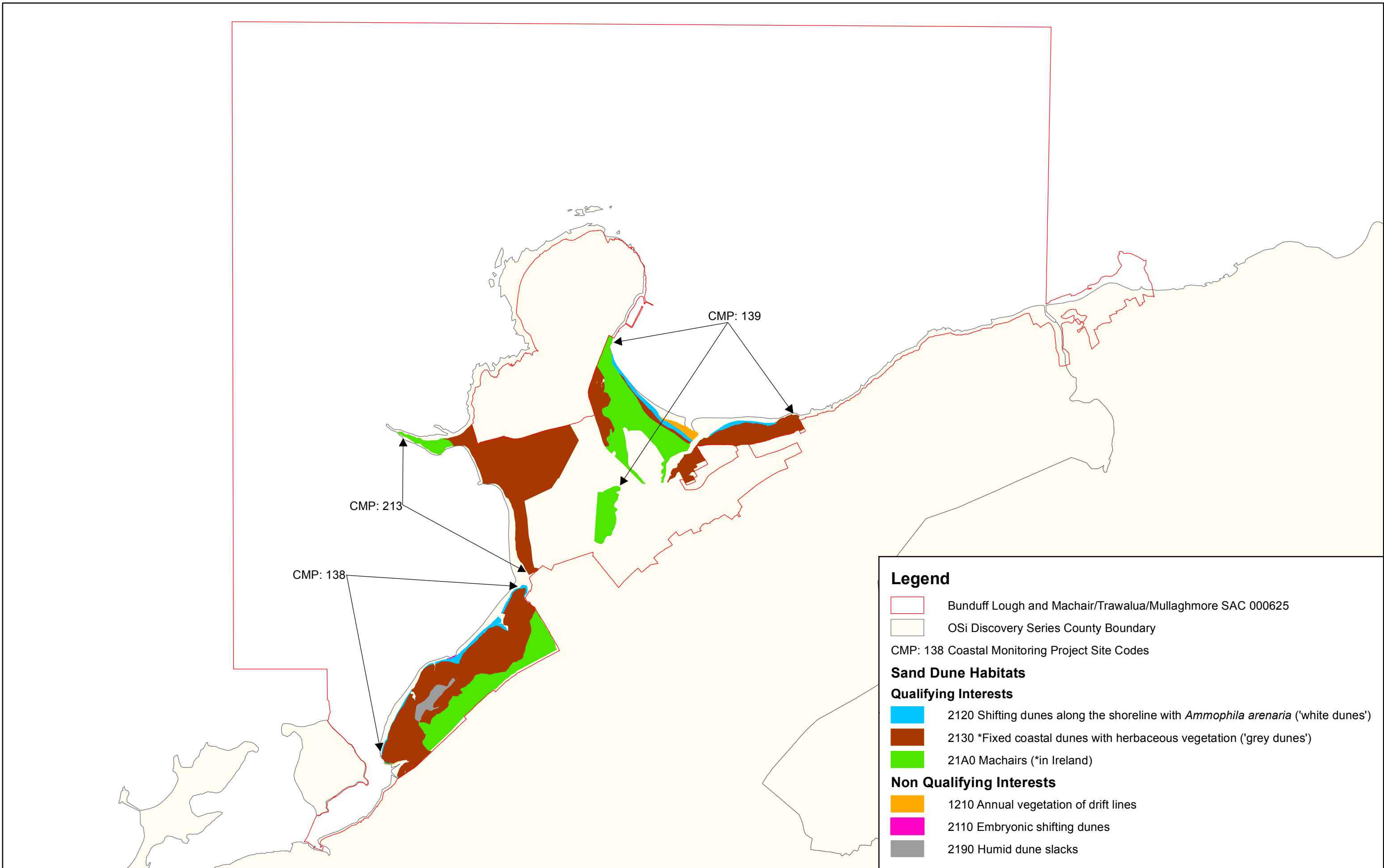


**Legend**

- Bunduff Lough and Machair/Trawalua/Mullaghmore SAC 000625
- OSi Discovery Series County Boundary

**Marine Community Types**

- Fine to very fine sand community complex
- Intertidal reef community complex
- Laminaria*-dominated community complex



**Legend**

- Bunduff Lough and Machair/Trawalua/Mullaghmore SAC 000625
- OSi Discovery Series County Boundary

CMP: 138 Coastal Monitoring Project Site Codes

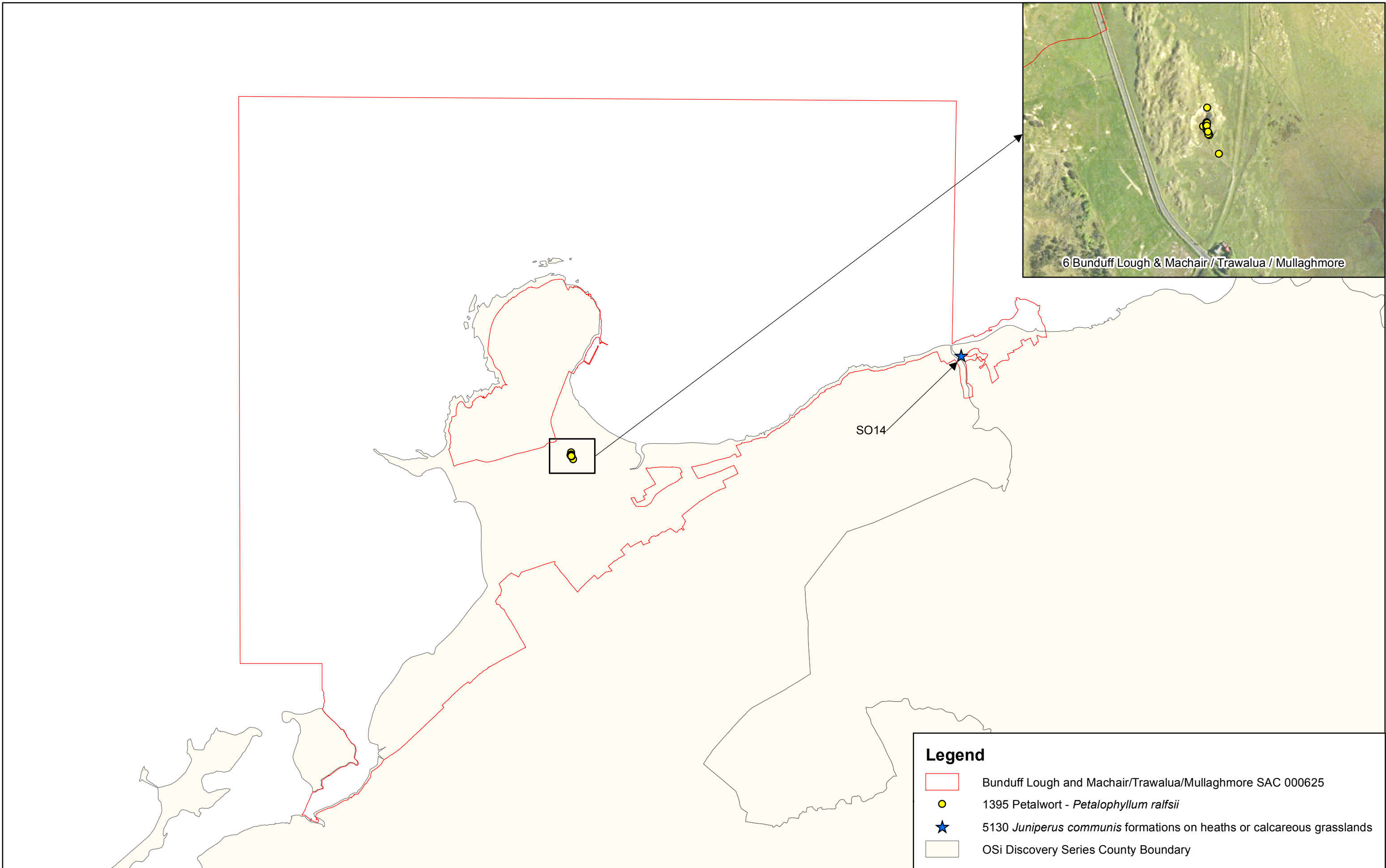
**Sand Dune Habitats**

**Qualifying Interests**

- 2120 Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes')
- 2130 \*Fixed coastal dunes with herbaceous vegetation ('grey dunes')
- 21A0 Machairs (\*in Ireland)

**Non Qualifying Interests**

- 1210 Annual vegetation of drift lines
- 2110 Embryonic shifting dunes
- 2190 Humid dune slacks



**Legend**

- Bunduff Lough and Machair/Trawalua/Mullaghmore SAC 000625
- 1395 Petalwort - *Petalophyllum ralfsii*
- ★ 5130 *Juniperus communis* formations on heaths or calcareous grasslands
- OSi Discovery Series County Boundary

# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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### Arroo Mountain SAC 001403



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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**Citation:**

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

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

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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001403	Arroo Mountain SAC
4010	Northern Atlantic wet heaths with <del>Cladonia</del> <i>Cladonia</i>
4030	European dry heaths
4060	Alpine and Boreal heaths
7130	Blanket bogs (* if active bog)
7220	Petrifying springs with tufa formation (Cratoneurion)E
8120	Calcareous and calcshist screes of the montane to alpine levels (Thlaspietea rotundifolii)
8210	Calcareous rocky slopes with chasmophytic vegetation

**Please note that this SAC overlaps with Sligo/Leitrim Uplands SPA (004187). 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>	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
<hr/>	
<b>Year :</b>	2013
<b>Title :</b>	Conservation status assessment for petrifying springs
<b>Author :</b>	Lyons, M.D.; Kelly, D.L.
<b>Series :</b>	Unpublished report to NPWS
<hr/>	
<b>Year :</b>	2013
<b>Title :</b>	National survey of upland habitats (phase 3, 2012-2013), site report no.12: Arroo Mountain cSAC (001403), Co. Leitrim
<b>Author :</b>	Perrin, P.M.; Roche, J.R.; Barron, S.J.; Daly, O.H.; Hodd, R.L.; Muldoon, C.S.; Leydon, K.J.
<b>Series :</b>	Unpublished report to NPWS
<hr/>	
<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
<hr/>	
<b>Year :</b>	2016
<b>Title :</b>	Arroo Mountain SAC (site code: 1403) Conservation objectives supporting document- upland habitats- V1
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document

### Other References

<b>Year :</b>	1988
<b>Title :</b>	The Irish red data book 1. Vascular plants
<b>Author :</b>	Curtis, T.G.F; McGough, H.N.
<b>Series :</b>	Wildlife Service, Dublin
<hr/>	
<b>Year :</b>	2000
<b>Title :</b>	A guide to habitats in Ireland
<b>Author :</b>	Fossitt, J.A.
<b>Series :</b>	The Heritage Council, Kilkenny
<hr/>	
<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



## Spatial data sources

**Year :** 2012

**Title :** National Survey of Upland Habitats- Phase 3

**GIS Operations :** 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

**Used For :** 4010, 4030, 4060, 7130, 7220, 8120, 8210 (maps 3 to 7)

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

**To restore the favourable conservation condition of Northern Atlantic wet heaths with *Erica tetralix* in Arroo Mountain 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	Arroo Mountain 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 304.4ha, covering 7.7% of the SAC. Perrin et al. (2013) report no significant losses of area since 1995, though erosion is noted as an impact. 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 3	Wet heath was recorded by Perrin et al. (2013) mainly through the southern portion of the SAC. Extensive patches occur at Rassau and Cloghmeen. 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) but did not form extensive carpets
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 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 : Arroo Mountain SAC [001403]

### 4030 European dry heaths

To restore the favourable conservation condition of European dry heaths in Arroo Mountain 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	Arroo Mountain 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 363.4ha, covering 9.2% of the SAC. Perrin et al. (2013) report minor obvious losses of habitat of 0.01ha 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 4	Dry heath was recorded by Perrin et al. (2013) throughout the SAC, with the most extensive patches at Leckanarainey on the south-western slopes. 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 four 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. <i>Campylopus introflexus</i> was recorded within this habitat by Perrin et al. (2013) but did not form extensive carpets. <i>Rhododendron ponticum</i> was recorded from this habitat at Leckanarainey
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 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 : Arro Mountain SAC [001403]

### 4060 Alpine and Boreal heaths

**To maintain the favourable conservation condition of Alpine and Boreal heaths in Arro Mountain 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	Arro Mountain SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; see Perrin et al., 2013; 2014). The total current area of Alpine and Boreal heath stated by Perrin et al. (2013) is 117.0ha, covering 2.9% 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 5	Alpine and boreal heath was recorded by Perrin et al. (2013) on the high ground through the central ridge of the SAC and was most abundant at the highest points. 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 two different alpine and boreal 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	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 66%	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: dwarf shrub species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of dwarf shrub species at least 10%	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 10%	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 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: signs of grazing	Percentage 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	Based on Perrin et al. (2014). See the uplands supporting document for further details including the list of specific graminoids
Vegetation structure: signs of browsing	Percentage 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	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 within the habitat	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 : Arro Mountain SAC [001403]

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

**To restore the favourable conservation condition of Blanket bogs in Arro Mountain 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	Arro Mountain 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 2174.9ha (54.8% of the SAC). This comprises 2096.3ha of active blanket bog area and 78.6ha of inactive blanket bog. Perrin et al. (2013) also report obvious losses of habitat since 1995 of approximately 1.83 ha. However, this is almost certainly an under-estimate, as chronic losses due to erosion since 1995 cannot be quantified (89.0ha 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) extensively across the SAC. It was abundant along the lower flanks of the SAC, but was also frequent on gently sloping higher ground. 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 areas given by Perrin et al. (2013) above, 96.4% of the Annex I blanket bog habitat is currently active. 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 forming extensive carpets within this habitat by Perrin et al. (2013)
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 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 : Arroo Mountain SAC [001403]

### 7220 Petrifying springs with tufa formation (Cratoneurion)

To maintain the favourable conservation condition of Petrifying springs with tufa formation (Cratoneurion)\* in Arroo Mountain SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Square metres	Area stable or increasing, subject to natural processes	Within Arroo Mountain SAC, 26 polygons were recorded as having petrifying springs/spring complexes during the National Survey of Upland Habitats (NSUH; see Perrin et al., 2013). The majority of these (21) were recorded as being less than 1% of the polygon in which they occurred. The overall area of habitat 7220* is given in Perrin et al. (2013) as 0.9ha. The approach to mapping conducted during the NSUH is detailed in Perrin et al. (2014). Note that the NSUH did not undertake a conservation status assessment of this habitat and thus it is not included in the uplands supporting document
Habitat distribution	Occurrence	No decline from current distribution. See map 7	This habitat has been recorded from 26 polygons within the SAC. Four of the polygons are predominantly wooded, with the Fossitt (2000) woodland types oak-ash-hazel woodland (WN2), scrub (WS1), mixed conifer woodland (WD3) and scattered trees and parkland (WD5) being associated with the habitat. The majority of the polygons where the habitat was recorded are more open with the Annex I habitats Wet heath (4010), Alkaline fens (7230), Blanket bog (7130*) and Calcareous scree (8120) being recorded with the springs. Other open polygons supported the non-Annex I habitats rich fen and flush (PF1), wet grassland (GS4), dry-humid acid grassland (GS3) and dry calcareous and neutral grassland (GS1). Lyons and Kelly (2013) recognise three main sub-types of spring: wooded springs, inland non-wooded springs and coastal springs. The springs in this SAC fall into the first two sub-types
Hydrological regime: height of water table; water flow	Metres; metres per second	Maintain appropriate hydrological regimes	The hydrological regimes of individual springs are currently unknown in detail. Petrifying springs rely on permanent irrigation, usually from upwelling groundwater sources or seepage sources. In karst areas, water tends to flow away rapidly over bare rock surfaces, even on fairly flat ground (Lyons and Kelly, 2013)
Water quality	Water chemistry measures	Maintain oligotrophic and calcareous conditions	Water chemistry is currently unknown for springs in this SAC. Characteristically, petrifying spring water has high values for pH, alkalinity and dissolved calcium and is oligotrophic (Lyons and Kelly, 2013)
Vegetation composition: typical species	Occurrence	Maintain typical species	The bryophytes <i>Palustriella commutata</i> ( <i>Cratoneuron commutatum</i> ) and <i>Cratoneuron filicinum</i> are diagnostic of petrifying springs (EC, 2013) and are found in this habitat in the SAC (Perrin et al., 2013). <i>Palustriella commutata</i> is diagnostic for the NSUH vegetation community SPG2i, this being synonymous with 7220*. Other bryophyte species recorded within the SAC (Perrin et al., 2013), which are listed in Appendix 1 A-C of Lyons and Kelly (2013) as being indicative of petrifying springs, are: <i>Aneura pinguis</i> , <i>Bryum pseudotriquetrum</i> , <i>Campylium stellatum</i> , <i>Fissidens adianthoides</i> , <i>Hymenostylium recurvirostrum</i> var. <i>recurvirostrum</i> , <i>Orthothecium rufescens</i> , <i>Palustriella falcata</i> , <i>Pellia endiviifolia</i> , <i>Philontis calcarea</i> and <i>Preissia quadrata</i>

## Conservation Objectives for : Arroo Mountain SAC [001403]

### 8120 Calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*)

To restore the favourable conservation condition of Calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*) in Arroo Mountain 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	Arroo Mountain SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; see Perrin et al., 2013; 2014). The total current area of calcareous scree in the SAC stated by Perrin et al. (2013) is 21.4ha. 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	Calcareous scree was recorded by Perrin et al. (2013) on the steep slopes which occur in the north-eastern portion of the SAC. 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 fern and <i>Saxifraga</i> species	Number of species in local vicinity of a representative number of 2m x 2m monitoring stops	Number of ferns and <i>Saxifraga</i> indicators at each monitoring stop at least one	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: positive indicator species	Number of species in local vicinity of a representative number of monitoring stops	Number of positive indicator species at each monitoring stop at least three	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: grass species and dwarf shrubs	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of dwarf shrubs and grasses, excluding blue moor-grass ( <i>Sesleria caerulea</i> ) collectively less than 20%	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	Proportion of vegetation composed 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 a representative number of 2m x 2m monitoring stops	Proportion of vegetation composed 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 composition: bracken, native trees and scrub	Percentage cover in local vicinity of a representative number of monitoring stops	Total cover of bracken ( <i>Pteridium aquilinum</i> ), native trees and scrub less than 25%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: grazing and browsing	Percentage at a representative number of 2m x 2m monitoring stops	Live leaves of forbs and shoots of dwarf shrubs showing signs of grazing or browsing collectively less than 50%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: disturbance	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Ground disturbed by human and animal paths, scree running, vehicles 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
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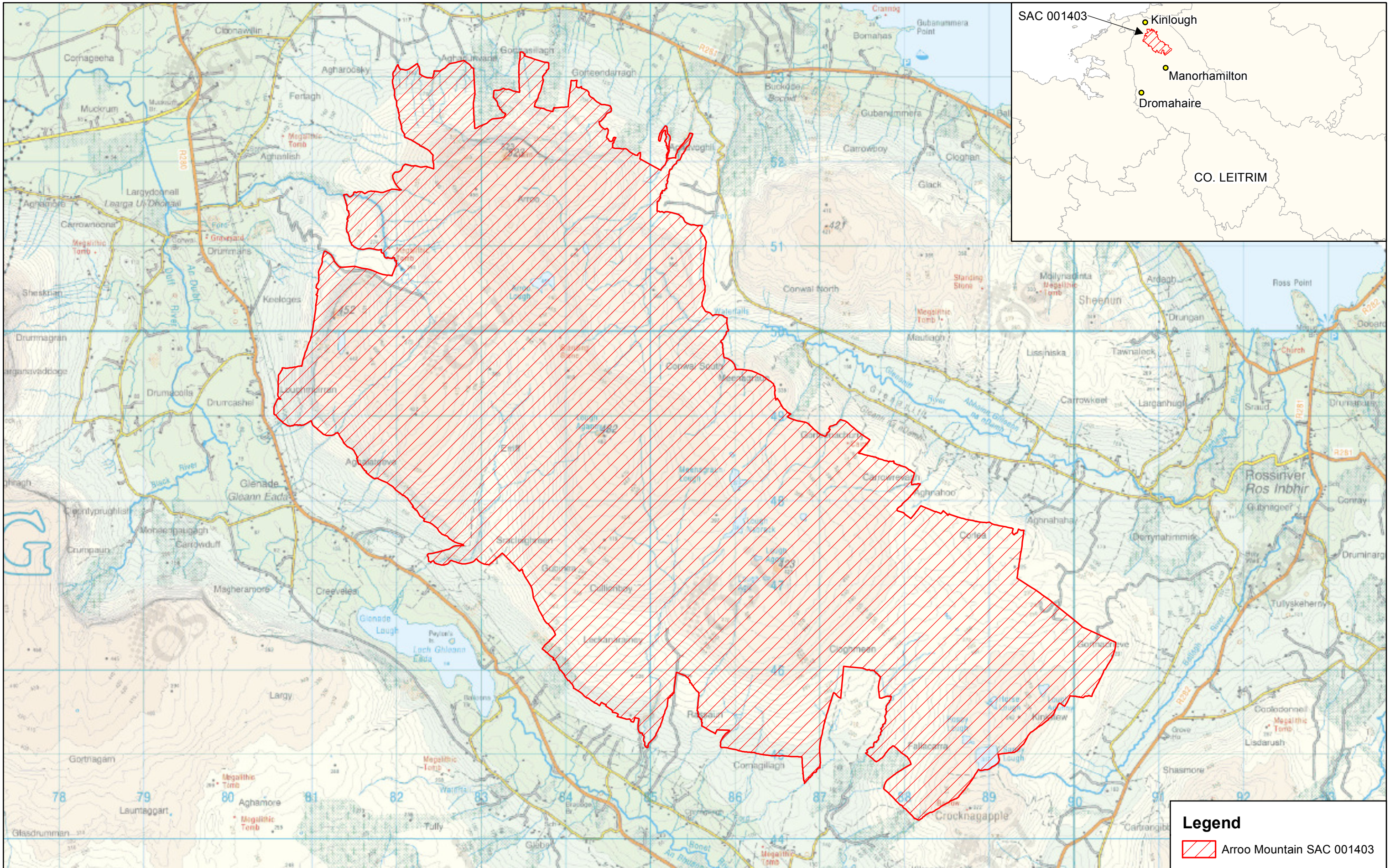
## Conservation Objectives for : Arroo Mountain SAC [001403]

### 8210 Calcareous rocky slopes with chasmophytic vegetation

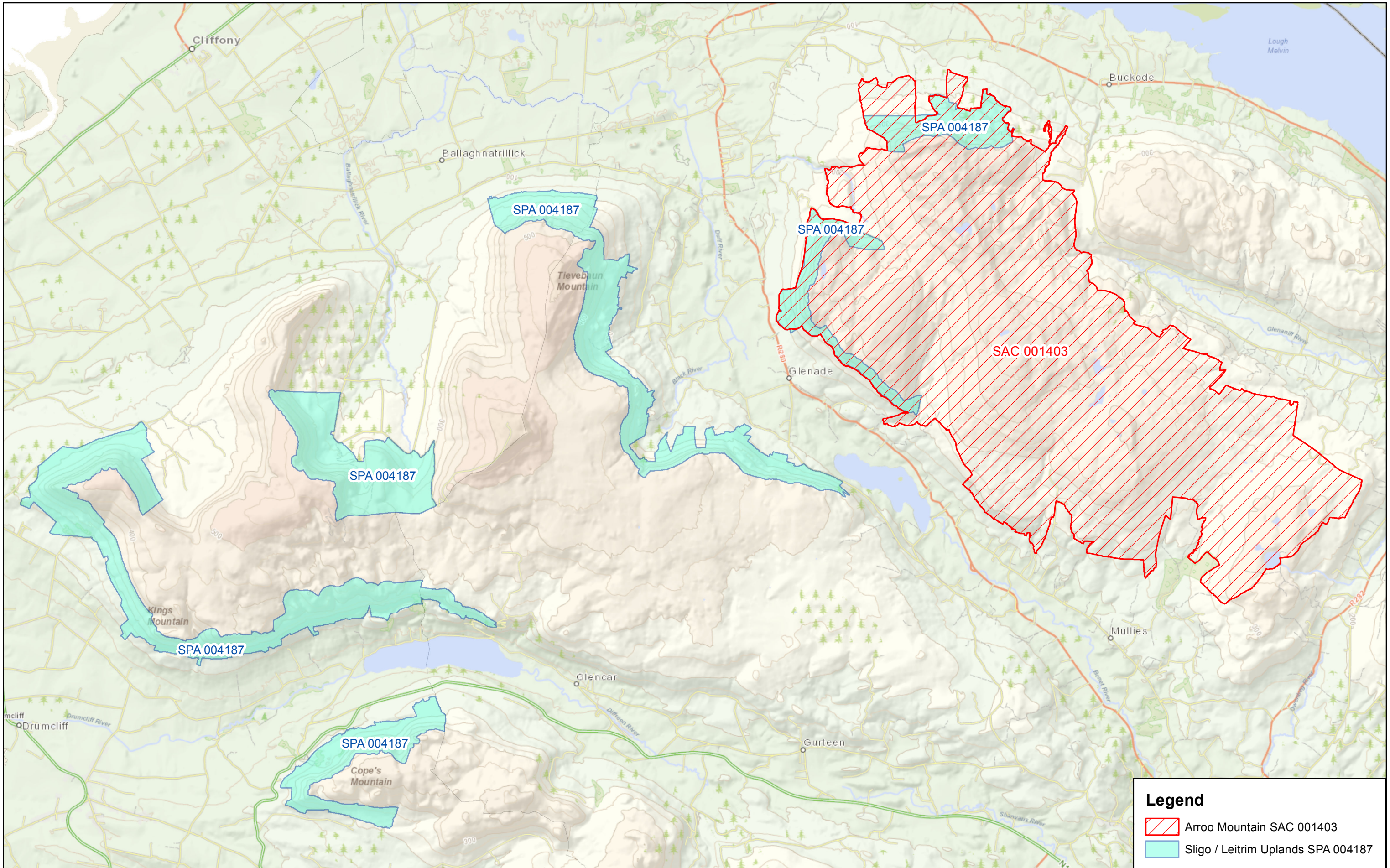
**To restore the favourable conservation condition of Calcareous rocky slopes with chasmophytic vegetation in Arroo Mountain SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Arroo Mountain SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; see Perrin et al., 2013; 2014). The total current area of calcareous rocky slopes in the SAC stated by Perrin et al. (2013) is 6.6ha. This covers 0.2% 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 9	Calcareous rocky slopes were recorded by Perrin et al. (2013) on the steep slopes which occur in the north-eastern portion of the SAC and also at other locations near its periphery. 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 fern and <i>Saxifraga</i> species	Number of species in local vicinity of a representative number of monitoring stops	Number of ferns and <i>Saxifraga</i> indicators at each monitoring stop at least one	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: positive indicator species	Number of species in local vicinity of a representative number of monitoring stops	Number of positive indicator species at each monitoring stop at least three	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: non-native species	Percentage cover in local vicinity of a representative number of monitoring stops	Proportion of vegetation composed of non-native species less than 1%	Based on Perrin et al. (2014). See the uplands supporting document for further details. <i>Epilobium brunnescens</i> was recorded within this habitat by Perrin et al. (2013)
Vegetation composition: bracken, native trees and scrub	Percentage cover in local vicinity of a representative number of monitoring stops	Total cover of bracken ( <i>Pteridium aquilinum</i> ), native trees and scrub less than 25%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: grazing and browsing	Percentage in local vicinity of a representative number of monitoring stops	Live leaves of forbs and shoots of dwarf shrubs showing signs of grazing or browsing collectively less than 50%	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. <i>Saxifraga aizoides</i> and <i>Saxifraga oppositifolia</i> , listed as Rare by Curtis and McGough (1988) have been recorded from this habitat. Also <i>Seligeria triafria</i> agg. and <i>Timmia norvegica</i> , listed as Near Threatened and Vulnerable respectively in Lockhart et al. (2012), have been recorded from the habitat. These and any new records should be considered within this attribute. See the uplands supporting document for further details





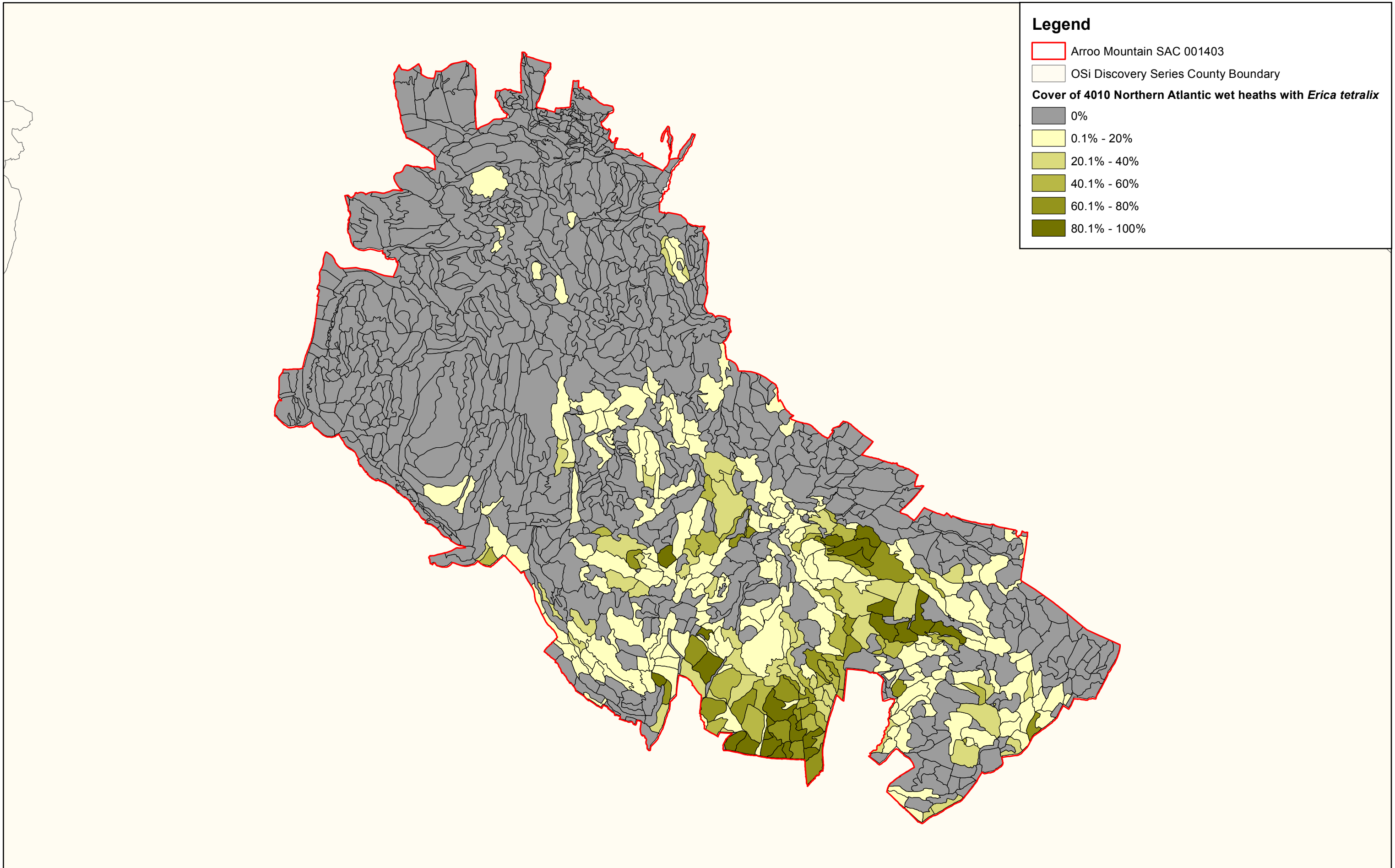




**Legend**

- Arroo Mountain SAC 001403
- Sligo / Leitrim Uplands SPA 004187



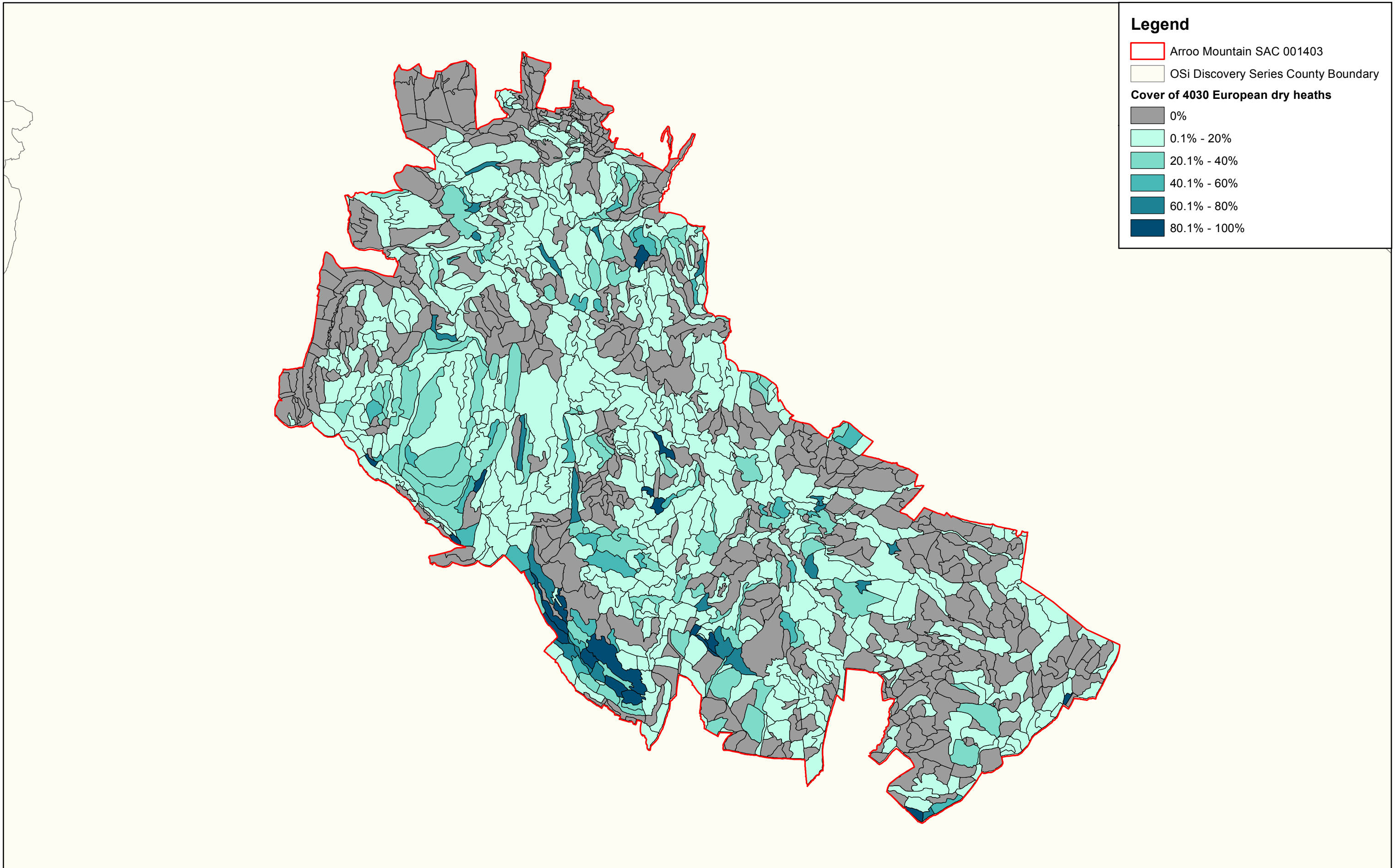


**Legend**

- Arroo Mountain SAC 001403
- OSi Discovery Series County Boundary

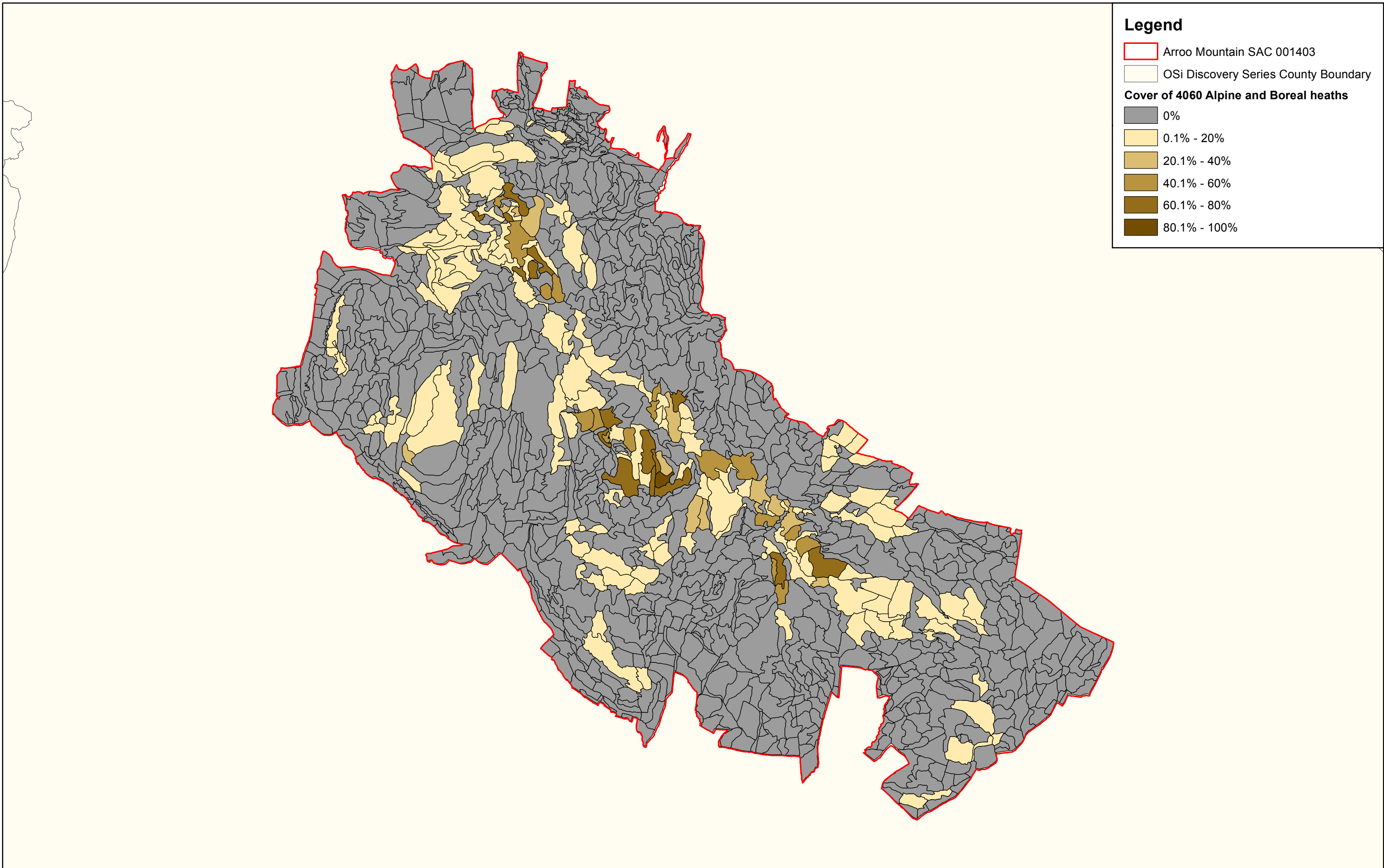
**Cover of 4010 Northern Atlantic wet heaths with *Erica tetralix***

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



**Legend**

- Arroo Mountain SAC 001403
- OSi Discovery Series County Boundary
- Cover of 4030 European dry heaths**
- 0%
- 0.1% - 20%
- 20.1% - 40%
- 40.1% - 60%
- 60.1% - 80%
- 80.1% - 100%



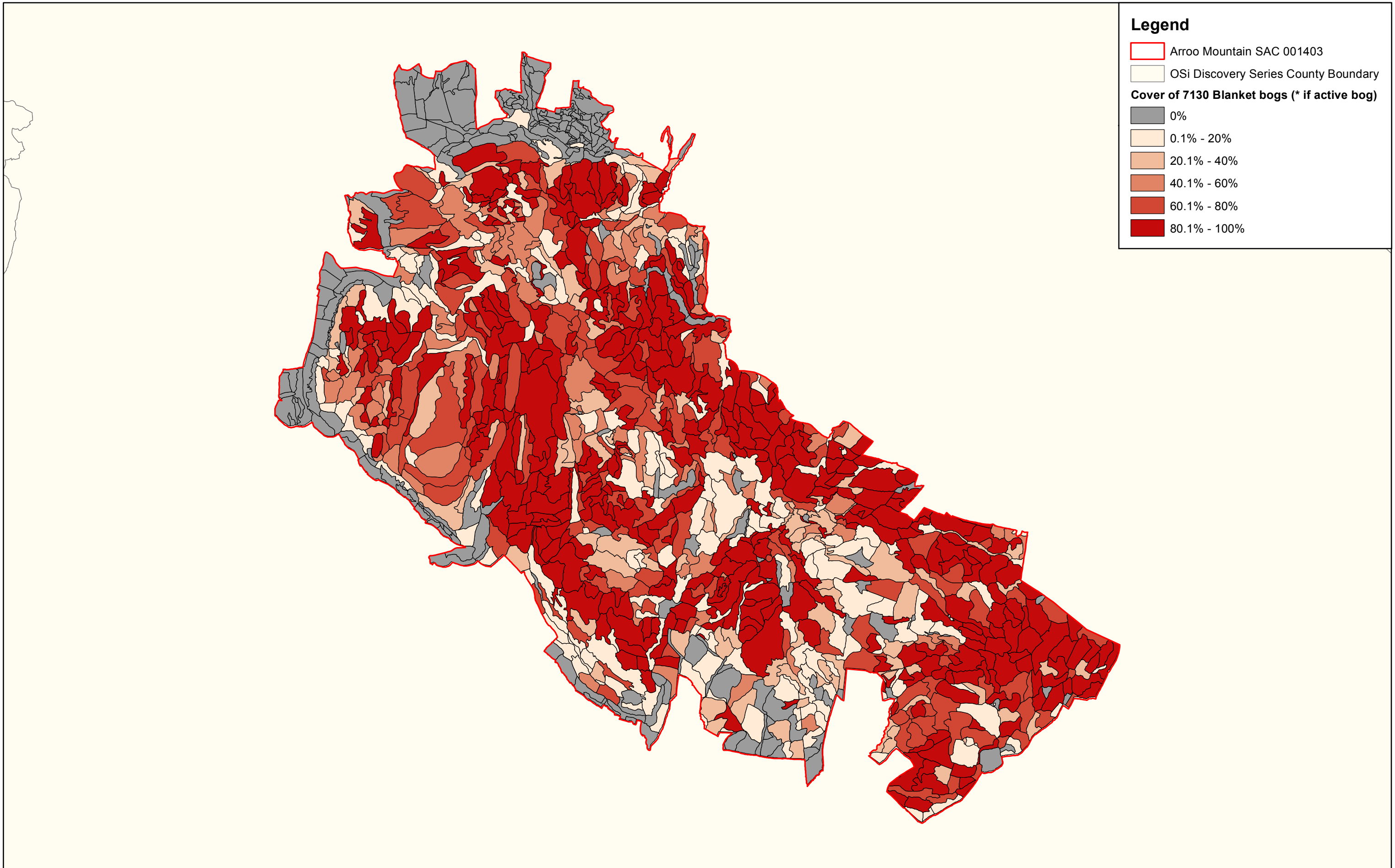
**Legend**

- Arro Mountain SAC 001403
- OSi Discovery Series County Boundary

**Cover of 4060 Alpine and Boreal heaths**

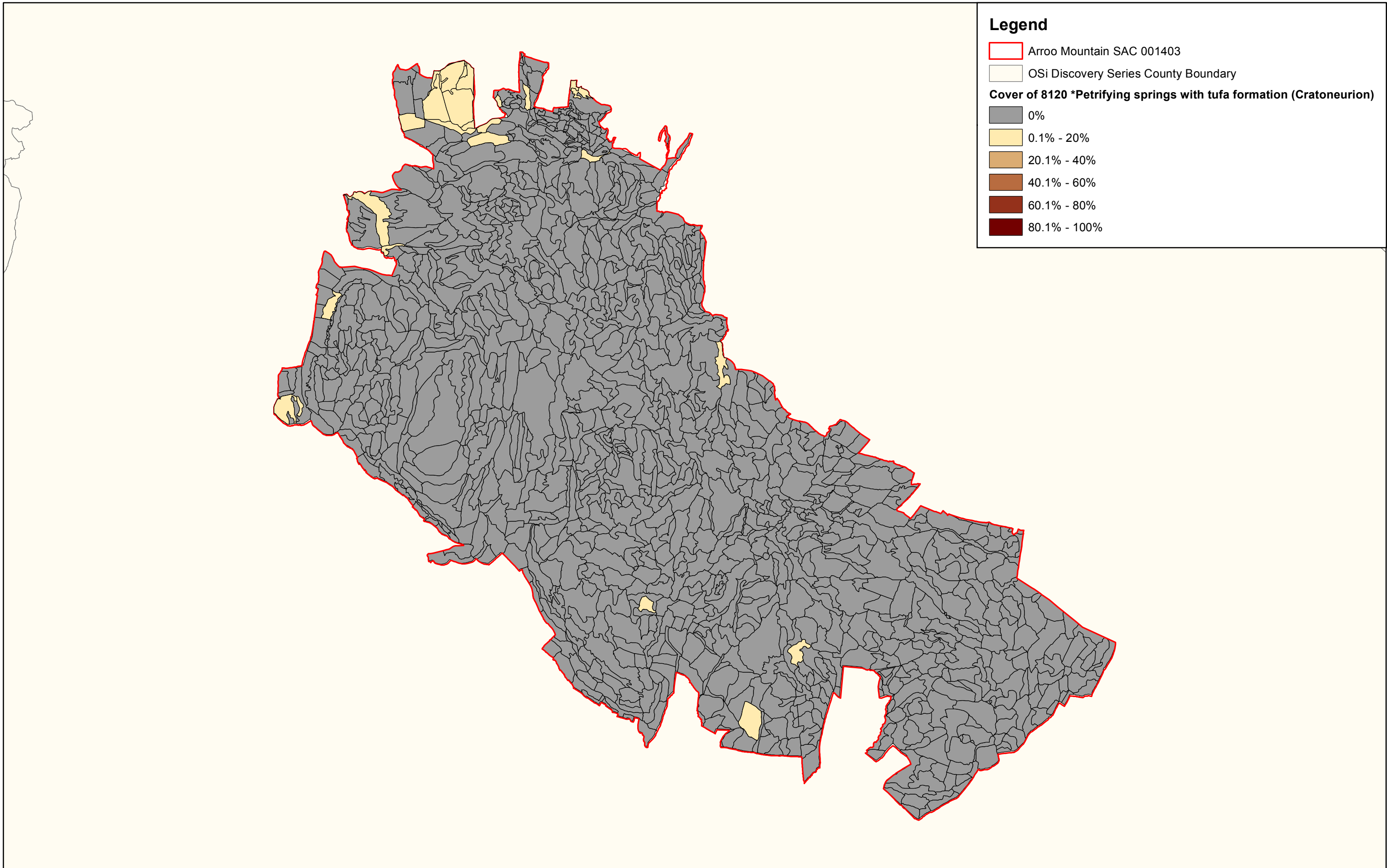
- 0%
- 0.1% - 20%
- 20.1% - 40%
- 40.1% - 60%
- 60.1% - 80%
- 80.1% - 100%

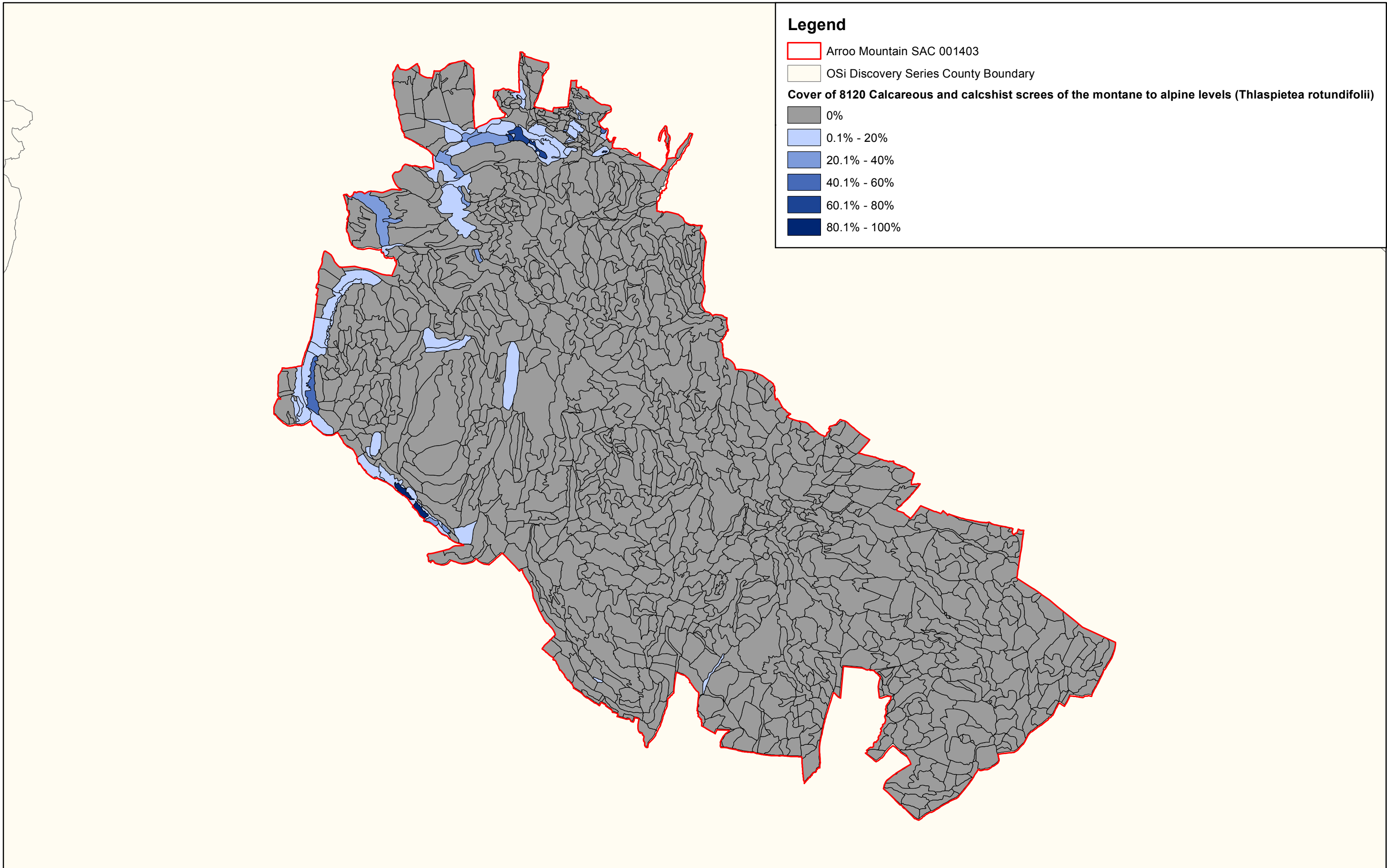




**Legend**

- Arroo Mountain SAC 001403
- OSi Discovery Series County Boundary
- Cover of 7130 Blanket bogs (\* if active bog)**
- 0%
- 0.1% - 20%
- 20.1% - 40%
- 40.1% - 60%
- 60.1% - 80%
- 80.1% - 100%

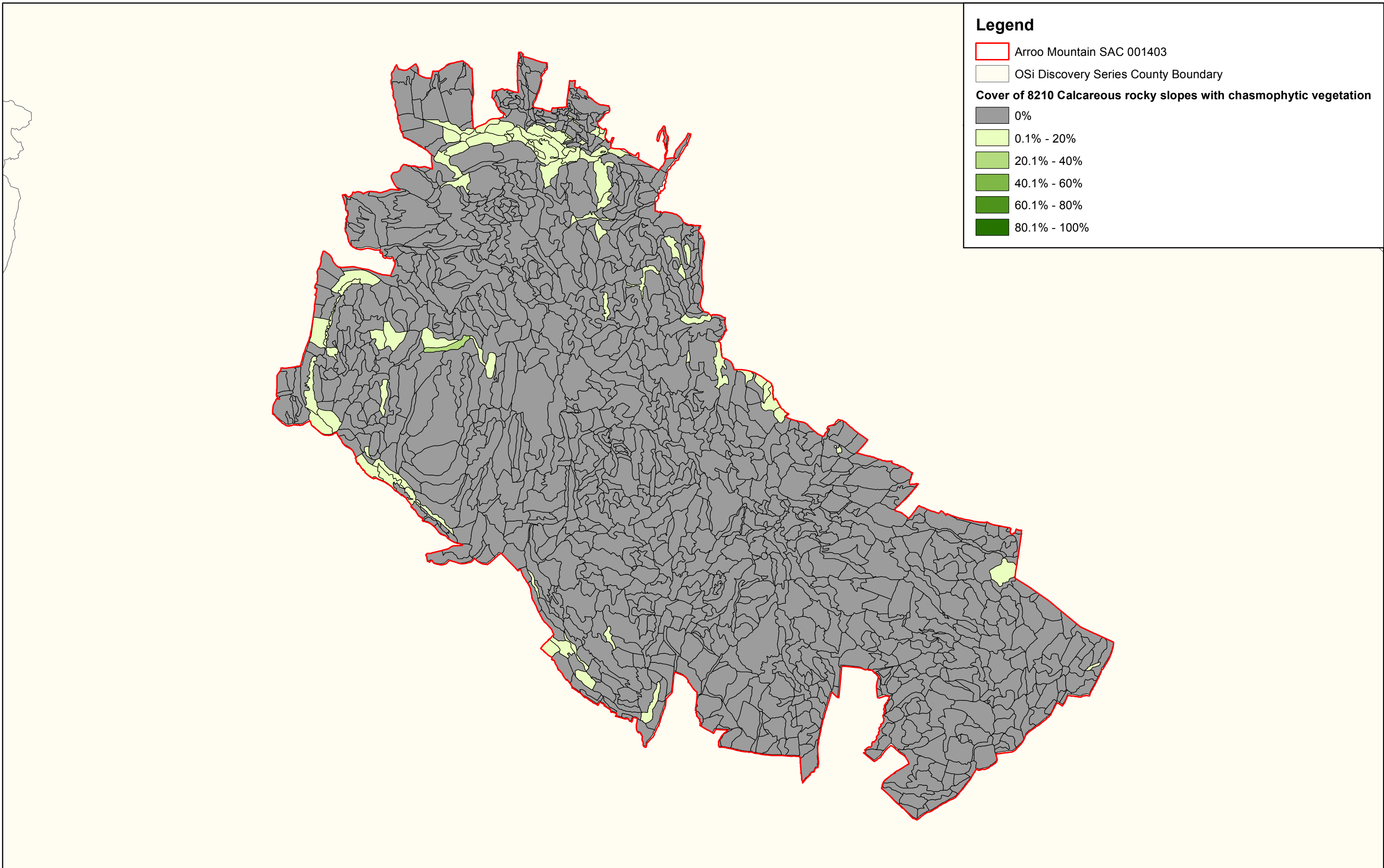




**Legend**

- Arroo Mountain SAC 001403
- OSi Discovery Series County Boundary
- Cover of 8120 Calcareous and calcshist scree of the montane to alpine levels (*Thlaspietea rotundifolii*)**
- 0%
- 0.1% - 20%
- 20.1% - 40%
- 40.1% - 60%
- 60.1% - 80%
- 80.1% - 100%





**Legend**

- Arroo Mountain SAC 001403
- OSi Discovery Series County Boundary
- Cover of 8210 Calcareous rocky slopes with chasmophytic vegetation**
- 0%
- 0.1% - 20%
- 20.1% - 40%
- 40.1% - 60%
- 60.1% - 80%
- 80.1% - 100%



# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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Streedagh Point Dunes SAC 001680



*An Roinn*  
*Ealaíon, Oidhreachta agus Gaeltachta*  

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*Department of*  
*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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001680	Streedagh Point Dunes SAC
1014	Narrow-mouthed Whorl Snail <i>Vertigo angustior</i>
1140	Mudflats and sandflats not covered by seawater at low tide
1220	Perennial vegetation of stony banks
1330	Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</i> )
1410	Mediterranean salt meadows ( <i>Juncetalia maritimi</i> )
2120	Shifting dunes along the shoreline with <i>Cladonia</i> spp (white dunes)
2130	Fixed coastal dunes with herbaceous vegetation (grey dunes)E

**Please note that this SAC adjoins Bunduff Lough and Machair/Trawalua/Mullaghmore SAC (000625). 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>	1999
<b>Title :</b>	National Shingle Beach Survey of Ireland 1999
<b>Author :</b>	Moore, D.; Wilson, F.
<b>Series :</b>	Unpublished Report to NPWS
<b>Year :</b>	2007
<b>Title :</b>	Management prescriptions for <i>Vertigo angustior</i> at cSAC sites for the species in the Republic of Ireland
<b>Author :</b>	Moorkens, E.
<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>	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>	2015
<b>Title :</b>	Streedagh Point Dunes SAC (site code: 1680) Conservation objectives supporting document-coastal habitats V1
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document
<b>Year :</b>	2015
<b>Title :</b>	Streedagh Point Dunes SAC (site code: 1680) Conservation objectives supporting document-marine 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
<b>Year :</b>	2012
<b>Title :</b>	Intertidal benthic surveys of Streedagh Point Dunes SAC
<b>Author :</b>	MERC
<b>Series :</b>	Unpublished report to the Marine Institute and NPWS

## Spatial data sources

<b>Year :</b>	Interpolated 2014
<b>Title :</b>	Intertidal survey, 2011
<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>	1140, marine community types (maps 3 and 4)
<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 4)
<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>	1330, 1410 (map 5)
<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 6)
<b>Year :</b>	2015
<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 (map 7)

## Conservation Objectives for : Streedagh Point Dunes SAC [001680]

### 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 Streedagh Point Dunes 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 338ha using OSi data
Community distribution	Hectares	Conserve the following community types in a natural condition: Sand with <i>Pygospio elegans</i> and <i>Cerastoderma edule</i> community complex; Mobile sand with <i>Haustorius arenarius</i> and polychaetes community complex. See map 4	Based on an intertidal survey undertaken in 2011 (MERC, 2012). See marine supporting document for further information

## Conservation Objectives for : Streedagh Point Dunes SAC [001680]

### 1220 Perennial vegetation of stony banks

**To maintain the favourable conservation condition of Perennial vegetation of stony banks in Streedagh Point Dunes 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. It was recorded as being present during the National Shingle Beach Survey (NSBS) (Moore and Wilson, 1999), but extent was not mapped from one sub-site: Streedagh. NB further unsurveyed areas maybe present within the SAC. 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 survey location	Full distribution unknown at present, although the habitat has been recorded at Streedagh by Moore and Wilson (1999) where it fronts the entire dune system. The dunes at Streedagh also support cobble based flats between the dunes similar to Ballyteige Burrow, County Wexford. 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	The shingle beaches within this SAC appear to be functioning naturally, with no artificial restrictions to beach dynamics (Moore and Wilson, 1999). Shingle features are relatively stable in the long term. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	The Streedagh sub-site is associated with shingle-based grassland, sand dunes and saltmarsh. Lichens are present, indicating a degree of stability. 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 typical vegetated shingle flora including the range of sub-communities within the different zones	Streedagh supports good quality vegetated shingle flora. Based on data from Moore and Wilson (1999). 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). 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 : Streedagh Point Dunes SAC [001680]

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

**To restore the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) in Streedagh Point Dunes 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: Streedagh Point - 12.82ha. See map 5	Based on data from the Saltmarsh Monitoring Project (SMP) (McCorry and Ryle, 2009). One sub-site that supports Atlantic Salt Meadows was mapped (12.82ha) and additional areas of potential ASM habitat (0.21ha) were identified from an examination of aerial photographs, giving a total estimated area of 13.03ha. NB further unsurveyed areas maybe present within the SAC. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes. See map 5 for known distribution	Based on data from McCorry and Ryle (2009). The saltmarsh at Streedagh is widely distributed 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	See 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 and Ryle (2009). A large area of ASM on the spit is unmodified and in relatively good condition. 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 range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from McCorry and Ryle (2009). The ASM at Streedagh is quite diverse and several typical ASM communities were noted by the SMP. The ASM is part of a larger coastal ecosystem. See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	Based on data from McCorry and Ryle (2009). Most of the saltmarsh is grazed by cattle though intensity varies and some areas are left ungrazed. Heavy grazing was noted adjacent to the sandhills at Streedagh in a commonage area. 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 and Ryle, 2009). At Streedagh there is some severe poaching of the saltmarsh by cattle in the commonage adjacent to the sandhills. 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 range of sub-communities with typical species listed in SMP (McCorry and Ryle, 2009)	See coastal habitats supporting document for further details
Vegetation structure: negative indicator species - <i>Spartina anglica</i>	Hectares	There is currently no common cordgrass ( <i>Spartina anglica</i> ) recorded at this SAC. This species should be prevented from establishing here	Based on data from McCorry and Ryle (2009). Common cord grass ( <i>Spartina anglica</i> ) is absent from the site. See coastal habitats supporting document for further details

## Conservation Objectives for : Streedagh Point Dunes SAC [001680]

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

**To maintain the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*) in Streedagh Point Dunes 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: Streedagh Point - 6.69ha. See map 5	Based on data from the Saltmarsh Monitoring Project (SMP) (McCorry and Ryle, 2009). One sub-site that supports Mediterranean Salt Meadows was mapped, giving a total estimated area of 6.69ha. NB further unsurveyed areas maybe present within the SAC. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 5 for known distribution	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	See 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 and Ryle (2009). See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	Mediterranean salt meadows is found high up in the saltmarsh but requires occasional tidal inundation. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain range of saltmarsh habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from McCorry and Ryle (2009). The MSM at Streedagh is quite diverse and some transitional vegetation has developed along the upper MSM in places. It is part of a larger coastal ecosystem. See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimetres	Maintain structural variation in the sward	See 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 area outside creeks vegetated	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 range of sub-communities with characteristic species listed in SMP (McCorry and Ryle, 2009)	Based on data from McCorry and Ryle (2009). Species of local distinctiveness such as saltmarsh flat-sedge ( <i>Blasmus rufus</i> ) was recorded in the MSM and forms a distinctive community in places in the upper marsh. See coastal habitats supporting document for further details
Vegetation structure: negative indicator species - <i>Spartina anglica</i>	Hectares	There is currently no common cordgrass ( <i>Spartina anglica</i> ) recorded at this SAC. This species should be prevented from establishing here	Based on data from McCorry and Ryle (2009). Common cord grass ( <i>Spartina anglica</i> ) is absent from the site. See coastal habitats supporting document for further details.

## Conservation Objectives for : Streedagh Point Dunes SAC [001680]

### 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 Streedagh Point Dunes 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: Streedagh Point - 2.12ha. See map 6	Habitat was mapped from a single site during the Coastal Monitoring Project (CMP) (Ryle et al., 2009). 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 6 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. Marram grass ( <i>Ammophila arenaria</i> ) reproduces vegetatively and requires constant accretion of fresh sand to maintain active growth encouraging further accretion. 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 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). 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 marram grass ( <i>Ammophila arenaria</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

## Conservation Objectives for : Streedagh Point Dunes SAC [001680]

### 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 Streedagh Point Dunes 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: Streedagh Point- 82.44ha. See map 6	Habitat was mapped from a single site during the Coastal Monitoring Project (CMP) (Ryle et al., 2009). 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	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	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 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 structure: sward height	Centimetres	Maintain structural variation within sward	Based on data from Gaynor (2008) 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 number 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). The habitat supports a typical dune flora. It also supports a population of the Annex II snail species <i>Vertigo angustior</i> . See coastal habitats supporting document and the conservation objective for <i>V. angustior</i> (1014) for further details
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. 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

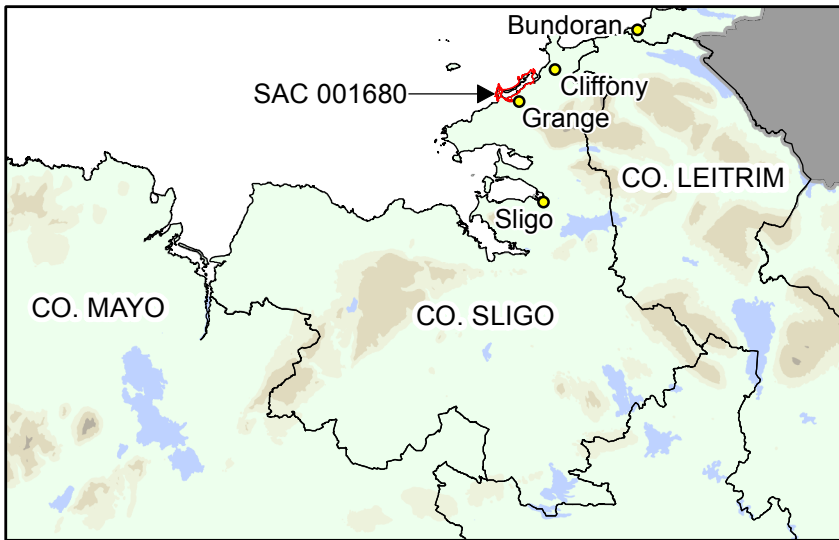


## Conservation Objectives for : Streedagh Point Dunes SAC [001680]


### 1014 Narrow-mouthed Whorl Snail *Vertigo angustior*

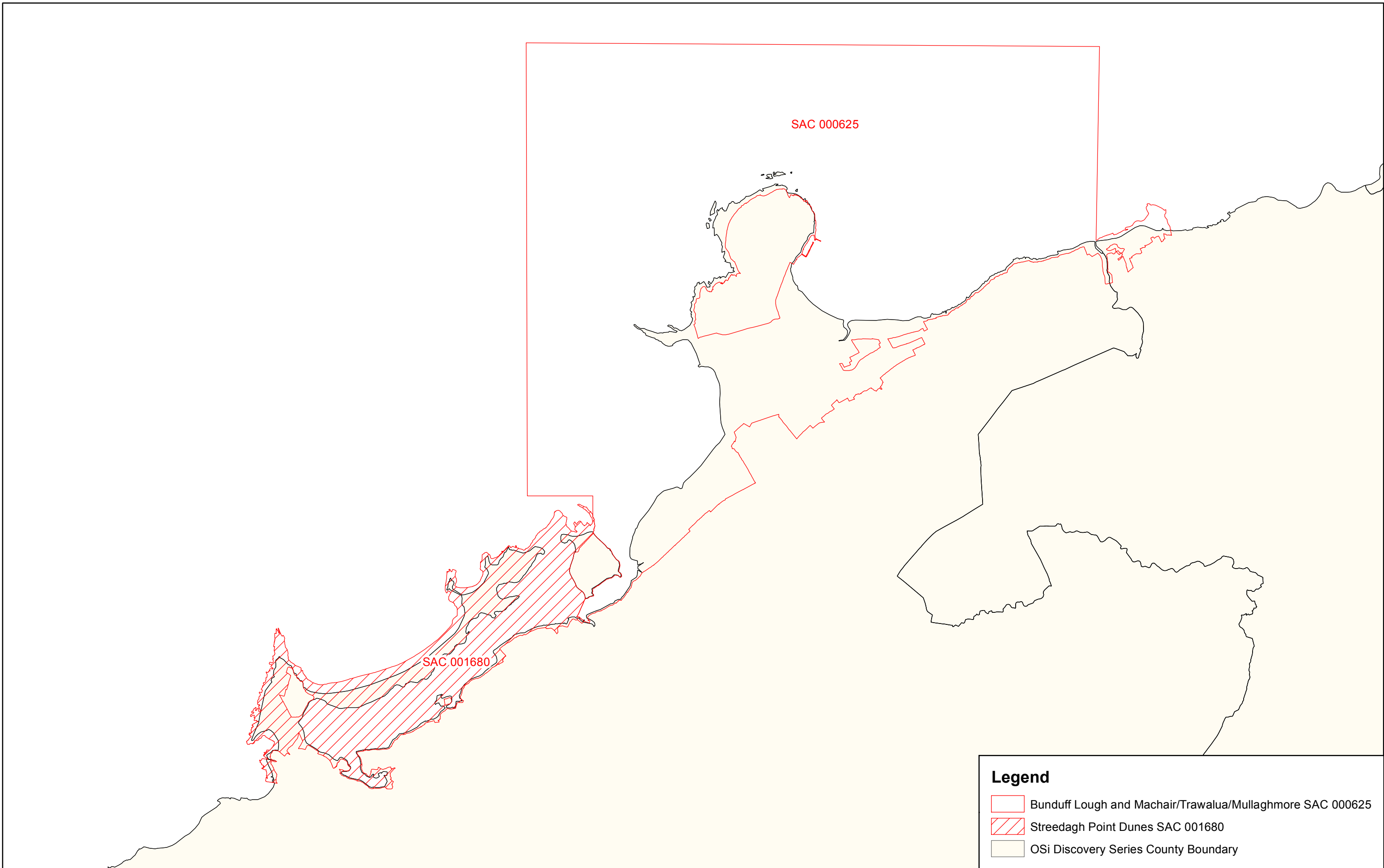
To maintain the favourable conservation condition of Narrow-mouthed Whorl Snail in Streedagh Point Dunes SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: occupied sites	Number	No decline. Streedagh Dunes can be considered as a single site for this species as the area of habitat is continuous. This overlaps with five 1km squares, G6350, G6450, G6551, G6552 and G6651. See map 7	<i>Vertigo angustior</i> occurs extensively within the SAC and there are confirmed records from the five 1km squares (Moorkens 2007; Moorkens and Killeen 2011) (site code VaCAM14)
Occurrence in suitable habitat	Percentage positive records at a representative number of monitoring stops	No decline. A minimum of 60% positive samples in areas of habitat that are optimal/suboptimal; 20% in areas defined as sub-optimal	From Moorkens and Killeen (2011). Positive samples mean the confirmed presence of snails (living or recently dead adults and/or juveniles). See habitat extent target below for definition of optimal and sub-optimal habitat
Optimal soil wetness	Metres along transect; Percentage of representative number of monitoring stops	127.5m of the established monitoring transect assessed as optimal wetness; at least 75% of sampling stops assessed as optimal wetness	Transect established as part of condition assessment monitoring (Moorkens and Killeen, 2011). Optimal wetness also defined by Moorkens and Killeen (2011)
Habitat extent	Hectares	Stable or increasing, subject to natural processes. Area of habitat that is in at least sub-optimal condition is at least 105ha	Optimal habitat is defined as either fixed dune, species-rich grassland with vegetation height of 10-30cm and dominated by <i>Festuca rubra</i> , with sparse <i>Ammophila arenaria</i> , <i>Geum verum</i> , <i>Pilosella officinarum</i> , <i>Anacamptis pyramidalis</i> , <i>Plantago lanceolata</i> and other low growing herbs, growing on damp, friable soil covered with a layer of humid, open structured thatch; or, transition marsh with vegetation height of 25-40cm of <i>Iris pseudacorus</i> , <i>Equisetum palustre</i> , <i>Caltha palustris</i> , <i>Lychnis flos-cuculi</i> , <i>Mentha aquatica</i> with an understorey of moss and litter. Sub-optimal fixed dune habitat is as above but either height is less than 10cm or between 30 and 50cm, or soil is dry and sandy, or thatch is wetter with a denser structure. Sub-optimal transition marsh is as above but either vegetation is less than 25cm high or over 50cm, or soil is very wet with pools of standing water, or thatch is wetter with a denser structure (Moorkens and Killeen, 2011)






**Legend**




 Streedagh Point Dunes SAC 001680

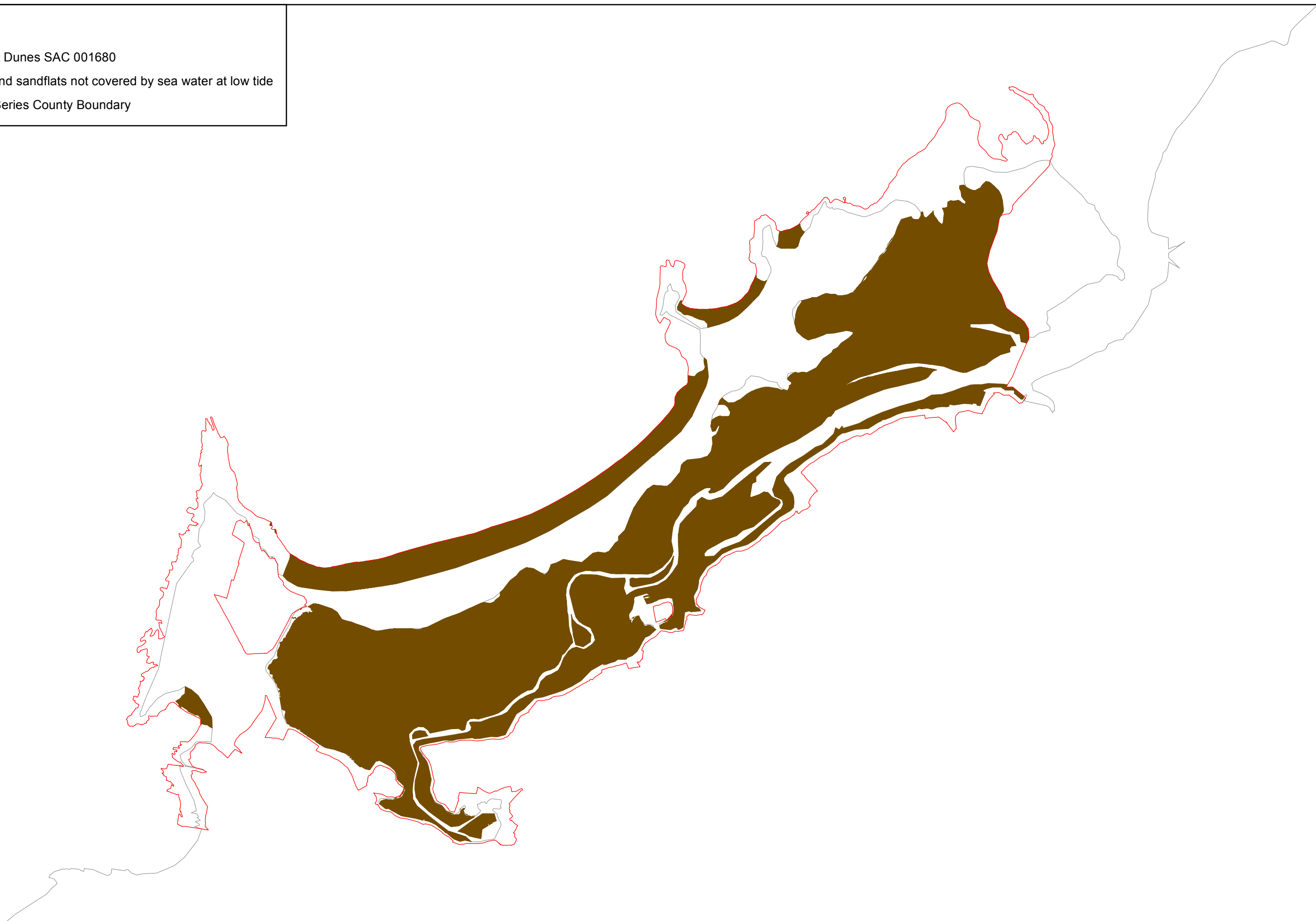


**Legend**

-  Bunduff Lough and Machair/Trawalua/Mullaghmore SAC 000625
-  Streedagh Point Dunes SAC 001680
-  OSi Discovery Series County Boundary


**Legend**

-  Streedagh Point Dunes SAC 001680
-  1140 Mudflats and sandflats not covered by sea water at low tide
-  OSi Discovery Series County Boundary







**Legend**


 Streedagh Point Dunes SAC 001680

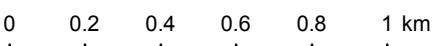
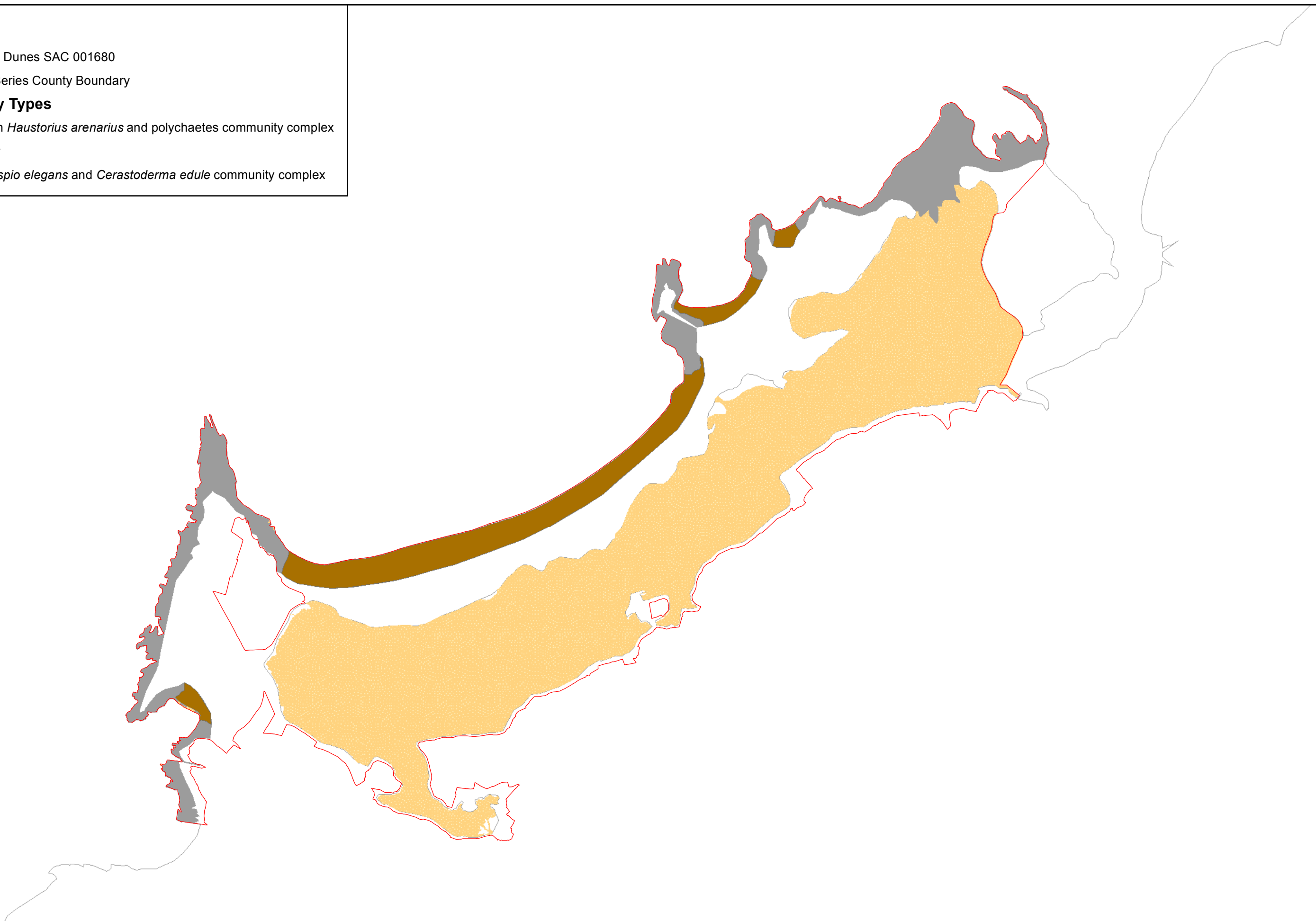
 OSi Discovery Series County Boundary

**Marine Community Types**

 Mobile sand with *Haustorius arenarius* and polychaetes community complex

 Reef community

 Sand with *Pygospio elegans* and *Cerastoderma edule* community complex



**Legend**

- Streedagh Point Dunes SAC 001680
- OSi Discovery Series County Boundary

SMP: 0121 Saltmarsh Monitoring Project Site Codes

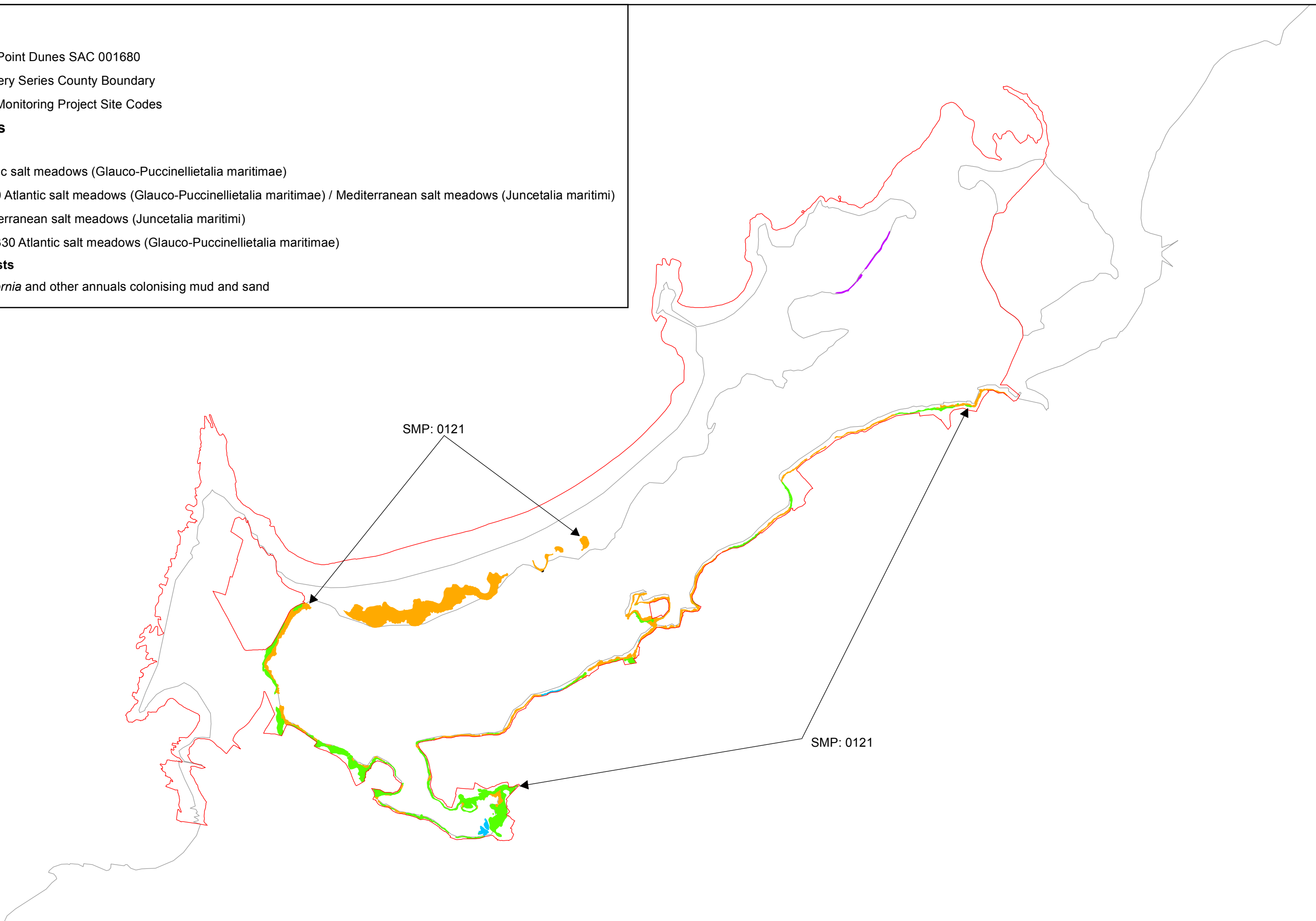
**Saltmarsh Habitats**

**Qualifying Interests**

- 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- 1330 / 1410 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) / Mediterranean salt meadows (*Juncetalia maritimi*)
- 1410 Mediterranean salt meadows (*Juncetalia maritimi*)
- Potential 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)

**Non Qualifying Interests**

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



**Legend**

- Streedagh Point Dunes SAC 001680
- OSi Discovery Series County Boundary
- National Shingle Beach Survey sub-sites

CMP: 137 Coastal Monitoring Project Site Codes

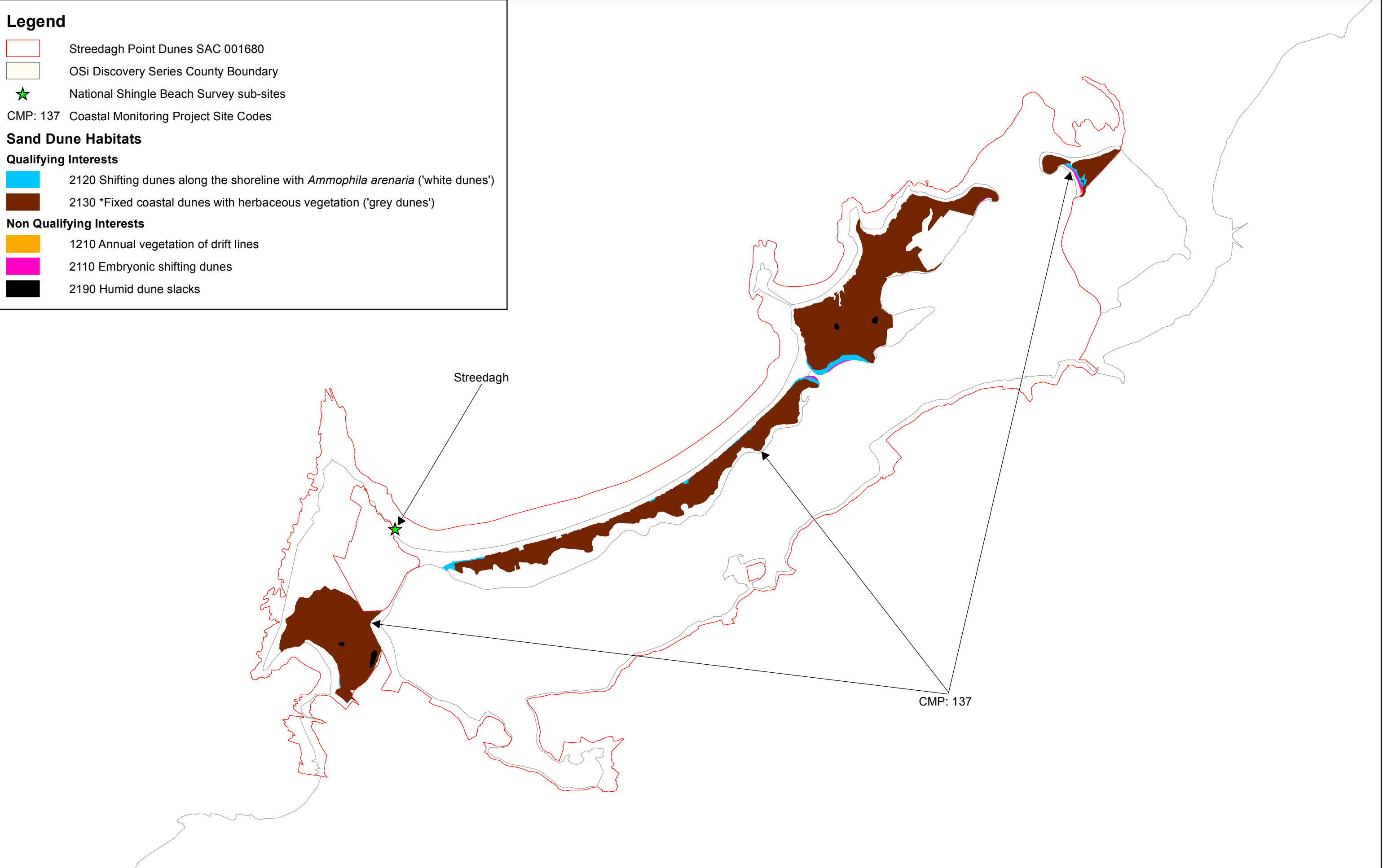
**Sand Dune Habitats**

**Qualifying Interests**

- 2120 Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes')
- 2130 \*Fixed coastal dunes with herbaceous vegetation ('grey dunes')

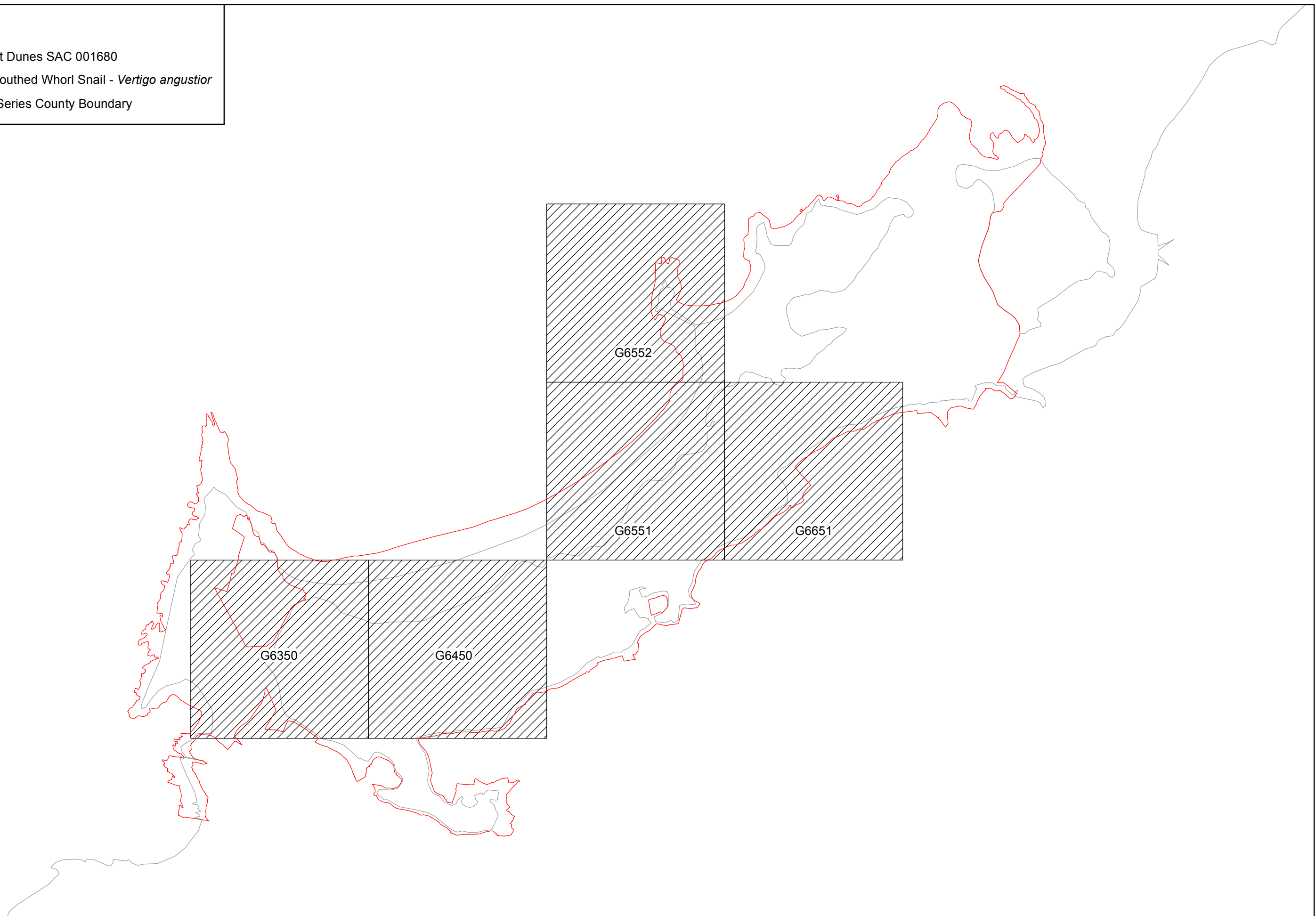
**Non Qualifying Interests**

- 1210 Annual vegetation of drift lines
- 2110 Embryonic shifting dunes
- 2190 Humid dune slacks



**Legend**

- Streedagh Point Dunes SAC 001680
- 1014 Narrow-Mouthed Whorl Snail - *Vertigo angustior*
- OSi Discovery Series County Boundary





# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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Glenade Lough SAC 001919



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

**National Parks and Wildlife Service,  
Department of Housing, Local Government and Heritage,  
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Web: [www.npws.ie](http://www.npws.ie)  
E-mail: [natureconservation@housing.gov.ie](mailto:natureconservation@housing.gov.ie)**

**Citation:**

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National Parks and Wildlife Service, Department of Housing, Local Government  
and Heritage.**

**Series Editors: Rebecca Jeffrey and Christina Campbell  
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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001919	Glenade Lough SAC
1092	White-clawed Crayfish <i>Austropotamobius pallipes</i>
1833	Slender Naiad <i>Najas flexilis</i>
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation

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**Please note that this SAC is adjacent to Ben Bulben, Gleniff and Glenade Complex SAC (000623), Lough Gill SAC (001976) and Sligo/Leitrim Uplands SPA (004187). See map 2. The conservation objectives for this site should be used in conjunction with those for the 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>	1984
<b>Title :</b>	The vegetation of Irish lakes
<b>Author :</b>	Heuff, H.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2002
<b>Title :</b>	<i>Najas flexilis</i> in Donegal
<b>Author :</b>	Roden, C.M.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2004
<b>Title :</b>	The distribution of <i>Najas flexilis</i> in Ireland 2002-2004
<b>Author :</b>	Roden, C.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>	2009
<b>Title :</b>	Monitoring of white-clawed crayfish <i>Austropotamobius pallipes</i> in Irish lakes in 2007
<b>Author :</b>	O'Connor, W.; Hayes, G.; O'Keeffe, C.; Lynn, D.
<b>Series :</b>	Irish Wildlife Manuals, No. 37
<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 Manuals, No.45
<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>	Article 17 assessment form and audit trail for <i>Najas flexilis</i> , the slender naiad (species code 1833). Backing document. April 2013
<b>Author :</b>	O Connor, Á.
<b>Series :</b>	Unpublished report by NPWS
<b>Year :</b>	2014
<b>Title :</b>	Targeted survey of <i>Najas flexilis</i>
<b>Author :</b>	Roden, C.; Murphy, P.
<b>Series :</b>	Unpublished report to NPWS
<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>	2017
<b>Title :</b>	Ballyhoorisky Point to Fanad Head SAC (site code: 1975) Conservation objectives supporting document- <i>Najas flexilis</i> V1
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document
<b>Year :</b>	2017
<b>Title :</b>	Mweelrea/Sheeffry/Erriff Complex SAC (site code: 1932) Conservation objectives supporting document- <i>Najas flexilis</i> V1
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document
<b>Year :</b>	2017
<b>Title :</b>	Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC (site code: 365) Conservation objectives supporting document- <i>Najas flexilis</i> V1
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document
<b>Year :</b>	2019
<b>Title :</b>	The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation assessments
<b>Year :</b>	2019
<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>	in prep.
<b>Title :</b>	A study of lakes with Slender Naiad ( <i>Najas flexilis</i> )
<b>Author :</b>	Roden, C.; Murphy, P.; Ryan, J.B.
<b>Series :</b>	Irish Wildlife Manuals
<b>Year :</b>	in prep.
<b>Title :</b>	Survey of the status of white-clawed crayfish, <i>Austropotamobius pallipes</i> , in designated SACs in 2017
<b>Author :</b>	Gammell, M.; McFarlane, A.; Brady, D.; O'Brien, J.; Mirimin, L.; Graham, C.; Lally, H.; Minto, C.; O'Connor, I.
<b>Series :</b>	Irish Wildlife Manuals

## Other References

<b>Year :</b>	2001
<b>Title :</b>	Aquatic plants in Britain and Ireland
<b>Author :</b>	Preston, C.D.; Croft, J.M.
<b>Series :</b>	Harley Books, Colchester
<b>Year :</b>	2004
<b>Title :</b>	The ecology of <i>Najas flexilis</i>
<b>Author :</b>	Wingfield, R.A.; Murphy, K.J.; Hollingsworth, P.; Gaywood, M.J.
<b>Series :</b>	Scottish Natural Heritage Commissioned Report No. 017 (ROAME No. F98PA02)
<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>	Environmental Protection Agency, Wexford

**Year :** 2016  
**Title :** A narrative for conserving freshwater and wetland habitats in England  
**Author :** Mainstone, C.; Hall, R.; Diack, I.  
**Series :** Natural England Research Reports Number 064

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**Year :** 2020  
**Title :** Slender Naiad (*Najas flexilis*) habitat quality assessment  
**Author :** Gunn, I.D.M.; Carvalho, L.  
**Series :** CRW2018\_27. Scotland's Centre of Expertise for Waters (CREW)

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## Spatial data sources

**Year :** 2008  
**Title :** OSi 1:5000 IG vector dataset  
**GIS Operations :** WaterPolygons feature class clipped to the SAC boundary. Expert opinion used to identify Annex I habitat and to resolve any issues arising  
**Used For :** 3150 (map 3)

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**Year :** 2021  
**Title :** NPWS rare and threatened species database  
**GIS Operations :** Dataset created from spatial references in database records. Expert opinion used as necessary to resolve any issues arising  
**Used For :** 1092 (map 4)

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## Conservation Objectives for : Glenade Lough SAC [001919]

### 3150 Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation

To restore the favourable conservation condition of Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation in Glenade Lough 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 3150 is no longer believed to occur in Glenade Lough, rather the lake is considered to be a <i>Najas</i> -type lake with high plant species and community diversity. As such, it is treated here as lake habitat 3130 in respect of the targets applied. Glenade Lough is an important lake. Its diversity may largely result from the mixed geology of its catchment, with base-poor springs and seepages likely to be a key driver. It is unusual in the co-occurrence of slender naiad ( <i>Najas flexilis</i> ) and white-clawed crayfish ( <i>Austropotamobius pallipes</i> ), although the former has not been seen since 1978 (see the conservation objective for slender naiad in this volume) and was considered extinct in Roden and Murphy (2014) and NPWS (2019). Lake surface area is the simplest measure of extent and should be stable or increasing. For further information on all attributes and an overview of slender naiad-type lakes see Roden et al. (in prep.). See also O Connor (2015)
Habitat distribution	Occurrence	No decline, subject to natural processes	As noted above, habitat 3130, and not 3150, is considered to occur in Glenade Lough. This is based on the reinterpretation of these lake habitats (O Connor, 2015) and the findings of Heuff (1984), Roden and Murphy (2014) and Roden et al. (in prep.). Roden and Murphy (2014) found that Glenade is suffering from eutrophication. Enrichment may already have begun when it was surveyed in 1978 by Heuff (1984). As a result, and owing to reclassification as 3130, the conservation objective is to restore the habitat to favourable conservation condition. Further data are also available from the Environmental Protection Agency (EPA) (Water Framework Directive (WFD) monitoring)
Vegetation species richness	Occurrence	Maintain/restore appropriate species richness	Roden and Murphy (2014) reported that 16 plant species were recorded in Glenade over time. See also Heuff (1984). There should be no decline in species richness (see Roden et al., in prep.). Roden et al. (in prep.) found that habitat 3130 has a varied and species-rich flora, with high conservation value examples having more than 30 species of aquatic macrophytes. Almost all lakes with more than 30 species had euphotic depth >3m (Roden et al., in prep.). The number of species recorded increases with sampling effort (Roden et al., in prep.)

Vegetation composition: typical species	Occurrence	Restore typical species, in good condition, and demonstrating typical abundances and distribution	Restore condition and extent of <i>Najas flexilis</i> (see 1833 conservation objective) and other typical species. Roden and Murphy (2014) recorded habitat 3130 typical species at Glenade including <i>Chara virgata</i> , <i>Callitriche hermaphroditica</i> , <i>Elatine hexandra</i> , <i>Isoetes lacustris</i> , <i>Potamogeton gramineus</i> , <i>P. lucens</i> , <i>P. perfoliatus</i> , <i>P. x zizii</i> . Many of these were recorded by Heuff (1984) but her 1978 survey also found a wider range of charophyte species: <i>Chara aspera</i> , <i>C. globularis</i> , <i>C. virgata</i> , <i>Nitella flexilis s.l.</i> , <i>Tolypella glomerata</i> , as well as <i>P. praelongus</i> and <i>Najas flexilis</i> . Roden et al. (in prep.) described 3130 typical species and indicators of good condition. 3130 has a varied and species-rich flora with several rare species that can include <i>Baldellia ranunculoides</i> subsp. <i>repens</i> , <i>Hydrilla verticillata</i> , <i>Isoetes echinospora</i> , <i>Najas flexilis</i> , <i>Pilularia globulifera</i> , <i>Fissidens fontanus</i> . See also NPWS (2013, 2019) and O Connor (2015)
Vegetation composition: characteristic zonation	Occurrence	Restore characteristic deep-water vegetation	The vegetation of Glenade Lough was described by Heuff (1984). While Roden and Murphy (2014) said Glenade's vegetation resembled that of other species-rich <i>Najas</i> lakes, they also found significant changes from the 1978 survey, including loss of <i>Najas flexilis</i> and <i>Potamogeton praelongus</i> zone. The characteristic zonation (3 or more zones) is described in Roden et al. (in prep.). Shallow water has a <i>Lobelia-Littorella</i> zone (0-1.5m), then an <i>Isoetes lacustris</i> zone (0.5-3m), both also typical of oligotrophic lakes and habitat 3110. The characteristic deep-water community is the most sensitive element and consists of some or all of <i>Callitriche hermaphroditica</i> , <i>Hydrilla verticillata</i> , <i>Najas flexilis</i> , <i>Potamogeton berchtoldii</i> , <i>P. perfoliatus</i> , <i>P. pusillus</i> , <i>Nitella confervacea</i> , <i>Nitella flexilis</i> , <i>Nitella translucens</i> . Full development is when a distinct deep-water zone is present, with one or more of its typical species having >25% cover
Vegetation distribution: maximum (euphotic) depth	Metres	Restore maximum depth of vegetation, subject to natural processes	Heuff (1984) found vegetation to 3.5m in Glenade. Roden and Murphy (2014) found this had decreased to 2.8m. Euphotic depth ranged from 5.2m to 1.9m in lakes surveyed 2016-2018 and the target for maximum depth of vegetation colonisation (euphotic depth) in 3130 lakes was set as at least >3m (Roden et al., in prep.). Site-specific targets must be considered, however, as euphotic depths of >4m or >5m have been recorded in species-rich lakes in good condition. Maximum depth is considered to have declined in many lakes, owing to increased water colour. Lakes within undisturbed peatland are expected to have clear water and large maximum vegetation depth
Hydrological regime: water level fluctuations	Metres	Maintain appropriate hydrological regime necessary to support the habitat	The mixed geology of the basin and catchment leads to a complex hydrological regime at Glenade. Surface and groundwater discharges of base-poor water to Glenade from surrounding blanket bog and acid rocks exert significant influence over the vegetation, particularly obligate CO <sub>2</sub> photosynthesisers such as slender naiad (Jim Ryan, pers. comm.). Calcareous springs and seepages also occur (Heuff, 1984). Roden et al. (in prep.) said exposure of >half of the typically submerged <i>Littorella</i> zone in summer is cause for concern and water level should never be lower than the top of the <i>Isoetes</i> zone. Natural fluctuations in lake water level can be amplified by activities such as abstraction, drainage and overgrazing, increasing wave action and turbidity, up-rooting vegetation, altering substratum and releasing nutrients from sediment. The hydrological regime must support maintenance of the area, distribution and depth of the habitat and its characteristic vegetation zones/species

Lake substratum quality	Various	Maintain/restore appropriate substratum type, extent and chemistry to support the vegetation	Heuff (1984) described the substratum of Glenade as sand and stone in the shallows, mud in deeper water. Roden et al. (in prep.) found that the habitat is generally dominated by bedrock, sand and loose stones, silt mud or hard peat, and stated that the appearance of large expanses of unconsolidated peat would indicate excessive sediment input. Groundwater inputs are likely to be important for the substratum of the characteristic deep-water zone and <i>Najas flexilis</i> (Gunn and Carvalho, 2020). Research is required to further characterise the chemical composition of the substratum
pH and Alkalinity	pH units, mg/l	Maintain/restore appropriate water and sediment pH, alkalinity and cation concentrations to support the habitat, subject to natural processes	Free et al. (2006) reported pH of 8.16 and alkalinity of 74mg/l for Glenade. EPA average alkalinity was 67-72mg/l in 2007-15. Seepages and springs appear to be important in the maintenance of appropriate sediment conditions for the vegetation of Glenade. Groundwater can contribute base-poor water to obligate CO <sub>2</sub> photosynthesisers, such as <i>Najas flexilis</i> , in more calcareous lakes, and more base-rich water to highly oligotrophic lakes. The habitat is associated with intermediate alkalinity, largely between 20-80mg/l, but lower values may occur on Old Red Sandstone (Roden et al., in prep.). Surveyed lakes had average alkalinity of 25mg/l (range 5.5-73mg/l) (Roden et al., in prep.). In line with targets for <i>N. flexilis</i> , median pH values should >7 pH units. Acidification by organic acids released from degraded peatland and conifer plantations may impact on the habitat. See also The European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2019
Nutrients	µg/l P; mg/l N	Restore the concentration of nutrients in the water column to sufficiently low levels to support the habitat and its typical species	EPA average total phosphorus (TP) was 0.015, 0.016 and 0.012mg/l TP in the 2007-09, 2010-12 and 2013-15 reporting periods. Roden et al. (in prep.) found that the best quality lakes surveyed had average total phosphorus of <0.015mg/l TP. Lakes in good condition with high-frequency nutrient data had an overall average of 0.011mg/l TP (lake averages ranged 0.008-0.015mg/l TP). While Roden et al. (in prep.) suggested a target of <0.015mg/l TP, a precautionary target for good condition is set as ≤0.010mg/l or WFD High Status; however, vegetation attributes determine the overall conservation condition. See also The European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2019). WFD High Status targets for total ammonia (annual average ≤0.04mg/l N and annual 95th percentile ≤0.09mg/l N) may also be appropriate
Water colour	mg/l PtCo	Maintain/restore appropriate water colour to support the habitat	Heuff (1984) described Glenade as 'a clear water lake'. Free et al. (2006) reported colour of 28mg/l PtCo in Glenade Lough. The habitat is found in clear water, and water colour (dissolved light-absorbing compounds) is negatively correlated with maximum vegetation (euphotic) depth; lakes with euphotic depth >3m had colour <40mg/l PtCo, while those with euphotic depth >3.5m had <35mg/l PtCo (Roden et al., in prep.). Water colour directly controls light penetration and, therefore, euphotic depth and vegetation extent. Roden et al. (in prep.) set good condition at <40mg/l PtCo; however, this was considered to be an impacted state some distance from reference condition. The primary source of increased colour in Ireland is peatland disturbance, e.g. through turf-cutting, overgrazing, plantation forestry. Further work is necessary to determine water colour in intact peatland catchments and sustainable levels for the habitat, which may be <30 or even <20mg/l PtCo

Dissolved organic carbon (DOC)	mg/l	Maintain appropriate organic carbon levels to support the habitat	Dissolved organic carbon (DOC) in the water column is linked to water colour and acidification (organic acids). It can provide a substrate (food source) for heterotrophic organisms, which can impact directly (e.g. shading) and indirectly (e.g. nutrient release) on the characteristic lake communities. Damage and degradation of peatland, e.g. through afforestation or turf-cutting, leading to decomposition of peat is likely to be the predominant source of dissolved and particulate organic carbon in Ireland
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. Particulate loads from peatlands are the most likely sources of increased turbidity in lakes with the habitat. Turbidity measurement and interpretation is challenging. As a result, it is likely to be difficult to set habitat-specific targets for turbidity in lakes
Transparency	Metres	Maintain/restore appropriate Secchi transparency. There should be no decline in Secchi depth/transparency	Heuff (1984) recorded Secchi transparency in Glenade of 2.2m in July and 2.3m in September 1978. Roden and Murphy (2014) recorded Secchi depth of 3m and described transparency as 'moderate'. Transparency relates to light penetration and, hence, to the depth of colonisation of vegetation. Roden et al. (in prep.) advised it is preferable to measure euphotic depth directly by observation, but noted that a decreasing trend in Secchi depth indicates declining water quality. Transparency can be affected by phytoplankton blooms, water colour and turbidity. Secchi depth in marl lakes in Good condition is generally >6m. The OECD fixed boundary system set transparency targets for oligotrophic lakes of ≥6m annual mean Secchi disk depth and ≥3m annual minimum Secchi disk depth
Attached algal biomass	Algal cover	Maintain/restore trace/absent attached algal biomass (<5% cover)	Roden and Murphy (2014) described <i>Cladophora</i> sp. as 'very common' in Glenade Lough. Nutrient enrichment can favour epiphytic and epipellic algae that can out-compete the submerged vegetation. Roden et al. (in prep.) noted that occasional blooms of filamentous algae occur in 3130 lakes in the absence of excess nutrients, especially species of the orders Zygnematales or Oedogoniales, but that drifting masses of <i>Cladophora</i> species may indicate a decline in water quality. In general, the cover abundance of attached algae in lakes with 3130 should be trace/absent (<5% cover)
Fringing habitat: area and condition	Hectares	Maintain the area and condition of fringing habitats necessary to support the natural structure and functioning of the habitat	In this SAC, a band of emergent vegetation occurs around much of the lake with <i>Phragmites australis</i> and <i>Schoenoplectus lacustris</i> , also <i>Typha latifolia</i> , <i>Equisetum fluviatile</i> and <i>Eleocharis palustris</i> . The fringing habitats include freshwater marsh, calcareous fens and flushes, cutaway peatland, wet grassland and wet woodland. Heterogeneous lake fringes with a range of natural and semi-natural habitats are preferable. Restoration or maintenance of open, species-rich fen, marsh and grassland can be particularly important. Fringing habitats along lakes intergrade with and support the structure and functions of the lake habitat. Equally, fringing wetland habitats are dependent on the lake, particularly its water levels, and support invertebrate and plant communities and species of high diversity and conservation concern. See also Mainstone et al. (2016)

## Conservation Objectives for : Glenade Lough SAC [001919]

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

**To maintain the favourable conservation condition of White-clawed Crayfish (*Austropotamobius pallipes*) in Glenade Lough SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Distribution	Number of occupied 1km squares	No reduction from baseline. See map 4	White-clawed crayfish ( <i>Austropotamobius pallipes</i> ) has been known from Glenade Lough since 1998, though the lack of records before then is not necessarily an indication of recent colonisation. The species was recorded by both O'Connor et al. (2009) and Gammell et al. (in prep.). All the records have come from the accessible eastern shoreline in the 1km square G8345. There is no reason to assume that crayfish should not be present in other 1km squares that intersect the lake. However, this needs to be confirmed by appropriate survey
Population structure: recruitment	Percentage occurrence of juveniles and females with eggs	Juveniles and females with eggs in at least 50% of positive samples taken at appropriate time and methodology	See Reynolds et al. (2010) for further details. Gammell et al. (in prep.) found juveniles in Glenade Lough
Population size	Catch per unit effort	No reduction from baseline of 2.27	The population in Glenade Lough was assessed as having a Population abundance grade of Moderate to High (Gammell et al., in prep.). This is based on the CPUE (catch per unit effort) figures from that study. It is only applicable to the hand search methodology. CPUE figures have not been calculated for other methodologies
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 and as a disease vector, in particular crayfish plague ( <i>Aphanomyces astaci</i> ), which is fatal to white-clawed crayfish. The possession, import and intentional release of five species of invasive alien crayfish is banned by Statutory Instrument No. 354/2018
Disease	Occurrence	No instances of disease	Crayfish plague, caused by the water-borne mould <i>Aphanomyces astaci</i> , is identified as a major threat to the species in Ireland. Instances of crayfish plague have occurred in Ireland since 2015 causing local extinctions. There have been no confirmed or suspected outbreaks in this SAC
Water quality	Water chemistry measures	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of the habitat	Water quality status of Glenade Lough is poor and has declined. White-clawed crayfish are not considered very sensitive of water quality but are intolerant of low pH and poorest water quality, and lack of calcareous influence. There should be no decline in the water quality as defined by the targets for the 3130 lake habitat, as these are more stringent than white-clawed crayfish require. See also the conservation objective for the lake habitat (3150) in this volume; while the SAC was selected for lake habitat 3150, it is clear that the habitat naturally present in Glenade is lake habitat 3130, and targets appropriate to this latter habitat are used



Habitat quality: heterogeneity	Occurrence of positive habitat features	No decline from the baseline	White-clawed 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 and habitat features must be available on the whole length of occupied habitat. Gammell et al. (in prep.) scored the habitat heterogeneity as between 0.32 and 0.48 in this SAC and there should be no decline from this baseline range
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## Conservation Objectives for : Glenade Lough SAC [001919]

### 1833 Slender Naiad *Najas flexilis*

To restore the favourable conservation condition of Slender Naiad (*Najas flexilis*) in Glenade Lough SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population extent	Hectares; distribution	Restore the spatial extent of slender naiad ( <i>Najas flexilis</i> ) within the lake, subject to natural processes	<i>Najas flexilis</i> was discovered in Glenade Lough by Hester Heuff and Jim Ryan in 1978 (Heuff, 1984). The species was widespread, occurring from very shallow water amongst <i>Schoenoplectus lacustris</i> to depths of >3m. The species has not been seen at Glenade since, despite dedicated snorkel survey in 2004, 2005 and 2014, and is considered to now be extinct (Roden and Murphy, 2014; NPWS, 2019). Roden and Murphy (2014) stated that the vegetation of Glenade Lough resembled that of other species-rich <i>Najas flexilis</i> lakes, but showed significant changes since 1978 that indicate eutrophication. For further information on all attributes and targets, see Roden et al. (in prep.), O Connor (2013) and <i>Najas flexilis</i> conservation objective supporting documents for other SACs, for example SACs 001975 (NPWS, 2017), 001932 (NPWS, 2017) and 000365 (NPWS, 2017)
Population depth	Metres	Restore the depth range of <i>Najas flexilis</i> within the lake, subject to natural processes	In 1978, <i>Najas flexilis</i> was found 'throughout the reed bed zone down to the deepest vegetated areas' in Glenade (Heuff, 1984). It grew in very shallow water in the <i>Schoenoplectus</i> reedbed in July, but in September had gone from these shallow areas. Heuff (1984) also recorded <i>Najas flexilis</i> in relevés at 1.8m and 3m. As depth increased, <i>Najas flexilis</i> and <i>Sparganium emersum</i> became more frequent. <i>Najas flexilis</i> is part of the characteristic deep-water community of lake habitat 3130 (Roden et al., in prep.). <i>Najas flexilis</i> is frequently associated with the lower depths of macrophyte growth, where scattered plants gradually give way to bare mud or silt (Preston and Croft, 2001; Roden, 2002)
Population viability	Plant traits	Restore plant fitness, subject to natural processes	Wingfield et al. (2004) used certain traits (leaf area/shoot length x reproductive number/shoot length) to assess <i>Najas flexilis</i> plant fitness and indicated a score of less than one would give rise to concern. Roden et al. (in prep.) suggested size measurements and photographs of the largest plants encountered may be non-destructive indicators of plant health
Population abundance	Square metres	Restore the cover abundance of <i>Najas flexilis</i> , subject to natural processes	Heuff (1984) described <i>Najas flexilis</i> as thriving in Glenade, being found throughout the reedbed zone and within the littoral zone to depths of over 3m, reaching higher cover abundance in deeper water. Cover abundance is likely to vary within a lake, with depth, substratum and exposure. It may also vary inter-annually. Such variations may be even more marked in small, marginal populations. However, there should be no sustained decline in the extent, overall size, cover abundance or density of the population in the lake and the absence of the species from Glenade in 2004, 2005 and 2014 demonstrates a genuine decline
Species distribution	Occurrence	Restore distribution, subject to natural processes	In 1978, <i>Najas flexilis</i> was found in and adjacent to relevé 46, in a sheltered bay along the southern shore of Glenade Lough (see map in Volume 2 of Heuff, 1984). Her survey was concentrated on the central area of the lake, however, and did not map the species full extent of the species in the lake at that time. For further information on the species and its distribution in Ireland, see O Connor (2013), <i>Najas flexilis</i> conservation objective supporting documents for other SACs and NPWS (2019)

Habitat extent	Hectares	Restore habitat extent, subject to natural processes	Habitat for the species relates to the area and quality of the available habitat for the species. The quality of the habitat for <i>Najas flexilis</i> in Glenade Lough is impacted by eutrophication (Roden and Murphy, 2014). See also the conservation objective for the lake habitat (3150) in this volume. While the SAC was selected for lake habitat 3150, it is clear that the habitat naturally present in Glenade is 3130, and targets appropriate to this latter habitat are used. See Roden et al. (in prep.) for further information on the species and its habitat
Vegetation distribution: maximum (euphotic) depth	Metres	Maintain/restore maximum depth of vegetation, subject to natural processes	Heuff (1984) recorded a maximum vegetation depth of 3.8m in Glenade, and found <i>Najas flexilis</i> in the relevé at 3m. Roden and Murphy (2014) recorded a euphotic depth of 2.8m. Euphotic depth ranged from 5.2m to 1.9m and the most extensive populations were found in lakes with euphotic depths >2.5m; however, several lakes with <i>Najas flexilis</i> had lower euphotic depths (Roden et al., in prep.). The target for maximum depth of vegetation colonisation (euphotic depth) was set as at least >3m (Roden et al., in prep.). Site-specific targets must be considered, however, as euphotic depths of >4m or >5m have been recorded in lakes with <i>Najas flexilis</i> in good condition. See also the conservation objective for habitat 3150 in this volume and Roden et al. (in prep.)
Hydrological regime: water level fluctuations	Metres	Maintain appropriate natural hydrological regime necessary to support the habitat for the species	The hydrological regime of the lakes must be maintained so that the area, distribution and depth of the <i>Najas flexilis</i> habitats can be restored. Run-off, seepages, and perhaps springs, discharging base-poor water to Glenade from surrounding blanket bog and acid rocks exert significant influence over the vegetation, particularly obligate carbon dioxide photosynthesisers such as <i>Najas flexilis</i> (Jim Ryan pers. comm.). Groundwater inputs are likely to be important for the characteristic deep-water zone and <i>Najas flexilis</i> in many lakes (Gunn and Carvalho, 2020). See also the conservation objective for the lake habitat (3150) in this volume and Roden et al. (in prep.)
Lake substratum quality	Various	Maintain/restore appropriate substratum type, extent and chemistry to support a population of the species	Heuff (1984) described the substratum of Glenade as sand and stone in the shallows, mud in deeper water, with <i>Najas flexilis</i> occurring on mud. <i>Najas flexilis</i> is typically found on soft substrata of mud, silt or fine sand (Preston and Croft, 2001; Roden, 2002, 2004). The sediment chemistry of <i>Najas flexilis</i> lakes is described by Wingfield et al. (2004) and Gunn and Carvalho (2020). See also the conservation objective for the lake habitat (3150) in this volume and Roden et al. (in prep.)
Nutrients	mg/l P; mg/l N	Restore the concentration of nutrients in the water column to sufficiently low levels to support a population of the species	The EPA recorded average total phosphorus in Glenade of 0.015, 0.016 and 0.012mg/l TP in the 2007-09, 2010-12 and 2013-15 reporting periods, respectively. <i>Najas flexilis</i> is typically associated with high water quality. This is demonstrated by naturally low dissolved nutrients, clear water and low algal growth. The species' association with mixed geology, including some base-enrichment, is well-documented (Preston and Croft, 2001; Roden, 2004; Wingfield et al., 2004). While Roden et al. (in prep.) suggested a target of <0.015mg/l TP, a precautionary target for good condition is set as ≤0.010mg/l or Water Framework Directive High Status; however, population attributes determine the species' overall conservation condition. See also the conservation objective for habitat 3150 in this volume and Roden et al. (in prep.)

Water colour	mg/l PtCo	Maintain/restore appropriate water colour to support a population of <i>Najas flexilis</i>	Free et al. (2006) reported colour of 28mg/l PtCo in Glenade. The species is found in clear water (Roden et al., in prep.). Increased water colour (dissolved light-absorbing compounds) and turbidity decrease light penetration and can reduce the area of available <i>Najas flexilis</i> habitat, particularly at the lower euphotic depths. Roden et al. (in prep.) set good condition at <40mg/l PtCo; however, this was considered to be an impacted state some distance from reference condition. Further work is necessary to determine sustainable water colour levels for the species which may be <30 or even <20mg/l PtCo. The primary source of increased colour in Ireland is peatland disturbance, e.g. through turf-cutting, overgrazing, plantation forestry. See also the conservation objective for habitat 3150 in this volume and Roden et al. (in prep.)
Dissolved organic carbon (DOC)	mg/l	Maintain/restore appropriate organic carbon levels to support a population of <i>Najas flexilis</i>	Dissolved organic carbon (DOC) in the water column is linked to water colour and acidification (organic acids). It can provide a substrate (food source) for heterotrophic organisms, which can impact directly (e.g. shading) and indirectly (e.g. nutrient release) on the characteristic lake communities. Damage and degradation of peatland, e.g. through afforestation or turf-cutting, leading to decomposition of peat is likely to be the predominant source of dissolved and particulate organic carbon in Ireland
Acidification status	pH units; mg/l	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support a population of <i>Najas flexilis</i> , subject to natural processes	Free et al. (2006) reported pH of 8.16 and alkalinity of 74mg/l for Glenade. The EPA found average alkalinity of 67-72mg/l in 2007-15. Seepages and springs appear to be important in the maintenance of appropriate sediment conditions for <i>Najas flexilis</i> in Glenade. Groundwater may influence sediment and water chemistry and contribute base-poor water to <i>Najas flexilis</i> , an obligate carbon dioxide photosynthesiser, in more calcareous lakes, and more base-rich water in highly oligotrophic lakes. The species is associated with intermediate alkalinity, largely between 20-80mg/l, but also occurs in some lakes with lower values on Old Red Sandstone (Roden et al., in prep.). Acidification is a significant threat to the species (Preston and Croft, 2001; Roden, 2004; Wingfield et al., 2004; Gunn and Carvalho, 2020). Wingfield et al. (2004) considered that it has specific environmental requirements and occupies a relatively narrow realised niche. See also Roden et al. (in prep.)
Associated species	Species composition and abundance	Restore appropriate associated species and vegetation communities to support a population of <i>Najas flexilis</i>	In 1978 at Glenade, <i>Najas flexilis</i> occurred with <i>Chara virgata</i> , <i>Nitella flexilis</i> s.l., <i>Tolypella glomerata</i> , <i>Callitriche hermaphroditica</i> and <i>Potamogeton pusillus</i> in the <i>Schoenoplectus</i> reedbed (Heuff, 1984). At 1.8m, it grew with <i>Nitella flexilis</i> s.l., <i>T. glomerata</i> , <i>Fontinalis antipyretica</i> , <i>C. hermaphroditica</i> and <i>Elodea canadensis</i> , and at 3m with dominant <i>P. praelongus</i> . See also Roden and Murphy (2014) and the conservation objective for 3150. <i>Najas flexilis</i> is part of the characteristic and highly sensitive deep-water community of habitat 3130 that consists of some or all of <i>Callitriche hermaphroditica</i> , <i>Hydrilla verticillata</i> , <i>Najas flexilis</i> , <i>P. berchtoldii</i> , <i>P. perfoliatus</i> , <i>P. pusillus</i> , <i>Nitella confervacea</i> , <i>N. flexilis</i> , <i>N. translucens</i> (Roden et al., in prep.). See also Preston and Croft (2001); Roden (2004, 2007 in NPWS, 2007); Wingfield et al. (2004); O Connor (2013); NPWS (2019); Gunn and Carvalho (2020)

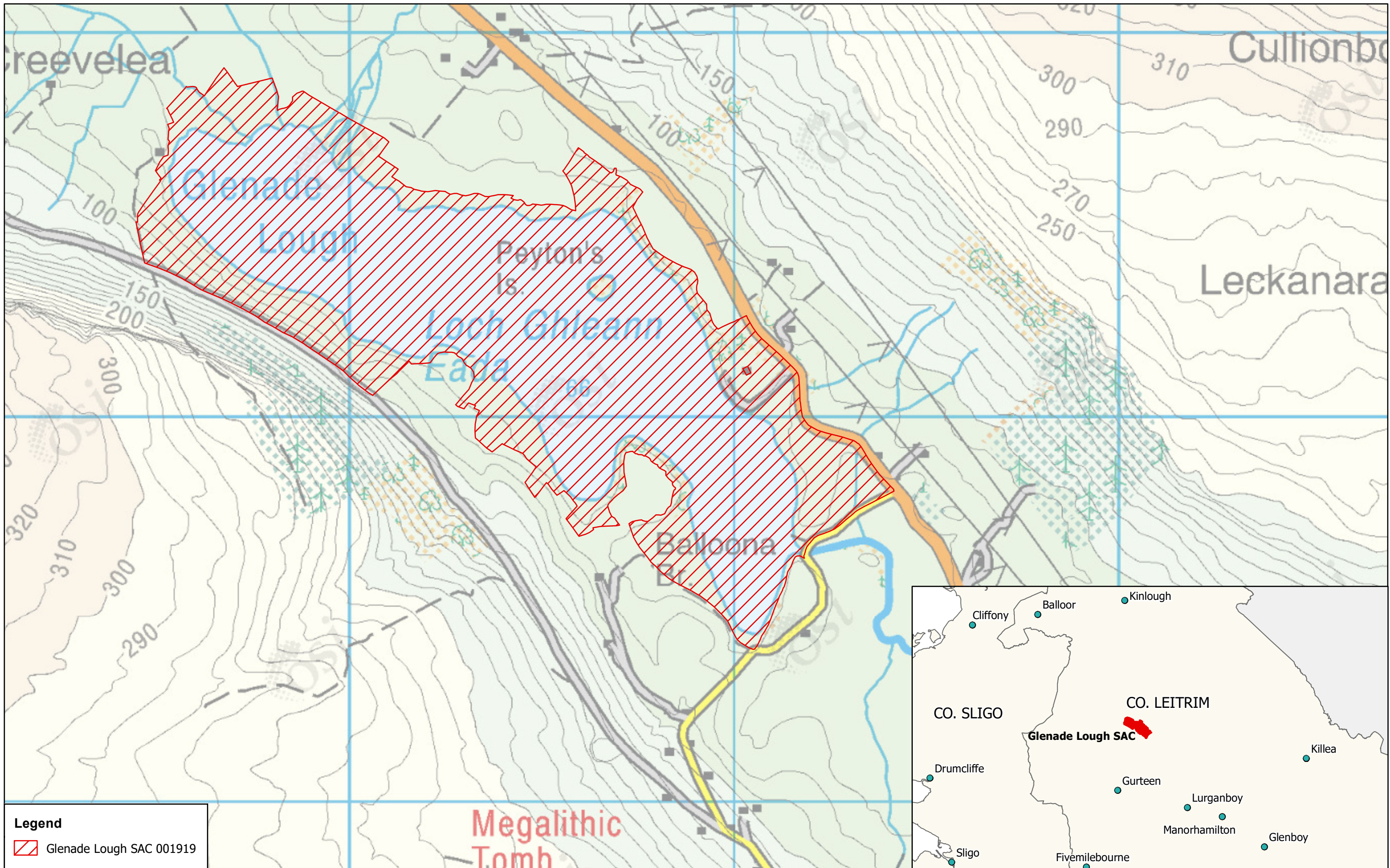
Fringing habitat: Hectares  
area and condition

Maintain the area and condition of fringing habitats necessary to support a population of *Najas flexilis*


In Glenade Lough, a band of emergent vegetation occurs around much of the lake with *Phragmites australis* and *Schoenoplectus lacustris*, also *Typha latifolia*, *Equisetum fluviatile* and *Eleocharis palustris*. Heuff (1984) found *Najas flexilis* within *Schoenoplectus* reedbeds, with a *Chara aspera* zone on the landward side. The fringing habitats of Glenade Lough include freshwater marsh, calcareous fens and flushes, cutaway peatland, wet grassland and wet woodland. Fringing habitats are an integral part of the structure and functioning of lake systems. Heterogeneous lake fringes with a range of natural and semi-natural habitats are preferable. Restoration or maintenance of open, species-rich fen, marsh and grassland can be particularly important. See also Mainstone et al. (2016)

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**Legend**

 Glenade Lough SAC 001919


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

**MAP 1:  
 GLENADE LOUGH SAC  
 CONSERVATION OBJECTIVES  
 SAC DESIGNATION**

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

**SITE CODE:  
 SAC 001919; version 3.03.  
 CO. LEITRIM**


0 100 200 400 Metres



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 OSI-NMA-014. © Ordnance Survey of Ireland Government of Ireland

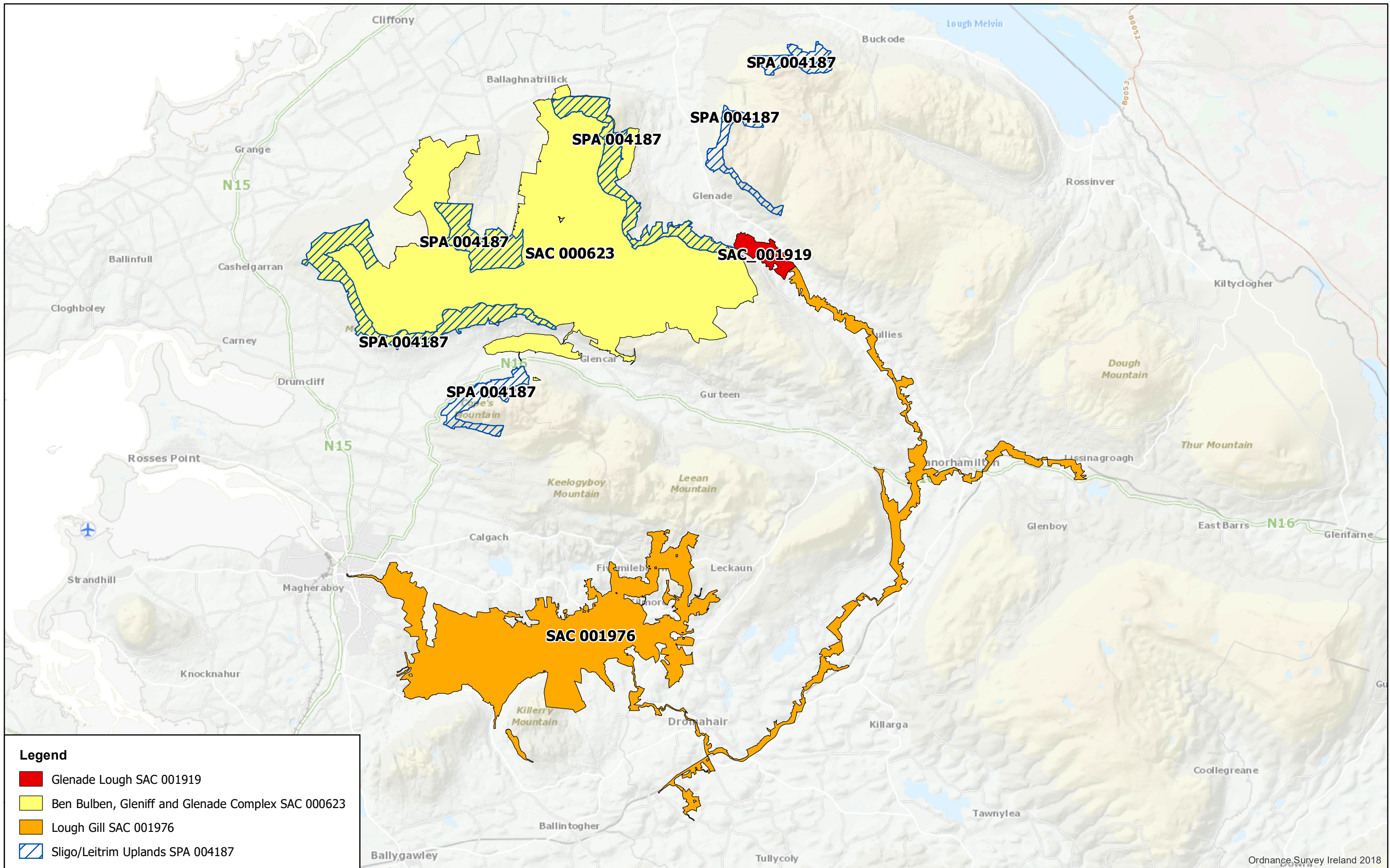
Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbheithnithe a déanamh ar theorainneacha na gceantar comharthaíthe. Suirbhéarachtá Ordonáis na hÉireann Ceadúnas Uimh OSI-NMA-014. © Suirbhéarachtá Ordonáis na hÉireann Rialtas na hÉireann

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**Date: March 2021**

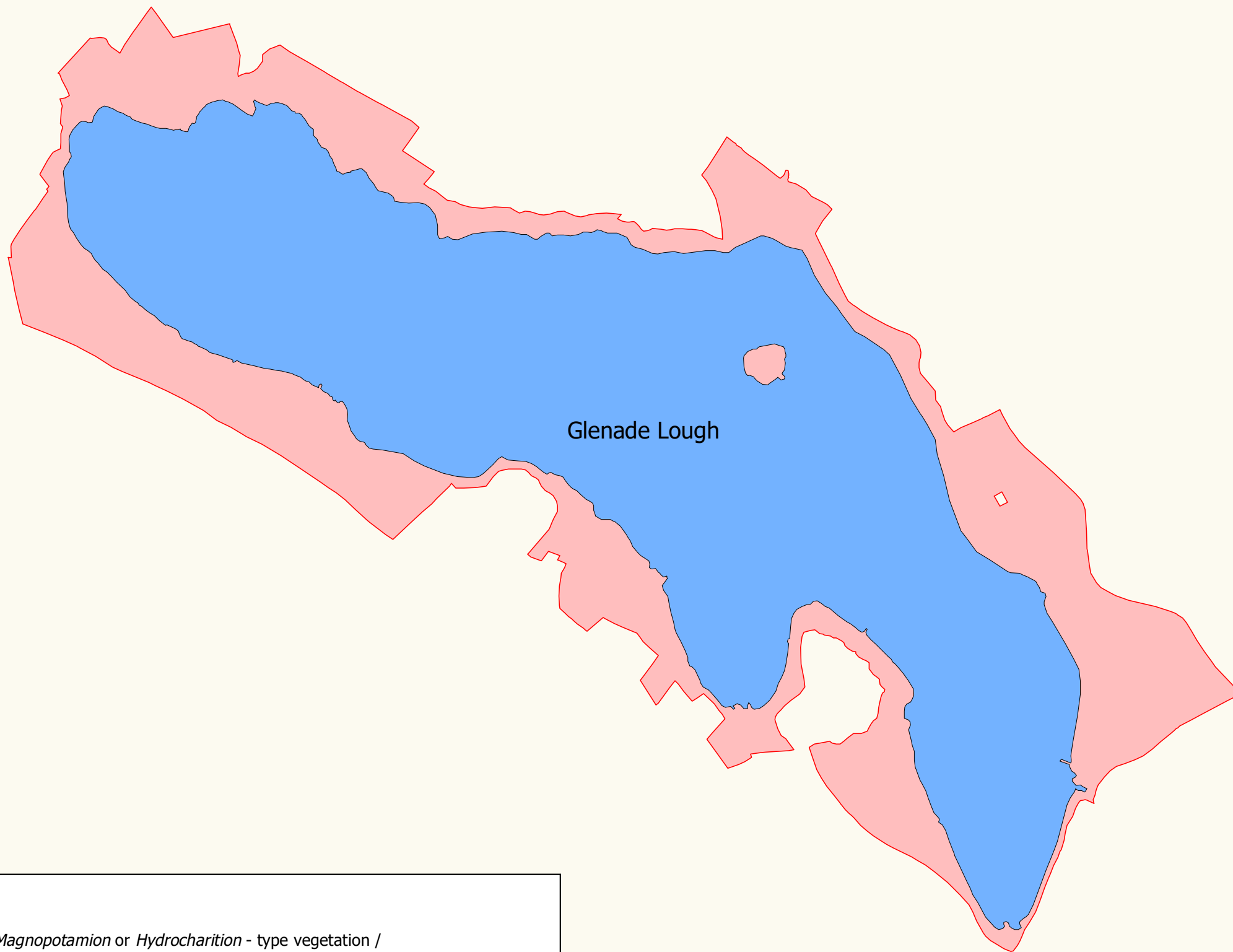




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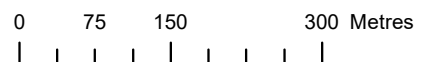
- Glenade Lough SAC 001919
- Ben Bulben, Gleniff and Glenade Complex SAC 00623
- Lough Gill SAC 001976
- Sligo/Leitrim Uplands SPA 004187

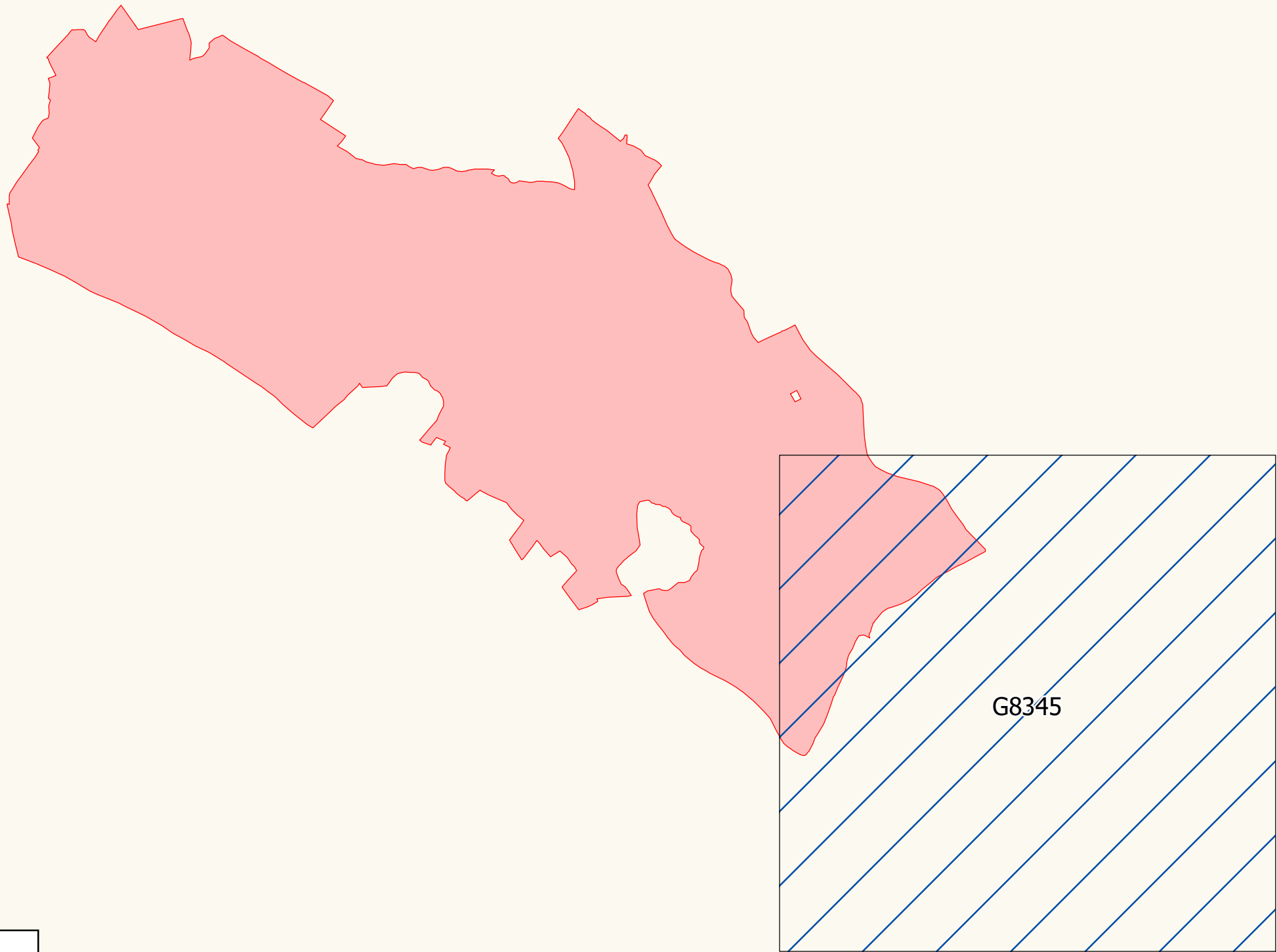







**Legend**

- 3150 Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation /
- 3130 Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea*
- Glenade Lough SAC 001919
- OSi Discovery Series County Boundary





**Legend**

-  1092 White-clawed crayfish  
Austropotamobius pallipes 1km grid square
-  Glenade Lough SAC 001919
-  OSi Discovery Series County Boundary



# National Parks and Wildlife Service

## *Conservation Objectives Series*

### Lough Gill SAC 001976



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



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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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001976	Lough Gill SAC
1092	White-clawed Crayfish <i>Austropotamobius pallipes</i>
1095	Sea Lamprey <i>Petromyzon marinus</i>
1096	Brook Lamprey <i>Lampetra planeri</i>
1099	River Lamprey <i>Lampetra fluviatilis</i>
1106	Salmon <i>Salmo salar</i>
1355	Otter <i>Lutra lutra</i>
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
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 is adjacent to Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC (000627) and Glenade Lough SAC (001919). See map 2. The conservation objectives for this site should be used in conjunction with those for the 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>	1972
<b>Title :</b>	A Preliminary Report on Areas of Scientific Interest in County Sligo
<b>Author :</b>	Goodwillie, R.N.
<b>Series :</b>	Unpublished Report
<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 Manuals, No. 23
<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>	2009
<b>Title :</b>	Monitoring of white-clawed crayfish <i>Austropotamobius pallipes</i> in Irish lakes in 2007
<b>Author :</b>	O'Connor, W.; Hayes, G.; O'Keeffe, C.; Lynn, D.
<b>Series :</b>	Irish Wildlife Manuals, No. 37
<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 Manuals, 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 Manuals, No.45
<b>Year :</b>	2012
<b>Title :</b>	The beetles of decaying wood in Ireland. A provisional annotated checklist of saproxylic Coleoptera
<b>Author :</b>	Alexander, K.N.A.; Anderson, R.
<b>Series :</b>	Irish Wildlife Manuals, No. 65
<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 Manuals, No. 76
<b>Year :</b>	2013
<b>Title :</b>	Irish semi-natural grasslands survey 2007-2012
<b>Author :</b>	O'Neill, F.H.; Martin, J.R.; Devaney, F.M.; Perrin, P.M.
<b>Series :</b>	Irish Wildlife Manuals, No. 78



<b>Year :</b>	2013
<b>Title :</b>	Results of a monitoring survey of old sessile oak woods and alluvial forests
<b>Author :</b>	O'Neill, F.H.; Barron, S.J.
<b>Series :</b>	Irish Wildlife Manuals, No. 71
<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>	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
<b>Year :</b>	2018
<b>Title :</b>	The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats
<b>Author :</b>	Martin, J.R.; O'Neill, F.H.; Daly, O.H.
<b>Series :</b>	Irish Wildlife Manuals, No. 102
<b>Year :</b>	2019
<b>Title :</b>	The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation assessments
<b>Year :</b>	2021
<b>Title :</b>	Conservation Objectives: Lough Carra/Mask Complex SAC 001774. Version 1
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation Objectives
<b>Year :</b>	2021
<b>Title :</b>	White-clawed Crayfish <i>Austropotamobius pallipes</i> survey in designated SACs in 2017
<b>Author :</b>	Gammell, M.; McFarlane, A.; Brady, D.; O'Brien, J.; Mirimin, L.; Graham, C.; Lally, H.; Minto, C.; O'Connor, I.
<b>Series :</b>	Irish Wildlife Manuals, No. 131
<b>Year :</b>	in prep.
<b>Title :</b>	The monitoring and assessment of four EU Habitats Directive Annex I woodland habitats
<b>Author :</b>	Daly, O.H.; O'Neill, F.H.; Barron, S.J.
<b>Series :</b>	Irish Wildlife Manuals
<b>Year :</b>	in prep.
<b>Title :</b>	A study of lakes with Slender Naiad ( <i>Najas flexilis</i> )
<b>Author :</b>	Roden, C.; Murphy, P.; Ryan, J.B.
<b>Series :</b>	Irish Wildlife Manuals

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<b>Author :</b>	Sealy, J.R.; Webb, D.A.
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<b>Year :</b>	1975
<b>Title :</b>	A preliminary survey of Irish lakes
<b>Author :</b>	Flanagan, P.J.; Toner P.F.
<b>Series :</b>	An Foras Forbartha
<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>	Moor Balls from the Shore of Lough Gill, Co Sligo
<b>Author :</b>	Campbell, J.; Scannell, M.J.P.
<b>Series :</b>	Irish Naturalists' Journal, 23(2): 75-76
<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>	1993
<b>Title :</b>	Ecological Study of Lough Gill - to Predict the Effects of the Sligo and Environs Water Supply Scheme on the Flora and Fauna with Suggestions for Future Management
<b>Author :</b>	Cotton, D.C.F.
<b>Series :</b>	Report prepared in conjunction with Jennings O'Donovan and Partners for Sligo County Council
<b>Year :</b>	1997
<b>Title :</b>	Irish wetland woods: the plant communities and their ecology
<b>Author :</b>	Kelly, D.L; Iremonger, S.F.
<b>Series :</b>	Biology and Environment: Proceedings of the Royal Irish Academy, 97B: 1-32
<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>	Reversing the habitat fragmentation of British woodlands
<b>Author :</b>	Peterken, G.
<b>Series :</b>	WWF-UK, London
<b>Year :</b>	2002
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<b>Author :</b>	Kruuk, H.
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<b>Year :</b>	2010
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<b>Author :</b>	De Jongh, A.; O'Neill, L.
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<b>Year :</b>	2010
<b>Title :</b>	Water Quality in Ireland 2007-2009
<b>Author :</b>	McGarrigle, M.; Lucey, J.; Ó Cinnéide, M.
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<b>Year :</b>	2010
<b>Title :</b>	National Programme: Habitats Directive and Red Data Book Species Executive Report 2009
<b>Author :</b>	Inland Fisheries Ireland (IFI)
<b>Series :</b>	IFI/2010/1-0480. Inland Fisheries Ireland
<b>Year :</b>	2011
<b>Title :</b>	Comparison of field- and GIS-based assessments of barriers to Atlantic salmon migration: a case study in the Nore Catchment, Republic of Ireland
<b>Author :</b>	Gargan, P.G.; Roche, W.K.; Keane, S.; King, J.J.; Cullagh, A.; Mills, P.; O'Keeffe, J.
<b>Series :</b>	Journal of Applied Ichthyology, 27 (Suppl. 3): 66-72
<b>Year :</b>	2013
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<b>Author :</b>	Rooney, S.M.; O'Gorman, N.M.; Green, F.; King, J.J.
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<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>	Environmental Protection Agency, Wexford
<b>Year :</b>	2015
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<b>Author :</b>	Rooney, S.M.; Wightman, G.D.; O Conchuir, R.; King, J.J.
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<b>Year :</b>	2015
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<b>Author :</b>	JNCC
<b>Series :</b>	Joint Nature Conservation Committee, Peterborough

<b>Year :</b>	2016
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<b>Author :</b>	Mainstone, C.; Hall, R.; Diack, I.
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<b>Title :</b>	Irish Vegetation Classification: Technical Progress Report No. 2
<b>Author :</b>	Perrin, P.
<b>Series :</b>	Report submitted to National Biodiversity Data Centre
<b>Year :</b>	2017
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<b>Year :</b>	2017
<b>Title :</b>	National Programme: Habitats Directive and Red Data Book Species Summary Report 2016
<b>Author :</b>	Gallagher, T.; O'Gorman, N.M.; Rooney, S.M.; Coghlan, B.; King, J.J.
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<b>Year :</b>	2019
<b>Title :</b>	Resurvey of long-term ecological monitoring transects at the People's Millennium Forests
<b>Author :</b>	Daly, O.H.; O'Neill, F.H.; Perrin, P.M.
<b>Series :</b>	Unpublished report to Woodlands of Ireland, Coillte and The Forest Service
<b>Year :</b>	2021
<b>Title :</b>	The Status of Irish Salmon Stocks in 2020 with Catch Advice for 2021
<b>Author :</b>	Gargan, P.; Fitzgerald, C.; Kennedy, R.; Maxwell, H.; McLean, S.; Millane, M.
<b>Series :</b>	Report of the Technical Expert Group on Salmon (TEGOS) to the North-South Standing Scientific Committee for Inland Fisheries

## Spatial data sources

<b>Year :</b>	2021
<b>Title :</b>	OSi Prime 2 water polygon file
<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>	3150 (map 3)
<b>Year :</b>	2018
<b>Title :</b>	Grasslands Monitoring Survey 2015-2017
<b>GIS Operations :</b>	Dataset clipped to the SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	6210 (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 5)
<b>Year :</b>	2018
<b>Title :</b>	Woodland Monitoring Survey 2017-2018
<b>GIS Operations :</b>	QIs selected; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	91E0 (map 5)
<b>Year :</b>	2021
<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 6)
<b>Year :</b>	2010
<b>Title :</b>	OSi 1:5000 IG vector dataset
<b>GIS Operations :</b>	Creation of 80m buffer on aquatic side of lake data; creation of 10m buffer on terrestrial side of lake data. Datasets combined with derived OSi Prime 2 water dataset. 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 7)
<b>Year :</b>	2021
<b>Title :</b>	OSi Prime 2 water polygon file
<b>GIS Operations :</b>	Creation of 10m buffer on terrestrial side of river banks data. Dataset combined with 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 (map 7)



## Conservation Objectives for : Lough Gill SAC [001976]

### 3150 Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation

To restore the favourable conservation condition of Natural eutrophic lakes with Magnopotamion or Hydrocharition - type vegetation in Lough Gill 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	It is uncertain whether the lake habitat in Lough Gill is 3150, or more closely aligned with the <i>Najas</i> -type lake habitat 3130 as is the upstream Glenade Lough. The mixed geology of the catchment suggests that habitat 3130 may be more appropriate. This distinction has important implications for the targets used as Water Framework Directive good ecological status/mesotrophic is considered sufficient for habitat 3150, while habitat 3130 broadly requires high status/oligotrophic status and has habitat-specific attributes and targets (see Roden et al., in prep.; see also 3130 in NPWS, 2021). Lough Gill has steeply sloping littoral zones and large areas of deep water. Despite this, a wide variety of pondweed species has been recorded. Further study of its aquatic vegetation is needed. 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, it is unclear whether the vegetation of Lough Gill is that of habitat 3150 or 3130
Vegetation composition: typical species	Occurrence	Typical species present, in good condition, and demonstrating typical abundances and distribution	A number of accounts indicate that the flora of Lough Gill is limited, most likely owing to its steeply sloping shorelines (Cotton, 1993). Nevertheless, a range of submerged aquatics have been recorded in Lough Gill, including charophytes: <i>Chara aspera</i> , <i>C. contraria</i> , <i>C. curta</i> , <i>C. hispida</i> , <i>C. virgata</i> and <i>Tolypella glomerata</i> ; <i>Callitriche hermaphroditica</i> , <i>Hippuris vulgaris</i> , <i>Littorella uniflora</i> , <i>Myriophyllum alterniflorum</i> , <i>M. spicatum</i> , <i>Potamogeton alpinus</i> , <i>P. berchtoldii</i> , <i>P. coloratus</i> , <i>P. filiformis</i> , <i>P. gramineus</i> , <i>P. lucens</i> , <i>P. natans</i> , <i>P. perfoliatus</i> , <i>P. x angustifolius</i> and <i>P. x nitens</i> . <i>Lemna minor</i> and <i>L. trisulca</i> also occur. See Roden et al. (in prep.) for habitat 3130 typical species. For lists of typical plant species of both habitats 3150 and 3130, see the Article 17 habitat assessments (NPWS, 2013, 2019) 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 vegetation zones/communities of Lough Gill have not been fully described. Further survey using snorkel/scuba is required. The characteristic zonation of habitat 3150 has not yet been described. Roden et al. (in prep.) describe the characteristic zonation and other spatial patterns of lake habitat 3130
Vegetation distribution: maximum depth	Metres	Maintain maximum depth of vegetation, subject to natural processes	Information on the maximum depth of vegetation growth in Lough Gill may be available from the Environmental Protection Agency (EPA). Roden et al. (in prep.) describe the maximum vegetation depth of habitat 3130 in Ireland. Further work is necessary to develop indicative targets for lake habitat 3150. The maximum depth of vegetation may be specific to the lake shoreline in question. It should be large in lakes within undisturbed peatland and uplands; however, pressures on peatland such as overgrazing, as well as eutrophication, may have reduced vegetation depth

Hydrological regime: water level fluctuations	Metres	Maintain appropriate hydrological regime necessary to support the habitat	The mixed geology of the lake's basin and catchment influences Lough Gill's hydrological regime, and it is likely that seepages and springs discharge to the lake. The inflowing Bonet River was arterially drained 1982-1992. 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
Lake substratum quality	Various	Maintain appropriate substratum type, extent and chemistry to support the vegetation	Roden et al. (in prep.) provide information on the substratum types of lake habitat 3130 in Ireland. Research is required to further characterise the substratum types (particle size and origin) of habitat 3150 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 soft muddy substrata dominate habitat 3150. Substratum varies with catchment geology, and with depth and along shorelines in an individual lake
Transparency	Metres	Maintain/restore appropriate Secchi transparency. There should be no decline in Secchi depth/transparency	McGarrigle et al. (2010) report average Secchi transparency of 2m in Lough Gill in 2008. The OECD fixed boundary system set transparency targets for mesotrophic lakes of 6-3m annual mean Secchi disk depth, and 3-1.5m annual minimum Secchi disk depth and for oligotrophic lakes of $\geq 6$ m annual mean Secchi disk depth, and $\geq 3$ m annual minimum Secchi disk depth. 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 habitats (O Connor, 2015); however, Roden et al. (in prep.) discuss Secchi depths in habitat 3130 in Ireland. Habitat 3130 is associated with clear water, as evidenced by the growth of the character species <i>Najas flexilis</i> (slender naiad) at depths of up to 10m
Nutrients	$\mu\text{g/l P}$ ; $\text{mg/l N}$	Maintain/restore the concentration of nutrients in the water column to sufficiently low levels to support the habitat and its typical species	Depending on which habitat occurs naturally in Lough Gill, the target is Water Framework Directive (WFD) good status and mesotrophic or better for 3150, or high status and oligotrophic for 3130. The 'good-moderate' boundary is too enriched to support habitat 3130. Lough Gill had good nutrient status from 2007-2015 (McGarrigle et al., 2010; Bradley et al., 2015; Fanning et al., 2017). Good status/mesotrophic has annual average TP concentration $\leq 20\mu\text{g/l TP}$ , average annual total ammonia concentration $\leq 0.065\text{mg/l N}$ and annual 95th percentile for total ammonia $\leq 0.140\text{mg/l N}$ . High status/oligotrophic has annual average TP concentration $\leq 10\mu\text{g/l TP}$ , average annual total ammonia concentration $\leq 0.040\text{mg/l N}$ and annual 95th percentile for total ammonia $\leq 0.090\text{mg/l N}$ . See also O Connor (2015), OECD (1982) and The European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2019

Phytoplankton biomass	µg/l chlorophyll <i>a</i>	Maintain appropriate water quality to support the habitat, including high chlorophyll <i>a</i> status	Lough Gill had high chlorophyll status from 2007-2015 (McGarrigle et al., 2010; Bradley et al., 2015; Fanning et al., 2017); therefore, the target for Lough Gill is set as high status and oligotrophic. The average growing season (March-October) chlorophyll <i>a</i> concentration must be <5.8µg/l. The annual average chlorophyll <i>a</i> concentration should be <2.5µg/l and the annual peak chlorophyll <i>a</i> concentration should be ≤8.0µg/l. 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. See also OECD (1982) and The European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2019
Phytoplankton composition	EPA phytoplankton composition metric	Maintain/restore 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. Phytoplankton composition status at Lough Gill was high in 2007-2009, but declined to good in 2010-12 and 2013-15 (McGarrigle et al., 2010; Bradley et al., 2015; Fanning et al., 2017)
Attached algal biomass	Algal cover	Maintain/restore trace/absent attached algal biomass (<5% cover)	Cotton (1993) noted that <i>Cladophora</i> balls, first observed in Lough Gill by Campbell and Scannell (1989), are a regular occurrence. Nutrient enrichment can favour epiphytic and epipelic algae that can out-compete the submerged vegetation. The cover abundance of attached algae in habitats 3130 and 3150 should, ideally therefore, be trace/absent (<5% cover)
Macrophyte status	EPA macrophyte metric (The Free Index)	Restore high/good macrophyte status	If habitat 3150 is present, the target for Lough Gill is WFD good status, or better. It failed to reach this, having moderate macrophyte status 2007-2009 and 2010-12, and poor in 2013-15 (McGarrigle et al., 2010; Bradley et al., 2015; Fanning et al., 2017). Specific vegetation targets are set for habitat 3130 (Roden et al., in prep.). 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 Water Framework Directive purposes using the 'Free Index'. See also The European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2019
Acidification status	pH units, mg/l	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the habitat, subject to natural processes	Habitat 3130 is associated with intermediate alkalinity, largely between 20-80mg/l (Roden et al., in prep.), and in line with targets for <i>Najas flexilis</i> , median pH values should be >7 pH units. The specific requirements of habitats 3150, in terms of water and sediment pH, alkalinity and cation concentration, have not been determined, but it is also expected to have median pH values above 7 pH units. Acidification can impact on species abundance and composition in lake habitats. Maximum pH should be <9.0 pH units, in line with the surface water standards. See also The European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2019. Lough Gill passed this target from 2007-15 (McGarrigle et al., 2010; Bradley et al., 2015; Fanning et al., 2017)

Water colour	mg/l PtCo	Maintain/restore appropriate water colour to support the habitat	Flanagan and Toner (1975) noted that the water of Lough Gill was markedly coloured. Free et al. (2006) reported colour of 44mg/l PtCo in Lough Gill. Roden et al. (in prep.) showed that habitat 3130 is found in clear water, and water colour is negatively correlated with maximum vegetation (euphotic) depth. They set good condition at <40mg/l PtCo; however, further work is necessary to determine sustainable water colour levels for the habitat, which may be <30 or even <20mg/l PtCo. 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). 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
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.
Turbidity	Nephelometric turbidity units/ mg/l SS/ other appropriate units	Maintain/restore appropriate turbidity to support the habitat	Lough Gill should, naturally, have clear water with low levels of turbidity. Cotton (1993) noted high turbidity in Lough Gill as a result of the Bonet drainage scheme. Jim Ryan (pers. comm.) has also noted high turbidity in the lake. 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 the habitat	Most lake shorelines have fringing habitats that intergrade with and support the structure and functions of the lake habitat. Lough Gill has a variety of important fringing habitats including alluvial woodland, other woodland, marsh, heath, wet grassland and orchid-rich calcareous grassland (see conservation objectives for 91E0, 91A0 and 6210). A number of rare and threatened plant species (see Wyse Jackson et al., 2016) are found in the fringing habitats including <i>Arbutus unedo</i> , <i>Taxus baccata</i> , <i>Prunus padus</i> , <i>Sorbus rupicola</i> , <i>Hieracium basalticola</i> , <i>Leucojum aestivum</i> , <i>Scutellaria minor</i> , <i>Sagittaria sagittifolia</i> , <i>Tamus communis</i> , <i>Neottia nidus-avis</i> and <i>Hypopitys monotropa</i> . 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. See also Mainstone et al. (2016)

## Conservation Objectives for : Lough Gill SAC [001976]

### 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (\* important orchid sites)

To restore the favourable conservation condition of Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (\* important orchid sites) in Lough Gill 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 Irish Semi-natural Grasslands Survey (ISGS; O'Neill et al., 2013) surveyed a number of areas of semi-natural grasslands within Lough Gill SAC, and found species-rich calcareous grassland habitat in one of those areas. The area of the habitat recorded within the SAC is located approximately midway along the northern shore of Lough Gill, in an area called Clogher Beg (survey site code 1556). This site (1556) was again visited as part of the Grasslands Monitoring Survey (GMS; Martin et al., 2018). The GMS (Martin et al., 2018) mapped 6.9ha of the habitat in Lough Gill SAC. See map 4. It is important to note that further unsurveyed areas of the habitat may be present within the SAC
Habitat distribution	Occurrence	No decline, subject to natural processes	Distribution based on GMS (Martin et al., 2018). See map 4. Note that further unsurveyed areas of the habitat may be present within the SAC
Vegetation composition: positive indicator species	Number at a representative number of 2m x 2m monitoring stops; within 20m surrounding area of monitoring stops	At least 7 positive indicator species present in monitoring stop or, if 5–6 present in stop, additional species within 20m of stop; this includes at least two 'high quality' positive indicator species present in stop or within 20m of stop	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018), where the lists of positive indicator species, including high quality indicators, are also presented. These documents should be consulted for further details
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Negative indicator species collectively not more than 20% cover, with cover of an individual species not more than 10%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018), where the list of negative indicator species is presented. The GMS (Martin et al., 2018) noted relatively high cover of the negative indicator species white clover ( <i>Trifolium repens</i> ) throughout the Clogher Beg site (site code 1556)
Vegetation composition: non-native species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of non-native species not more than 1%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Vegetation composition: woody species and bracken	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of woody species (except certain listed species) and bracken ( <i>Pteridium aquilinum</i> ) not more than 5%	Woody species that can occur above 5% cover are juniper ( <i>Juniperus communis</i> ), burnet rose ( <i>Rosa spinosissima</i> ), mountain avens ( <i>Dryas octopetala</i> ) and hoary rock-rose ( <i>Helianthemum oelandicum</i> ). However, cover of these species above 25% may indicate transition to another Annex I habitat such as Alpine and Boreal heaths (4060) or <i>Juniperus communis</i> formations (5130). Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Vegetation structure: broadleaf herb:grass ratio	Percentage at a representative number of 2m x 2m monitoring stops	Broadleaf herb component of vegetation between 40% and 90%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018). Broadleaf herb component of vegetation between 30% and 40% may be allowed to pass on expert judgement (Martin et al., 2018)
Vegetation structure: sward height	Percentage at a representative number of 2m x 2m monitoring stops	At least 30% of sward between 5cm and 40cm tall	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018). The GMS (Martin et al., 2018) recorded both tall rank vegetation and very short vegetation (3cm) at separate monitoring stops at the Clogher Beg site (site code 1556) in 2017
Vegetation structure: litter	Percentage cover at a representative number of 2m x 2m monitoring stops	Litter cover not more than 25%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)



Physical structure: bare soil	Percentage cover at a representative number of 2m x 2m monitoring stops	Not more than 10% bare soil	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Physical structure: grazing or disturbance	Area in local vicinity of a representative number of monitoring stops	Area of the habitat showing signs of serious grazing or disturbance less than 20m <sup>2</sup>	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)

## Conservation Objectives for : Lough Gill SAC [001976]

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

**To restore the favourable conservation condition of Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles in Lough Gill SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes. See map 5	Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles is present at Lough Gill SAC. As part of the National Survey of Native Woodlands (NSNW), the sub-sites Stonepark (NSNW site code 333), Cullentra (1400) and Sliswood (1411) were surveyed by Perrin et al. (2008). The conservation assessment score of Cullentra was ranked as joint first in Co. Sligo. National monitoring surveys have included Sliswood (1411) (Daly et al., in prep.) and Stonepark (333) (O'Neill and Barron, 2013). Oak woodland was formerly much more extensive at Sliswood, but much of the site was planted with conifers c. the 1950s (Goodwillie, 1972). Map 5 shows the minimum area of old sessile oak woods in the SAC which is estimated to be 41.42ha: 16.85ha at Stonepark, 6.07ha at Sliswood, and 18.50ha at Cullentra where the habitat occurs in association with other native woodland types (Perrin et al., 2008). It is important to note that further unsurveyed areas are present within the SAC
Habitat distribution	Occurrence	No decline, subject to natural processes. The surveyed woodland locations are shown on map 5	Distribution based on Perrin et al. (2008). It is important to note that further unsurveyed areas are present within the SAC
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	The target areas for individual woodlands aim to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). In some cases, topographical constraints may restrict expansion
Woodland structure: cover and height	Percentage; metres; centimetres	Total canopy cover at least 30%; median canopy height at least 11m; native shrub layer cover 10-75%; native herb/dwarf shrub layer cover at least 20% and height at least 20 cm; bryophyte cover at least 4%	The target aims for a diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer and ground layer. Assessment criteria are described in Daly et al. (in prep.) and O'Neill and Barron (2013)
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008). See also the Irish Vegetation Classification (Perrin, 2016; <a href="http://www.biodiversityireland.ie/projects/ivc-classification-explorer">www.biodiversityireland.ie/projects/ivc-classification-explorer</a> )
Woodland structure: natural regeneration	Seedling:sapling:pole ratio	Seedlings, saplings and pole age-classes of target species for 91A0 woodlands and other native tree species occur in adequate proportions to ensure survival of woodland canopy	The target species for 91A0 are sessile oak ( <i>Quercus petraea</i> ) and the hybrid oak <i>Quercus x rosacea</i> . Assessment criteria are described in Daly et al. (in prep.) and O'Neill and Barron (2013)
Woodland structure: dead wood	Number per hectare	At least 19 stems/ha of dead wood of at least 20cm diameter	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem. Dead wood comprises old senescent trees, standing dead trees, fallen dead wood (including large branches) and rotten stumps of any species. Assessment criteria are described in Daly et al. (in prep.) and O'Neill and Barron (2013)

Woodland structure: veteran trees	Number per hectare	No decline	Veteran trees are important habitats for bryophytes, lichens, saproxylic organisms, and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources
Woodland structure: indicators of local distinctiveness	Occurrence; population size	No decline in distribution and, in the case of red listed and other rare or localised species, population size	Includes ancient or long-established woodlands (see Perrin and Daly, 2010), archaeological and geological features as well as red listed and other rare or localised species. The eastern half of Cullentra (site code 1400) and the majority of Sliswood (1411) have been classified as Possible Ancient Woodland. Stonepark (333) contains an area of Long-established Woodland (I) (Perrin and Daly, 2010). Rare and red listed plant species have been recorded within the SAC, including the Near Threatened yellow bird's-nest ( <i>Hypopitys monotropa</i> ) and the Vulnerable rock whitebeam ( <i>Sorbus rupicola</i> ) (NPWS internal files; Wyse Jackson et al., 2016). Strawberry tree ( <i>Arbutus unedo</i> ) is present, Lough Gill being its most northerly site globally (Sealy and Webb, 1950). Rare old growth species of saproxylic beetle have been recorded at Sliswood, one of only two sites in Ireland for the fire-winged beetle <i>Pyropterus nigroruber</i> (Alexander and Anderson, 2012)
Woodland structure: indicators of overgrazing	Occurrence	All four indicators of overgrazing absent	There are four indicators of overgrazing within 91A0: topiary effect on shrubs and young trees, browse line on mature trees, abundant dung, and severe recent bark stripping (Daly et al., in prep.; O'Neill and Barron, 2013). A large herd of fallow deer is present within the SAC (NPWS internal files). Excessive levels of grazing by deer have been recorded at Sliswood (Daly et al., in prep.) and Cullentra (Perrin et al., 2008). As part of the People's Millennium Forests Project, conifer clear felling was undertaken adjacent to Cullentra with the aim of allowing natural regeneration of native woodland. The area remains largely open, mainly due to heavy grazing by deer (Daly et al., 2019)
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover at least 90% of canopy; target species cover at least 50% of canopy	The target species for 91A0 are sessile oak ( <i>Quercus petraea</i> ) and the hybrid oak <i>Quercus x rosacea</i> (Daly et al., in prep.; O'Neill and Barron, 2013)
Vegetation composition: typical species	Occurrence	At least 1 target species for 91A0 woodlands present; at least 6 positive indicator species for 91A0 woodlands present	A variety of typical native species should be present, depending on woodland type. The target species for 91A0 are sessile oak ( <i>Quercus petraea</i> ) and the hybrid oak <i>Quercus x rosacea</i> . Positive indicator species for 91A0 are listed in Daly et al. (in prep.) and O'Neill and Barron (2013)
Vegetation composition: negative indicator species	Occurrence	Negative indicator species cover not greater than 10%; regeneration of negative indicator species absent	Negative indicator species (i.e. any non-native species, including herbaceous species such as montbretia ( <i>Crocsmia x crocosmiiflora</i> ) should be absent or under control. Rhododendron ( <i>Rhododendron ponticum</i> ) is problematic at Sliswood (Perrin et al., 2008; Daly et al., in prep.)

## Conservation Objectives for : Lough Gill SAC [001976]

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

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

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes. See map 5	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)* is present within Lough Gill SAC. Significant areas of the habitat occur along the Garvoge River and at the mouth of the River Bonet (NPWS internal files). As part of the National Survey of Native Woodlands (NSNW), the sub-sites Conaghil (NSNW site code 371), Cleaveragh Demesne (1408) and Hazelwood Demesne (1409) were surveyed by Perrin et al. (2008). The conservation assessment scores of Hazelwood Demesne and Cleaveragh Demesne were ranked as joint first and joint second respectively in Co. Sligo. Hazelwood Demesne (site code 1409) was also included in a national monitoring survey (O'Neill and Barron, 2013; Daly et al., in prep.). Map 5 shows the minimum area of alluvial forests within the SAC, which is estimated to be 55.3ha. It is important to note that further unsurveyed areas may be present within the SAC
Habitat distribution	Occurrence	No decline, subject to natural processes. The surveyed woodland locations are shown on map 5	Distribution based on Perrin et al. (2008), with modifications to the boundary of the monitoring site at Hazelwood Demesne (NSNW site code 1409) by Daly et al. (in prep.). It is important to note that further unsurveyed areas may be present within the SAC
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	The target areas for individual woodlands aim to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). In some cases, topographical constraints may restrict expansion
Woodland structure: cover and height	Percentage; metres; centimetres	Total canopy cover at least 30%; median canopy height at least 7m; native shrub layer cover 10-75%; native herb/dwarf shrub layer cover at least 20% and height at least 20cm; bryophyte cover at least 4%	The target aims for a diverse structure with a canopy containing mature trees, shrub layer with semi-mature trees and shrubs, and well-developed field layer (herbs, graminoids and dwarf shrubs) and ground layer (bryophytes). Assessment criteria are described in Daly et al. (in prep.) and O'Neill and Barron (2013)
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008). See also the Irish Vegetation Classification (Perrin, 2016; <a href="http://www.biodiversityireland.ie/projects/ivc-classification-explorer">www.biodiversityireland.ie/projects/ivc-classification-explorer</a> ). Kelly and Iremonger (1997) classified plots from Hazelwood as the Osmundo-Salicetum atrocineriae vegetation type and one plot from the mouth of the Bonet River as the Carici remotae-Fraxinetum vegetation type
Woodland structure: natural regeneration	Seedling:sapling:pole ratio	Seedlings, saplings and pole age-classes of target species for 91E0* woodlands and other native tree species occur in adequate proportions to ensure survival of woodland canopy	The target species for 91E0* are alder ( <i>Alnus glutinosa</i> ), ash ( <i>Fraxinus excelsior</i> ) and willows ( <i>Salix</i> spp.). Assessment criteria are described in Daly et al. (in prep.) and O'Neill and Barron (2013)

Hydrological regime: flooding depth/height of water table	Metres	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	Periodic flooding is essential to maintain alluvial woodlands along river and lake floodplains, but not for woodland around springs/seepage areas. Drain blocking has been undertaken to reinstate natural hydrological functions at Hazelwood as part of a LIFE Project (LIFE05 NAT/IRL/000182) (Coillte: <a href="http://www.woodlandrestoration.ie/demonstration-sites-hazelwood.php">www.woodlandrestoration.ie/demonstration-sites-hazelwood.php</a> )
Woodland structure: dead wood	Number per hectare	At least 19 stems/ha of dead wood of at least 20cm diameter	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem. Dead wood comprises old senescent trees, standing dead trees, fallen dead wood (including large branches) and rotten stumps of any tree species. Assessment criteria are described in Daly et al. (in prep.) and O'Neill and Barron (2013)
Woodland structure: veteran trees	Number per hectare	No decline	Veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources
Woodland structure: indicators of local distinctiveness	Occurrence; population size	No decline in distribution and, in the case of red listed and other rare or localised species, population size	Includes ancient or long-established woodlands (see Perrin and Daly, 2010), archaeological and geological features as well as red listed and other rare or localised species. Parts of the alluvial forest habitat at Cleaveragh Demesne (NSNW site code 1408) and Hazelwood Demesne (1409) have been categorised as Long-established Woodland (I) i.e. they appear on the 1830s 1st edition Ordnance Survey maps but no further evidence of antiquity could be found in older documentation (Perrin and Daly, 2010). The notable species bird cherry ( <i>Prunus padus</i> ) is abundant at Hazelwood Demesne (Perrin et al., 2008). See also the conservation objective for otter ( <i>Lutra lutra</i> ; Annex II species code 1355) in this volume
Woodland structure: indicators of overgrazing	Occurrence	All five indicators of overgrazing absent	There are five indicators of overgrazing within 91E0*: topiary effect on shrubs and young trees, browse line on mature trees, abundant dung, severe recent bark stripping, and trampling (Daly et al., in prep.)
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover at least 90% of canopy; target species cover at least 50% of canopy	The target species for 91E0* are alder ( <i>Alnus glutinosa</i> ), ash ( <i>Fraxinus excelsior</i> ) and willows ( <i>Salix</i> spp.) (Daly et al., in prep.; O'Neill and Barron, 2013)
Vegetation composition: typical species	Occurrence	At least 1 target species for 91E0* woodlands present; at least 6 positive indicator species for 91E0* woodlands present	A variety of typical native species should be present, depending on woodland type. The target species for 91E0* are alder ( <i>Alnus glutinosa</i> ), ash ( <i>Fraxinus excelsior</i> ) and willows ( <i>Salix</i> spp.). Positive indicator species for 91E0* are listed in Daly et al. (in prep.) and O'Neill and Barron (2013)
Vegetation composition: negative indicator species	Occurrence	Negative indicator species cover not greater than 10%; regeneration of negative indicator species absent	Negative indicator species (i.e. any non-native species, including herbaceous species) should be absent or under control. At Cleaveragh Demesne (1408), the non-native red-osier dogwood ( <i>Cornus sericea</i> ) forms thickets in the northern part of the site, and Rhododendron ( <i>Rhododendron ponticum</i> ) forms dense stands in western parts of the site. At Hazelwood Demesne (1409), Rhododendron and cherry laurel ( <i>Prunus laurocerasus</i> ) are dominant in a central part of the site and scattered elsewhere. Red-osier dogwood is frequent in wetter areas (Perrin et al., 2008). Horse-chestnut ( <i>Aesculus hippocastanum</i> ) is present and regenerating (Daly et al., in prep.). Substantial invasive species control work was undertaken to restore 24ha of alluvial forest at Hazelwood as part of a LIFE Project (LIFE05 NAT/IRL/000182) (Coillte: <a href="http://www.woodlandrestoration.ie/demonstration-sites-hazelwood.php">www.woodlandrestoration.ie/demonstration-sites-hazelwood.php</a> ) and further work is being undertaken by Coillte Nature on an additional 30ha



Vegetation composition: problematic native species	Percentage	Cover of common nettle ( <i>Urtica dioica</i> ) less than 75%	Common nettle ( <i>Urtica dioica</i> ) is a positive indicator species for 91E0* but, in some cases, it may become excessively dominant. Increased light and nutrient enrichment are factors which favour proliferation of common nettle (Daly et al., in prep.)
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## Conservation Objectives for : Lough Gill SAC [001976]

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

To maintain the favourable conservation condition of White-clawed Crayfish (*Austropotamobius pallipes*) in Lough Gill SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Number of occupied 1km squares	No reduction from baseline. See map 6	Within Lough Gill SAC, the main population of white-clawed crayfish ( <i>Austropotamobius pallipes</i> ) is found in the Bonet River. Records indicate it is present on the main channel of the Bonet from Dromahair upstream to Glenade Lough (which is in an adjoining SAC). It is also found on the Shanvaus and Owenmore rivers and in Doon Lough, and in the stream that connects this lake to Lough Gill. There are likely to be crayfish populations in all 1km squares that overlap the designated sections of all these rivers; however, this would need to be proven by appropriate surveys. White-clawed crayfish are, however, not known to be present in Lough Gill itself (O'Connor et al., 2009)
Population structure: recruitment	Percentage occurrence of juveniles and females with eggs	Juveniles and females with eggs in at least 50% of positive samples taken at appropriate time and methodology	See Reynolds et al. (2010) for further details. Gammell et al. (2021) found juveniles at sites at sites along the River Bonet
Population size	Catch per unit effort	No reduction from baseline of 0.25	The population abundance grade at most sites sampled in Gammell et al. (2021) was low except in the upper reaches of the Bonet River. The catch per unit effort (CPUE) figure is based on the figures and methodologies in Gammell et al. (2021) and in O'Connor et al. (2009). This may be refined with further more detailed assessment of the stocks within this SAC and in the different habitats
Negative indicator species	Occurrence	No non-indigenous crayfish species present	Non-indigenous crayfish species (NICS) are identified as a major direct threat to the white-clawed crayfish and as a disease vector, in particular crayfish plague ( <i>Aphanomyces astaci</i> ), which is fatal to white-clawed crayfish. The possession, import and intentional release of five species of invasive alien crayfish is banned by Statutory Instrument No. 354/2018
Disease	Occurrence	No instances of disease	Crayfish plague, caused by the water-borne mould <i>Aphanomyces astaci</i> , is identified as major threat to the species in Ireland. Instances of crayfish plague have occurred in Ireland since 2015 causing local extinctions. There have been no confirmed or suspected outbreaks in this SAC
River water quality	EPA Q value	At least Q3-4 at all sites sampled by EPA	The Bonet system is monitored by the Environmental Protection Agency (EPA) and in the latest assessment the river is High in the upper reaches downstream of Glenade Lough to H8641. Below this, it changes progressively through Good and Moderate to Poor in the section downstream of Dromahair. The Shanavaus and Owenmore are both classified as High. The subcatchment that includes Doon Lough is classified as Poor. The target level is based on Demers and Reynolds (2002). Q values are based on triennial water quality surveys carried out by the EPA
Lake water quality	Water chemistry measures	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of the habitat	White-clawed crayfish are not considered very sensitive of water quality but are intolerant of low pH and poorest water quality, and lack of calcareous influence. There should be no decline in the water quality as defined by the targets for the 3150 lake habitat, as these are more stringent than white-clawed crayfish requires. See the conservation objective for the lake habitat in this volume for further details

Habitat quality: heterogeneity	Occurrence of positive habitat features	No decline from the baseline	White-clawed 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 and habitat features must be available on the whole length of occupied habitat. Gammell et al. (2021) scored the habitat heterogeneity and following this methodology a baseline score of 0.37, based on the mean score, is set
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## Conservation Objectives for : Lough Gill SAC [001976]

### 1095 Sea Lamprey *Petromyzon marinus*

To restore the favourable conservation condition of Sea Lamprey (*Petromyzon marinus*) in Lough Gill 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	Artificial barriers can block or impede the passage of upstream migrating lamprey, thereby restricting access to spawning areas (Gargan et al., 2011; Rooney et al., 2015). The weir on the Garavogue River in Sligo town is currently not considered an issue for sea lamprey. However, there is a significant natural barrier, consisting of a sequence of waterfalls, at the village of Dromahair in the lower reaches of the River Bonet. Only a small number of records exist for sea lamprey ( <i>Petromyzon marinus</i> ) in Lough Gill SAC. An individual lamprey was observed immediately downstream of the weir in Sligo in 2015 and there have been anecdotal records of sea lamprey nests in the Garavogue in Sligo town. Significantly, two juvenile lake-feeding sea lampreys were recorded from Lough Gill in 2018 attached to pike (King and O’Gorman, 2018)
Annual run size	Number of sea lamprey nests	Annual run size should reflect that expected under near-natural conditions	This target is based on guidance from JNCC (2015) and requires assessment of adult sea lamprey spawning activity in the form of annual nest counts. Sea lamprey do not exhibit complete fidelity to natal rivers and monitoring needs to occur over several years to build up a picture of inter-annual variation in spawning occurrence. Suitable spawning habitat for sea lamprey in Lough Gill SAC is limited to sections of the Garavogue River in Sligo town and downstream of Dromahair on the River Bonet. As stated above, few records exist for adult sea lampreys in this catchment and the sequence of waterfalls on the Bonet River at Dromahair represents a potential natural barrier to upstream migration
Larval lamprey in fine sediment	Larval lamprey/m <sup>2</sup>	Larval lamprey present in SAC catchment	It is currently not possible to set a target mean density for this attribute. Sea lamprey larvae are rarely encountered in catchment-wide electro-fishing surveys and more information is required on larval habitat utilisation by this species. Targeted surveys may be required to establish presence/absence of sea lamprey larvae in Lough Gill SAC and new sampling techniques may need to be explored. An electro-fishing survey for larval lamprey was carried out on the Garavogue-Bonet catchment by Inland Fisheries Ireland (IFI) in 2009 (Inland Fisheries Ireland, 2010), with a repeat survey in 2016 (Gallagher et al., 2017). No sea lamprey larvae were recorded from these surveys

Extent and distribution of spawning and nursery habitat

m<sup>2</sup> and occurrence

No decline in extent and distribution of spawning and nursery beds

Sea lampreys spawn in well-oxygenated gravels where they excavate large nests. Suitable spawning habitat for sea lamprey in this SAC is limited to sections of the Garavogue River in Sligo town and downstream of Dromahair on the River Bonet, as stated above. The target for nursery beds is based on habitat mapping during targeted larval lamprey monitoring surveys. Of the 23 sites surveyed in the 2016 survey (Gallagher et al., 2017), 35% had no nursery habitat for larval lamprey. A high proportion of sites with no suitable nursery habitat reflects the fluvial geomorphology of this catchment which is predominantly a mid to high energy system. Some of the low-lying arerially drained sections were too deep for sampling using the electro-fishing technique. Approximately 30% of the catchment's water bodies were subjected to arterial drainage in the 1980s. Drainage maintenance has the potential to alter instream sediment dynamics which in turn affects larval lamprey populations

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## Conservation Objectives for : Lough Gill SAC [001976]

### 1096 Brook Lamprey *Lampetra planeri*

To restore the favourable conservation condition of Brook Lamprey (*Lampetra planeri*) in Lough Gill SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Percentage of river accessible	Access to all water courses down to first order streams	Artificial barriers can block or impede the passage of upstream migrating lamprey, thereby limiting their distribution to lower stretches and restricting access to spawning areas (Gargan et al., 2011; Rooney et al., 2015). Artificial barriers are not considered an issue for brook lamprey ( <i>Lampetra planeri</i> ) in Lough Gill SAC
Distribution in suitable habitat	Percentage of positive sites in 2nd order channels (and greater), downstream of spawning areas	Not less than 50% of sample sites with suitable habitat positive for larval brook/river lamprey	Larval lamprey live in fine sediments for up to six years. It is not possible to distinguish between larval brook lamprey ( <i>Lampetra planeri</i> ) and river lamprey ( <i>L. fluviatilis</i> ) in the field and they are therefore considered together in this and other attribute targets. A survey for larval lamprey was carried out on the Garavogue-Bonet catchment in 2009 (Inland Fisheries Ireland, 2010), with a repeat survey in 2016 (Gallagher et al., 2017). Results were broadly similar for both years. To achieve favourable condition, <i>Lampetra</i> spp. should, as a minimum, be present in not less than 50% of all sampling sites surveyed with suitable habitat present within the natural range (JNCC, 2015). Of the 23 sites sampled in 2016 (Gallagher et al., 2017), <i>Lampetra</i> spp. larvae were present in 47% of sites with suitable nursery habitat, indicating this catchment does not achieve favourable condition for this attribute
Population structure of larvae	Number of age/size classes	At least three age/size classes of larval brook/river lamprey present	The target of at least three age/size classes is based on guidance from JNCC (2015). Larvae typically range from 10-150mm in length and this corresponds to up to six age classes. A broad range of size classes (21-104mm) was recorded from the Garavogue-Bonet catchment-wide survey in 2016 (Gallagher et al., 2017) indicating favourable condition for this attribute
Larval lamprey density in fine sediment	Larval lamprey/m <sup>2</sup>	Mean density of brook/river larval lamprey in sites with suitable habitat at least 5/m <sup>2</sup>	A target mean density of at least 5/m <sup>2</sup> larvae in sites with suitable habitat is required to achieve favourable condition (JNCC, 2015). A mean density of 1.5/m <sup>2</sup> <i>Lampetra</i> spp. larvae was obtained in the 2009 electro-fishing survey of the Garavogue-Bonet catchment (Inland Fisheries Ireland, 2010), with no improvement (1.7/m <sup>2</sup> ) recorded in 2016 (Gallagher et al., 2017). Brook lamprey, therefore, do not achieve favourable condition for this attribute in Lough Gill SAC
Extent and distribution of spawning and nursery habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning and nursery beds	This target is based on habitat mapping during targeted larval lamprey monitoring surveys. Brook lamprey spawn in clean gravels where they excavate shallow nests (Rooney et al., 2013). While coarse substrate is required for spawning, the close proximity of nursery areas comprising mainly sand/silt are necessary for the development of larvae. Of the 23 sites surveyed in 2016 (Gallagher et al., 2017), 35% had no nursery habitat, with 43% of sites having no nearby spawning habitat. A high proportion of sites with no suitable nursery habitat reflects the fluvial geomorphology of this catchment which is predominantly a mid to high energy system. Some of the low-lying arterially drained sections were too deep for sampling using the electro-fishing technique. Approximately 30% of the catchment's water bodies were subjected to arterial drainage in the 1980s. Drainage maintenance has the potential to alter instream sediment dynamics which in turn affects larval lamprey populations

## Conservation Objectives for : Lough Gill SAC [001976]

### 1099 River Lamprey *Lampetra fluviatilis*

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

Attribute	Measure	Target	Notes
Distribution	Percentage of river accessible	Access to all water courses down to first order streams	Artificial barriers can block or impede the passage of upstream migrating lamprey, thereby restricting access to spawning areas (Gargan et al., 2011; Rooney et al., 2015). There is a substantial weir on the Garavogue River in Sligo town, but this is currently not considered an issue for river lamprey ( <i>Lampetra fluviatilis</i> ) migration as there is a working fish pass and, failing that, one of the weir arches is open to enable fish passage. Of more significance is a possible natural barrier in the form of a substantial bedrock outcrop at the village of Dromahair in the lower reaches of the River Bonet. At this point, the river falls approximately 9m in a short distance over a series of bedrock outcroppings, creating a sequence of waterfalls. This feature poses a significant barrier to anadromous and catadromous fish species. At present, there are no records for adult river lamprey in the Garavogue-Bonet system
Distribution in suitable habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	Not less than 50% of sample sites with suitable habitat positive for larval brook/river lamprey	It is not possible to distinguish between larval brook lamprey ( <i>Lampetra planeri</i> ) and river lamprey ( <i>L. fluviatilis</i> ) in the field and they are therefore considered together in this and other targets. That said, it is likely that the majority, if not all, records are for brook lamprey, particularly those recorded above barriers to river lamprey upstream passage. A survey for larval lamprey was carried out on the Garavogue-Bonet catchment in 2009 (IFI, 2010), with a repeat survey in 2016 (Gallagher et al., 2017). Results were broadly similar for both years. To achieve favourable condition, <i>Lampetra</i> spp. should, as a minimum, be present in not less than 50% of all sampling sites surveyed with suitable habitat present within the natural range (JNCC, 2015). Of the 23 sites sampled in 2016, <i>Lampetra</i> spp. larvae were present in 47% of sites with suitable nursery habitat, indicating this catchment does not achieve favourable condition for this attribute
Population structure of larvae	Number of age/size classes	At least three age/size classes of larval brook/river lamprey present	The target of at least 3 age/size classes is based on guidance from JNCC (2015). Larvae typically range from 10-150mm in length and this corresponds to up to six age classes. A broad range of size classes (21-104mm) for <i>Lampetra</i> spp. was recorded from the Garavogue-Bonet catchment-wide survey in 2016 (Gallagher et al., 2017) indicating favourable condition for this attribute in Lough Gill SAC
Larval lamprey density in fine sediment	Larval lamprey/m <sup>2</sup>	Mean density of brook/river larval lamprey in sites with suitable habitat at least 5/m <sup>2</sup>	A target mean density of at least 5/m <sup>2</sup> larvae in sites with suitable habitat is required to achieve favourable condition (JNCC, 2015). A mean density of 1.5/m <sup>2</sup> <i>Lampetra</i> spp. larvae was obtained in the 2009 electro-fishing survey (Inland Fisheries Ireland, 2010), with no improvement (1.7/m <sup>2</sup> ) recorded in 2016 (Gallagher et al., 2017), indicating that the Garavogue-Bonet catchment does not achieve favourable condition for this attribute

Extent and distribution of spawning and nursery habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning and nursery beds	<p>This target is based on habitat mapping during targeted larval lamprey monitoring surveys. River lamprey spawn in clean gravels in flowing water where they excavate shallow nests. While coarse substrate is required for spawning, the close proximity of nursery areas comprising mainly sand/silt are necessary for the development of larvae. Of the 23 sites surveyed in 2016 (Gallagher et al., 2017), 35% had no nursery habitat, with 43% of sites having no nearby spawning habitat. A high proportion of sites with no suitable nursery habitat reflects the fluvial geomorphology of this catchment which is predominantly a mid to high energy system. Some of the low-lying arterially drained sections were too deep for sampling using the electro-fishing technique. Approximately 30% of the catchment's water bodies were subjected to arterial drainage in the 1980s. Drainage maintenance has the potential to alter instream sediment dynamics which in turn affects larval lamprey populations</p>
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## Conservation Objectives for : Lough Gill SAC [001976]

### 1106 Salmon *Salmo salar*

To restore the favourable conservation condition of Atlantic Salmon (*Salmo salar*) in Lough Gill 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 Technical Expert Group on Salmon's (TEGOS) annual model output of CL attainment levels. See Gargan et al. (2021) for further details. Stock estimates are either derived from direct counts of adults (rod catch, fish counter) or indirectly by fry abundance counts. Lough Gill SAC is just below its CL for one-sea-winter (1SW) and just above its CL for multi-sea-winter (MSW) 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 is restricted habitat for salmon in the system 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)

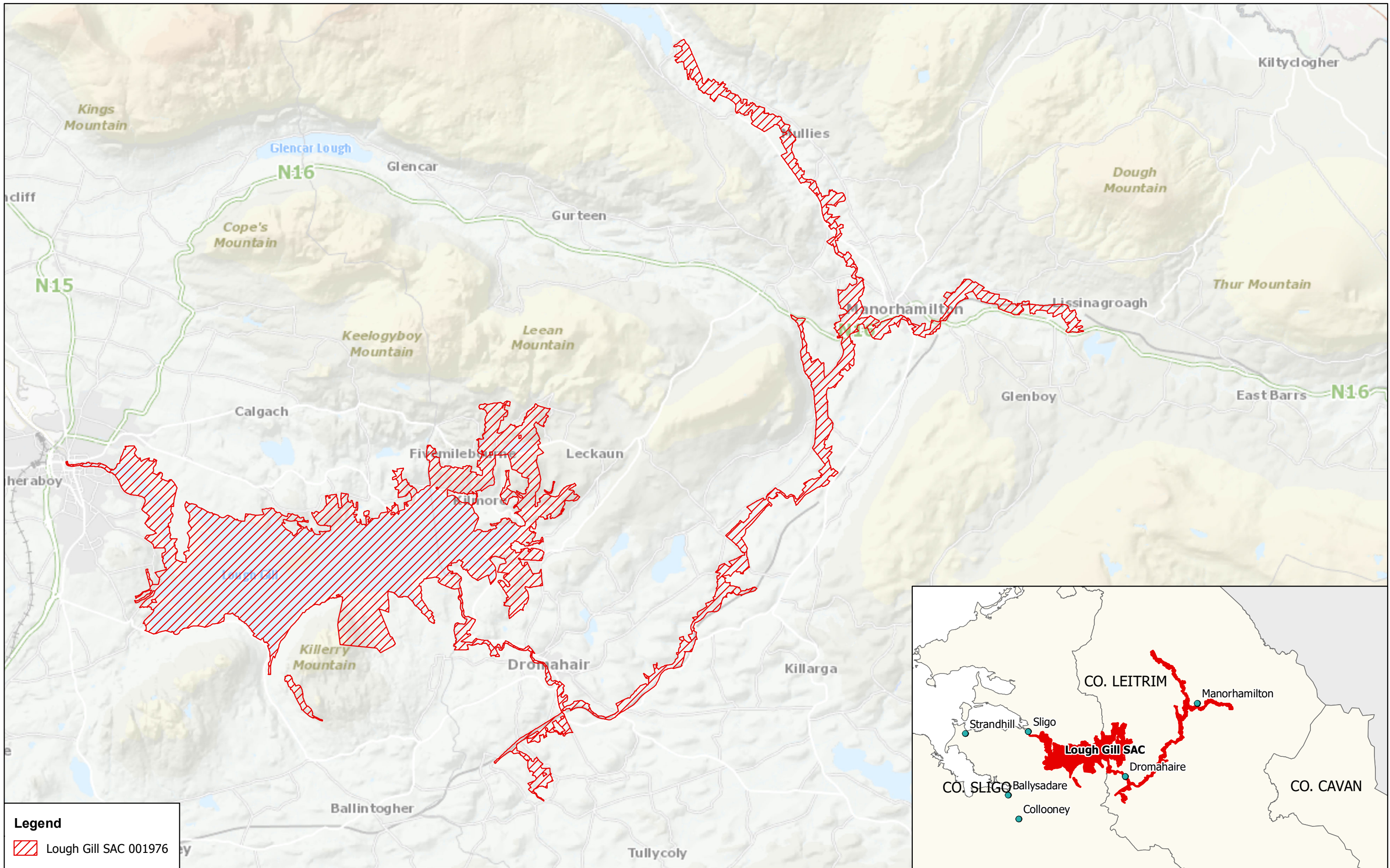
## Conservation Objectives for : Lough Gill SAC [001976]


### 1355 Otter *Lutra lutra*

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

Attribute	Measure	Target	Notes
Distribution	Percentage positive survey sites	No significant decline	Measure based on standard otter survey technique. Favourable Conservation Status (FCS) target, based on 1980/81 survey findings, is 88% in SACs. Current range is estimated at 93.6% (Reid et al., 2013)
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 193.91ha along river banks/ lake shoreline/around ponds	No field survey. Areas mapped to include 10m terrestrial buffer, identified as critical for otters (NPWS, 2007), along rivers and around water bodies
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 80.38km	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 353.39ha	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. For guidance, see map 7	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**  
 Lough Gill SAC 001976

 **An Roinn Tithíochta,  
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 Department of Housing,  
 Local Government and Heritage


**MAP 1:  
 LOUGH GILL SAC  
 CONSERVATION OBJECTIVES  
 SAC DESIGNATION**  
 Map to be read in conjunction with the NPWS Conservation Objectives Document

**SITE CODE:  
 SAC 001976; version 3.  
 CO. SLIGO / LEITRIM**

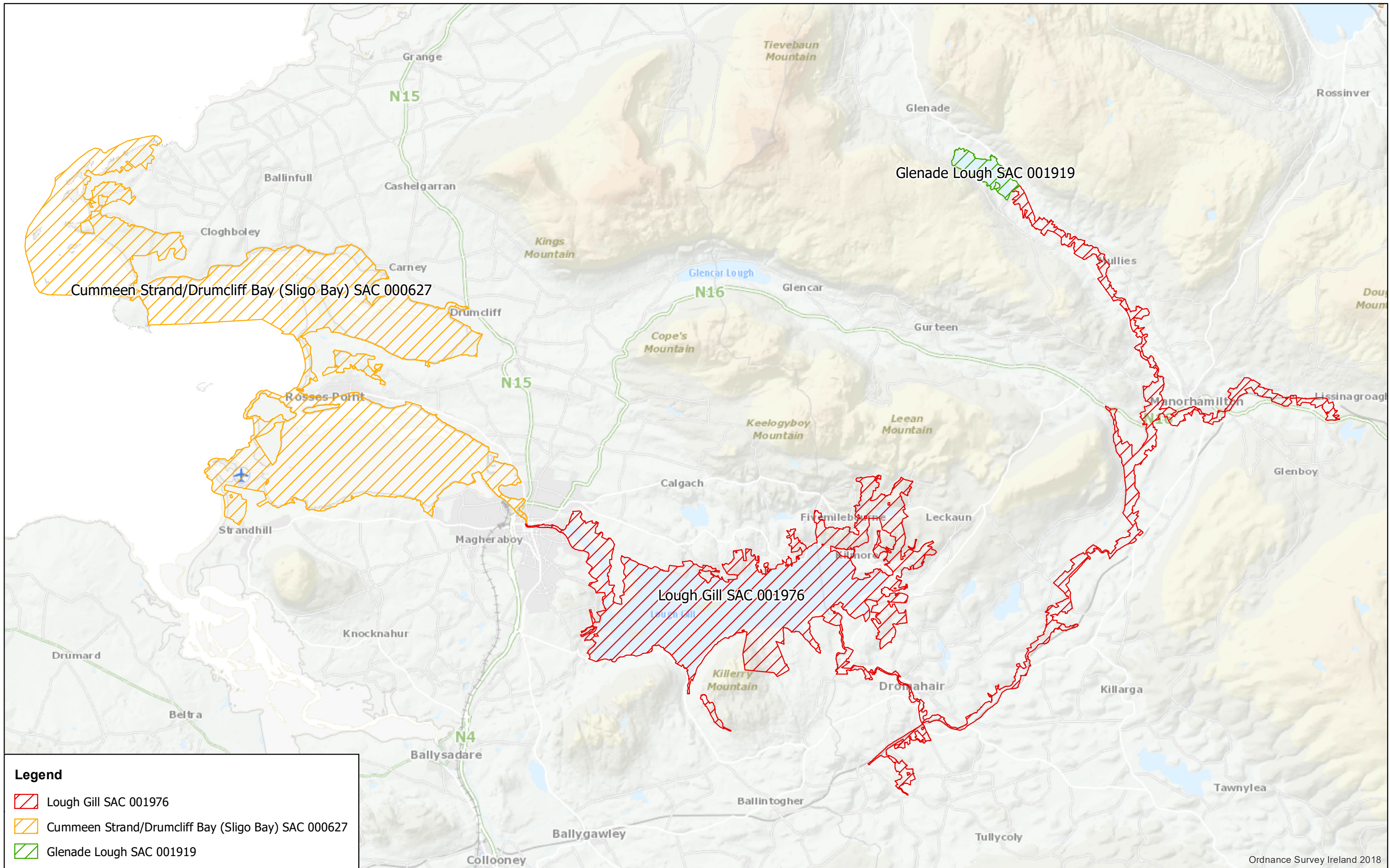
0 1 2 4 Kilometres

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 comharthaíthe. Suirbhéarachta Ordoanáis na hÉireann Ceadúnas Uimh OSI-NMA-014. © Suirbhéarachta Ordoanáis na hÉireann Rialtas na hÉireann

  
**Date: November 2021**





**Legend**

-  Lough Gill SAC 001976
-  Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC 000627
-  Glenade Lough SAC 001919

Ordnance Survey Ireland 2018



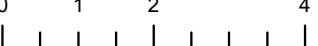
**An Roinn Tithíochta,  
Rialtais Áitiúil agus Oidhreacht**  
Department of Housing,  
Local Government and Heritage

**MAP 2:  
LOUGH GILL SAC  
CONSERVATION OBJECTIVES  
ADJACENT SITES**

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


**SITE CODE:  
SAC 001976; version 3.  
CO. SLIGO / LEITRIM**

0 1 2 4 Kilometres



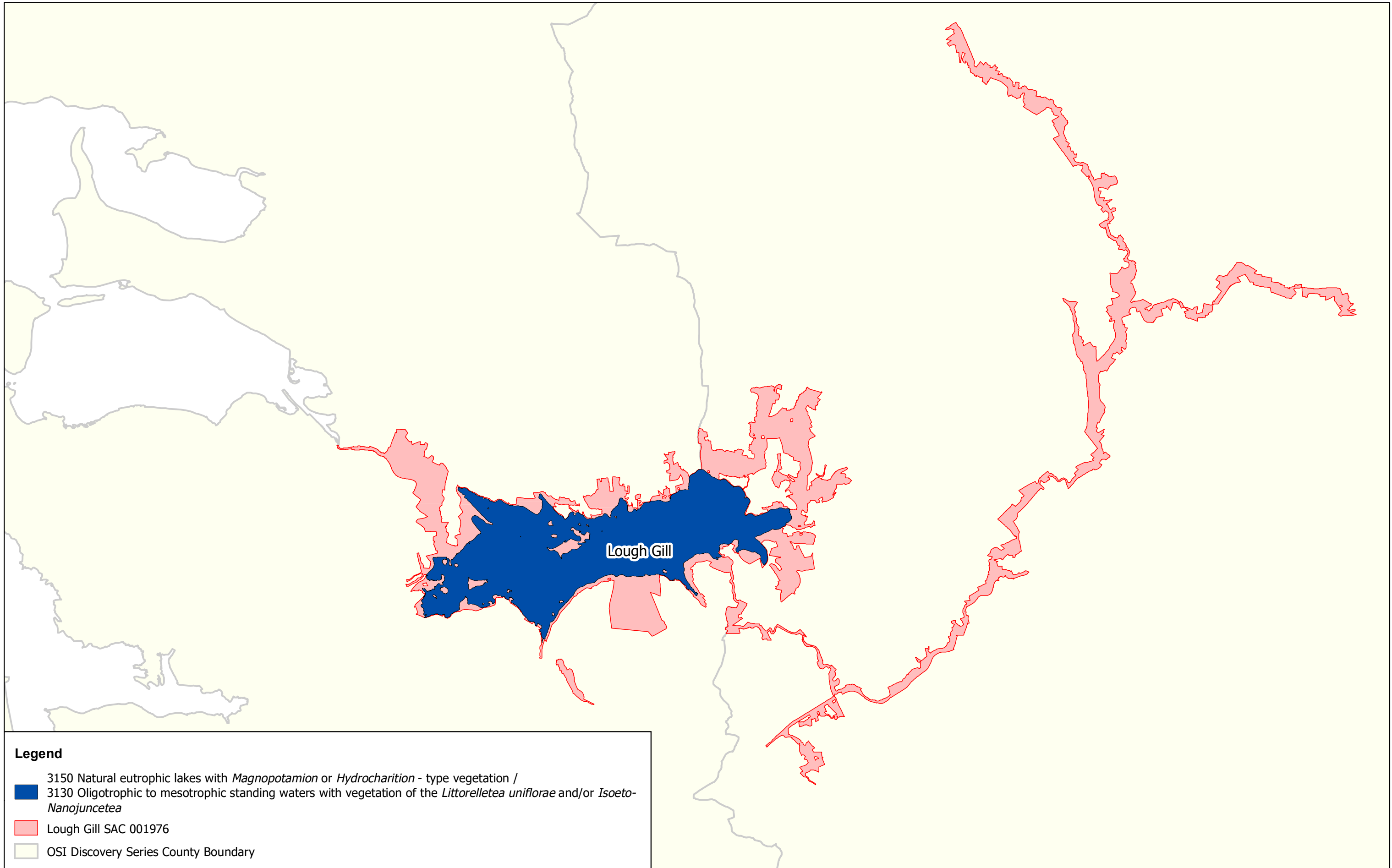
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
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Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaite. Suirbhéarachtá Ordoanáis na hÉireann Ceadúnas Uimh OSI-NMA-014. © Suirbhéarachtá Ordoanáis na hÉireann Rialtas na hÉireann



**Date: November 2021**

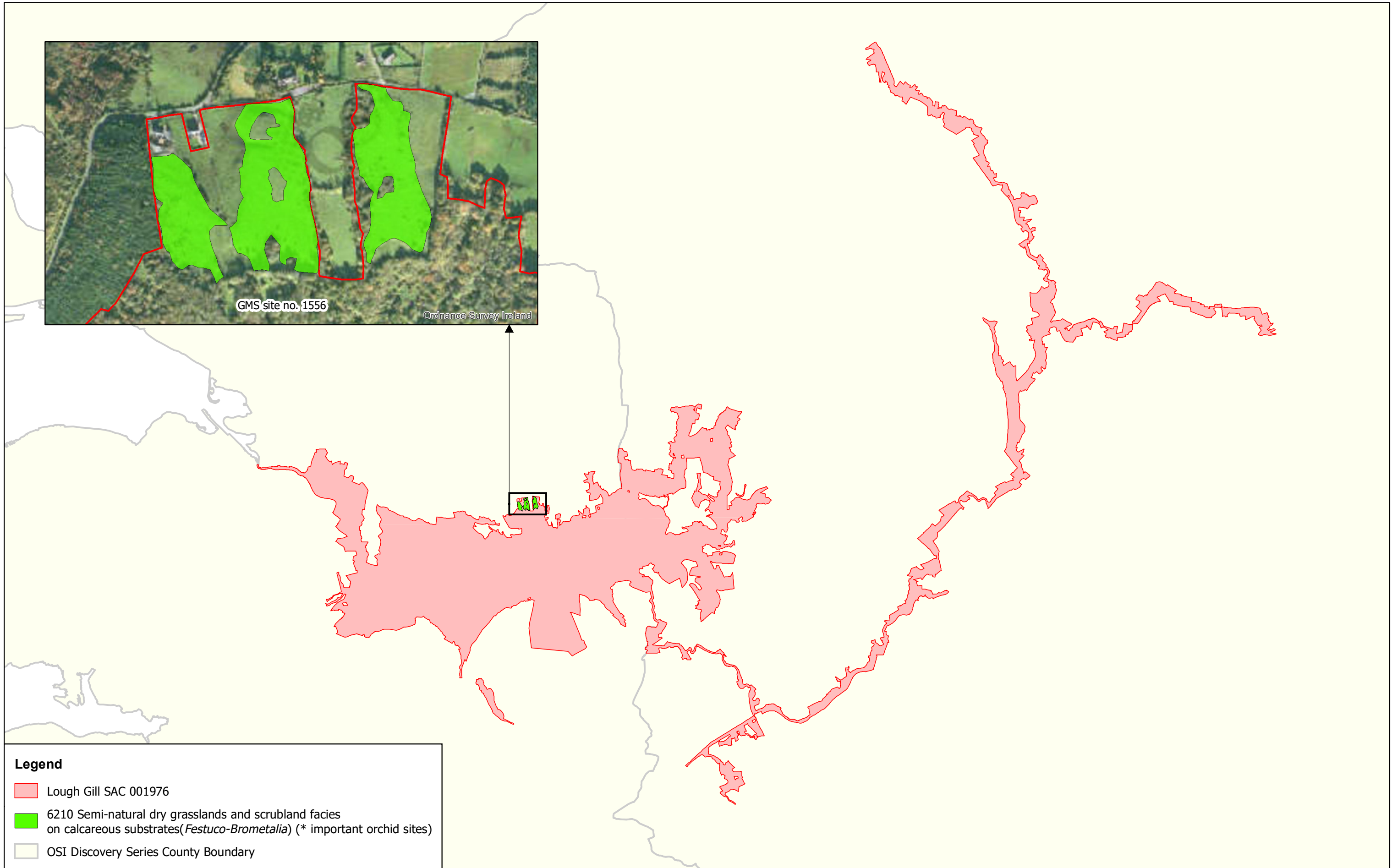




**Legend**

- 3150 Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation /
- 3130 Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea*
- Lough Gill SAC 001976
- OSI Discovery Series County Boundary



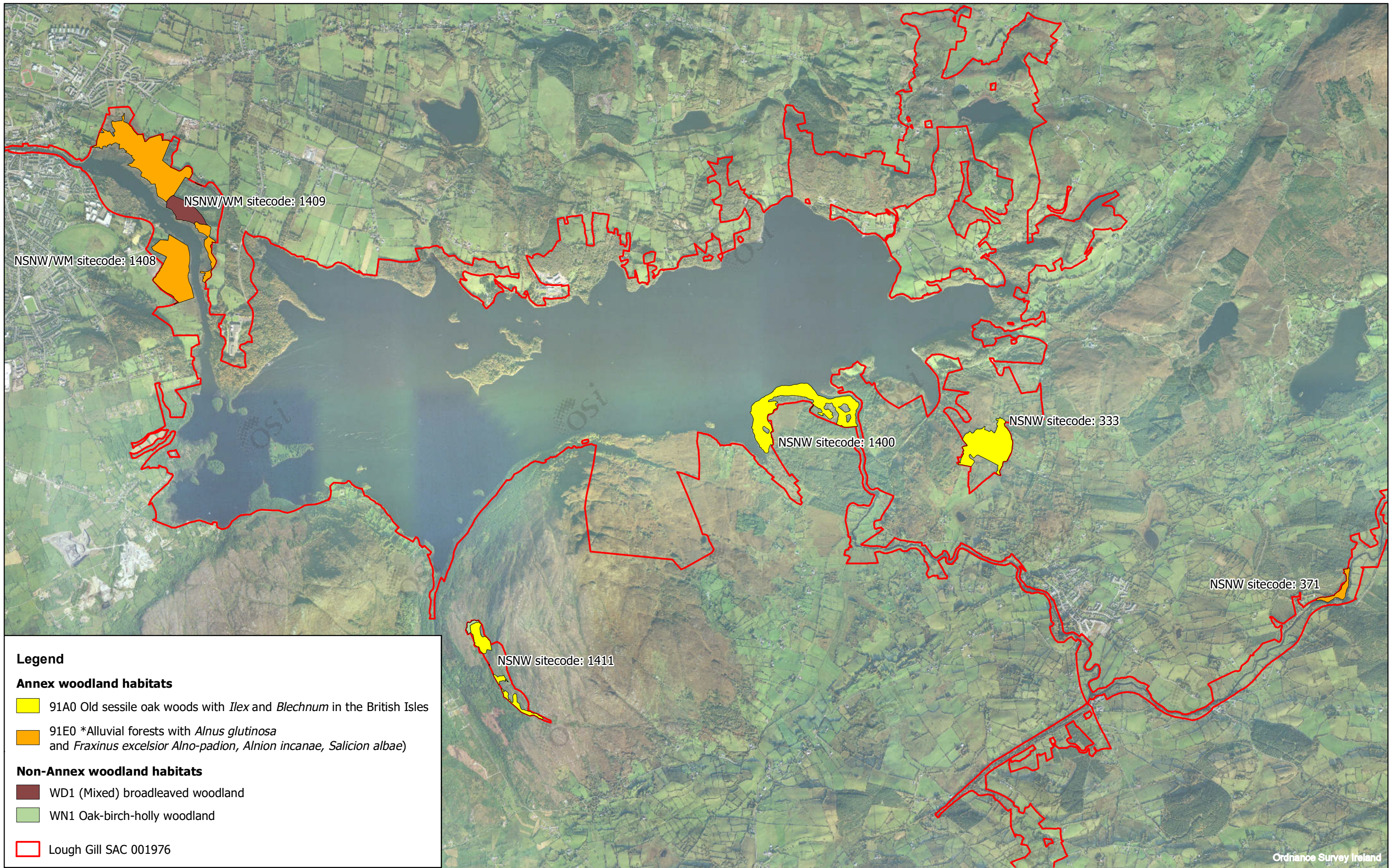


**Legend**

- Lough Gill SAC 001976
- 6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates(*Festuco-Brometalia*) (\* important orchid sites)
- OSI Discovery Series County Boundary







**Legend**

**Annex woodland habitats**

- 91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
- 91E0 \*Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-padion*, *Alnion incanae*, *Salicion albae*)

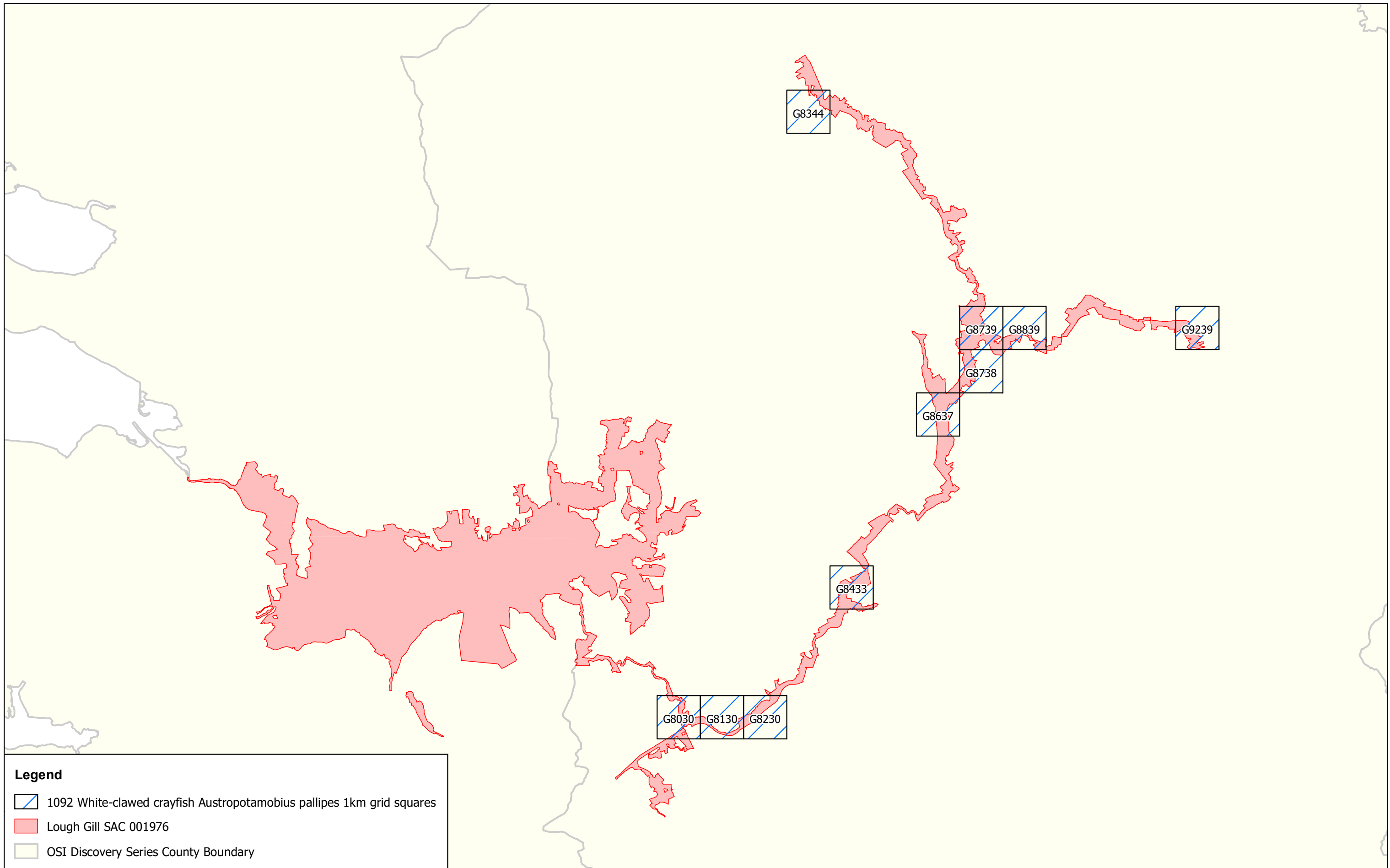
**Non-Annex woodland habitats**

- WD1 (Mixed) broadleaved woodland
- WN1 Oak-birch-holly woodland
- Lough Gill SAC 001976




Ordnance Survey Ireland

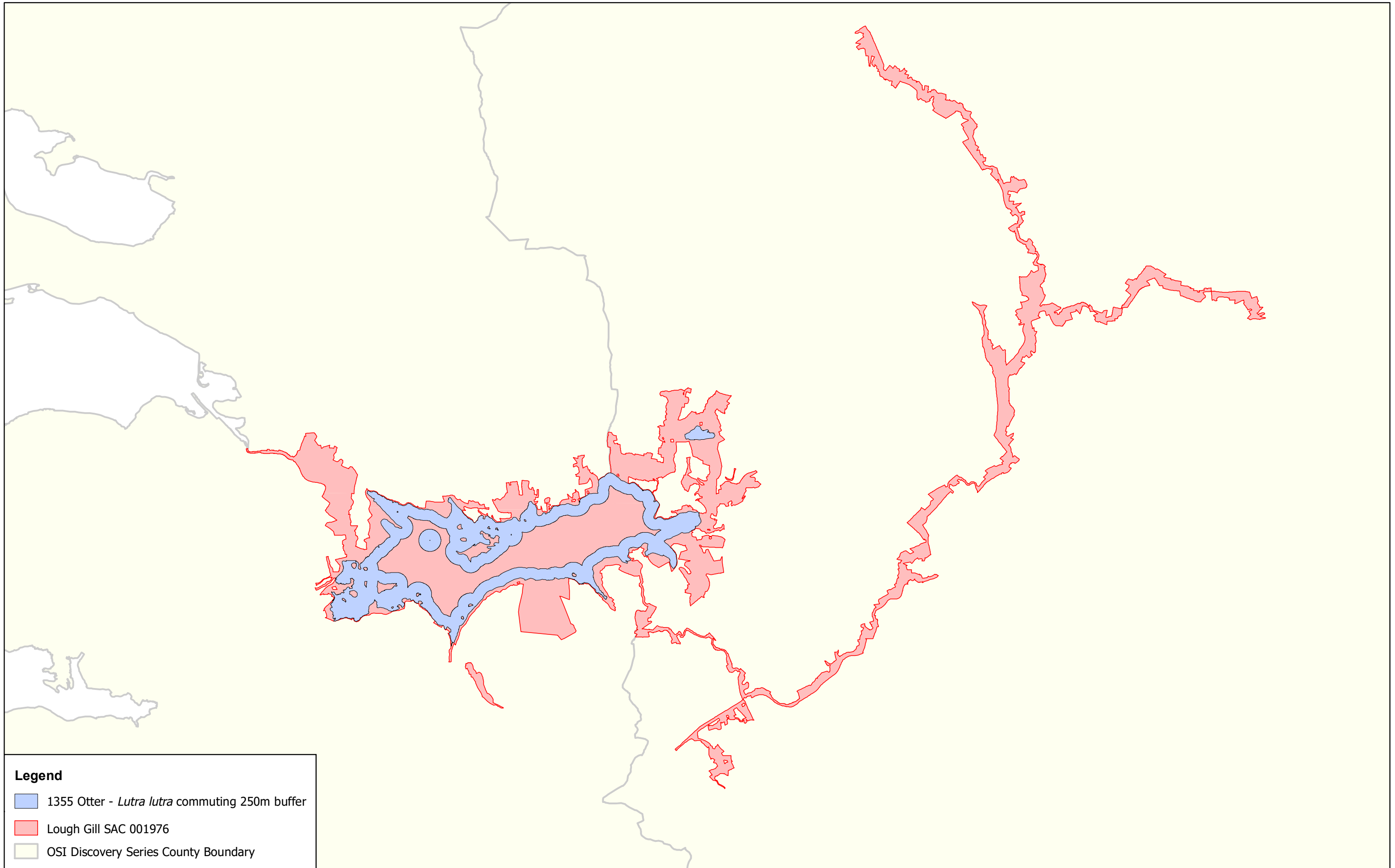






**Legend**

-  1092 White-clawed crayfish *Austropotamobius pallipes* 1km grid squares
-  Lough Gill SAC 001976
-  OSI Discovery Series County Boundary



**Legend**

- 1355 Otter - *Lutra lutra* commuting 250m buffer
- Lough Gill SAC 001976
- OSI Discovery Series County Boundary

# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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### Dunmuckrum Turloughs SAC 002303



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

**National Parks and Wildlife Service,  
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Government and Heritage.**

**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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002303      Dunmuckrum Turloughs SAC

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3180      Turloughs\*

## 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 :** 2017  
**Title :** Conservation objectives supporting document: Turloughs\* and Rivers with muddy banks with *Chenopodium rubri* p.p. and *Bidention* p.p. vegetation  
**Author :** O Connor, Á.  
**Series :** Conservation objectives supporting document

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### Other References

**Year :** 2005  
**Title :** Guidance on the Pressures and Impacts on Groundwater Dependent Terrestrial Ecosystems. Risk Assessment Sheet GWDTERA2a - Turloughs  
**Author :** Working Group on Groundwater (Turlough sub-committee)  
**Series :** Water Framework Directive Pressures and Impact Assessment Methodology - Guidance Document No. GW9

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**Year :** 2009  
**Title :** Teagasc EPA soil and subsoils mapping project-final report. Volume II  
**Author :** Fealy, R. M.; Green, S.; Loftus, M.; Meehan, R.; Radford, T.; Cronin, C.; Bulfin, M.  
**Series :** Teagasc, Dublin

---

**Year :** 2014  
**Title :** Interim classification, harmonisation and generalisation of county soil maps of Ireland. Irish soil information system final technical report 1  
**Author :** Jones, R.J.A.; Hannam, J.A.; Palmer, R.C.; Truckell, I.G.; Creamer, R.E.; McDonald, E.  
**Series :** Report for the EPA prepared by Teagasc and Cranfield University

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**Year :** 2017  
**Title :** The draft seven strategic towns local area plan 2018-2024 Natura Impact Statement  
**Author :** Donegal County Council  
**Series :** Unpublished report

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## Spatial data sources

**Year :** 2020

**Title :** Internal NPWS data

**GIS Operations :** Paper map scanned and georectified. Turlough as outlined on map digitised and clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising

**Used For :** 3180 (map 2)

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## Conservation Objectives for : Dunmuckrum Turloughs SAC [002303]

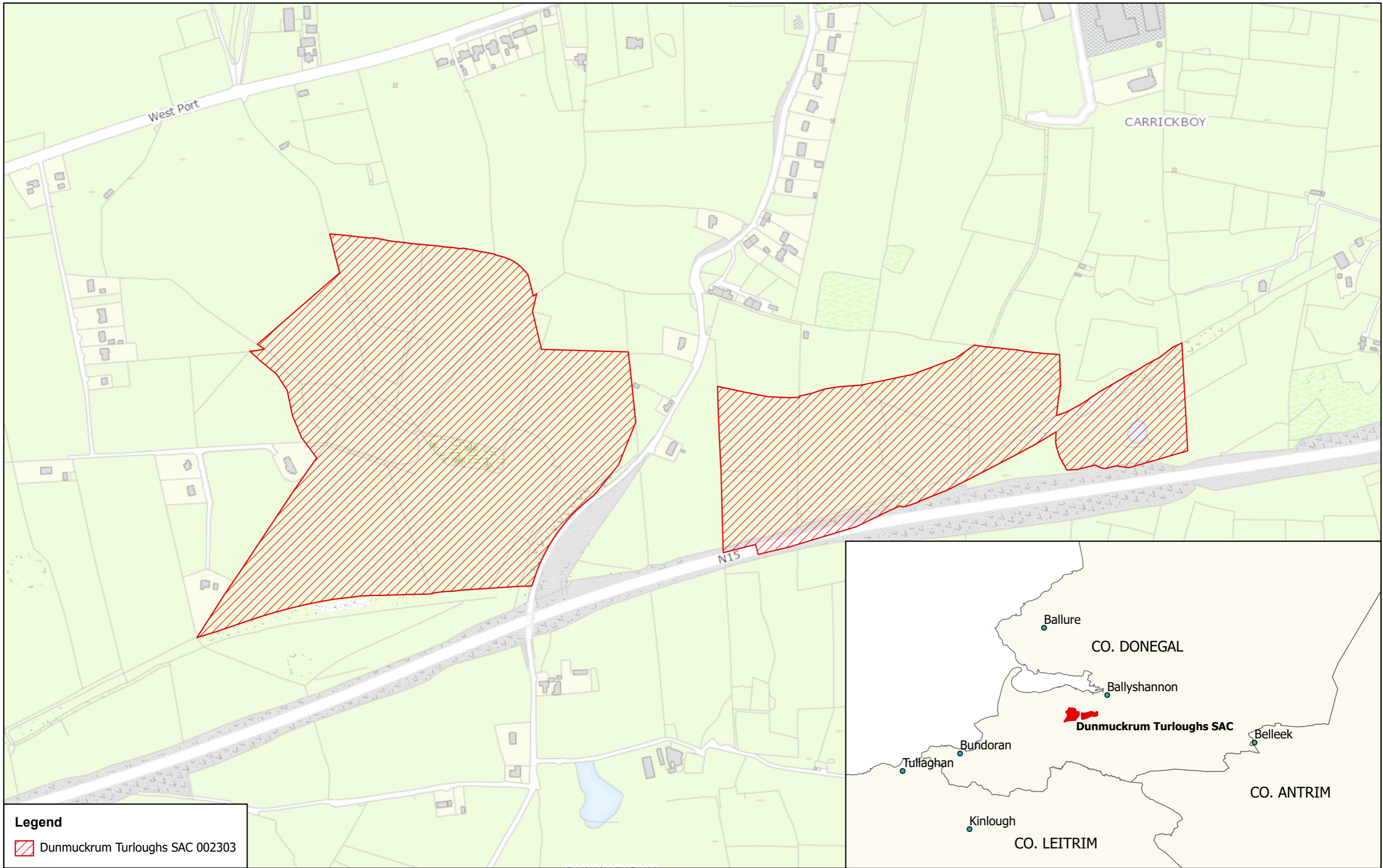
### 3180 Turloughs\*

To maintain the favourable conservation condition of Dunmuckrum Turloughs 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 turloughs in this SAC are the most northerly known in the country. The turlough area in the SAC has been calculated as 6.1ha, based on internal NPWS files. See map 2 for known extent. See O Connor (2017) for information on all attributes and targets
Habitat distribution	Occurrence	No decline, subject to natural processes	There are at least four small turloughs within the SAC. See map 2
Hydrological regime	Various	Maintain appropriate natural hydrological regime necessary to support the natural structure and functioning of the habitat	Hydrological regime is sub-divided into more detailed attributes (groundwater contribution, flood duration, frequency, area and depth, and permanently flooded/wet areas) and targets in O Connor (2017). NPWS internal files describe Dunmuckrum Turloughs as a series of four low-lying winter-flooded depressions set in an undulating landscape of limestone hills. Donegal County Council (2017) states that the area around Dunmuckrum Turloughs is an area of extreme groundwater vulnerability, in terms of both quality and quantity
Soil type	Hectares	Maintain variety, area and extent of soil types necessary to support turlough vegetation and other biota	The Teagasc/EPA soils map by Fealy et al. (2009) classified the soils in the most flooded part of the turloughs as acidic mineral soil over metamorphic tills, mostly deep and well-drained but with some areas poorly drained, whereas areas outside the main flood zone were predominantly shallow, well-drained, basic mineral soil over calcareous rock. Jones et al. (2014) classified the soils in the locality of the turloughs as poorly drained, coarse loamy drift with igneous and metamorphic stones
Soil nutrient status: nitrogen and phosphorus	N and P concentration in soil	Maintain nutrient status appropriate to soil types and vegetation communities	
Physical structure: bare ground	Presence	Maintain sufficient wet bare ground, as appropriate	NPWS internal files note an exposed mud community behind areas of wet vegetation at the lowest part of the basin, where <i>Rorippa palustris</i> and <i>Gnaphalium uliginosum</i> had established
Chemical processes: calcium carbonate deposition and concentration	Calcium carbonate deposition rate/soil concentration	Maintain appropriate calcium carbonate deposition rate and concentration in soil	
Active peat formation	Flood duration	Maintain active peat formation	
Water quality	Various	Maintain appropriate water quality to support the natural structure and functioning of the habitat	Water quality is sub-divided into more detailed attributes (nutrients, colour, phytoplankton and epiphyton biomass) and targets in O Connor (2017). See also The European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2019. According to the Working Group on Groundwater (Turlough sub-committee) (2005), the Dunmuckrum turloughs are currently oligotrophic, which is their natural trophic status. To remain in favourable condition they must meet targets of $\leq 20\mu\text{g/l}$ total phosphorus and should maintain trace/absent epiphyton as algal mats (<2% cover)



Vegetation composition: area of vegetation communities	Hectares	Maintain area of sensitive and high conservation value vegetation communities/units	NPWS internal files note the presence of a number of vegetation communities in the main (most westerly) basin: a scraw community at the lowest level, dominated by <i>Carex rostrata</i> , <i>Menyanthes trifoliata</i> and <i>Eleocharis palustris</i> ; a wet, sedge-dominated community, with <i>Carex nigra</i> , <i>C. disticha</i> and a wide range of wetland herbs; an exposed mud community behind these wet areas, with <i>Rorippa palustris</i> and <i>Gnaphalium uliginosum</i> . At the upper levels of flooding the vegetation grades into limestone grassland, and <i>Crataegus monogyna-Prunus spinosa</i> scrub woodland. The small turlough basin further east supports permanent marsh, mostly dominated by sedges ( <i>Carex nigra</i> and <i>C. rostrata</i> ) and <i>Filipendula ulmaria</i> , surrounded by grazed grassland with <i>Agrostis stolonifera</i> , <i>Juncus articulatus</i> and <i>Leontodon autumnalis</i>
Vegetation composition: vegetation zonation	Distribution	Maintain vegetation zonation/mosaic characteristic of the turlough	NPWS internal files describe the zonation in the most westerly turlough: a permanently wet area at the lowest part of the basin with stoneworts ( <i>Chara</i> sp.) and other aquatic species is surrounded by marsh, which then grades into a wet, sedge-dominated sward. A different community occupies the exposed muds behind these wet areas, with <i>Rorippa palustris</i> and <i>Gnaphalium uliginosum</i> present. At the upper levels the vegetation graded into limestone grassland and scrub woodland. The smaller turlough basin further east has a permanent marsh at the base, surrounded by shorter grazed grassland
Vegetation structure: sward height	Centimetres	Maintain sward heights appropriate to the vegetation unit, and a variety of sward heights across the turlough	NPWS internal files note grazing in the turlough grasslands
Typical species	Presence	Maintain typical species within the turlough	Typical species is sub-divided into more detailed attributes (terrestrial, wetland and aquatic plants, invertebrates and birds) and targets in O Connor (2017). The turlough was surveyed during a Botanical Society of Britain and Ireland (BSBI) field trip in August 2016 and species characteristic of very wet habitats, such as <i>Comarum palustre</i> and <i>Hydrocotyle vulgare</i> , and dry calcareous habitats, such as <i>Briza media</i> and <i>Galium verum</i> , were recorded (Oisin Duffy, pers. comm.). Internal NPWS files note <i>Ophioglossum vulgatum</i> , <i>Parnassia palustris</i> and an abundance of the moss <i>Cinclidotus fontinaloides</i> on all the inundated rocky surfaces
Fringing habitats: area	Hectares	Maintain marginal fringing habitats that support turlough vegetation, invertebrate, mammal and/or bird populations	
Vegetation structure: turlough woodland	Species diversity and woodland structure	Maintain appropriate turlough woodland diversity and structure	Scrub is present at the upper edges of the turlough basins. This is visible on recent aerial imagery of the site. NPWS internal files note that <i>Crataegus monogyna</i> and <i>Prunus spinosa</i> are present



**Legend**

 Dunmuckrum Turloughs SAC 002303




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

**MAP 1:  
DUNMUCKRUM TURLOUGH SAC  
CONSERVATION OBJECTIVES  
SAC DESIGNATION**

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

**SITE CODE:  
SAC 002303; version 3. CO. DONEGAL**

0 50 100 150 200 Metres

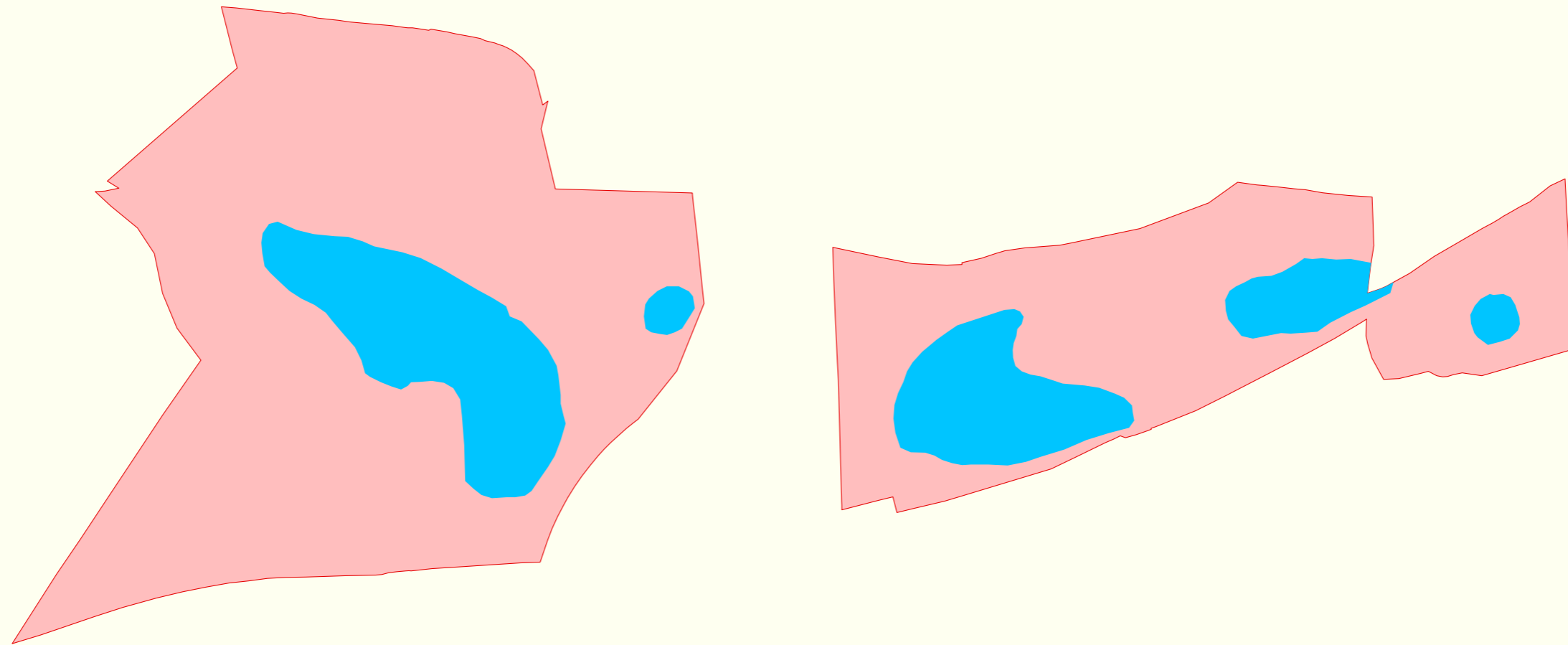


The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
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Níl sna teorainneacha ar na léarscáileanna ach nod garshuimhach ginearálta. Féadfar athbheithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh OSI-NMA-014. © Suirbhéarachta Ordonáis na hÉireann Rialtas na hÉireann



**Map Version 1**  
Date: November 2020



**Legend**

- 3180 Turloughs\*
- Dunmuckrum Turloughs SAC 002303

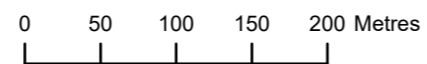


An Roinn Tithíochta,  
Rialtais Áitiúil agus Oidhreacht  
Department of Housing,  
Local Government and Heritage

**MAP 2  
DUNMUCKRUM TURLOUGHES SAC  
CONSERVATION OBJECTIVES  
TURLOUGHES**

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

**SITE CODE:  
SAC 002303; version 3. CO. DONEGAL**



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 athbheithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh OSI-NMA-014. © Suirbhéarachta Ordonáis na hÉireann Rialtas na hÉireann



**Map Version 1  
Date: November 2020**

# National Parks and Wildlife Service

## Conservation Objectives Series

Donegal Bay SPA 004151



**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,  
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 (2012) Conservation Objectives: Donegal Bay SPA 004151. 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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004151	Donegal Bay SPA	
A003	Great Northern Diver <i>Gavia immer</i>	wintering
A046	Light-bellied Brent Goose <i>Branta bernicla hrota</i>	wintering
A065	Common Scoter <i>Melanitta nigra</i>	wintering
A144	Sanderling <i>Calidris alba</i>	wintering
A999	Wetlands	

**Please note that this SPA overlaps with Donegal Bay (Murvagh) SAC (000133), Durnesh Lough SAC (000138) and Lough Melvin SAC (000428) and is adjacent to Lough Eske and Ardnamona Wood SAC (000163). 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)*

---

**Title:** Donegal Bay SPA (004151). Conservation objectives supporting document [Version 1]

**Year:** 2012

**Author:** NPWS

**Series:** Unpublished Report to NPWS

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**A003 Great Northern Diver *Gavia immer***

**To maintain the favourable conservation condition of Great Northern Diver in Donegal Bay 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	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by Great Northern Diver, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**A046 Light-bellied Brent Goose *Branta bernicla hrota***

**To maintain the favourable conservation condition of Light-bellied Brent Goose in Donegal Bay 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	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by Light-bellied Brent Goose, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of the conservation objectives supporting document



**A065 Common Scoter *Melanitta nigra***

**To maintain the favourable conservation condition of Common Scoter in Donegal Bay 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	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by Common Scoter, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 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 Donegal Bay 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	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by Sanderling, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of the conservation objectives supporting document

**A999 Wetlands**

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

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Wetland habitat area	Hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 10,461ha, other than that occurring from natural patterns of variation	The wetland habitat area was estimated as 10,461ha using OSi data and relevant orthophotographs. For further information see part three of the conservation objectives supporting document





**Legend**

SPA 004151

**MAP 1:  
DONEGAL BAY SPA  
CONSERVATION OBJECTIVES  
SPA DESIGNATION**

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

**SITE CODE:  
SPA 004151 Version 2.01**

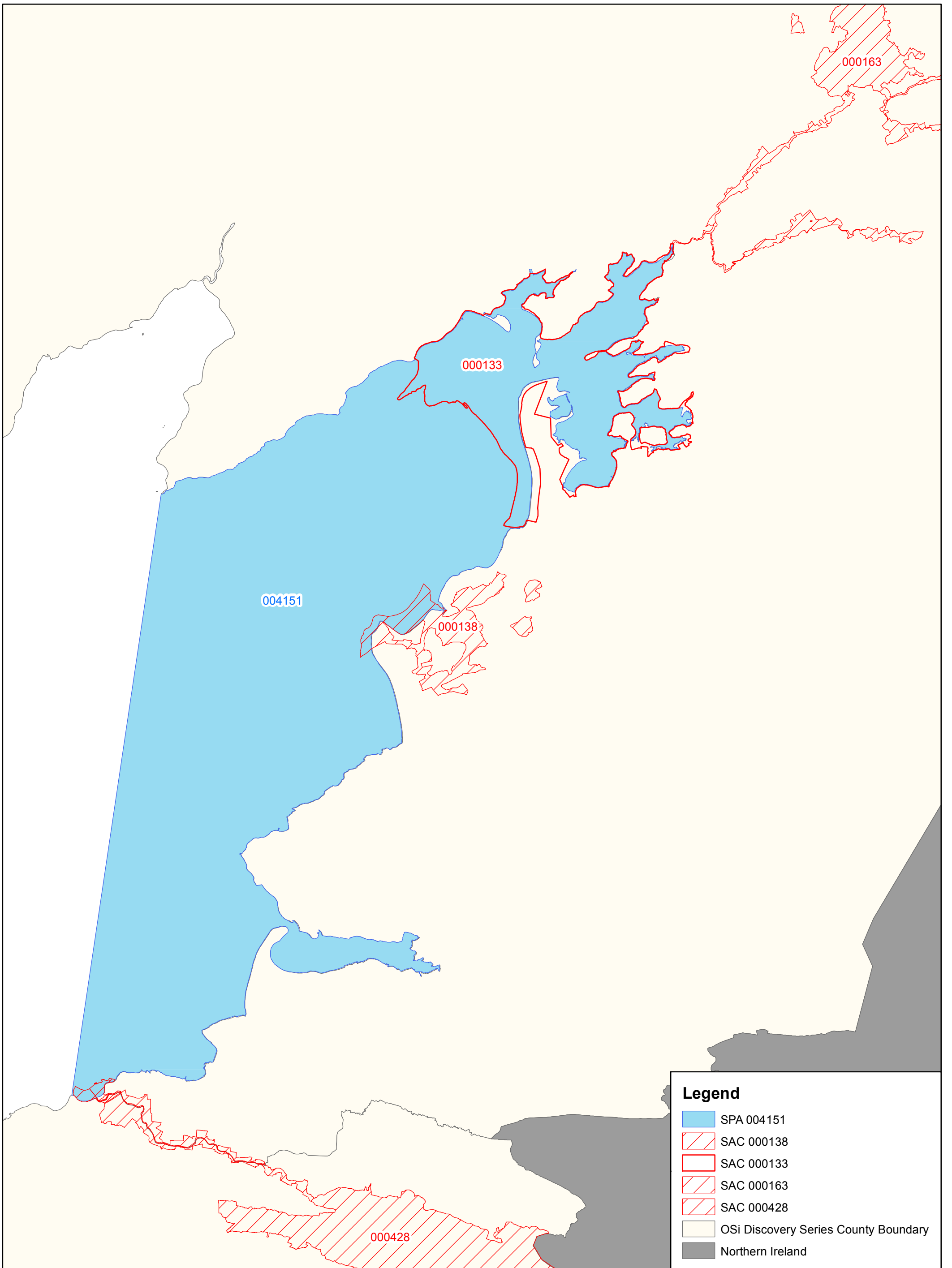


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Níl sna teorainneacha ar na léarscálanna ach nod garshuíomhach gearrálta. Féadfar athbheithnithe a déanamh ar theorainneacha na geantar comharthaí. Macasamhail d'ábhar na Suirbhéaracha Ordoináis le chead ón Rialtas (Ceadúnas Uimh. EN 0059208)



**Map Version 1  
Date: Dec 2011**





**Legend**

- SPA 004151
- SAC 000138
- SAC 000133
- SAC 000163
- SAC 000428
- OSi Discovery Series County Boundary
- Northern Ireland





## Conservation objectives for Sligo/Leitrim Uplands SPA [004187]

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
A103	Peregrine	<i>Falco peregrinus</i>
A346	Chough	<i>Pyrrhocorax pyrrhocorax</i>



**Citation:** NPWS (2021) *Conservation objectives for Sligo/Leitrim Uplands SPA [004187]. Generic Version 8.0. Department of Housing, Local Government and Heritage.*



# NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),  
Proposed Sites for Community Importance (pSCI),  
Sites of Community Importance (SCI) and  
for Special Areas of Conservation (SAC)

SITE IE0000138  
SITENAME Durnesh Lough SAC

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- [1. SITE IDENTIFICATION](#)
- [2. SITE LOCATION](#)
- [3. ECOLOGICAL INFORMATION](#)
- [4. SITE DESCRIPTION](#)
- [6. SITE MANAGEMENT](#)
- [7. MAP OF THE SITE](#)

## 1. SITE IDENTIFICATION

<b>1.1 Type</b> B	<b>1.2 Site code</b> IE0000138	<a href="#">Back to top</a>
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### 1.3 Site name

Durnesh Lough SAC
-------------------

<b>1.4 First Compilation date</b> 1999-12	<b>1.5 Update date</b> 2020-10
----------------------------------------------	-----------------------------------

### 1.6 Respondent:

<b>Name/Organisation:</b>	National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht
<b>Address:</b>	90 King Street North, Dublin 7, D07 N7CV, Ireland
<b>Email:</b>	datadelivery@chg.gov.ie

<b>Date site proposed as SCI:</b>	1999-12
<b>Date site confirmed as SCI:</b>	No data
<b>Date site designated as SAC:</b>	2018-10
<b>National legal reference of SAC designation:</b>	415/2018

## 2. SITE LOCATION

2.1 Site-centre location [decimal degrees]:

[Back to top](#)







B		<a href="#">Cygnus olor</a>			91	91	i							X	
I		<a href="#">Gammarus chevreuxi</a>													X
I		<a href="#">Jaera nordmanni</a>													X
I		<a href="#">Neomysis integer</a>													X
I		<a href="#">Palaemonetes varians</a>													X
I		<a href="#">Philonthus furcifer</a>													X
P		<a href="#">Ruppia cirrhosa</a>													X
P		<a href="#">Ruppia maritima</a>													X
I		<a href="#">Schistoglossa gemina</a>													X
I		<a href="#">Sigara stagnalis</a>													X
I		<a href="#">Stenus lustrator</a>													X

- **Group:** A = Amphibians, B = Birds, F = Fish, Fu = Fungi, I = Invertebrates, L = Lichens, M = Mammals, P = Plants, R = Reptiles
- **CODE:** for Birds, Annex IV and V species the code as provided in the reference portal should be used in addition to the scientific name
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Unit:** i = individuals, p = pairs or other units according to the standard list of population units and codes in accordance with Article 12 and 17 reporting, (see [reference portal](#))
- **Cat.:** Abundance categories: C = common, R = rare, V = very rare, P = present
- **Motivation categories:** **IV, V:** Annex Species (Habitats Directive), **A:** National Red List data; **B:** Endemics; **C:** International Conventions; **D:** other reasons

## 4. SITE DESCRIPTION

### 4.1 General site character

[Back to top](#)

Habitat class	% Cover
N06	2.0
N07	20.0
N23	1.0
N05	1.0
N02	22.0
N10	27.0
N08	3.0
N14	1.0
N04	20.0
N09	3.0

### Other Site Characteristics

Situated along the southern part of Donegal Bay, site comprises a range of coastal and wetland habitats. The underlying geology is limestone but this is covered by a thick layer of clay drift deposits in the form of drumlins. Durnesh Lough is a large, low salinity (0-7 ppt), shallow (<1.5 m) sedimentary lagoon of a very unusual type in that the barrier is composed of a combination of drumlins, high sand dunes and a remnant cobble barrier. The inlet is now an artificial pipe which runs through the sandhills and allows sea water to enter through a malfunctioning sluice. Swamp vegetation, freshwater marsh, poor fen and wet grassland occurs around the lagoon and also in low-lying areas to the west and south of Durnesh Hill. Site also includes sand dunes, a cobble storm beach and intertidal sand flats. Some improved pasture is included for the benefit of geese and swans.

### 4.2 Quality and importance

An important example of a sedimentary lagoon noted for its large size. Despite the artificial inlet channel, the lagoon is relatively well conserved. Flora is diverse, with two species of *Ruppia* and the Red Data Book charophyte *Chara canescens*. Fauna is also diverse, with 48 taxa recorded including six lagoonal specialists and at least two rare species (*Gammarus chevreuxi*, *Cordylophora caspia*). Based on geomorphology, flora and fauna, the lagoon is ranked amongst the best 10 lagoons in the country. Site also has a good example of *Molinia* meadows. A nationally important population of *Anser albifrons flavirostris* is regular at the site. *Cygnus cygnus* is also regular and at times occurs in numbers of international importance. A range of other waterfowl species occur in numbers of regional or local importance, though numbers of *Cygnus olor* often exceed national importance.

### 4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i o b]
M	E01.03		o
L	F03.01		i
M	A08		o
L	G01		i
L	E03.01		o

Positive Impacts			
Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i o b]
L	A04.02.01		i

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

i = inside, o = outside, b = both

### 4.5 Documentation

Costello, M.J., Holmes, J.M.C., McGrath, D. and Myers, A.A. (1989). A review and catalogue of the Amphipoda (Crustacea) in Ireland. Irish Fisheries Investigations Series B (Marine), 33: 3-70 Colhoun, K. (1998). I-WeBS Report 1996-97. BirdWatch Ireland, Dublin. Curtis, T.G.F. (1991a). A site inventory of the sandy coasts of Ireland. In Quigley, M.B. (ed.) A Guide to the Sand Dunes of Ireland. E.U.C.C. Dublin. De Grave, S. and A.A. Myers. (1997). The occurrence of *Pontocrates arcticus* in Ireland and the confirmation of *Gammarus chevreuxi* as an Irish species (Crustacea: Amphipoda). Ir. Nat. J. 25: 10 Fox, A.D., Norriss, D.W., Stroud, D.A. & Wilson, H.J. (1994). Greenland White-fronted Geese in Ireland and Britain 1982/83 - 1993/94. Greenland White-fronted Goose Study research report no. 8. Greenland White-fronted Goose Study, Wales and National Parks & Wildlife Service, Dublin. Good, J.A. (1999). Irish coastal lagoon survey, 1998. Vol V. Dúchas. Good, J.A. and Butler, F.T. (1998). Coastal lagoon shores as a habitat for Staphylinidae and Carabidae (Coleoptera) in Ireland. Bull. Ir. biogeogr. Soc. 21: 21-66. Hatch, P. and Healy, B. (1998). Aquatic vegetation of Irish coastal lagoons. Bull. Ir. biogeogr. Soc. 21: 2-21. Healy, B. (1999). Irish coastal lagoon survey, 1998. Vol 1, Part 1. Background, Description and summary of the surveys. Dúchas. Healy, B. and Oliver, G.A. (1998). Irish coastal lagoons: summary of a survey. Bull. Ir. biogeogr. Soc. 21: 116-151. Healy, B., Oliver, G.A., Hatch, P. and Good, J.A. (1997). Coastal lagoons in the Republic of Ireland. Vol. 2. Inventory of lagoons and saline lakes. Report to the National Parks and Wildlife Service, Dublin. Merne, O.J. (1989). Important bird areas in the Republic of Ireland. In: Grimmett, R.F.A. and Jones, T.A. (eds) Important

Bird Areas in Europe. ICBP Technical Publication No. 9. Cambridge. Oliver, G.A. (1999). Irish coastal lagoon survey, 1998. Vol IV. Dúchas. Oliver, G.A. and Healy B. (1998). Records of aquatic fauna from coastal lagoons in Ireland. Bull. Ir. biogeogr. Soc. 21: 66-115. Roden, C. (1999). Irish coastal lagoon survey, 1998. Vol III. Dúchas. Sheppard, R. (1993). Ireland's Wetland Wealth. IWC, Dublin. Young, R. (1973). Report on Areas of Ecological and Geological Interest in County Donegal. An Foras Forbartha, Dublin.

## 6. SITE MANAGEMENT

### 6.2 Management Plan(s):

[Back to top](#)

An actual management plan does exist:

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No, but in preparation
<input checked="" type="checkbox"/>	No

## 7. MAP OF THE SITES

[Back to top](#)

INSPIRE ID:

IE.NPWS.PS.NATURA2000.SAC.IE0000138

Map delivered as PDF in electronic format (optional)

Yes  No

Reference(s) to the original map used for the digitalisation of the electronic boundaries (optional).

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# NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),  
Proposed Sites for Community Importance (pSCI),  
Sites of Community Importance (SCI) and  
for Special Areas of Conservation (SAC)

SITE IE0000428  
SITENAME Lough Melvin SAC

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- [3. ECOLOGICAL INFORMATION](#)
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- [7. MAP OF THE SITE](#)

## 1. SITE IDENTIFICATION

<b>1.1 Type</b> B	<b>1.2 Site code</b> IE0000428	<a href="#">Back to top</a>
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### 1.3 Site name

Lough Melvin SAC
------------------

<b>1.4 First Compilation date</b> 1999-12	<b>1.5 Update date</b> 2018-09
----------------------------------------------	-----------------------------------

### 1.6 Respondent:

<b>Name/Organisation:</b>	National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht
<b>Address:</b>	90 King Street North, Dublin 7, D07 N7CV, Ireland
<b>Email:</b>	datadelivery@chg.gov.ie

<b>Date site proposed as SCI:</b>	1999-12
<b>Date site confirmed as SCI:</b>	No data
<b>Date site designated as SAC:</b>	No data
<b>National legal reference of SAC designation:</b>	No data

## 2. SITE LOCATION

2.1 Site-centre location [decimal degrees]:

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**Longitude**  
-8.184708149

**Latitude**  
54.43304269

**2.2 Area [ha]:**  
2268.869587

**2.3 Marine area [%]**  
0.964

**2.4 Sitelength [km]:**  
0.0

### 2.5 Administrative region code and name

**NUTS level 2 code**      **Region Name**

IEZZ	Extra-Regio
IE01	Border, Midland and Western

### 2.6 Biogeographical Region(s)

Atlantic ( %)

## 3. ECOLOGICAL INFORMATION

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### 3.1 Habitat types present on the site and assessment for them

Annex I Habitat types						Site assessment			
Code	PF	NP	Cover [ha]	Cave [number]	Data quality	A B C D	A B C		
						Representativity	Relative Surface	Conservation	Glo
3130			1776.119601		M	B	B	B	B
6410			2.7		G	C	C	C	C

- **PF:** for the habitat types that can have a non-priority as well as a priority form (6210, 7130, 9430) enter "X" in the column PF to indicate the priority form.
- **NP:** in case that a habitat type no longer exists in the site enter: x (optional)
- **Cover:** decimal values can be entered
- **Caves:** for habitat types 8310, 8330 (caves) enter the number of caves if estimated surface is not available.
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation)

### 3.2 Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them

Species		Population in the site						Site assessment	
	Scientific								



G	Code	Name	S	NP	T	Size		Unit	Cat.	D.qual.	A B C D		A B C		
						Min	Max				Pop.	Con.	Iso.	Glo.	
B	A061	<a href="#">Aythya fuligula</a>			w	40	40	i		G	C	B	C	C	
M	1355	<a href="#">Lutra lutra</a>			p				P	DD	C	A	C	B	
F	1106	<a href="#">Salmo salar</a>			r				C	DD	C	A	C	A	

- **Group:** A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Type:** p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)
- **Unit:** i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see [reference portal](#))
- **Abundance categories (Cat.):** C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

### 3.3 Other important species of flora and fauna (optional)

Species					Population in the site				Motivation					
Group	CODE	Scientific Name	S	NP	Size		Unit	Cat.	Species Annex		Other categories			
					Min	Max			C R V P	IV	V	A	B	C
M		<a href="#">Martes martes</a>									X			
P		<a href="#">Salix phylicifolia</a>									X			
F		<a href="#">Salmo trutta</a>												X
F		<a href="#">Salmo trutta</a>											X	
F		<a href="#">Salvelinus alpinus</a>									X			
P		<a href="#">Trollius europaeus</a>									X			

- **Group:** A = Amphibians, B = Birds, F = Fish, Fu = Fungi, I = Invertebrates, L = Lichens, M = Mammals, P = Plants, R = Reptiles
- **CODE:** for Birds, Annex IV and V species the code as provided in the reference portal should be used in addition to the scientific name
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Unit:** i = individuals, p = pairs or other units according to the standard list of population units and codes in accordance with Article 12 and 17 reporting, (see [reference portal](#))
- **Cat.:** Abundance categories: C = common, R = rare, V = very rare, P = present
- **Motivation categories:** IV, V: Annex Species (Habitats Directive), A: National Red List data; B: Endemics; C: International Conventions; D: other reasons

## 4. SITE DESCRIPTION

#### 4.1 General site character

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Habitat class	% Cover
N23	1.0
N09	1.0
N08	1.0
N20	1.0
N01	1.0
N05	1.0
N10	3.0
N16	3.0
N07	1.0
N06	87.0
<b>Total Habitat Cover</b>	<b>100</b>

#### Other Site Characteristics

Lough Melvin is a large lake, over 12 km in length and up to 3 km in width. The lake lies in a glaciated valley, with average depth of 8.5 m and a maximum of 45 m. The underlying rock is limestone. The lake is fed by several main rivers - the Ballagh, the Glenaniff, the County and the Roogagh (lies in Northern Ireland), plus numerous small streams. The lake drains into Donegal Bay via the Drowes River. Marginal vegetation is mainly wet grassland, but there are significant areas of wet woodland and some swamp and fen vegetation. Several large islands occur. Landuse in surrounding areas is mainly agricultural though there are substantial areas of forestry. Some areas of bog and heath occur in the catchment.

#### 4.2 Quality and importance

Lough Melvin, part of which lies in Northern Ireland, is an important example of an oligotrophic-mesotrophic lake system. Sections of the main inflowing rivers and all of the outflowing river are included in site. It has a typical aquatic and emergent flora. The site is of great importance for fish conservation, with three genetically distinct populations of brown trout (*Salmo trutta*) - ?ferox?, ?gillaroo?, ?sonaghen? as well as *Salvelinus alpinus*, and important populations of *Salmo salar*. It may be one of the last examples in north-western Europe of a natural post-glacial salmonid lake. The site supports a population of *Lutra lutra* and has four Red Data Book plant species, notably *Trollius europaeus*. *Martes martes* has been reported from the site in recent times.

#### 4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i o b]
M	I01		i
M	B02		b
M	H01.05		b
M	A08		i
M	A10.01		i
M	A04		i

Positive Impacts			
Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i o b]
M	B02		b

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

i = inside, o = outside, b = both

## 4.5 Documentation

Bowman, J.J., Clabby, K.J., Lucey, J., Mc Garrigle, M.L. and Toner, P.H. (1996). Water Quality in Ireland 1991-1994. Environmental Protection Agency, Wexford. Central Fisheries Board (1993). A Baseline Survey of the Glenaniff and Ballagh Rivers, Lough Melvin Catchment and Recommendations for Fisheries Development. Central Fisheries Board, Dublin. Central Fisheries Board (2001). Irish Salmon Catches 2000. <http://www.cfb.ie/>:February 2001. Doris, Y., McGarrigle, M.L., Clabby, K.J., Lucey, J., Neill, M., Flanagan, M., Quinn, M.B., Sugrue, M. and Lehane, M. (1999). Water Quality in Ireland 1995-1997. Statistical compendium of River Quality Data. Electronic Publication on Disk. Environmental Protection Agency, Wexford. Ferguson, A. and Mason, F.M. (1981). Allozyme evidence for reproductively isolated sympatric populations of brown trout, *Salmo trutta* L., in Lough Melvin, Ireland. *Journal of Fish Biology* 18: 629-642. Ferguson, A. (1986). Lough Melvin - a unique fish community. *Occasional papers in Irish Science and Technology*, No. 1. Went Memorial Lecture. Royal Dublin Society, Dublin. Ferguson, A. (1989). Genetic differences among brown trout *Salmo trutta* and their importance for conservation and management of the species. *Freshwater Biology* 21: 35-46. Goodwillie, R. (1973). A Preliminary Report on Areas of Scientific Interest in County Leitrim. An Foras Forbartha, Dublin. Lawrie, E.W., Wolfe-Murphy, S.A. and Gibson, C.E. (1992). Northern Ireland Lakes Survey. 7: Large Lakes. A Botanical Survey of the Eight Largest Lakes in Northern Ireland. Unpublished report for the Department of the Environment, Northern Ireland. Lucey, J., Bowman, J.J., Clabby, K.J., Cunningham, P., Lehane, M., MacCarthaigh, M., McGarrigle, M.L. and Toner, P.F. (1999). Water Quality in Ireland 1995-1997. Environmental Protection Agency, Wexford. O'Reilly, P. (1991). Trout and Salmon Rivers of Ireland: An Angler's Guide. Merlin Unwin books, London. Praeger, R.L. (1934). *The Botanist in Ireland*. Hodges, Figgis & Co, Dublin. Sheppard, R. (1993). Ireland's Wetland Wealth. IWC, Dublin.

## 6. SITE MANAGEMENT

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### 6.2 Management Plan(s):

An actual management plan does exist:

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No, but in preparation
<input checked="" type="checkbox"/>	No

## 7. MAP OF THE SITES

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INSPIRE ID:

IE.NPWS.PS.NATURA2000.SAC.IE0000428

Map delivered as PDF in electronic format (optional)

Yes  No

Reference(s) to the original map used for the digitalisation of the electronic boundaries (optional).

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# NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),  
Proposed Sites for Community Importance (pSCI),  
Sites of Community Importance (SCI) and  
for Special Areas of Conservation (SAC)

SITE IE0000623

SITENAME Ben Bulben, Gleniff and Glenade Complex SAC

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- [2. SITE LOCATION](#)
- [3. ECOLOGICAL INFORMATION](#)
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## 1. SITE IDENTIFICATION

<b>1.1 Type</b> B	<b>1.2 Site code</b> IE0000623	<a href="#">Back to top</a>
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### 1.3 Site name

Ben Bulben, Gleniff and Glenade Complex SAC

<b>1.4 First Compilation date</b> 1995-11	<b>1.5 Update date</b> 2020-10
----------------------------------------------	-----------------------------------

### 1.6 Respondent:

**Name/Organisation:** National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht

**Address:** 90 King Street North, Dublin 7, D07 N7CV, Ireland

**Email:** datadelivery@chg.gov.ie

<b>Date site proposed as SCI:</b>	2002-01
<b>Date site confirmed as SCI:</b>	No data
<b>Date site designated as SAC:</b>	No data
<b>National legal reference of SAC designation:</b>	No data

## 2. SITE LOCATION

2.1 Site-centre location [decimal degrees]:

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Group	CODE	Name	S	NP	Size		Unit	Cat.	Annex			categories			
					Min	Max			C R V P	IV	V	A	B	C	D
P		<a href="#">Amblystegium compactum</a>						P							X
P		<a href="#">Arenaria ciliata</a>						P			X				
P		<a href="#">Barbula icmadophila</a>						P							X
P		<a href="#">Barbula maxima</a>						P							X
P		<a href="#">Cardaminopsis petraea</a>						P			X				
P		<a href="#">Draba incana</a>						P			X				
P		<a href="#">Encalypta alpina</a>						P							X
P		<a href="#">Epilobium alsinifolium</a>						P			X				
P		<a href="#">Gymnostomum insigne</a>						P							X
P		<a href="#">Hymenelia prevostii</a>						P							X
P		<a href="#">Lempholemma radiatum</a>						P							X
P		<a href="#">Leptogium massiliense</a>						P							X
P		<a href="#">Myurella julacea var. scabrifolia</a>						P							X
P		<a href="#">Orthothecium rufescens</a>						P							X
P		<a href="#">Placidiopsis cartilaginea</a>						P							X
P		<a href="#">Plagiopus oederi</a>						P							X
P		<a href="#">Platydictya jungermannioides</a>						P							X
P		<a href="#">Poa alpina</a>						P			X				
P		<a href="#">Poeltinula cerebrina</a>						P							X
P		<a href="#">Pohlia wahlenbergii var. glacialis</a>						P							X
P		<a href="#">Poly gonum viviparum</a>						P			X				
P		<a href="#">Polystichum lonchitis</a>						P			X				
P		<a href="#">Pseudorchis albida</a>						P			X				
P		<a href="#">Pyrola media</a>						P			X				
P		<a href="#">Rhynchostegiella curvistea</a>						P							X
P		<a href="#">Salix phylicifolia</a>						P			X				
P		<a href="#">Saussurea alpina</a>						P			X				

P		<a href="#">Saxifraga aizoides</a>						P			X			
P		<a href="#">Saxifraga nivalis</a>						P			X			
P		<a href="#">Saxifraga oppositifolia</a>						P						X
P		<a href="#">Seligeria acutifolia</a>						P						X
P		<a href="#">Seligeria donniana</a>						P						X
P		<a href="#">Seligeria oelandica</a>						P						X
P		<a href="#">Seligeria pusilla</a>						P						X
P		<a href="#">Seligeria trifaria</a>						P						X
P		<a href="#">Silene acaulis</a>						P			X			
P		<a href="#">Solorina spongiosa</a>						P						X
P		<a href="#">Timmia austriaca</a>						P						X
P		<a href="#">Timmia norvegica</a>						P						X
I		<a href="#">Tinodes dives</a>						P						X
P		<a href="#">Tortula princeps</a>						P						X

- **Group:** A = Amphibians, B = Birds, F = Fish, Fu = Fungi, I = Invertebrates, L = Lichens, M = Mammals, P = Plants, R = Reptiles
- **CODE:** for Birds, Annex IV and V species the code as provided in the reference portal should be used in addition to the scientific name
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Unit:** i = individuals, p = pairs or other units according to the standard list of population units and codes in accordance with Article 12 and 17 reporting, (see [reference portal](#))
- **Cat.:** Abundance categories: C = common, R = rare, V = very rare, P = present
- **Motivation categories:** **IV, V:** Annex Species (Habitats Directive), **A:** National Red List data; **B:** Endemics; **C:** International Conventions; **D:** other reasons

## 4. SITE DESCRIPTION

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### 4.1 General site character

Habitat class	% Cover
N09	7.0
N22	4.0
N06	2.0
N08	38.0
N07	24.0
N10	24.0
N16	1.0
<b>Total Habitat Cover</b>	<b>100</b>

### Other Site Characteristics

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The site comprises a high plateau of carboniferous limestone capped by shale standing 300-650 metres above the surrounding country and sloping gently to the south-east. The edges of the plateau form steep, high cliffs, below which is found a skirt of scree. The cliffs and scree hold a rich diversity of arctic-alpine plants; the summit of the plateau is less diverse but does have extensive areas of blanket bog and heath, with rock outcropping frequently. A large number of streams drain the site, many of which form waterfalls. Glencar Lough, a medium-sized lake, is found on the southern side of the site. Wet and dry grassland, scrub, broad-leaved deciduous, flushes, swallow holes and small areas of fen and limestone pavement are also found on the site. Disused barytes workings occur above Gleniff valley.

#### 4.2 Quality and importance

The site holds the finest examples of limestone cliffs in the country. These and the scree slopes below are home to extremely species-rich and diverse montane vascular plant, bryophyte and lichen floras, which include many Red Data Book species and species known only from this or one or two other sites in the country. The site holds a large number of petrifying springs, an extensive area of dry heath and a small area of alpine heath; much of the blanket bog on the site is eroding. Several populations of the rare mollusc *Vertigo geyeri* have recently been recorded from calcareous flushes within the site-these comprise the first records for Co. Leitrim. The occurrence of four pairs of *Falco peregrinus* breeding on the site is notable. The site is also utilised by *Lutra lutra*. The site has a little known but potentially interesting invertebrate fauna. The site is the type locality for the Ben Bulbin shale, the Glencar limestone and the Dartry limestone.

#### 4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i o b]
L	G01.03.02		i
M	A04.01.02		i
L	A04.03		i
L	C01.03.02		i
L	L05		i
L	D01.01		i
M	I01		o
M	K01.01		i

Positive Impacts			
Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i o b]
L	X		i

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

i = inside, o = outside, b = both

#### 4.5 Documentation

Goodwillie, R.N. (1978). Areas of Scientific Interest in County Leitrim. Unpublished report to Leitrim County Council. An Foras Forbartha, Dublin. Stelfox, A.W. (1965). *Salix hibernica* Rechinger f., The Irish Naturalists' Journal 15:25-29. Barrington, R.M. and Vowell, R.P. (1885). Report on the flora of Ben Bulbin and the adjoining mountain range in Sligo and Leitrim, Proceedings of the Royal Irish Academy. 2nd series. 4: 493-517. Synnott, D.M. (1984). Notes on *Salix phylicifolia* L. and related Irish willows, Glasra 7: 1-10. Corry, T.H. (1884). On the heights attained by plants on Ben Bulbin, Proceedings of the Royal Irish Academy. 2nd series. 4: 73-77. Kirby, N., Lockhart, N. and Synnott, D.M. (1980). Bryological observations at Gleniff, County Sligo (H28), Bulletin of the Irish Biogeographical Society 4: 30-32. Curtis, T.G.F., Goodwillie, R.N. and Young, R. (1978). Areas of Scientific Interest in County Sligo. Unpublished report to Sligo County Council, An Foras Forbartha, Dublin.

## 6. SITE MANAGEMENT

### 6.2 Management Plan(s):

An actual management plan does exist:

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<input type="checkbox"/> Yes
<input type="checkbox"/> No, but in preparation
<input checked="" type="checkbox"/> No

## 7. MAP OF THE SITES

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INSPIRE ID:

IE.NPWS.PS.NATURA2000.SAC.IE0000623

Map delivered as PDF in electronic format (optional)

Yes  No

Reference(s) to the original map used for the digitalisation of the electronic boundaries (optional).

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# NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),  
Proposed Sites for Community Importance (pSCI),  
Sites of Community Importance (SCI) and  
for Special Areas of Conservation (SAC)

SITE IE0000625

SITENAME Bunduff Lough and Machair/Trawalua/Mullaghmore SAC

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## 1. SITE IDENTIFICATION

<b>1.1 Type</b> B	<b>1.2 Site code</b> IE0000625	<a href="#">Back to top</a>
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### 1.3 Site name

Bunduff Lough and Machair/Trawalua/Mullaghmore SAC

<b>1.4 First Compilation date</b> 1999-08	<b>1.5 Update date</b> 2020-10
----------------------------------------------	-----------------------------------

### 1.6 Respondent:

**Name/Organisation:** National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht  
**Address:** 90 King Street North, Dublin 7, D07 N7CV, Ireland  
**Email:** datadelivery@chg.gov.ie

<b>Date site proposed as SCI:</b>	1999-08
<b>Date site confirmed as SCI:</b>	No data
<b>Date site designated as SAC:</b>	No data
<b>National legal reference of SAC designation:</b>	No data

## 2. SITE LOCATION

2.1 Site-centre location [decimal degrees]:

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	X		43.89		M	B		C	B	C
7230			175.56		M	A		C	B	A

- **PF:** for the habitat types that can have a non-priority as well as a priority form (6210, 7130, 9430) enter "X" in the column PF to indicate the priority form.
- **NP:** in case that a habitat type no longer exists in the site enter: x (optional)
- **Cover:** decimal values can be entered
- **Caves:** for habitat types 8310, 8330 (caves) enter the number of caves if estimated surface is not available.
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation)

### 3.2 Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them

Species				Population in the site						Site assessment				
G	Code	Scientific Name	S	NP	T	Size		Unit	Cat.	D.qual.	A B C D		A B C	
						Min	Max				Pop.	Con.	Iso.	Glo.
B	A052	<a href="#">Anas crecca</a>			w	64	64	i		G	C	B	C	C
B	A053	<a href="#">Anas platyrhynchos</a>			w	61	61	i		G	C	B	C	C
B	A038	<a href="#">Cygnus cygnus</a>			w	57	57	i		G	C	B	C	C
I	1065	<a href="#">Euphydryas aurinia</a>			p				P	DD	C	A	C	A
B	A009	<a href="#">Fulmarus glacialis</a>			r	70	100	p		G	C	B	C	C
B	A153	<a href="#">Gallinago gallinago</a>			r	5	5	p		G	C	B	C	C
P	1395	<a href="#">Petalophyllum ralfsii</a>			p	44	44	area	P	G	C	B	C	C
B	A140	<a href="#">Pluvialis apricaria</a>			w	150	150	i		G	C	B	C	C
B	A346	<a href="#">Pyrrhocorax pyrrhocorax</a>			p	3	4	p		G	C	B	C	C
B	A162	<a href="#">Tringa totanus</a>			r	2	2	p		G	C	B	C	C
B	A142	<a href="#">Vanellus vanellus</a>			r	16	16	p		G	C	B	C	B

- **Group:** A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Type:** p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)
- **Unit:** i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see [reference portal](#))
- **Abundance categories (Cat.):** C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not

even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

### 3.3 Other important species of flora and fauna (optional)

Species					Population in the site				Motivation					
Group	CODE	Scientific Name	S	NP	Size		Unit	Cat.	Species Annex		Other categories			
					Min	Max		C R V P	IV	V	A	B	C	D
I		<a href="#">Brachytron pratense</a>												X
I		<a href="#">Callophrys rubi</a>												X
B		<a href="#">Cepphus grylle</a>			10	10	i						X	
B		<a href="#">Cygnetus olor</a>			27	27	i						X	
B		<a href="#">Phalacrocorax aristotelis</a>			5	10	p						X	

- **Group:** A = Amphibians, B = Birds, F = Fish, Fu = Fungi, I = Invertebrates, L = Lichens, M = Mammals, P = Plants, R = Reptiles
- **CODE:** for Birds, Annex IV and V species the code as provided in the reference portal should be used in addition to the scientific name
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Unit:** i = individuals, p = pairs or other units according to the standard list of population units and codes in accordance with Article 12 and 17 reporting, (see [reference portal](#))
- **Cat.:** Abundance categories: C = common, R = rare, V = very rare, P = present
- **Motivation categories:** **IV, V:** Annex Species (Habitats Directive), **A:** National Red List data; **B:** Endemics; **C:** International Conventions; **D:** other reasons

## 4. SITE DESCRIPTION

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### 4.1 General site character

Habitat class	% Cover
N04	39.0
N01	13.0
N16	1.0
N06	7.0
N23	2.0
N10	1.0
N08	1.0
N05	9.0
N09	1.0
N03	1.0
N07	4.0
N02	16.0
N20	5.0

### Other Site Characteristics

This site is located on the south side of Donegal Bay and c.18 km north of Sligo town. The part of the site west of Mullaghmore Head is very exposed to prevailing wind and swells from the Atlantic, whereas the Head itself affords moderate shelter to the eastern part of the site. Bedrock is Middle Carboniferous limestone. The site is generally low-lying and includes a fine range of coastal habitats, with open shallow marine areas, intertidal sandy beaches, bedrock shoreline, various sand dune types, including fixed dunes and machair. Bunduff Lough is a shallow coastal lake, probably with a brackish influence, and is fringed with swamp, fen and dune grassland. Grazing is the main landuse within the site and area is used for water-based recreational activities.

### 4.2 Quality and importance

This site is of importance in terms of both habitat diversity and quality. The machair and alkaline fen habitats are particularly well developed. Much of the machair is wet in character and there are interesting transitional areas with the alkaline fen. The machair is considered one of the best examples in the north-west region. A very substantial area of fixed dunes occur, which are well-developed and mostly intact. Also present are well developed marram dunes and Juniper scrub. Intertidal sandflat, shallow bay and reef habitats are well represented, with a well developed zonation of benthic communities and high species richness in the littoral sediments. *Petalophyllum ralfsii* has recently been found in the machair habitat. The site has a number of locally rare plant species, including *Orobanche rubra*, *Cuscuta epithymum*, *Epipactis palustris* and *Ophrys apifera*. *Cygnus cygnus* and *Pluvialis apricaria*, both Annex I Bird Directive species, are regular in winter. *Pyrhocorax pyrrhocorax* breeds, as well as several wader species, notably *Vanellus vanellus* and small numbers of seabirds.

### 4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i o b]
H	A04.01.01		i
H	A02.01		i
L	G01.02		i
M	K01.01		i
M	A04.02.02		i
H	A05.02		i
L	J02.01.03		i
H	A08		i
M	A10.01		i

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

i = inside, o = outside, b = both

Positive Impacts			
Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i o b]
L	J02.12.01		i
L	F03.02.04		i

### 4.5 Documentation

Berrow, S.D., Mackie, K.L., O. Sullivan, O., Shepperd, K.B., Mellon, C. and Coveney, J.A. (1993). The second International Chough Survey in Ireland, 1992. *Irish Birds* 5: 1-10. Colhoun, K. (1998). I-WeBS Report 1996-97. BirdWatch Ireland, Dublin. Costelloe, J. and Keegan, B.F. (1984). Littoral and benthic investigations on the west coast of Ireland - XIX. Synonymy, diagnostic morphology, distribution and life-style of *Aslia lefevrei* (Barrois 1882) (Holothurioidea: Echinodermata). *Proceedings of the Royal Irish Academy* 84B: 29-35. Cotton, D.C.F. and Cawley, M. (1993). New records for vascular plants from Cos. Sligo (H28) and Leitrim (H29). *Irish Naturalists' Journal* 24: 288-295. Crawford, I., Bleasdale, A. and Conaghan, J. (1996). Biomar Survey of Irish Machair Sites 1996. *Irish Wildlife Manuals* Nos 3 and 4. Dúchas the Heritage Service, Dublin. Cullinane, S.P. (1970). New seaweed records from the Leitrim and Sligo coasts. *Irish Naturalists' Journal* 16: 393-394. Curtis, T.G.F. (1991a). A site inventory of the sandy coasts of Ireland. In Quigley, M.B. (ed.). *A Guide to the Sand Dunes of Ireland*. E.U.C.C., Dublin. Curtis, T.G.F., Goodwillie, R. and Young, R. (1978). A



Preliminary Report on Areas of Scientific Interest in County Sligo. An Foras Forbartha, Dublin. Fox, A.D., Norriss, D.W., Stroud, D.A. and Wilson, H.J. (1994). Greenland White-fronted Geese in Ireland and Britain 1982/83 - 1993/94. Greenland White-fronted Goose Study research report no. 8. Greenland White-fronted Goose Study, Wales and National Parks & Wildlife Service, Dublin. Guiry, M.D. (1978). A Consensus and Bibliography of Irish Seaweeds. Cramer, Vaduz. Healy, B., Oliver, G., Hatch, P. and Good, P. (1997). Lagoons and Other Enclosed Brackish Waters in the Republic of Ireland. Unpublished report to the National Parks and Wildlife Service, Dublin. Heuff, H. (1980). The Vegetation of Irish Lakes: Part 2. Unpublished report to the Wildlife Service, Dublin. Lockhart, N.D. (1999). Report on Survey of Petalophyllum ralfsii at Bunduff, Co. Sligo. Unpublished report to Dúchas The Heritage Service, National Parks and Wildlife, Dublin. Lloyd, C. (1982). Inventory of Seabird Breeding Colonies in Republic of Ireland, Unpublished report, Forestry and Wildlife Service, Dublin. Madden, B., Cooney, T., O'Donoghue, A., Norriss, D.W. and Merne, O.J. (1998). Breeding waders of machair systems in Ireland in 1996. Irish Birds 6 177-190. Sheppard, R. (1993) Ireland's Wetland Wealth. IWC, Dublin. Southward, A.J. and Crisp, D.J. (1954). The distribution of certain intertidal animals around the Irish coast. Proceedings of the Royal Irish Academy 57B: 1-29.

## 6. SITE MANAGEMENT

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### 6.2 Management Plan(s):

An actual management plan does exist:

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No, but in preparation
<input checked="" type="checkbox"/>	No

## 7. MAP OF THE SITES

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INSPIRE ID:

IE.NPWS.PS.NATURA2000.SAC.IE0000625

Map delivered as PDF in electronic format (optional)

Yes  No

Reference(s) to the original map used for the digitalisation of the electronic boundaries (optional).

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# NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),  
Proposed Sites for Community Importance (pSCI),  
Sites of Community Importance (SCI) and  
for Special Areas of Conservation (SAC)

SITE IE0001403  
SITENAME Arroo Mountain SAC

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## 1. SITE IDENTIFICATION

<b>1.1 Type</b> B	<b>1.2 Site code</b> IE0001403	<a href="#">Back to top</a>
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### 1.3 Site name

Arroo Mountain SAC
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<b>1.4 First Compilation date</b> 1995-11	<b>1.5 Update date</b> 2018-09
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### 1.6 Respondent:

<b>Name/Organisation:</b>	National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht
<b>Address:</b>	90 King Street North, Dublin 7, D07 N7CV, Ireland
<b>Email:</b>	datadelivery@chg.gov.ie

<b>Date site proposed as SCI:</b>	1997-11
<b>Date site confirmed as SCI:</b>	No data
<b>Date site designated as SAC:</b>	No data
<b>National legal reference of SAC designation:</b>	No data

## 2. SITE LOCATION

2.1 Site-centre location [decimal degrees]:

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**Longitude**  
-8.230581991

**Latitude**  
54.3849773

**2.2 Area [ha]:**  
3966.188137

**2.3 Marine area [%]**  
0.0

**2.4 Sitelength [km]:**  
0.0

### 2.5 Administrative region code and name

NUTS level 2 code	Region Name
IE01	Border, Midland and Western

### 2.6 Biogeographical Region(s)

Atlantic (%)

## 3. ECOLOGICAL INFORMATION

### 3.1 Habitat types present on the site and assessment for them

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Annex I Habitat types						Site assessment			
Code	PF	NP	Cover [ha]	Cave [number]	Data quality	A B C D	A B C		
						Representativity	Relative Surface	Conservation	Global
4010			304.3905		G	A	B	A	B
4030			363.3628		G	C	C	C	C
4060			117.0068		G	B	C	A	B
7130	X		2174.9406		G	C	C	B	C
7220			0.8698		G	B	C	B	B
8120			21.4191		G	C	C	B	C
8210			6.5779		G	A	C	A	B

- **PF:** for the habitat types that can have a non-priority as well as a priority form (6210, 7130, 9430) enter "X" in the column PF to indicate the priority form.
- **NP:** in case that a habitat type no longer exists in the site enter: x (optional)
- **Cover:** decimal values can be entered
- **Caves:** for habitat types 8310, 8330 (caves) enter the number of caves if estimated surface is not

available.

- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation)

### 3.2 Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them

Species					Population in the site						Site assessment			
G	Code	Scientific Name	S	NP	T	Size		Unit	Cat.	D.qual.	A B C D		A B C	
						Min	Max				Pop.	Con.	Iso.	Glo.
B	A103	<a href="#">Falco peregrinus</a>			p	1	1	p		G	C	A	C	C
B	A140	<a href="#">Pluvialis apricaria</a>			r	1	1	p		G	C	A	C	C

- **Group:** A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Type:** p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)
- **Unit:** i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see [reference portal](#))
- **Abundance categories (Cat.):** C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

### 3.3 Other important species of flora and fauna (optional)

Species					Population in the site				Motivation						
Group	CODE	Scientific Name	S	NP	Size		Unit	Cat.	Species Annex		Other categories				
					Min	Max		C R V P	IV	V	A	B	C	D	
P		<a href="#">Barbula maxima</a>						P						X	
P		<a href="#">Dicranella grevilleana</a>						P						X	
P		<a href="#">Draba incana</a>						P			X				
P		<a href="#">Gymnostomum insigne</a>						P						X	
B		<a href="#">Lagopus lagopus</a>						P					X		
M		<a href="#">Lepus timidus hibernicus</a>						P				X			
M		<a href="#">Lepus timidus hibernicus</a>						P					X		
M		<a href="#">Lepus timidus hibernicus</a>						P			X				

P		<a href="#">Mnium thomsonii</a>						P							X
P		<a href="#">Orthothecium rufescens</a>						P							X
P		<a href="#">Plagiothecium curvifolium</a>						P							X
A		<a href="#">Rana temporaria</a>						P			X				
A		<a href="#">Rana temporaria</a>						P					X		
P		<a href="#">Salix phylicifolia</a>						P			X				
P		<a href="#">Saxifraga aizoides</a>						P			X				
P		<a href="#">Saxifraga oppositifolia</a>						P							X
P		<a href="#">Seligeria oelandica</a>						P							X
P		<a href="#">Seligeria trifaria</a>						P							X

- **Group:** A = Amphibians, B = Birds, F = Fish, Fu = Fungi, I = Invertebrates, L = Lichens, M = Mammals, P = Plants, R = Reptiles
- **CODE:** for Birds, Annex IV and V species the code as provided in the reference portal should be used in addition to the scientific name
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Unit:** i = individuals, p = pairs or other units according to the standard list of population units and codes in accordance with Article 12 and 17 reporting, (see [reference portal](#))
- **Cat.:** Abundance categories: C = common, R = rare, V = very rare, P = present
- **Motivation categories:** **IV, V:** Annex Species (Habitats Directive), **A:** National Red List data; **B:** Endemics; **C:** International Conventions; **D:** other reasons

## 4. SITE DESCRIPTION

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### 4.1 General site character

Habitat class	% Cover
N08	50.0
N16	1.0
N22	1.0
N07	40.0
N10	4.0
N09	3.0
N06	1.0
<b>Total Habitat Cover</b>	<b>100</b>

### Other Site Characteristics

A large mountain complex comprised of blanket bog, wet and dry heath, humid and dry calcareous grassland, flushes, streams, small lakes, wooded ravines, limestone gorges, limestone scree and steep limestone cliffs which have developed on the sides and summit of an undulating plateau of carboniferous limestone overlain by shale. Post-glacial slippage of sections of cliff has formed an interesting geomorphological feature at the



northern end of the site. Numerous swallow holes are found on the plateau. The site includes several megalithic monuments and tombs of archaeological interest.

#### 4.2 Quality and importance

The north-facing limestone cliffs of Arroo Mountain and the 'slips' below them are very important for the rich arctic-alpine vascular plant and bryophyte floras they support. A number of very rare species are found springs and flushes, some of which have tufa formations, occur amongst the calcareous rocky habitats. The main interest of the summit vegetation lies with the extensive area of good quality, almost intact wet heath found there; here also are found several good, but small, examples of intact mountain blanket bog. Falco peregrinus nest on the cliffs, while Pluvialis apricaria on blanket bog in the north-eastern section of the plateau.

#### 4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i o b]
L	B02		b
L	C01.01.01		i
M	K01.01		i
H	C01.03.02		i
L	C01.03.01		i
L	J01.01		i
L	L05		i
L	G01.03.02		i
L	I01		i
L	D01.01		i

Positive Impacts			
Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i o b]
L	B02		b
M	A04.02.02		i

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

i = inside, o = outside, b = both

#### 4.5 Documentation

Unpublished report to Leitrim County Council, An Foras Forbartha, Dublin. Barrington, R.M. and Vowell, R.P. (1885). Report on the flora of Ben Bulbin and the adjoining mountain range in Sligo and Leitrim, Proceedings of the Royal Irish Academy. 2nd series. 4: 493-517. Conaghan, J. and Fuller, J. (2005). A survey of Rare and Threatened Vascular Plants in County Leitrim. A Report to the National Parks and Wildlife Service, Dublin. Douglas, C., Dunnells, D., Scally, L. and Wyse Jackson, M.B. (1990). A Survey to Locate Lowland-Highland Blanket Bogs of Scientific Interest in Counties Donegal, Cavan, Leitrim and Roscommon. Unpublished report to the Wildlife Service, Office of Public Works, Dublin. Goodwillie, R.N. (1978). Areas of Scientific Interest in County Leitrim. Stelfox, A.W. (1965). Salix hibernica Rechinger f., Irish Naturalists' Journal 15: 25-29. Synnott, D.M. (1984). Notes on Salix phylicifolia L. and related Irish willows, Glasra 7: 1-10.

## 6. SITE MANAGEMENT

### 6.2 Management Plan(s):

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An actual management plan does exist:

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No, but in preparation
<input checked="" type="checkbox"/>	No

## 7. MAP OF THE SITES

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INSPIRE ID:

IE.NPWS.PS.NATURA2000.SAC.IE0001403

Map delivered as PDF in electronic format (optional)

Yes  No

Reference(s) to the original map used for the digitalisation of the electronic boundaries (optional).



# NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),  
Proposed Sites for Community Importance (pSCI),  
Sites of Community Importance (SCI) and  
for Special Areas of Conservation (SAC)

SITE IE0001680  
SITENAME Streedagh Point Dunes SAC

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## 1. SITE IDENTIFICATION

<b>1.1 Type</b> B	<b>1.2 Site code</b> IE0001680	<a href="#">Back to top</a>
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### 1.3 Site name

Streedagh Point Dunes SAC

<b>1.4 First Compilation date</b> 1999-07	<b>1.5 Update date</b> 2019-01
----------------------------------------------	-----------------------------------

### 1.6 Respondent:

**Name/Organisation:** National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht  
**Address:** 90 King Street North, Dublin 7, D07 N7CV, Ireland  
**Email:** datadelivery@chg.gov.ie

<b>Date site proposed as SCI:</b>	1999-07
<b>Date site confirmed as SCI:</b>	No data
<b>Date site designated as SAC:</b>	2018-02
<b>National legal reference of SAC designation:</b>	79/2018

## 2. SITE LOCATION

2.1 Site-centre location [decimal degrees]:

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**Longitude**

-8.534328

**Latitude**

54.409861

**2.2 Area [ha]:**

632.83154

**2.3 Marine area [%]**

70.775

**2.4 Sitelength [km]:**

0.0

**2.5 Administrative region code and name****NUTS level 2 code****Region Name**

IE01	Border, Midland and Western
------	-----------------------------

**2.6 Biogeographical Region(s)**

Atlantic (%)

**3. ECOLOGICAL INFORMATION**[Back to top](#)**3.1 Habitat types present on the site and assessment for them**

Annex I Habitat types						Site assessment			
Code	PF	NP	Cover [ha]	Cave [number]	Data quality	A B C D	A B C		
						Representativity	Relative Surface	Conservation	Global
1140			337.9322		M	B	B	A	B
1220			12.61		M	C	C	B	C
1330			13.0367		M	B	C	B	B
1410			6.5424		M	B	C	B	B
2120			2.1171		M	B	C	B	B
2130			82.4358		M	A	C	B	B

- **PF:** for the habitat types that can have a non-priority as well as a priority form (6210, 7130, 9430) enter "X" in the column PF to indicate the priority form.
- **NP:** in case that a habitat type no longer exists in the site enter: x (optional)
- **Cover:** decimal values can be entered
- **Caves:** for habitat types 8310, 8330 (caves) enter the number of caves if estimated surface is not available.
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with





- **Group:** A = Amphibians, B = Birds, F = Fish, Fu = Fungi, I = Invertebrates, L = Lichens, M = Mammals, P = Plants, R = Reptiles
- **CODE:** for Birds, Annex IV and V species the code as provided in the reference portal should be used in addition to the scientific name
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Unit:** i = individuals, p = pairs or other units according to the standard list of population units and codes in accordance with Article 12 and 17 reporting, (see [reference portal](#))
- **Cat.:** Abundance categories: C = common, R = rare, V = very rare, P = present
- **Motivation categories:** **IV, V:** Annex Species (Habitats Directive), **A:** National Red List data; **B:** Endemics; **C:** International Conventions; **D:** other reasons

## 4. SITE DESCRIPTION

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### 4.1 General site character

Habitat class	% Cover
N16	1.0
N02	60.0
N10	2.0
N05	5.0
N03	2.0
N04	25.0
N09	5.0
<b>Total Habitat Cover</b>	<b>100</b>

### Other Site Characteristics

Situated on the north Co. Sligo coastline, this site comprises a fine diversity of coastal habitats. A shingle/stony spit is overlaid by a well developed sand dune system, fronted by a boulder beach. The spit provides shelter for the formation of salt marshes, which fringe extensive intertidal sand flats. The River Grange flows into the site. Underlying geology is limestone (Glencar formation), shale (Benbulbin formation) and sandstone (Mullaghmore formation). The fossilised remains of corals and brachiopods are locally abundant. Site also has a number of National Monuments. Main landuses within site are grazing and recreational activities.

### 4.2 Quality and importance

Sand dunes are part of an interesting tombolo formation. Fixed dunes are well represented and are notably species-rich. Also good development of shifting marram dunes and both Atlantic and Mediterranean salt meadows. Extensive intertidal sand flats of good quality. The Annex II mollusc *Vertigo angustior* recently confirmed at site. Supports moderate populations of wintering waterfowl. Site of importance for both ecological, geological and geomorphological reasons.

### 4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i o b]
H	G01.02		i
M	G05.01		i
L	C01.01.01		i

Positive Impacts			
Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i o b]
L	X		i

L	G01.01		i
L	G01.03.02		i
L	G02.08		i

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

i = inside, o = outside, b = both

#### 4.5 Documentation

Cawley, M. (1996). Notes on some non-marine mollusca from Co Sligo and Co Leitrim, including a new site for *Vertigo geyeri* Lindholm. Irish Naturalists' Journal 25: 183-185. Colhoun, K. (1998). I-WeBS Report 1996-97. BirdWatch Ireland, Dublin. Curtis, T.G.F. (1991a). A site inventory of the sandy coasts of Ireland. In Quigley, M.B. (ed.) A Guide to the Sand Dunes of Ireland. E.U.C.C. Dublin. Curtis, T.G.F. (1991b). The flora and vegetation of sand dunes in Ireland. In Quigley, M.B. (ed.) A Guide to the Sand Dunes of Ireland. E.U.C.C. Dublin. Curtis, T., Goodwillie, R. and Young, R. (1978). A preliminary report on areas of scientific interest in County Sligo, An Foras Forbartha, Dublin. Curtis, T.G.F. and Sheehy Skeffington, M.J. (1998). The salt marshes of Ireland: an inventory and account of their geographical variation. Biology and the Environment, Proceedings of the Royal Irish Academy 98B: 87-104. Falvey, J.P., Costello, M.J. and Dempsey, S. (1997). Survey of intertidal biotopes in estuaries in Ireland. Unpublished report to the National Parks and Wildlife Service, Dublin. Moorkens, E.A. (1997). An Inventory of Mollusca in Potential SAC Sites, with Special Reference to *Vertigo angustior*, *V. moulinsiana* and *V. geyeri*. Unpublished report, National Parks & Wildlife Service, Dublin. Sheppard, R. (1993). Ireland's Wetland Wealth. IWC, Dublin.

## 6. SITE MANAGEMENT

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### 6.2 Management Plan(s):

An actual management plan does exist:

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No, but in preparation
<input checked="" type="checkbox"/>	No

## 7. MAP OF THE SITES

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INSPIRE ID:

IE.NPWS.PS.NATURA2000.SAC.IE0001680

Map delivered as PDF in electronic format (optional)

Yes  No

Reference(s) to the original map used for the digitalisation of the electronic boundaries (optional).

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# NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),  
Proposed Sites for Community Importance (pSCI),  
Sites of Community Importance (SCI) and  
for Special Areas of Conservation (SAC)

SITE IE0001919  
SITENAME Glenade Lough SAC

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- [6. SITE MANAGEMENT](#)
- [7. MAP OF THE SITE](#)

## 1. SITE IDENTIFICATION

<b>1.1 Type</b> B	<b>1.2 Site code</b> IE0001919	<a href="#">Back to top</a>
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### 1.3 Site name

Glenade Lough SAC

<b>1.4 First Compilation date</b> 1997-02	<b>1.5 Update date</b> 2018-09
----------------------------------------------	-----------------------------------

### 1.6 Respondent:

**Name/Organisation:** National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht  
**Address:** 90 King Street North, Dublin 7, D07 N7CV, Ireland  
**Email:** datadelivery@chg.gov.ie

<b>Date site proposed as SCI:</b>	1997-08
<b>Date site confirmed as SCI:</b>	No data
<b>Date site designated as SAC:</b>	2016-05
<b>National legal reference of SAC designation:</b>	259/2016

## 2. SITE LOCATION

2.1 Site-centre location [decimal degrees]:

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I	1092	<a href="#">Austropotamobius pallipes</a>			p				P	DD	C	A	C	B
P	1833	<a href="#">Najas flexilis</a>			p				P	DD	B	A	C	A

- **Group:** A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Type:** p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)
- **Unit:** i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see [reference portal](#))
- **Abundance categories (Cat.):** C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

## 4. SITE DESCRIPTION

### 4.1 General site character

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Habitat class	% Cover
N20	1.0
N10	4.0
N09	8.0
N16	4.0
N06	68.0
N07	15.0
<b>Total Habitat Cover</b>	<b>100</b>

### Other Site Characteristics

Glenade Lough is situated on the upper reaches of the Bonet River, within a valley between the Arroo and Benbulbin Mountain ranges. Site is underlain by carboniferous limestone which confers a calcareous nature to the lake. The water is clear, well aerated, and relatively nutrient poor. Lake shore is stony or sandy. Marginal vegetation is well developed, with reed swamp, calcareous fens and flushes, and wet grassland. Broad-leaved woodland and dry grassland also occur. Surrounding areas are mainly of pasture, though not intensively managed.

### 4.2 Quality and importance

An interesting system, considered more mesotrophic in physical and chemical characters than eutrophic. Has a wide diversity of vegetation, from well developed Potamogeton communities to species more associated with nutrient poor water, such as Isoetes lacustris. Also has Najas flexilis. Quality of system is good, with no evidence of artificial nutrient inputs. Has a good population of Austropotamobius pallipes and is a site for a genetic research programme on Irish crayfish. Although small, an important site of high quality.

### 4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i o b]

Positive Impacts			
Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i o b]
M	B02.02		b



M	I01		b
H	B04		b

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

i = inside, o = outside, b = both

#### 4.5 Documentation

Byrne, C., O'Sullivan, A. & MhicDaeid, C. (1995). Rare Plant Survey 1995 - Glenade Lough, Co. Donegal. Unpublished report to the National Parks & Wildlife Service, Dublin. Clabby, K.J., Lucey, J., McGarrigle, M.L., Bowman, J.J., Flanagan, P.J. & Toner, P.F. (1992). Water Quality in Ireland 1987-1990. Environmental Research Unit, Dublin. Heuff, H. (1984). The Vegetation of Irish Lakes. Unpublished report to the Forest & Wildlife Service, Dublin. Sheppard, R. (1993). Ireland's Wetland Wealth. Irish Wildbird Conservancy, Dublin. Lucey, J. & McGarrigle, M.L. (1987). The distribution of the freshwater crayfish in Ireland. Irish Fisheries Investigations 29A: 1-13.

## 6. SITE MANAGEMENT

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### 6.2 Management Plan(s):

An actual management plan does exist:

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No, but in preparation
<input checked="" type="checkbox"/>	No

## 7. MAP OF THE SITES

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INSPIRE ID:

IE.NPWS.PS.NATURA2000.SAC.IE0001919

Map delivered as PDF in electronic format (optional)

Yes  No

Reference(s) to the original map used for the digitalisation of the electronic boundaries (optional).

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# NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),  
Proposed Sites for Community Importance (pSCI),  
Sites of Community Importance (SCI) and  
for Special Areas of Conservation (SAC)

SITE IE0001976  
SITENAME Lough Gill SAC

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- [2. SITE LOCATION](#)
- [3. ECOLOGICAL INFORMATION](#)
- [4. SITE DESCRIPTION](#)
- [6. SITE MANAGEMENT](#)
- [7. MAP OF THE SITE](#)

## 1. SITE IDENTIFICATION

<b>1.1 Type</b> B	<b>1.2 Site code</b> IE0001976	<a href="#">Back to top</a>
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### 1.3 Site name

Lough Gill SAC
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<b>1.4 First Compilation date</b> 1999-08	<b>1.5 Update date</b> 2020-10
----------------------------------------------	-----------------------------------

### 1.6 Respondent:

<b>Name/Organisation:</b>	National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht
<b>Address:</b>	90 King Street North, Dublin 7, D07 N7CV, Ireland
<b>Email:</b>	datadelivery@chg.gov.ie

<b>Date site proposed as SCI:</b>	1999-08
<b>Date site confirmed as SCI:</b>	No data
<b>Date site designated as SAC:</b>	No data
<b>National legal reference of SAC designation:</b>	No data

## 2. SITE LOCATION

2.1 Site-centre location [decimal degrees]:

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**Longitude**

-8.341159

**Latitude**

54.261523

**2.2 Area [ha]:**

3318.66754

**2.3 Marine area [%]**

0.0

**2.4 Sitelength [km]:**

0.0

**2.5 Administrative region code and name****NUTS level 2 code****Region Name**

IE01	Border, Midland and Western
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**2.6 Biogeographical Region(s)**

Atlantic (%)

**3. ECOLOGICAL INFORMATION**[Back to top](#)**3.1 Habitat types present on the site and assessment for them**

Annex I Habitat types						Site assessment			
Code	PF	NP	Cover [ha]	Cave [number]	Data quality	A B C D	A B C		
						Representativity	Relative Surface	Conservation	Global
3150			2589.95		M	B	B	B	B
6210	X		7.8		G	C	C	C	C
91A0			99.61		M	B	C	C	B
91E0			33.2		M	B	B	B	B

- **PF:** for the habitat types that can have a non-priority as well as a priority form (6210, 7130, 9430) enter "X" in the column PF to indicate the priority form.
- **NP:** in case that a habitat type no longer exists in the site enter: x (optional)
- **Cover:** decimal values can be entered
- **Caves:** for habitat types 8310, 8330 (caves) enter the number of caves if estimated surface is not available.
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation)

**3.2 Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them**

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- **Cat.:** Abundance categories: C = common, R = rare, V = very rare, P = present
- **Motivation categories:** **IV, V:** Annex Species (Habitats Directive), **A:** National Red List data; **B:** Endemics; **C:** International Conventions; **D:** other reasons

## 4. SITE DESCRIPTION

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### 4.1 General site character

Habitat class	% Cover
N09	1.0
N07	3.0
N10	2.0
N06	80.0
N16	8.0
N22	1.0
N08	4.0
N20	1.0
<b>Total Habitat Cover</b>	<b>100</b>

### Other Site Characteristics

Lough Gill is a moderate to large sized lake lying immediately east of Sligo town. It is fed by the River Bonet and drains into the sea via the Garvogue River, a short, wide and slow flowing river which passes through Sligo town. The lake lies along the junction between old metamorphic rocks to the south and limestone to the north. The water of the lake is thus influenced by both acidic and alkaline inputs, although nearly all the basin lies over limestone. The lake is 8 km by 2-3 km and has an area of 1,400 ha. It is a deep lake, with maximum depth at 31 m. Islands are a feature of the lake. Much of the shoreline is wooded and there is also some swamp vegetation, wet grassland and scrub along the shoreline. The lake is an important salmonid and coarse fishery and is used for a range of recreational activities. The site also includes the Shanvans and Owenmore rivers.

### 4.2 Quality and importance

An important example of a lake which appears to be naturally eutrophic. Quality generally good though blooms of blue-green algae in recent years indicate some artificial enrichment. Significant areas of alluvial forest occur along the Garvogue River (*Osmunda - Salicetum atrocinerea* type) and at the mouth of the River Bonet (*Carici remotae - Fraxinetum* type). Old oak woodland of varying quality is well scattered along the shoreline and on some of the islands and is an important example of this habitat for western Ireland. At least six Red Data Book plant species have been recorded from site. Site has three species of lamprey and *Austroptamobius pallipes*. The lake and its associated rivers support an important population of *Salmo salar*. *Lutra lutra* has a good population within the site. Of minor importance for birds though the site has a small breeding colony of *Sterna hirundo*. A wide range of rare or scarce invertebrates are known from the site, as well as several Red Data Book mammal species, including *Martes martes*.

### 4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i o b]
H	E01.01		b
L	J02.05.02		i
M	B06		i
L	G01.01.01		i

Positive Impacts			
Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i o b]
L	X		i

L	B		i
M	A10.01		i
M	E01.03		i
M	I01		i
M	D01.01		i
L	E03.03		i
L	J02.10		i

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

i = inside, o = outside, b = both

#### 4.5 Documentation

Central Fisheries Board (2001). Irish Salmon Catches 2000. <http://www.cfb.ie/>:February 2001. Clabby, K.J., Lucey, J., McGarrigle, M.L., Bowman, J.J., Flanagan, P.J. and Toner, P.F. (1992). Water Quality in Ireland 1987-1990. Part One General Assessment. Environmental Research Unit, Dublin. Cotton, D.C.F. (1982). *Coenagrion lunulatum* (Charpentier) (Odonata: Coenagridae) new to the British Isles. *Entomologists' Gazette* 33: 213-214. Cotton, D.C.F. (1993). Ecological Study of Lough Gill - to Predict the Effects of the Sligo and Environs Water Supply Scheme on the Flora and Fauna with Suggestions for Future Management. Report prepared in conjunction with Jennings O'Donovan and Partners for Sligo County Council. Cotton, D.C.F. and Cawley, M. (1993). New records for vascular plants from Cos. Sligo (H28) and Leitrim (H29). *Irish Naturalists' Journal* 24: 288-295. Colhoun, K. (1998). I-WeBS Report 1996-97. BirdWatch Ireland, Dublin. Doris, Y., McGarrigle, M.L., Clabby, K.J., Lucey, J., Neill, M., Flanagan, M., Quinn, M.B., Sugrue, M. and Lehane, M. (1999). Water Quality in Ireland 1995-1997. Statistical Compendium of River Quality Data. Electronic Publication on Disk. Environmental Protection Agency, Wexford. Flanagan, P.J. and Toner, P.F. (1975). A preliminary survey of Irish lakes. An Foras Forbartha, Water Resources Division. Goodwillie, R. (1972). A Preliminary Report on Areas of Scientific Interest in County Sligo. An Foras Forbartha, Dublin. Jennings O'Donovan and Partners (1994). Sligo and Environs Water Supply Scheme. Ecology Study. Report prepared for Sligo County Council. Kelly, D.L. and Iremonger, S.F. (1997). Irish wetland woods: the plant communities and their ecology. *Biology and Environment - Proceedings of the Royal Irish Academy* 97B: 1-32. Kurz, I. and Costello, M.J. (1998). An Outline of the Biology, Distribution & Conservation of Lampreys in Ireland. *Irish Wildlife Manual* No. 5 Dúchas The Heritage Service. O'Reilly, P. (1991). Trout and Salmon Rivers of Ireland: an Anglers Guide. Merlin Unwin Books, London. Praeger, R.L. (1932). Some noteworthy plants found in or reported from Ireland. *Proceedings of the Royal Irish Academy* 41B (4): 95-124. Praeger, R.L. (1934). *The Botanist in Ireland*. Hodges & Figgis, Dublin. Round, F.E. and Brook, A.J. (1959). The phytoplankton of some Irish loughs and an assessment of their trophic status. *Proceedings of the Royal Irish Academy* 60B (4): 167-191. Thompson, E., Ryan, S. and Cotton, D.C.F. (1998). Management Plan for the Lough Gill Catchment. Sligo County Council. Whilde, A. (1985). The All Ireland Tern Survey 1984. Unpublished report for the Irish Wildbird Conservancy, Dublin. Whilde, A., Cotton, D.C.F., and Sheppard, R. (1993). A repeat survey of gulls breeding in Counties Donegal, Sligo, Mayo and Galway, with recent counts from Leitrim and Fermanagh. *Irish Birds* 5: 67-72.

## 6. SITE MANAGEMENT

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### 6.2 Management Plan(s):

An actual management plan does exist:

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No, but in preparation
<input checked="" type="checkbox"/>	No

## 7. MAP OF THE SITES

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INSPIRE ID:

IE.NPWS.PS.NATURA2000.SAC.IE0001976

Map delivered as PDF in electronic format (optional)

Yes  No

Reference(s) to the original map used for the digitalisation of the electronic boundaries (optional).



# NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),  
Proposed Sites for Community Importance (pSCI),  
Sites of Community Importance (SCI) and  
for Special Areas of Conservation (SAC)

SITE IE0002303  
SITENAME Dunmuckrum Turloughs SAC

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## 1. SITE IDENTIFICATION

<b>1.1 Type</b> B	<b>1.2 Site code</b> IE0002303	<a href="#">Back to top</a>
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### 1.3 Site name

Dunmuckrum Turloughs SAC

<b>1.4 First Compilation date</b> 2003-03	<b>1.5 Update date</b> 2018-09
----------------------------------------------	-----------------------------------

### 1.6 Respondent:

**Name/Organisation:** National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht  
**Address:** 90 King Street North, Dublin 7, D07 N7CV, Ireland  
**Email:** datadelivery@chg.gov.ie

<b>Date site proposed as SCI:</b>	2003-03
<b>Date site confirmed as SCI:</b>	No data
<b>Date site designated as SAC:</b>	No data
<b>National legal reference of SAC designation:</b>	No data

## 2. SITE LOCATION

2.1 Site-centre location [decimal degrees]:

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**Longitude**  
-8.213287441

**Latitude**  
54.49116643

**2.2 Area [ha]:**  
33.90349707

**2.3 Marine area [%]**  
0.0

**2.4 Sitelength [km]:**  
0.0

## 2.5 Administrative region code and name

NUTS level 2 code	Region Name
IE01	Border, Midland and Western

## 2.6 Biogeographical Region(s)

Atlantic ( %)

# 3. ECOLOGICAL INFORMATION

## 3.1 Habitat types present on the site and assessment for them

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Annex I Habitat types						Site assessment			
Code	PF	NP	Cover [ha]	Cave [number]	Data quality	A B C D	A B C		
						Representativity	Relative Surface	Conservation	Global
3180			16.96		M	B	C	B	B

- **PF:** for the habitat types that can have a non-priority as well as a priority form (6210, 7130, 9430) enter "X" in the column PF to indicate the priority form.
- **NP:** in case that a habitat type no longer exists in the site enter: x (optional)
- **Cover:** decimal values can be entered
- **Caves:** for habitat types 8310, 8330 (caves) enter the number of caves if estimated surface is not available.
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation)

# 4. SITE DESCRIPTION

## 4.1 General site character

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Habitat class	% Cover
N22	1.0
N06	50.0



N08	6.0
N14	40.0
N16	3.0
<b>Total Habitat Cover</b>	<b>100</b>

### Other Site Characteristics

The site is situated in a karstic area of south Donegal. It comprises a group of four small turloughs, which lie in a W-E line and are probably hydrologically connected. The westernmost turlough is the largest and best developed. The base remains wet throughout the year with water amongst the marsh vegetation, but the sides dry out entirely and are covered by heathy grassland with outcropping limestone. Pools remain at the western end in summer and there is an obvious swallow hole with evidence of a seasonal stream. The second turlough in the series also has a permanent marsh at the base but the final two are smaller and dry out in summer. Typical turlough scrub woodland occurs at the flood line. For water quality reasons, areas of improved grassland are included in the site.

### 4.2 Quality and importance

While small in area, the turloughs in this site are of note as they are at the northern limit of the habitat in Ireland. The largest in the series has a varied morphology and good quality vegetation including an oligotrophic margin. The flora includes several unusual species characteristic of turloughs. The proximity of this site to the coast also results in peculiarities that distinguish these turloughs from the nearest turloughs in Sligo and Mayo to the south.

### 4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i o b]
L	A10.01		i
H	A08		i
H	K02		i
H	A02.01		i

Positive Impacts			
Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i o b]
L	X		i

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

i = inside, o = outside, b = both

### 4.5 Documentation

Babbie Pettit (2000). N15 Bundoran / Ballyshannon Bypass. Environmental Impact Statement. Prepared for Donegal County Council. Goodwillie, R. (1992). Turloughs over 10ha - Vegetation Survey and Evaluation. Unpublished report to National Parks and Wildlife Service, O.P.W., Dublin. Goodwillie, R. (2000). Turloughs in the Ballyshannon Area, Co. Donegal. Unpublished report to Biosphere Environmental Services, Wicklow.

## 6. SITE MANAGEMENT

### 6.2 Management Plan(s):

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An actual management plan does exist:

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No, but in preparation
<input checked="" type="checkbox"/>	No

## 7. MAP OF THE SITES

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INSPIRE ID:

IE.NPWS.PS.NATURA2000.SAC.IE0002303

Map delivered as PDF in electronic format (optional)

Yes  No

Reference(s) to the original map used for the digitalisation of the electronic boundaries (optional).



# NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),  
Proposed Sites for Community Importance (pSCI),  
Sites of Community Importance (SCI) and  
for Special Areas of Conservation (SAC)

SITE IE0004151  
SITENAME Donegal Bay SPA

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- [5. SITE PROTECTION STATUS](#)
- [6. SITE MANAGEMENT](#)
- [7. MAP OF THE SITE](#)

## 1. SITE IDENTIFICATION

<b>1.1 Type</b> A	<b>1.2 Site code</b> IE0004151	<a href="#">Back to top</a>
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### 1.3 Site name

Donegal Bay SPA

<b>1.4 First Compilation date</b> 2010-04	<b>1.5 Update date</b> 2018-09
----------------------------------------------	-----------------------------------

### 1.6 Respondent:

**Name/Organisation:** National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht  
**Address:** 90 King Street North, Dublin 7, D07 N7CV, Ireland  
**Email:** datadelivery@chg.gov.ie

### 1.7 Site indication and designation / classification dates

<b>Date site classified as SPA:</b>	2004-02
<b>National legal reference of SPA designation</b>	No data

## 2. SITE LOCATION

2.1 Site-centre location [decimal degrees]:

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**Longitude**  
-8.24309334

**Latitude**  
54.56844847

**2.2 Area [ha]:**

10455.866

**2.3 Marine area [%]**

99.017

**2.4 Sitelength [km]:**

0.0

**2.5 Administrative region code and name**

**NUTS level 2 code**      **Region Name**

IEZZ	Extra-Regio
IE01	Border, Midland and Western

**2.6 Biogeographical Region(s)**

Atlantic ( %)

**3. ECOLOGICAL INFORMATION**

**3.2 Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them**

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Species				Population in the site						Site assessment				
G	Code	Scientific Name	S	NP	T	Size		Unit	Cat.	D.qual.	A B C D		A B C	
						Min	Max				Pop.	Con.	Iso.	Glo.
B	A050	<a href="#">Anas penelope</a>			w	224	224	i		G	C	B	C	C
B	A053	<a href="#">Anas platyrhynchos</a>			w	100	100	i		G	C	B	C	C
B	A028	<a href="#">Ardea cinerea</a>			w	20	20	i		G	C	B	C	C
B	A169	<a href="#">Arenaria interpres</a>			w	53	53	i		G	C	B	C	C
B	A046	<a href="#">Branta bernicla</a>			w	207	207	i		G	C	B	C	B
B	A144	<a href="#">Calidris alba</a>			w	68	68	i		G	C	B	C	B
B	A149	<a href="#">Calidris alpina</a>			w	269	269	i		G	C	B	C	C
B	A148	<a href="#">Calidris maritima</a>			w	7	7	i		G	C	B	C	C
B	A137	<a href="#">Charadrius hiaticula</a>			w	99	99	i		G	C	B	C	C
B	A064	<a href="#">Clangula hyemalis</a>			w	14	14	i		G	B	A	C	A

B	A002	<a href="#">Gavia arctica</a>			w	11	11	i		G	C	A	B	B
B	A003	<a href="#">Gavia immer</a>			w	138	138	i		G	B	A	C	A
B	A001	<a href="#">Gavia stellata</a>			w	21	21	i		G	C	A	C	C
B	A130	<a href="#">Haematopus ostralegus</a>			w	581	581	i		G	C	B	C	C
B	A182	<a href="#">Larus canus</a>			w	297	297	i		G	C	B	C	C
B	A179	<a href="#">Larus ridibundus</a>			w	239	239	i		G	C	B	C	C
B	A157	<a href="#">Limosa lapponica</a>			w	49	49	i		G	C	B	C	C
B	A065	<a href="#">Melanitta nigra</a>			w	860	860	i		G	B	A	C	A
B	A069	<a href="#">Mergus serrator</a>			w	38	38	i		G	C	B	C	B
B	A160	<a href="#">Numenius arquata</a>			w	359	359	i		G	C	B	C	C
B	A017	<a href="#">Phalacrocorax carbo</a>			w	29	29	i		G	C	B	C	C
B	A048	<a href="#">Tadorna tadorna</a>			w	24	24	i		G	C	B	C	C
B	A164	<a href="#">Tringa nebularia</a>			w	12	12	i		G	C	B	C	B
B	A162	<a href="#">Tringa totanus</a>			w	93	93	i		G	C	B	C	C

- **Group:** A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Type:** p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)
- **Unit:** i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see [reference portal](#))
- **Abundance categories (Cat.):** C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

## 4. SITE DESCRIPTION

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### 4.1 General site character

Habitat class	% Cover
N09	1.0
N04	1.0
N05	1.0
N03	1.0
N02	5.0
N01	91.0



### Other Site Characteristics

The Donegal Bay SPA is a very large, marine dominated, site. It extends from Doorin Point, to the west of Donegal town, to Tullaghan Point in Co. Leitrim, a distance of approximately 15 km along its north-east/south-west axis. It varies in width from about 3 km to over 8 km. The site includes the estuary of the River Eske, which flows through Donegal town, and the estuary of the River Erne which flows through Ballyshannon. Much of the shoreline is rocky or stony, with well-developed littoral reefs in places. There are also extensive stretches of sandy beach, especially from the Murvagh peninsula southwards to Rossowlagh and at the outer part of the Erne estuary. Shingle or cobble beaches are also represented. There are extensive areas of intertidal flats associated with the Eske Estuary, reflecting the very sheltered conditions in this part of the bay. These have been shown to be biotope rich. Elsewhere a narrow fringe of intertidal flats are exposed at low tides. Salt marshes are found in the sheltered conditions of the innermost part of the bay. A number of small, grassy, islands occur in the innermost part of the bay. The shallow bay waters overlies mostly sandy substrates though reefs occur in places.

### 4.2 Quality and importance

This site supports an excellent diversity of waterfowl species associated with shallow bays. It has an internationally important wintering population of *Gavia immer*, and is one of the top sites in the country for this species. Also has one of the few regular populations of *Gavia arctica* in the country and a regionally important population of *Gavia stellata*. The site has nationally important populations of *Melanitta nigra* (up to 4.6% of all-Ireland total) and *Branta bernicla hrota*. A range of other species associated with estuarine and shoreline habitats occur. The site provides both feeding and roost sites for most of the species. Habitat quality is mostly good. The site has a population of *Phoca vitulina*.

### 4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i o b]
M	A04		o
M	E01.01		o
M	G01.01		i
M	D01.02		o
M	F01		i
H	G01.02		i
L	A04		i

Positive Impacts			
Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i o b]
M	G01.01		i
M	E01.01		o
L	A04		i
M	D01.02		o
M	A08		o
M	F01		i
M	A04		o
H	G01.02		i

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

i = inside, o = outside, b = both

### 4.5 Documentation

Colhoun, K. (2001). I-WeBS Report 1998-99. BirdWatch Ireland, Dublin. Curtis, T.G.F. and Sheehy, Skeffington, M.J. (1998). The salt marshes of Ireland: an inventory and account of their geographical variation. *Biology and the Environment, Proceedings of the Royal Irish Academy*, 99B: 87-104. Crowe, O. (2005). Ireland's Wetlands and their Waterbirds: Status and Distribution. BirdWatch Ireland, Newcastle, Co. Wicklow. Crowe, O., Austin, G.E., Colhoun, K., Cranswick, P.A., Kershaw, M. and Musgrove, A.J. (2008). Estimates and trends of waterbird numbers wintering in Ireland 1994/95 to 2003/04. *Bird Study* 55: 66-77. Falvey, J.P., Costello, M.J. and Dempsey, S. (1997). Survey of intertidal biotopes in estuaries in Ireland. Unpublished report to the National Parks and Wildlife Service. Hunt, J., Derwin, J., Coveney, J. and Newton, S. (2000). Republic of Ireland. Pp. 365-416 in Heath, M.F. and Evans, M.I. (eds). *Important Bird Areas in Europe: Priority Sites for Conservation 1: Northern Europe*. Cambridge, UK: BirdLife International (BirdLife Conservation Series No. 8). McGarrigle, M.L., Bowman, J.J., Clabby, K.J., Lucey, J., Cunningham, P., MacCarthaigh, M., Keegan, M., Cantrell, B., Lehane, M., Clenaghan, C. and Toner, P.F. (2002). *Water Quality in Ireland 1998-2000*. Environmental Protection Agency, Wexford. Merne, O.J. (1989). *Important bird*

areas in the Republic of Ireland. In: Grimmett, R.F.A. and Jones, T.A. (eds) Important Bird Areas in Europe. ICBP Technical Publication No. 9. Cambridge. Moore, D and Wilson, F. (1999). National Shingle Beach Survey of Ireland 1999. Unpublished Report National Parks and Wildlife Service, Dublin. Picton, B.E. and Costello, M.J. (1998). The BioMar biotope viewer: a guide to marine habitats, fauna and flora in Britain and Ireland. Environmental Sciences Unit, Trinity College Dublin. Sheppard, R. (1993). Ireland's Wetland Wealth. IWC, Dublin.

## 6. SITE MANAGEMENT

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### 6.2 Management Plan(s):

An actual management plan does exist:

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No, but in preparation
<input checked="" type="checkbox"/>	No

## 7. MAP OF THE SITES

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INSPIRE ID:

IE.NPWS.PS.NATURA2000.SPA.IE0004151

Map delivered as PDF in electronic format (optional)

Yes  No

Reference(s) to the original map used for the digitalisation of the electronic boundaries (optional).

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# NATURA 2000 - STANDARD DATA FORM

For Special Protection Areas (SPA),  
Proposed Sites for Community Importance (pSCI),  
Sites of Community Importance (SCI) and  
for Special Areas of Conservation (SAC)

SITE IE0004187  
SITENAME Sligo/Leitrim Uplands SPA

## TABLE OF CONTENTS

- [1. SITE IDENTIFICATION](#)
- [2. SITE LOCATION](#)
- [3. ECOLOGICAL INFORMATION](#)
- [4. SITE DESCRIPTION](#)
- [6. SITE MANAGEMENT](#)
- [7. MAP OF THE SITE](#)

## 1. SITE IDENTIFICATION

<b>1.1 Type</b> A	<b>1.2 Site code</b> IE0004187	<a href="#">Back to top</a>
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### 1.3 Site name

Sligo/Leitrim Uplands SPA

<b>1.4 First Compilation date</b> 2009-07	<b>1.5 Update date</b> 2018-09
----------------------------------------------	-----------------------------------

### 1.6 Respondent:

**Name/Organisation:** National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht  
**Address:** 90 King Street North, Dublin 7, D07 N7CV, Ireland  
**Email:** datadelivery@chg.gov.ie

### 1.7 Site indication and designation / classification dates

<b>Date site classified as SPA:</b>	2006-11
<b>National legal reference of SPA designation</b>	No data

## 2. SITE LOCATION

### 2.1 Site-centre location [decimal degrees]:

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Longitude

Latitude

-8.389995957

54.36889284

**2.2 Area [ha]:**

1733.549332

**2.3 Marine area [%]**

0.0

**2.4 Sitelength [km]:**

0.0

**2.5 Administrative region code and name**

**NUTS level 2 code**

**Region Name**

IE01	Border, Midland and Western
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**2.6 Biogeographical Region(s)**

Atlantic ( %)

**3. ECOLOGICAL INFORMATION**

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**3.2 Species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC and site evaluation for them**

Species			Population in the site							Site assessment				
G	Code	Scientific Name	S	NP	T	Size		Unit	Cat.	D.qual.	A B C D	A B C		
						Min	Max				Pop.	Con.	Iso.	Glo.
B	A103	<a href="#">Falco peregrinus</a>			r	5	5	p		G	C	A	C	C
B	A346	<a href="#">Pyrrhocorax pyrrhocorax</a>			r	15	15	p		G	C	B	C	B

- **Group:** A = Amphibians, B = Birds, F = Fish, I = Invertebrates, M = Mammals, P = Plants, R = Reptiles
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Type:** p = permanent, r = reproducing, c = concentration, w = wintering (for plant and non-migratory species use permanent)
- **Unit:** i = individuals, p = pairs or other units according to the Standard list of population units and codes in accordance with Article 12 and 17 reporting (see [reference portal](#))
- **Abundance categories (Cat.):** C = common, R = rare, V = very rare, P = present - to fill if data are deficient (DD) or in addition to population size information
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation); VP = 'Very poor' (use this category only, if not even a rough estimation of the population size can be made, in this case the fields for population size can remain empty, but the field "Abundance categories" has to be filled in)

**4. SITE DESCRIPTION**

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#### 4.1 General site character

Habitat class	% Cover
N08	27.0
N23	11.0
N14	25.0
N22	5.0
N06	2.0
N15	15.0
N09	15.0
<b>Total Habitat Cover</b>	<b>100</b>

#### Other Site Characteristics

The Sligo/Leitrim Uplands SPA is located north-east of the town of Sligo in the mountain range of Ben Bulbin, Arroo and Cope's Mountain/Crockauns. The site straddles the Co. Sligo/Co. Leitrim border. The site includes six separate lengths of cliffs in these ranges, including those of King's Mountain, Benbulbin, Benwiskin, Gleniff, Truskmore, Tievebaun, Glenade, Glencar, Arroo Mountain and Cope's Mountain/Crockauns. These uplands are formed of Carboniferous limestone, capped in places with shales. They stand on a high plateau, 300-450m above the surrounding countryside, and the edges form lofty cliffs from 15 to 300m in height. Areas of scree occur below cliffs on slopes of 40-50 degrees.

#### 4.2 Quality and importance

The cliffs hold nesting Chough, a Red Data Book species that is listed on Annex I of the E.U. Birds Directive; 14 breeding pairs were recorded from the site in the 1992 survey and 15 in the 2002/03 survey. Chough forage mostly on unimproved, closely grazed grassland and flocks of up to 29 have been seen. The land on the plateau is, for the most part, vegetated by heath and blanket bog which is largely unsuitable habitat for Chough. The extensive uplands on the plateau provide excellent habitat for Peregrine; the cliffs are ideal nesting sites and five pairs were recorded in 2002.

#### 4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i o b]
H	E01.01		o
L	I01		o
H	K01.01		i
H	B01		i
L	C01.03.02		o
L	G01.04		i
M	C01.01		o
M	G02.08		o
H	A04.03		o
H	B01		o
L	I01		i
M	G01.02		i

Positive Impacts			
Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i o b]
L	C01.03.02		o
H	A04		i
M	C01.01.01		o
M	G01.02		i

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

i = inside, o = outside, b = both



#### 4.5 Documentation

Berrow, S.D., Mackie, K.I., O'Sullivan, O., Shephard, K.B., Mellon, C. and Coveney, J.A. (1992). The Second International Chough Survey Ireland. Irish Birds 5:1-10  
Bullock, I.D., Drewett, D.R. and Mickleburgh, S.P. (1983). The Chough in Britain and Ireland. British Birds 76: 377-401.  
Environment and Heritage Service (2000). Biodiversity in Northern Ireland. Northern Ireland Species Action Plan: Chough. Environment and Heritage Service, Belfast.  
Gray, N., Thomas, G., Trewby, M. and Newton, S.F. (2003). The status and distribution of Chough *Pyrrhocorax pyrrhocorax* in the Republic of Ireland 2002/03. Irish Birds 7: 147-156.  
Madden, B. (in prep.). Breeding Survey of Peregrine Falcons in the Republic of Ireland, 2002. Unpublished Report to NPWS, Dublin.  
Norriss, D.W. (1995). The 1991 survey and weather impacts on the Peregrine Falco peregrinus breeding population in the Republic of Ireland. Bird Study 42: 20-30.

## 6. SITE MANAGEMENT

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### 6.2 Management Plan(s):

An actual management plan does exist:

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No, but in preparation
<input checked="" type="checkbox"/>	No

## 7. MAP OF THE SITES

[Back to top](#)

INSPIRE ID:

IE.NPWS.PS.NATURA2000.SPA.IE0004187

Map delivered as PDF in electronic format (optional)

Yes  No

Reference(s) to the original map used for the digitalisation of the electronic boundaries (optional).

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**Site Name: Durnesh Lough SAC**

**Site Code: 000138**

This site is situated on the southern side of Donegal Bay, and is about 10 km north of Ballyshannon. The underlying geology of the area is limestone but this is covered by a thick layer of clay drift deposits in the form of drumlins.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[1150] Coastal Lagoons* [6410] <i>Molinia</i> Meadows
----------------------------------------------------------

Durnesh Lough is a large, sedimentary lagoon, which is separated from the sea by a barrier that is composed partly of drumlins and partly high sand dunes with the remains of a cobble barrier in places. The lagoon formerly had a natural outlet to the sea but the outlet is now an artificial channel and pipe running under the sand dunes which appears to allow a certain amount of seawater to enter. The lagoon is shallow (0.5 - 1.5 m deep), oligohaline (0 - 7 ppt) and the substrate is mostly clean sand with finer organic sediments in sheltered areas. The aquatic flora is diverse and interesting, with two species of Tasselweed (*Ruppia cirrhosa*, *R. maritima*) and the Red Data Book charophyte *Chara canescens*. The fauna is also diverse, with 48 taxa recorded including six lagoonal specialists and at least two rare species *Gammarus chevreuxi* (Order Amphipoda) and *Cordylophora caspia* (Order Hydroida). Based on geomorphology, flora and fauna, the lagoon has been ranked amongst the best ten lagoons in the country.

As mentioned above, the lagoon is shallow with both stony and muddy shores. In the stony areas, Shoreweed (*Littorella uniflora*) and Common Club-rush (*Scirpus lacustris*) are the dominant plants. In the muddy areas, the emergent vegetation is much more dense and varied, and includes Bulrush (*Typha latifolia*), Common Club-rush, Yellow Iris (*Iris pseudacorus*), Mare's-tail (*Hippurus vulgaris*) and Reed Canary-grass (*Phalaris arundinacea*).

Extensive reedbeds occur beside the lough. These are dominated by Common Reed (*Phragmites australis*), Bulrush, and Common Club-rush. Areas dominated by Common Cottongrass (*Eriophorum angustifolium*) are also present here.

Large areas of wet grassland occur adjacent to the lake. These areas are liable to flooding and abundant species include Soft Rush (*Juncus effusus*), Creeping Bent (*Agrostis stolonifera*), Cuckooflower (*Cardamine pratensis*), Marsh-marigold (*Caltha*

*palustris*), Wild Angelica (*Angelica sylvestris*), Water Mint (*Mentha aquatica*) and Bog-sedge (*Carex limosa*). Some examples of wet grassland on the site are referable to *Molinia* Meadows, a habitat type listed on Annex I of the E.U. Habitats Directive.

This site also includes sandhills, coastal beaches, a cobble storm-beach, sand-covered drumlins and a small coastal lagoon. A series of smaller loughs, Drumoske, Drumhoe and Birra, are also included. All of these areas are of general ecological interest.

The large areas of wet grassland adjacent to the lough provide important feeding areas for swans and geese. Nationally important numbers of Greenland White-fronted Goose (148) and regionally important numbers of Mute Swan (91), Bewick's Swan (13) and Whooper Swan (58) are found here. Bewick's Swan, Whooper Swan and Greenland White-fronted Goose are all species listed on Annex I of the E.U. Birds Directive. Regionally/locally important numbers of Wigeon (37), Pochard (116), Tufted Duck (30), Goldeneye (39), Scaup (23) and Coot (210) also occur on Durnesh Lough. All figures are maximum winter averages over the period 1994/5 to 1997/8.

Otter, a species listed on Annex II of the E.U. Habitats Directive, has also been recorded at this site.

This site contains an excellent example of a lagoon, a priority habitat on Annex I of the E.U. Habitats Directive, and a second Annex I habitat, *Molinia* Meadows, is also present. Durnesh Lough also supports populations of three species listed on Annex I of the Birds Directive (Bewick's Swan, Whooper Swan and Greenland White-fronted Goose) and one species listed under Annex II of the Habitats Directive (Otter). The wetlands and sandhills add further botanical and ecological interest to the area.

**Site Name: Lough Melvin SAC**

**Site Code: 000428**

Lough Melvin is situated in the extreme north-west of Co. Leitrim, about 4 km south of Bundoran. The area is underlain by sedimentary calp-limestone, shale and sandstone. Lough Melvin is an oligo-mesotrophic lake and is approximately 13 km long by 3 km wide. The mean depth of the lake is 8.5 m, the maximum depth being 45 m. A number of inflowing and outflowing streams and rivers are included in the site, for instance, the Drowes River links the lake to Donegal Bay. Several large islands occur on the lake.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[3130] Oligotrophic to Mesotrophic Standing Waters
[6410] <i>Molinia</i> Meadows
[1106] Atlantic Salmon ( <i>Salmo salar</i> )
[1355] Otter ( <i>Lutra lutra</i> )

The lake has a good diversity of aquatic plants, including Quillwort (*Isoetes lacustris*), Shoreweed (*Littorella uniflora*), Alternate Water-milfoil (*Myriophyllum alterniflorum*), Water Lobelia (*Lobelia dortmanna*), Canadian Waterweed (*Elodea canadensis*) and several species of pondweed (*Potamogeton gramineus*, *P. lucens* and *P. x nitens*). Swamp vegetation is generally sparse, being best developed in the sheltered bay areas. Species include Reeds (*Phragmites australis*), Common Spike-rush (*Eleocharis palustris*) and Common Club-rush (*Scirpus lacustris*).

The most extensive terrestrial habitat in the site is lowland wet grassland. This is highly variable throughout the site in both its species composition and species richness. Grassland ascribable to the E.U. Habitats Directive Annex I type *Molinia* Meadows has been reported by the Irish Semi-natural Grasslands Survey (2009) from Gubacreeny (site no. 802) and Gubalaun (site no. 804). Common species include Jointed Rush (*Juncus articulatus*), Soft Rush (*J. effusus*), Marsh Pennywort (*Hydrocotyle vulgaris*), Yellow Iris (*Iris pseudacorus*), Water Mint (*Mentha aquatica*), Silverweed (*Potentilla anserina*), Creeping Soft-grass (*Holcus mollis*) and Devil's-bit Scabious (*Succisa pratensis*).

Wet deciduous woodland, dominated by Alder (*Alnus glutinosa*), Goat Willow (*Salix caprea*) and Downy Birch (*Betula pubescens*), is common in places. Ground flora species under these canopies include Lesser Burdock (*Arctium minus*), Wild Angelica (*Angelica sylvestris*) and Common Spike-rush (*Eleocharis palustris*).

Drier woodland exists in other areas, with Hazel (*Corylus avellana*), Ash (*Fraxinus excelsior*), Holly (*Ilex aquifolium*) and Hawthorn (*Crataegus monogyna*). Some stands have a rich ground flora that includes Primrose (*Primula vulgaris*), Wood-sorrel (*Oxalis acetosella*), Bluebell (*Hyacinthoides non-scripta*), Honeysuckle (*Lonicera periclymenum*) and Sanicle (*Sanicula europaea*). The fern community is well developed too, with such species as Male-fern (*Dryopteris filix-mas*) and Hart's-tongue (*Phyllitis scolopendrium*) present.

Four plant species which are listed in the Irish Red Data Book, Globeflower (*Trollius europaeus*), Marsh Helleborine (*Epipactis palustris*), Blue-eyed-grass (*Sisyrinchium bermudiana*) and Tea-leaved Willow (*Salix phylicifolia*), are found in this site. Globeflower is also protected under the Flora (Protection) Order, 2015.

The main interest of the site is the unique fish community which the lake supports. Lough Melvin is an excellent example of a natural, post-glacial salmonid lake. A relict population of the Arctic Char (*Salvelinus alpinus*), which constitutes an arctic-alpine element of the Irish fauna, occur there, as does the Atlantic Salmon (*Salmo salar*). Both of these species are listed in the Irish Red Data Book, and Salmon is listed on Annex II of the E.U. Habitats Directive.

Lough Melvin has three races of Brown Trout (*Salmo trutta*) - Ferox, Sonaghen and Gillaroo - which have distinctive characteristics and separate spawning grounds. The lake's inflowing and outflowing streams which are used for spawning by these Brown Trout races are included in the site.

Otter have been recorded from the Drowes River and the main inflowing rivers, and are likely to be widespread throughout the site. Recently, Pine Marten has been recorded from within the site. Both of these species are listed in the Irish Red Data Book, and Otter is listed on Annex II of the E.U. Habitats Directive.

Moderate numbers of waterfowl use the lake and Greenland White-fronted Goose, a species listed on Annex I of the E.U. Birds Directive, have occasionally been reported from the site.

The lake is used for boating, fishing and water abstraction, while much of the terrestrial part of the site is used for grazing. Consequently, the main threats to the site are from agricultural pollution and recreational pressure.

Lough Melvin is an example of a lake type that is of conservation significance and that is listed on Annex I of the E.U. Habitats Directive. The site is also important for *Molinia* Meadow grassland, Otter and for the presence of a unique fish community, including Atlantic Salmon, a species that is listed on Annex II of the E.U. Habitats Directive, and for a diverse flora which includes a number of rare plants, most notably, the protected Globeflower.





### Site Name: Ben Bulben, Gleniff and Glenade Complex SAC

### Site Code: 000623

This large SAC site is located in the uplands around Ben Bulben, King's Mountain, Benwisikin, Truskmore and Tievebaun (or Eagle's Rock), straddling the Sligo/Leitrim county boundary. These uplands are formed of Carboniferous limestone, capped in places by shales. They stand in a high plateau, 300-450 m above the surrounding countryside, and the edges form lofty cliffs ranging from 15 to 300 m in height. Below these cliffs, block scree usually occurs on slopes of 40-50 degrees. The mesa type of landform (i.e. flat-topped hill) found at this site, which has arisen from the long exposure of the upland areas to erosion, is of great interest geomorphologically. So too are the upper Viséan reefs exposed on the cliffs and on some of the summits. In addition, this region is also the type locality for the Ben Bulben shale, the Glencar limestone and the Dartry limestone.

This site is important botanically mainly because of the profusion of alpine plants which occur on the cliffs throughout the area, and particularly the cliffs of the Gleniff valley. The site is one of the best in the country for alpinism, in terms of species-richness, abundance and indeed, some of the alpine plants found here occur nowhere else in Ireland. The numerous waterfalls and Glencar Lake are also of great botanical interest.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

- [3260] Floating River Vegetation
- [4010] Wet Heath
- [4030] Dry Heath
- [4060] Alpine and Subalpine Heaths
- [5130] Juniper Scrub
- [6210] Orchid-rich Calcareous Grassland\*
- [6230] Species-rich *Nardus* Grassland\*
- [6430] Hydrophilous Tall Herb Communities
- [7220] Petrifying Springs\*
- [7130] Blanket Bogs (Active)\*
- [7140] Transition Mires
- [7230] Alkaline Fens
- [8110] Siliceous Scree
- [8120] Calcareous Scree

[8210] Calcareous Rocky Slopes

[1013] Geyer's Whorl Snail (*Vertigo geyeri*)

[1355] Otter (*Lutra lutra*)

Throughout the site, on scree slopes and on cliffs, there are a large number of calcareous springs and seepage areas. Many of these have tufa deposits associated with them. Species occurring in these wet conditions include Common Bent (*Agrostis stolonifera*), Golden-saxifrage (*Chrysosplenium oppositifolium*), Pale Butterwort (*Pinguicula lusitanica*), Bog Pimpernel (*Anagallis tenella*), Blue Moor-grass (*Sesleria albicans*), sedges (including *Carex panicea*) and an abundance of bryophytes. The Red Data Book species Yellow Saxifrage (*Saxifraga aizoides*) and Mossy Saxifrage (*S. hypnoides*) are scattered throughout this community. In places on the limestone cliffs, tufa builds up on rocky ledges and provides very wet habitat for rare and interesting vegetation communities. Noteworthy here too are the bryophyte communities, which include a number of very rare species (e.g. *Didymodon maximus* at its only known locality in Europe). Transition Mires, Alkaline Fens and Hydrophilous Tall Herb Communities, all Annex I habitats listed under the E.U. Habitats Directive, are associated with these wetland areas.

Drier areas on the calcareous and siliceous screes, cliffs and rocky slopes, support somewhat different vegetation. Common here are Lesser Meadow-rue (*Thalictrum minus*), Welsh Poppy (*Meconopsis cambrica*), Roseroot (*Rhodiola rosea*), Harebell (*Campanula rotundifolia*) and Viviparous Fescue (*Festuca vivipara*). Scattered throughout this vegetation are Alpine Meadow-rue (*Thalictrum alpinum*), Hoary Rock-cress (*Arabis hirsuta*), Mountain Sorrel (*Oxyria digyna*), Mountain Avens (*Dryas octopetala*) and the Red Data Book species, Purple Saxifrage (*Saxifraga oppositifolia*) and Alpine Meadow-grass (*Poa alpina*). Ferns are particularly abundant in the rocky crevices, including Bristle Bladder-fern (*Cystopteris fragilis*), Green Spleenwort (*Asplenium viride*), Wilson's Filmy-fern (*Hymenophyllum wilsonii*) and the Red Data Book species, Holly Fern (*Polystichum lonchitis*). Trees and shrubs are scattered along the cliff ledges, including Yew (*Taxus baccata*), Juniper (*Juniperus communis*) and the Red Data Book species, Tea-leaved Willow (*Salix phylicifolia*). Some areas of Juniper scrub exist.

Where the cliffs are interrupted by more gently sloping ground, grassy vegetation usually predominates, but where the underlying rock outcrops, the Red data Book species, Moss Champion (*Silene acaulis*) is found. The proximity of the site to the sea is evident in the occurrence of several maritime species, e.g. Sea Champion (*Silene vulgaris* subsp. *maritima*), Sea Plantain (*Plantago maritima*) and Common Scurvygrass (*Cochlearia officinalis*). Small areas of grasslands ascribable to the E.U. Habitats Directive Annex I priority types: Species-rich *Nardus* Grassland and Orchid-rich Calcareous Grassland have been reported to occur from the Leitrim part of the site, according to the Irish Semi-natural Grasslands Survey, 2009.

The summit of the plateau is peat-covered, with areas of blanket bog and wet and dry heath, dominated by Heather (*Calluna vulgaris*) and Bell Heather (*Erica cinerea*), with Lesser Twayblade (*Listera cordata*) commonly occurring underneath Heather bushes. On the highest parts of the site, the heath becomes more alpine in character, and includes species such as Crowberry (*Empetrum nigrum*), Cowberry (*Vaccinium vitis-idaea*), Fir Clubmoss (*Huperzia selago*), Alpine Sedge (*Carex bigelowii*) and the moss *Racomitrium lanuginosum*.

Many fast flowing upland streams rise on the summit of the plateau and flow down its sides. Some of these streams carry base-rich water and support a species-rich bryophyte flora, often associated with tufa deposits. A number of rare bryophytes have been recorded, including *Orthothecium rufescens*, *Daltonia splachnoides*, *Fissidens pusillus* and *Ulotia calvescens*, among others. The streams on the site show a good range of riverine structures, with pools, riffles, cascades, waterfalls, tufa deposits, petrifying springs and swallow holes. There are also some streams which have intermittent flow and which are typical of high-level karst streams, very few of which occur in the country.

Six rare flowering plant species which are legally protected under the Flora (Protection) Order, 2015, have been recorded from this remarkable site: Fringed Sandwort (*Arenaria ciliata*), Northern Rock-cress (*Cardaminopsis petraea*), Alpine Bistort (*Polygonum viviparum*), Small-white Orchid (*Pseudorchis albida*), Chickweed Willowherb (*Epilobium alsinifolium*) and Alpine Saxifrage (*Saxifraga nivalis*). The latter two species have their only known Irish stations at this site.

The rare whorl snail, *Vertigo geyeri*, has recently been discovered at the site. Five populations occur at three locations, all in calcareous flushes on sloping ground. These are the first records for Co. Leitrim for this rare mollusc which is listed on Annex II of the E.U. Habitats Directive. Otter, a species which is also listed on Annex II of the E.U. Habitats Directive, is known to occur within the site.

The extensive uplands in the site provide excellent habitat for Peregrine, a species listed on Annex I of the E.U. Birds Directive. Four breeding pairs were recorded here in recent years.

The uplands are used primarily for grazing. On some parts of the plateau, peat deposits are eroding. Upland habitats are generally threatened by afforestation. The cliffs and steep scree slopes are not significantly threatened.

This plateau area is recognised as, botanically, one of the richest in Ireland. It provides the best example in the country of alpine and arctic-alpine vegetation and includes two vascular species which are not known to occur elsewhere in Ireland, as well as a host of rare mosses and liverworts. The site contains a diverse range of good quality upland habitats. The petrifying springs with tufa deposits are of particular interest, and are good examples of a habitat which is considered to be threatened in Europe and given priority status on Annex I of the E.U. Habitats Directive.



**Site Name: Bunduff Lough and Machair/Trawalua/Mullaghmore SAC**

**Site Code: 000625**

This site is situated on the south side of Donegal Bay, 5 km south-west of Bundoran, and it falls in the counties of Sligo and Leitrim. The part of the site west of Mullaghmore Head is very exposed to the prevailing wind and swells from the Atlantic, whereas the head itself affords moderate shelter to the eastern part of the site. The underlying geology is of sedimentary rocks including limestone, shale and sandstone. Windblown sand is common in places, covering much of the underlying rocks and shingle.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

- [1140] Tidal Mudflats and Sandflats
- [1160] Large Shallow Inlets and Bays
- [1170] Reefs
- [2120] Marram Dunes (White Dunes)
- [2130] Fixed Dunes (Grey Dunes)\*
- [2190] Humid Dune Slacks
- [21A0] Machairs\*
- [5130] Juniper Scrub
- [6210] Orchid-rich Calcareous Grassland\*
- [7230] Alkaline Fens
- [1065] Marsh Fritillary (*Euphydryas aurinia*)
- [1395] Petalwort (*Petalophyllum ralfsii*)

Machair is common throughout the site, occurring mostly in the flat areas between dune ridges and areas of alkaline fen/marsh. Although areas with typical dry machair grassland can be found close to dunes ridges, much of the habitat is wetter than is usually seen, and there are large areas that are considered to be transitional to alkaline fen. Typical dry machair grassland species present include Red Fescue (*Festuca rubra*), Wild Thyme (*Thymus praecox*), Daisy (*Bellis perennis*), Ribwort Plantain (*Plantago lanceolata*), Common Bird's-foot-trefoil (*Lotus corniculatus*) and Lady's Bedstraw (*Galium verum*). The plant species indicative of fen conditions include Bog Pimpernel (*Anagallis tenella*), Flea Sedge (*Carex pulicaris*), Common Sedge (*Carex nigra*), Marsh Pennywort (*Hydrocotyle vulgaris*), Knotted Pearlwort (*Sagina nodosa*), Common Twayblade (*Listera ovata*), Ragged-Robin (*Lychnis flos-cuculi*) and Lesser Spearwort (*Ranunculus flammula*). Other notable fen species include Grass-of-

parnassus (*Parnassia palustris*), Common Spotted-orchid (*Dactylorhiza fuchsii*) and the uncommon Marsh Helleborine (*Epipactis palustris*). Moss cover is well-developed, frequently attaining 90% cover. Typical species include *Campylium stellatum*, *Scorpidium revolvens*, *Ctenidium molluscum*, *Calliergonella cuspidata* and *Philonotis fontana*, most of which indicate the presence of wet, base-rich conditions. The fen vegetation is best developed to the south-west of the Bunduff Lough. These areas of wet machair/alkaline fen are very species-rich, often containing 40-50 plant species in an area of 4 m<sup>2</sup>. The E.U. Habitats Directive Annex II liverwort species *Petalophyllum ralfsii* has recently been recorded from areas of machair within the site.

The fixed dune habitat is well represented at the site. Areas of fixed dunes with a high cover of herbs and mosses are found on the dune systems at both Bunduff strand and Trawalua. The habitat typically occurs as a prominent zone on gently sloping ground between the more exposed and species-poor white dune vegetation, and the flat areas of dune grassland that comprise the machair plains. The vegetation is typically dominated by Marram (*Ammophila arenaria*) and Red Fescue, and these are generally accompanied by species such as Lady's Bedstraw, Yorkshire-fog (*Holcus lanatus*), Ribwort Plantain, eyebrights (*Euphrasia* spp.), Wild Thyme, clovers (*Trifolium* spp.) and the mosses *Rhytidiadelphus squarrosus*, *Homalothecium lutescens*, *Brachythecium albicans* and *Calliergonella cuspidata*. In addition, the distinctive lichen, *Peltigera canina* agg., is quite frequent. Other noteworthy components of the vegetation are Pyramidal Orchid (*Anacamptis pyramidalis*) and, occasionally, Bee Orchid (*Ophrys apifera*). At Bunduff, well back from the high dune areas, there are also extensive areas of fixed dune grassland without Marram, occurring on unusual low sandy mounds. These distinctive areas are dominated by mosses and with a high cover of Wild Thyme, Glaucous Sedge (*Carex flacca*) and Hairy Rock-cress (*Arabis hirsuta*). The rare parasitic plant, Dodder (*Cuscuta epithimum*) grows in close association with this moss-rich habitat.

There is a relatively large dune slack located behind the fixed dunes in the south of the Trawalua site. It is composed of low-growing Creeping willow (*Salix repens*) and is grazed by sheep and cattle. There are low, fixed dune ridges towards the back of the slack and in some places the slack grades into the machair. The dune slack vegetation is characterised by typical species such Glaucous sedge, Sand sedge (*Carex arenaria*), Common sedge (*Carex nigra*), Marsh Pennywort, Water mint (*Mentha aquatica*), Lesser spearwort, Rush spp. (*Juncus* spp.), Common Marsh-bedstraw (*Galium palustre*), Silverweed (*Potentilla anserina*), Autumn Hawkbit (*Leontodon autumnalis*), Selfheal (*Prunella vulgaris*) and Yorkshire-fog.

Shifting dunes with Marram are best-developed at Trawlua in the south of the site. In exposed areas Marram is the only species present, however, further back species such as Colt's-foot (*Tussilago farfara*), Sand Couch (*Elymus farctus*), Sand Sedge and Common Ragwort (*Senecio jacobaea*) are found. Mosses are typically sparse.

Orchid-rich calcareous grassland is found in fragmentary form in a small area to the north of Bunduff Lough, where it forms a mosaic with heath and dune grassland. Characteristic species include Kidney Vetch (*Anthyllis vulneraria*), Yellow-wort



(*Blackstonia perfoliata*), Flea sedge, Quaking-grass (*Briza media*), Mountain Everlasting (*Antennaria dioica*), Frog Orchid (*Coeloglossum viride*), and many others.

Bunduff Lough is a shallow, sandy-bottomed lake situated at the back of the dunes and machair. The marginal vegetation of the lake is well-developed and dominated by Sea Club-rush (*Scirpus maritimus*), Common Reed (*Phragmites australis*), Bulrush (*Typha latifolia*) and Water Horsetail (*Equisetum fluviatile*). Where the substrate is stony and unable to support the reedswamp community, the margins of the lough are dominated by Amphibious Bistort (*Polygonum amphibium*). At the north-eastern end of the lough, where conditions are drier, wet grassland occurs. Here, Rough Meadow-grass (*Poa trivialis*), Yorkshire-fog, Soft Rush (*Juncus effusus*) and Marsh Cinquefoil (*Potentilla palustris*) are dominant.

Heath, dominated by Crowberry (*Empetrum nigrum*), occurs near Skerrydoo.

Trawalua Strand, a sandy beach, is backed by high Marram dunes and flat machair areas, similar to drier areas at Bunduff. These two dune areas are separated by Mullaghmore Point and Classiebawn Woods. Classiebawn Wood is a plantation woodland of Maritime Pine (*Pinus pinaster*) with a very interesting ground flora, including plants such as Marsh Helleborine, Broad-leaved Helleborine (*E. helleborine*), Common Twayblade and Fragrant Orchid (*Gymnadenia conopsea*). As is typical for a coastal site in Ireland, the site has a notable butterfly fauna including the E.U. Habitats Directive Annex II and red-listed (VU) Marsh Fritillary (*Euphydryas aurinia*). A colony is found in at least two locations in the machair and fixed dune grassland mosaic with the webs often placed on the low sandy mounds which remain unflooded during the winter. Other red-listed and near threatened species present are the Small Blue (*Cupido minimus*), Dingy Skipper (*Erynnis tages*), Small Heath (*Coenonympha pamphilus*) and Dark Green Fritillary (*Argynnis aglaja*) (VU)

The terrestrial and freshwater habitats support a rich and varied fauna in other insect groups. Notable species recorded from the site include the hoverflies *Cheilosia ahenea*, *Paragus haemorrhous* and *Pipizella viduata*, the moths *Parasemia plantaginis* (Wood Tiger) and *Adsticta statures* (Forester), the dragonfly *Orthetrum cancellatum* (Black-tailed Skimmer) and the aquatic bugs *Corixa panzeri* and *Arctocorisa germari*. Two near threatened bumblebee species *Bombus lapidarius* and *Bombus muscorum* have been recorded.

The site features characteristic intertidal sediment communities which are often found in association with large bays. There is a well-developed zonation of benthic communities and high species-richness in the littoral sediments. In places the low shore is dominated by the burrowing urchin *Echionocardium cordatum*, with razor shell species (*Ensis siliqua* and *E. ensis*) abundant. The exposed rocky shore is of interest from both ecological and geological viewpoints. Marine invertebrates present include the Purple Sea Urchin (*Paracentrotus lividus*).

Bunduff Lough is locally important for waterfowl. In winter, Whooper Swan (57), Teal (64) and Mallard (61) are regular, along with Golden Plover (150) at certain

times (figures are average maxima for winters 1994/95 to 1995/96). Resident species include Coot, Water Rail, Mute Swan and Little Grebe. Both Whooper Swan and Golden Plover are listed on Annex I of the E.U. Birds Directive. The site also provides habitat for breeding waders, notably Lapwing (16 pairs in 1996) and Snipe (5 pairs in 1996). Shag, Fulmar, Raven and Chough are all reported from the cliffs at this site.

The machair and dunes within this site are grazed by sheep and cattle. Amenity use close to Mullaghmore village is high, with fishing and shooting also occurring nearby. Bunduff Strand is a busy recreational beach and water sports are popular here. A sewage discharge at Thumb Rock may be having a deleterious effect on water quality and sediment communities.

This extensive coastal site contains a good range of habitats, including several listed on Annex I of the E.U. Habitats Directive, and three which are listed with priority status. The machair found on the site is of particular importance because of how it grades into wet fen-like vegetation, and because it is intact and has not been subdivided by fences, which is commonly seen at other sites.

**Site Name: Arroo Mountain SAC**

**Site Code: 001403**

Arroo Mountain is a large mountain complex which is comprised of blanket bog, heathland, upland grassland, calcareous flushes, wooded ravines, limestone gorges and steep limestone cliffs which have developed on top of an undulating limestone plateau. It is the most north-easterly part of the Ben Bulbin range of mountains, and is located 3 km south-west of Kinlough in Co. Leitrim.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[4010] Wet Heath
[4030] Dry Heath
[4060] Alpine and Subalpine Heaths
[7130] Blanket Bogs (Active)*
[7220] Petrifying Springs*
[8120] Calcareous Scree
[8210] Calcareous Rocky Slopes

The steep cliffs on the north face of Arroo were one of the first areas on the mountain to be identified as of botanical interest. They are nearly vertical with a steep talus slope. Active erosion has created several interesting geomorphological features at their base, including sharp pinnacles and large rock slides.

The cliffs have a distinctive flora, similar to the Ben Bulbin range, which contains several high-level arctic-alpine species that are common here but occur very rarely in the rest of the country. Species of interest include Mossy Saxifrage (*Saxifraga hypnoides*), which is occasional in the north and west but very rare elsewhere; Rue-leaved Saxifrage (*Saxifraga tridactylites*), frequent in the south and west but local elsewhere; Mountain Avens (*Dryas octopetala*), locally abundant in the north and west but very rare in mountains of the north; and Mountain Sorrel (*Oxyria digyna*) which is restricted to mountain cliffs in the west and the Galtee Mountains. Several species which are listed in the Irish Red Data Book occur at this site. Purple Saxifrage (*Saxifraga oppositifolia*), a rare species found only in mountains in the west and north, Hoary Whitlowgrass (*Draba incana*) which occurs mainly in the north-west of the country, and Yellow Saxifrage (*S. aizoides*) which is virtually confined to mountains of the north-west are all found.

The cliffs also contain a very rich assemblage of calcareous bryophytes, including several Red Listed species such as *Schistidium trichodon*, *Seligeria oelandica* and *Timmia norvegica*. The scree below cliffs also contains an exceptional diversity of ferns.

The main plateau area of the mountain supports blanket bog and heath communities and is of ecological interest. The hydrology of the plateau is interesting and a number of unusual geomorphological features that reflect the underlying limestone occur. Many streams and flushes drain into sinkholes and several large flushes found at the base of limestone cliffs have an enriched calcicole element in the flora. Springs, some of which have tufa formations, are also a feature of the site. Species recorded from petrifying springs here include stoneworts (*Chara* spp.), Golden-saxifrage (*Chrysosplenium oppositifolium*), water-starworts (*Callitriche* spp.), Common Water-crowfoot (*Ranunculus aquatilis*) and various sedges (*Carex* spp.). Bryophytes are usually abundant, with species such as *Drepanocladus revolvens*, *Aulacomium palustre* and *Scorpidium scorpioides* occurring, as well as rare species such as *Didymodon maximus* and *Cinclidium stygium*.

The heath flora is well developed, with mature stands of Heather (*Calluna vulgaris*) in some areas. The summit of Arroo Mountain supports a large area of wet heath, and cover of bog mosses (*Sphagnum* spp.) is good. Active blanket bog occurs in the south (Cloghmeen Bog), in the north-east of the site (Carrowrevagh Bog) and as small pockets scattered over the plateau. These areas support typical highland/mountain blanket bog plant species, but generally lack features such as pools. Because of their overall extent and integrity, the peatlands on Arroo Mountain are highly rated.

Peregrine and Golden Plover, both species listed on Annex I of the E.U. Birds Directive, breed within the site.

Sheep grazing poses the greatest threat to the site, and over-grazing has degraded the blanket bog on the west and east sides. Turbary is also encroaching on the north and south-east sides. However, unlike most other uplands in this region, afforestation has not taken place.

The quality and range of habitats, and the variety of rare species, within this site makes it of high scientific and conservation importance. Together, Ben Bulbin and Arroo Mountain comprise one of the floristically richest areas in the country, supporting excellent examples of arctic-alpine vegetation communities. The interesting geomorphological and hydrological facets add greatly to the ecological and scientific value of the site.

**Site Name: Streedagh Point Dunes SAC**

**Site Code: 001680**

Streedagh Point Dunes SAC is a sand dune and estuary system, and lies approximately 4 km west of Grange, a small village about 16 km north of Sligo town. The site consists of a tombolo formation, with a shingle spit overlain by sand dunes joining Conors Island to Streedagh Point. The landward side of the site comprises an area of sand flats, the estuary of the River Grange. The underlying bedrock is of stratified sedimentary rocks - argillaceous and oolitic limestones, conglomerates and chert; some strata are rich in fossils.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

- [1140] Tidal Mudflats and Sandflats
- [1220] Perennial Vegetation of Stony Banks
- [1330] Atlantic Salt Meadows
- [1410] Mediterranean Salt Meadows
- [2120] Marram Dunes (White Dunes)
- [2130] Fixed Dunes (Grey Dunes)\*
  
- [1014] Narrow-mouthed Whorl Snail (*Vertigo angustior*)

Sand dunes extend along the length of the spit and cover the southern half of Conors Island. A boulder beach extends along the entire seaward side of the system. The dunes are accreting on the landward side and eroding on the northern, seaward side.

The embryo dunes are colonised primarily by Sea Sandwort (*Honkenya peploides*), Sea Campion (*Silene vulgaris* subsp. *maritima*) and small amounts of Sand Couch (*Elymus farctus*). At this site this habitat occurs in association with, and grades into, perennial vegetation of stony banks. A ridge of shifting marram dunes occurs along the entire length of the dune system. These are dominated by Marram (*Ammophila arenaria*), but include Colt's-foot (*Tussilago farfara*), clovers (*Trifolium* spp.), Ribwort Plantain (*Plantago lanceolata*) and Common Bird's-foot-trefoil (*Lotus corniculatus*).

The fixed dunes, which are a priority habitat on Annex I of the E.U. Habitats Directive, are well-developed. They contain some large sand hills and dune slacks, and are rich in plant species, particularly small herbs. Plant species occurring include Daisy (*Bellis perennis*), Wild Pansy (*Viola tricolor* subsp. *curtisii*), Wild Carrot (*Daucus carota*), Bulbous Buttercup (*Ranunculus bulbosus*), Field Wood-rush (*Luzula*



*campestris*), Bramble (*Rubus fruticosus* agg.), Wild Thyme (*Thymus praecox*), Biting Stonecrop (*Sedum acre*), Common Cornsalad (*Valerianella locusta*), Rue-leaved Saxifrage (*Saxifraga tridactylites*), Bee Orchid (*Ophrys apifera*) and Pyramidal Orchid (*Anacamptis pyramidalis*). The dune slacks are rich in sedges (*Carex* spp.), with rushes (*Juncus* spp.) and Variegated Horsetail (*Equisetum variegatum*) also found.

The estuary of the River Grange consists of intertidal sandflats with areas of saltmarsh around the margins. The area of intertidal flats is fairly extensive, and extends for approximately 4 km. Saltmarsh on the site supports Thrift (*Armeria maritima*), Sea Plantain (*Plantago maritima*), Red Fescue (*Festuca rubra*), Lax-flavoured Sea-lavender (*Limonium humile*), Sea Rush (*Juncus maritimus*), Common Scurvygrass (*Cochlearia officinalis*), glassworts (*Salicornia* spp.) and turf fucoids (dwarfed seaweeds). Both Atlantic and Mediterranean types of saltmarsh are well-represented at the site.

The rare snail, *Vertigo angustior*, a species listed on Annex II of the E.U. Habitats Directive, has recently been recorded from sand dunes on the site. Common Seals haul out on sand banks in the site and Grey Seals have also been noted in the area. The locally-occurring butterfly, Dingy Skipper, has also been recorded on the site.

The estuary is used by moderate numbers of wintering waterfowl (all figures are average maximum counts for 1995/96 - 1998/99): Ringed Plover (14), Grey Plover (41), Brent Goose (30), Oystercatcher (113), Dunlin (298), Curlew (43) and Redshank (48). The site is also used by Terns and Chough, although these species do not nest here.

The main land uses within the site are sheep grazing and recreation, both of which have led to some erosion in the dunes, although in places grazing has maintained a short sward used by geese and Choughs for feeding.

The site contains a diversity of habitats and supports a wide range of vegetation communities and plant species. Six habitats found on the site are listed on Annex I of the E.U. Habitats Directive. The presence of fixed dunes, a habitat given priority status on this Annex, is of particular note. The site is also important for the presence of the rare snail, *Vertigo angustior*. The presence of wintering waterfowl adds to the significance of this site and the geological interest of Streedagh Point enhances its overall importance.

**Site Name: Glenade Lough SAC**

**Site Code: 001919**

Glenade Lough is situated approximately 9 km north-west of Manorhamilton in Co. Leitrim. It is a relatively small lake situated on the upper reaches of the Bonet River and in a valley between the Arroo and Benbulbin Mountain ranges. The lough is underlain by Carboniferous limestone and shales. This confers a calcareous nature to the lake and the marginal vegetation. It is a naturally eutrophic lake, but although eutrophic, the system shows mesotrophic features - the water is clear, well aerated and relatively nutrient poor and the shoreline is stony or sandy. The lake has a maximum depth of 7.25 m. Some areas of surrounding wet grassland, marshes and fens are also included in the site.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[3150] Natural Eutrophic Lakes
[1092] White-clawed Crayfish ( <i>Austropotamobius pallipes</i> )
[1833] Slender Naiad ( <i>Najas flexilis</i> )

The aquatic flora of Glenade Lough is diverse and has species characteristic of both eutrophic and oligo-mesotrophic systems. Of particular note is the diversity of pondweeds, with at least four species known to occur (*Potamogeton praelongus*, *P. pusillus*, *P. lucens* and *P. natans*). Other species characteristic of eutrophic conditions include Ivy-leaved Duckweed (*Lemna trisulca*), Canadian Waterweed (*Elodea canadensis*), Unbranched Bur-reed (*Sparganium emersum*) and Spiked Water-milfoil (*Myriophyllum spicatum*). Notable plant species which occur at Glenade Lough and are typically associated with oligotrophic systems are Quillwort (*Isoetes lacustris*) and Slender Naiad (*Najas flexilis*). The latter is a species which is listed on Annex II of the E.U. Habitats Directive and legally protected under the Flora (Protection) Order, 1999.

A band of emergent vegetation occurs around much of the lake. This is dominated by Common Reed. (*Phragmites australis*) and Common Club-rush (*Scirpus lacustris*). Bulrush (*Typha latifolia*) occurs in an area in the north-west of the site, while Water Horsetail (*Equisetum fluviatile*) and Common Spike-rich (*Eleocharis palustris*) are common throughout these stands of reeds.

Above the swamp zone there is a mix of calcareous fens and flushes, wet grassland and some freshwater marshes. Much of the vegetation in these areas is sedge-rich with Common Sedge (*Carex nigra*), Bog-sedge (*C. limosa*), Slender Sedge (*C. lasiocarpa*)

and Bottle Sedge (*C. rostrata*) present. Herbaceous species such as Meadowsweet (*Filipendula ulmaria*), Marsh-marigold (*Caltha palustris*), Cuckooflower (*Cardamine pratensis*) and Devil's-bit Scabious (*Succisa pratensis*) also occur. Bryophytes are also common, especially bog mosses such as *Sphagnum palustre* and *S. recurvum*.

Some deciduous woodland, often wet in character, is present around the lake. The main native tree species here are Hazel (*Corylus avellana*), Ash (*Fraxinus excelsior*), Alder (*Alnus glutinosa*) and Sessile Oak (*Quercus petraea*). Introduced species also occur - Beech (*Fagus sylvatica*), Rhododendron (*Rhododendron ponticum*) and Sycamore (*Acer pseudoplatanus*).

Further habitat diversity is added by the presence of dry grassland within the site. Plant species present here include Creeping Bent (*Agrostis stolonifera*), Sweet Vernal-grass (*Anthoxanthum odoratum*), Primrose (*Primula vulgaris*), Tormentil (*Potentilla erecta*) and Common Spotted-orchid (*Dactylorhiza fuchsii*).

A large population of the White-clawed Crayfish, a species listed on Annex II of the E.U. Habitats Directive, and also protected under the Wildlife Act, 1976, has been reported from Glenade Lough. This is a species which is normally found in calcium-rich waters.

The main land use around the site is low to moderate intensity agriculture, mostly grazing. Some boating and fishing occur on the lake. These practises may cause minor disturbances or damage to the site.

This site is of scientific importance because it contains an interesting example of a naturally eutrophic lake, an Annex I habitat on the E.U. Habitats Directive, which also displays some mesotrophic/oligotrophic elements. Furthermore the lake supports populations of two Annex II species, the White-clawed Crayfish and the Slender Naiad.

**Site Name: Lough Gill SAC**

**Site Code: 001976**

This site includes Lough Gill, Doon Lough to the north-east, the Bonet River (as far as, but not including, Glenade Lough), and a stretch of the Owenmore River near Manorhamilton in Co. Leitrim. Lough Gill itself, 2 km east of Sligo town, lies at a geological junction of ancient metamorphic rocks which produce acid groundwater, and limestone which dissolves in the groundwater.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

- |                                                                   |
|-------------------------------------------------------------------|
| [3150] Natural Eutrophic Lakes                                    |
| [6210] Orchid-rich Calcareous Grassland*                          |
| [91A0] Old Oak Woodlands                                          |
| [91E0] Alluvial Forests*                                          |
| [1092] White-clawed Crayfish ( <i>Austropotamobius pallipes</i> ) |
| [1095] Sea Lamprey ( <i>Petromyzon marinus</i> )                  |
| [1096] Brook Lamprey ( <i>Lampetra planeri</i> )                  |
| [1099] River Lamprey ( <i>Lampetra fluviatilis</i> )              |
| [1106] Atlantic Salmon ( <i>Salmo salar</i> )                     |
| [1355] Otter ( <i>Lutra lutra</i> )                               |

Lough Gill is a large lake, being 8 km long, and has steep limestone shores and underwater cliffs. It is over 20 m deep in places. The lake appears to be naturally eutrophic. The aquatic macrophyte flora is very limited, probably due to the rapid increase in depth around most of the margin. Species such as pondweeds (*Potamogeton* spp.) are present, as well as Shoreweed (*Littorella uniflora*). Where the lake shore has a shallow gradient, some swamp vegetation occurs, mainly dominated by Common Reed (*Phragmites australis*), with Common Club-rush (*Scirpus lacustris*) and sedges (*Carex* spp.).

The Old Oak Woodlands within this site are dominated by oak (*Quercus* spp.), Rowan (*Sorbus aucuparia*) and willows (*Salix* spp.). A number of interesting tree species occur. Strawberry Tree (*Arbutus unedo*) is found in its most northerly site in the world. Yew (*Taxus baccata*) occurs in abundance. Bird Cherry (*Prunus padus*), a Red Data Book species, is also found, as is the nationally scarce Rock Whitebeam (*Sorbus rupicola*). Some areas of conifer plantation occur in association with these woodlands.

There is a fringe of deciduous woodland along most of the length of the Garvoge River. In parts it is dense and impenetrable, with a very wet marshy underlayer. Some areas are dominated by Rusty Willow (*Salix cinerea* subsp. *oleifolia*), with Alder (*Alnus glutinosa*) also occurring commonly. Other tree species present include Goat Willow (*Salix caprea*), Hazel (*Corylus avellana*), Rhododendron (*Rhododendron ponticum*) and Cherry Laurel (*Prunus laurocerasus*). Both of the latter species are invasive aliens. In the understorey, species such as Guelder-rose (*Viburnum opulus*), Gipsywort (*Lycopus europaeus*) and Skullcap (*Scutellaria galericulata*) are found. Reedswamp is also common along the river. Another area of alluvial wet woodland is found at the mouth of the Bonet River. Here there is dense willow (*Salix* sp.) scrub, along with Reed Canary-grass (*Phalaris arundinacea*), and also areas where Alder and Goat Willow are dominant.

Areas of unimproved wet and dry grassland also occur within the site, the former particularly by the lake and the latter well developed in the north-east of the site and in the vicinity of O'Rourke's Table. Orchid-rich Calcareous Grassland, a priority habitat listed on Annex I of the E.U. Habitats Directive, has been reported from Clogher Beg, according to the Irish Semi-natural Grasslands Survey, 2010. Heath-covered hillsides above the woods are dominated by Heather (*Calluna vulgaris*).

The site also supports several rare plant species, including Yellow Bird's-nest (*Monotropa hypopitys*), the lady's-mantle species *Alchemilla glaucescens*, Ivy Broomrape (*Orobancha hederarum*), Black Bryony (*Tamus communis*), Intermediate Wintergreen (*Pyrola media*) and Bird's-nest Orchid (*Neottia nidus-avis*). There is also an unconfirmed record for Melancholy Thistle (*Cirsium helenioides*) from the eastern side of the site.

Both the woods and the mountains are used by a large herd of Fallow Deer. The site is of considerable importance for the presence of four Red Data Book fish species that are listed on Annex II of the E.U. Habitats Directive - Brook Lamprey (*Lampetra planeri*), River Lamprey (*Lampetra fluviatilis*), Sea Lamprey (*Petromyzon marinus*) and Atlantic Salmon (*Salmo salar*). The Lough Gill system gets a very early run of spring salmon, while the Bonet holds stocks of salmon from spring right through to the end of the season. White-clawed Crayfish (*Austropotamobius pallipes*), Otter and Pine Marten are well established on this site, the first two are both Annex II species. The woodlands have a fauna which includes several rare snail species.

Lough Gill supports low numbers of wintering waterfowl, mostly Mallard (<150), Tufted Duck (20-30) and Goldeneye (<20). A small colony of Common Tern breed on the islands (20 pairs in 1993), while Kingfisher are found on the lake and rivers. Both of these species are listed on Annex I of the E.U. Birds Directive. A colony of Black-headed Gulls (63 pairs in 1992) occurs with the terns. The woods support a good diversity of bird species including Jay, Woodcock and Blackcap.

The site is of importance for four habitats listed on Annex I of the E.U. Habitats Directive, including two with priority status. It is also noted for the high number of rare or scarce animal and plant species.





**Site Name: Dunmuckrum Turloughs SAC**

**Site Code: 002303**

This site is located about 2 km south-west of Ballyshannon in Co. Donegal. It consists of a series of low-lying winter-flooded depressions set in an undulating landscape of limestone hills.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (\* = priority; numbers in brackets are Natura 2000 codes):

[3180] Turloughs*
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The most westerly of the depressions, in Lugnav townland, supports typical turlough vegetation, reflecting the zonation caused by periodic flooding. The wettest areas at the base contain small patches of open water surrounded by marsh plants. At the eastern end there is some stonewort (*Chara* sp.), Horned Pondweed (*Zannichellia palustris*), Common Duckweed (*Lemna minor*) and the moss *Fontinalis antipyretica*. The western pools are distinguished by the presence of Thread-leaved Water-crowfoot (*Ranunculus trichophyllus*), Blue Water-speedwell (*Veronica anagallis-aquatica*), Water-cress (*Nasturtium officinale*) and Lesser Marshwort (*Apium inundatum*). Exposed muds behind these areas support Equal-leaved Knotgrass (*Polygonum arenastrum*), Shepherd's-purse (*Capsella bursa-pastoris*), Marsh Yellow-cress (*Rorippa palustris*) and Marsh Cudweed (*Gnaphalium uliginosum*), amongst others.

A permanently wet area of scraw (i.e. floating) vegetation at the lowest part of this turlough is dominated by Bottle Sedge (*Carex rostrata*), Bogbean (*Menyanthes trifoliata*) and Common Spike-rush (*Eleocharis palustris*). This grades into a wet, sedge-dominated sward, with species such as Common Sedge (*Carex nigra*), Brown Sedge (*C. disticha*) and a wide range of wetland herbs. At the upper levels of flooding the vegetation grades into a leached limestone grassland, with patches of Hawthorn (*Crataegus monogyna*) and Blackthorn (*Prunus spinosa*) scrub woodland. Notable species here include Adder's-tongue (*Ophioglossum vulgatum*), Grass-of-parnassus (*Parnassia palustris*) and an abundance of the moss *Cinclidotus fontinaloides* on all the inundated rocky surfaces.

Further east, in Dunmuckrum townland, lies a smaller turlough basin with a permanent marsh at the base, mostly dominated by sedges (*Carex nigra* and *C. rostrata*) and Meadowsweet (*Filipendula ulmaria*). A shorter grazed grassland vegetation surrounds this with Creeping Bent (*Agrostis stolonifera*), Jointed Rush (*Juncus articulatus*) and Autumn Hawkbit (*Leontodon autumnalis*), amongst others.

Two further depressions lie just to the east, straddling the disused railway line. Although seasonally flooded, these basins are smaller and drier, and support mainly grassland vegetation dominated by Creeping Bent.

The site is of conservation importance as it represents the mostly northerly turlough known in the country, if not globally. Turlough habitat is listed with priority status in Annex I of the E.U. Habitats Directive.

## SITE SYNOPSIS

**SITE NAME: DONEGAL BAY SPA**

**SITE CODE: 004151**

Donegal Bay SPA is a very large, marine-dominated, site. It extends from Doorin Point, to the west of Donegal Town, to Tullaghan Point in County Leitrim, a distance of approximately 15 km along its north-east/south-west axis. It varies in width from about 3 km to over 8 km. The site includes the estuary of the River Eske, which flows through Donegal Town, and the estuary of the River Erne, which flows through Ballyshannon. Much of the shoreline is rocky or stony, with well-developed littoral reefs in places. There are also extensive stretches of sandy beaches, especially from the Murvagh peninsula southwards to Rossnowlough and at the outer part of the estuary of the River Erne. Shingle or cobble beaches are also represented. There are extensive areas of intertidal flats associated with the estuary of the River Eske, reflecting the very sheltered conditions in this part of the bay. These have been shown to be biotope rich, and supporting a range of macro-invertebrates, including polychaete worms (*Hediste diversicolor*, *Arenicola marina* and *Nephtys hombergii*) and bivalves (*Scrobicularia plana*, *Cerastoderma edule* and *Macoma balthica*). Elsewhere, a narrow fringe of intertidal flats is exposed at low tides. Salt marshes are found in the sheltered conditions of the innermost part of the bay. A number of small, grassy, islands occur in the innermost part of the bay. The waters of the shallow bay overlie mostly sandy substrates, though reefs occur in places.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Great Northern Diver, Light-bellied Brent Goose, Common Scoter and Sanderling. The E.U. Birds Directive pays particular attention to wetlands, and as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Donegal Bay supports an excellent diversity of wintering waterbirds, especially species associated with shallow bays (all figures are mean peak counts for four of the five winters between 1995/96 and 1999/2000). It has an internationally important wintering population of Great Northern Diver (138) and is consistently one of the top sites in the country for this species. It also has one of the few regular populations of Black-throated Diver in the country (11), and Red-throated Diver (21). It supports an internationally important population of Light-bellied Brent Goose (207) and nationally important populations of Common Scoter (860) and Sanderling (68). A range of other species associated with estuarine and shoreline habitats occurs at the site, including Cormorant (29), Shelduck (24), Wigeon (224), Mallard (100), Long-tailed Duck (14), Red-breasted Merganser (38), Oystercatcher (581), Ringed Plover (99), Golden Plover (103), Lapwing (122), Dunlin (269), Bar-tailed Godwit (49), Curlew (359), Redshank (93), Greenshank (12) and Turnstone (53). Gulls are regular in autumn and winter, especially Black-headed Gull (239) and Common Gull (297).

This large coastal site is of high ornithological importance, with two species having populations of international importance (Great Northern Diver and Light-bellied Brent Goose) and a further two species having populations of national importance (Common Scoter and Sanderling). Also of note is that five of the regularly occurring species are listed on Annex I of the E.U. Birds Directive, i.e. Great Northern Diver, Black-throated Diver, Red-throated Diver, Golden Plover and Bar-tailed Godwit.

13.10.2010

## SITE SYNOPSIS

**SITE NAME: SLIGO/LEITRIM UPLANDS SPA**

**SITE CODE: 004187**

The Sligo/Leitrim Uplands SPA is located north-east of the town of Sligo in the mountain ranges of Ben Bulbin, Arroo and Cope's Mountain/Crockauns. The site straddles the Co. Sligo/Co. Leitrim border. The site includes six separate lengths of cliffs in these ranges, including those of King's Mountain, Benbulbin, Benwisikin, Gleniff, Truskmore, Tievebaun, Glenade, Glencar, Arroo Mountain and Cope's Mountain/Crockauns. The upper boundary of the site is taken to be 50 m from the cliff top except in the King's Mountain area, above Glencar Lough, where an expanse of suitable foraging habitat *c.* 200 m from the cliff top is included. These uplands are formed of Carboniferous limestone, capped in places by shales. They stand on a high plateau, 300-450 m above the surrounding countryside, and the edges form lofty cliffs from 15 to 300 m in height. Areas of scree occur below the cliffs on slopes of 40-50°.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Chough and Peregrine.

Inland cliffs and scree slopes are the predominant habitats of the site. Other habitats present on the site include heath, blanket bog, grassland, scrub, woodland and streams.

The cliffs hold an internationally important population of breeding Chough (14 breeding pairs recorded from the site in the 1992 survey and 15 in the 2002/03 survey). Chough forage mostly in unimproved, closely grazed grassland and flocks of up to 29 birds have been seen. The land on the plateau is, for the most part, vegetated by heath and blanket bog which is largely unsuitable habitat for Chough. The suitable grassland occurs mainly on the steep slopes below the cliffs.

The extensive uplands on the plateau provide excellent habitat for Peregrine; the cliffs are ideal nesting sites and four pairs were recorded here in 2002. Small numbers of Red Grouse are also known to occur within the site.

The Sligo/Leitrim Uplands SPA is of considerable ornithological significance, being a site of international importance for Chough and of national importance for Peregrine; both species are listed on Annex I of the E.U. Birds Directive.