

National Parks and Wildlife Service

Conservation Objectives Series

Lough Hoe Bog SAC 000633



An Roinn
Cultúir, Oidhreachta agus Gaeltachta

Department of
Culture, Heritage and the Gaeltacht



**National Parks and Wildlife Service,
Department of Culture, Heritage and the Gaeltacht,
7 Ely Place, Dublin 2, Ireland.
Web: www.npws.ie
E-mail: nature.conservation@ahg.gov.ie**

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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*

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

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

Supporting documents, relevant reports & publications

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

NPWS Documents

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Series :	Unpublished report to NPWS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

Year : 2017
Title : Lough Hoe Bog SAC (site code: 633) Conservation objectives supporting document- blanket bogs and associated habitats V1
Author : NPWS
Series : Conservation objectives supporting document

Other References

Year : 1982
Title : Eutrophication of waters. Monitoring assessment and control
Author : OECD
Series : OECD, Paris

Year : 1996
Title : Notes on some non-marine Mollusca from Co. Sligo and Co. Leitrim, including a new site for *Vertigo geyeri* Lindholm
Author : Cawley, M.
Series : Irish Naturalists' Journal, 25: 183-185

Year : 2000
Title : Colour in Irish lakes
Author : Free, G.; Allott, N.; Mills, P.; Kennelly, C.; Day, S.
Series : Verhandlungen Internationale Vereinigung für theoretische und angewandte Limnologie, 27: 2620-2623

Year : 2002
Title : A survey of the white-clawed crayfish (*Austropotamobius pallipes*) Lereboullet and of water quality in two catchments of eastern Ireland
Author : Demers, A.; Reynolds, J.D.
Series : Bulletin Francais de la Peche et de la Pisciculture, 367: 729-740

Year : 2002
Title : Deterioration of Atlantic soft water macrophyte communities by acidification, eutrophication and alkalinisation
Author : Arts, G.H.P.
Series : Aquatic Botany, 73: 373-393

Year : 2006
Title : A reference-based typology and ecological assessment system for Irish lakes. Preliminary investigations. Final report. Project 2000-FS-1-M1 Ecological assessment of lakes pilot study to establish monitoring methodologies EU (WFD)
Author : Free, G.; Little, R.; Tierney, D.; Donnelly, K.; Coroni, R.
Series : EPA, Wexford

Year : 2008
Title : Water Quality in Ireland 2004-2006
Author : Clabby, K.J.; Bradley, C.; Craig, M.; Daly, D.; Lucey, J.; McGarrigle, M.; O'Boyle, S.; Tierney, D.; Bowman, J.
Series : EPA, Wexford

Year : 2009
Title : The identification, characterization and conservation value of isoetid lakes in Ireland
Author : Free, G.; Bowman, J.; McGarrigle, M.; Little, R.; Coroni, R.; Donnelly, K.; Tierney, D.; Trodd, W.
Series : Aquatic Conservation: Marine and Freshwater Ecosystems, 19(3): 264-273

Year : 2010
Title : Water quality in Ireland 2007-2009
Author : McGarrigle, M.; Lucey, J.; Ó Cinnéide, M.
Series : EPA, Wexford

Year : 2015
Title : Water quality in Ireland 2010-2012
Author : Bradley, C.; Byrne, C.; Craig, M.; Free, G.; Gallagher, T.; Kennedy, B.; Little, R.; Lucey, J.; Mannix, A.; McCreesh, P.; McDermott, G.; McGarrigle, M.; Ní Longphuirt, S.; O'Boyle, S.; Plant, C.; Tierney, D.; Trodd, W.; Webster, P.; Wilkes, R.; Wynne, C.
Series : EPA, Wexford

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 : 3110 (map 3)

Year : 2017
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 : 1013, 1092 (maps 4 and 5)

Conservation Objectives for : Lough Hoe Bog SAC [000633]

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

To maintain the favourable conservation condition of Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) in Lough Hoe Bog SAC, which is defined by the following list of attributes and targets:

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

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

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

Conservation Objectives for : Lough Hoe Bog SAC [000633]

7130 Blanket bogs (* if active bog)

To restore the favourable conservation condition of Blanket bogs (* if active bog) in Lough Hoe Bog SAC, which is defined by the following list of attributes and targets:

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

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

Conservation Objectives for : Lough Hoe Bog SAC [000633]

1013 Geyer's Whorl Snail *Vertigo geyeri*

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

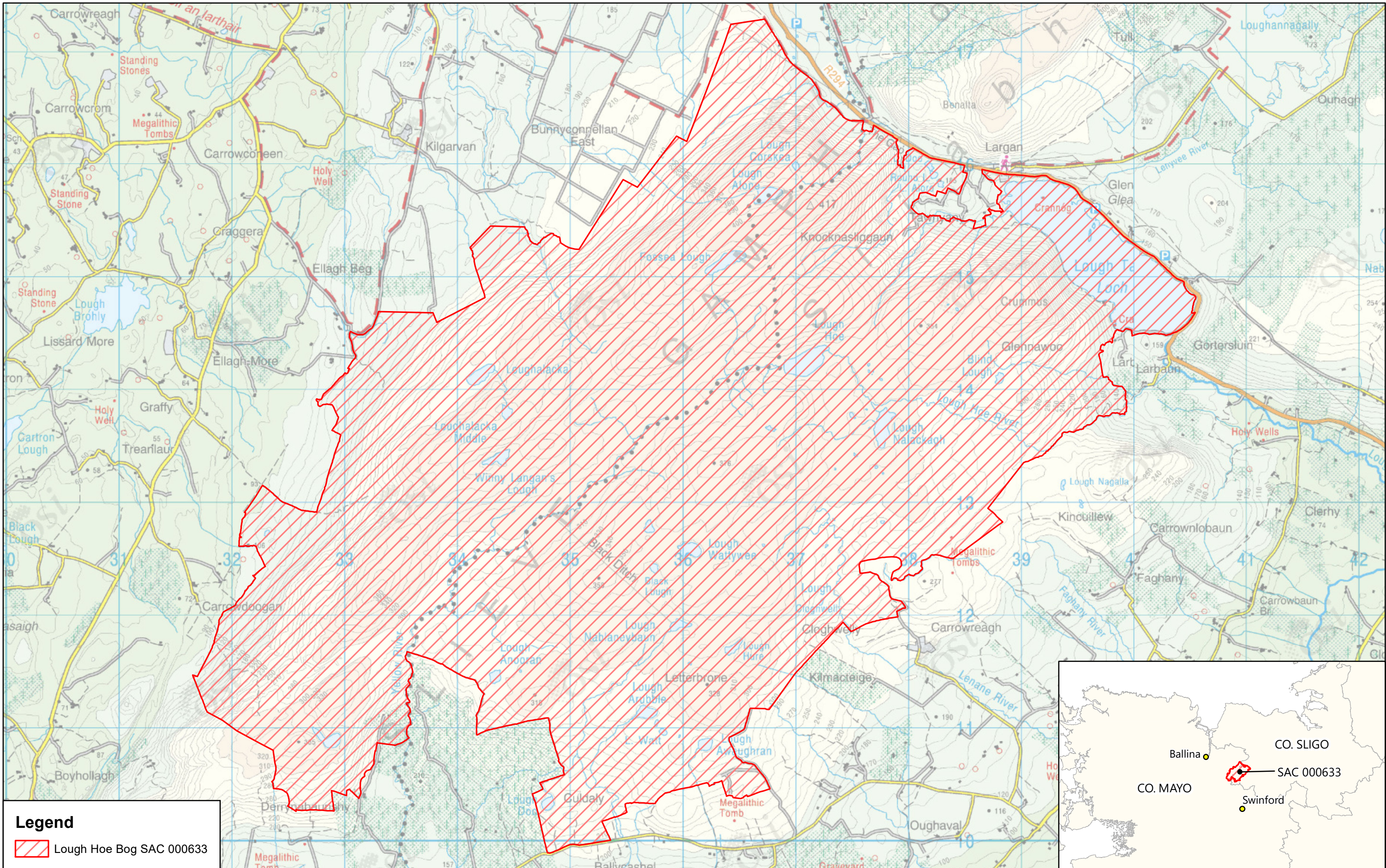
Attribute	Measure	Target	Notes
Distribution: occupied sites	Number of occupied 1km grid squares	Restore at least one sub-population	Geyer's whorl snail (<i>Vertigo geyeri</i>) has been recorded in two separate areas on the shore of Lough Talt in Lough Hoe Bog SAC within a single 1km square, G3915 (Cawley,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

Conservation Objectives for : Lough Hoe Bog SAC [000633]


1092 White-clawed Crayfish *Austropotamobius pallipes*

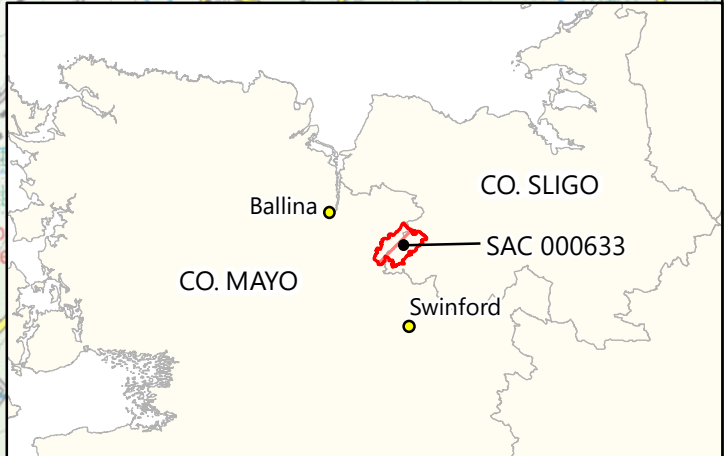
To maintain the favourable conservation condition of White-clawed Crayfish in Lough Hoe Bog SAC, which is defined by the following list of attributes and targets:


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



Legend

 Lough Hoe Bog SAC 000633



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

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

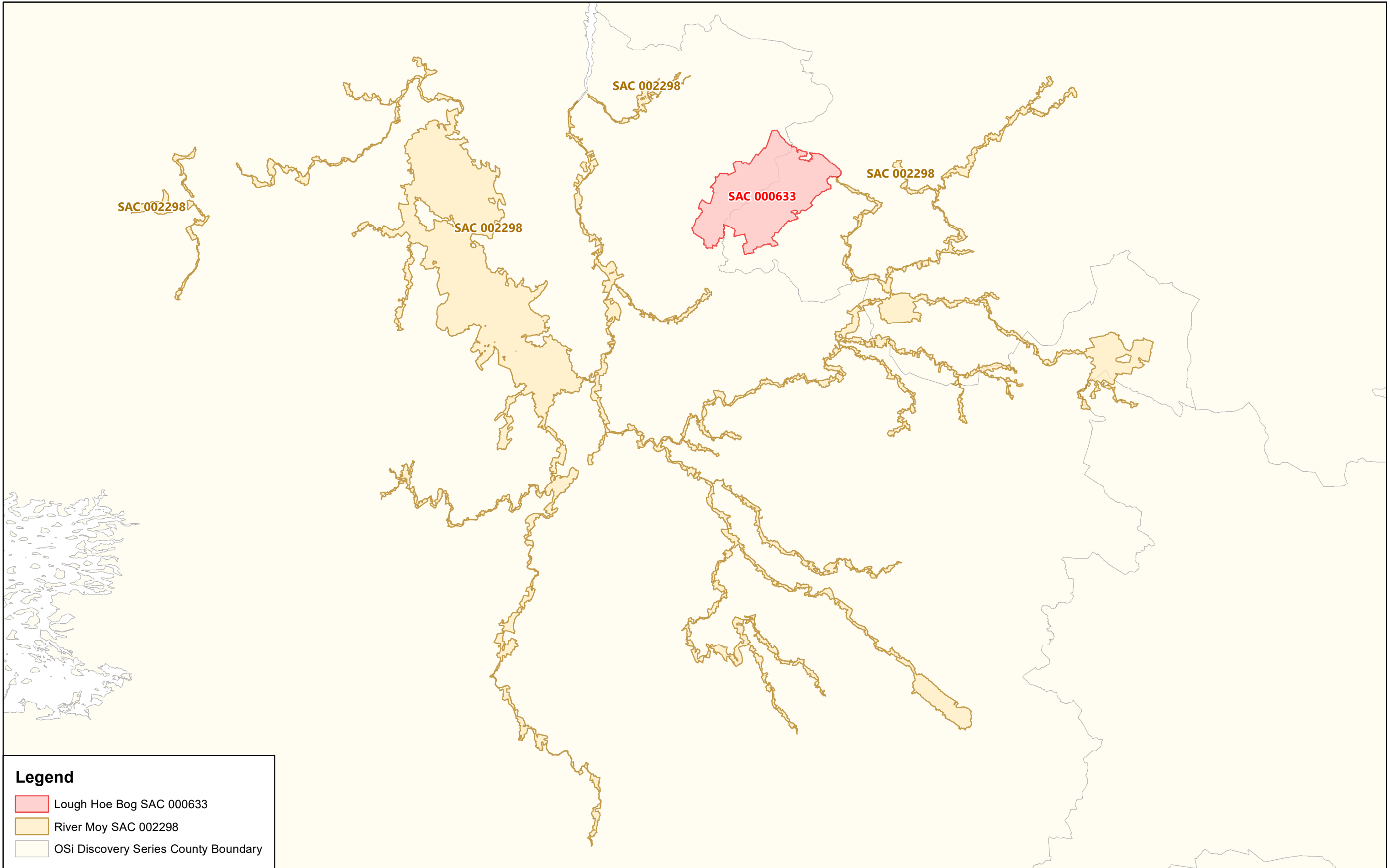
**SITE CODE:
SAC 000633; version 3. CO. SLIGO / CO. MAYO**

0 0.5 1 1.5 2 km

The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.
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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 EN 0059216. © Suirbhéarachta Ordonáis na hÉireann Rialtas na hÉireann.

 **Map Version 1
Date: Aug 2017**



Legend

- Lough Hoe Bog SAC 000633
- River Moy SAC 002298
- OSi Discovery Series County Boundary

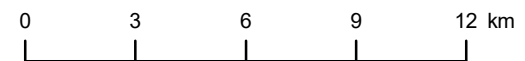


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**MAP 2:
LOUGH HOE BOG SAC
CONSERVATION OBJECTIVES
ADJACENT, ADJOINING AND
OVERLAPPING DESIGNATIONS**

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

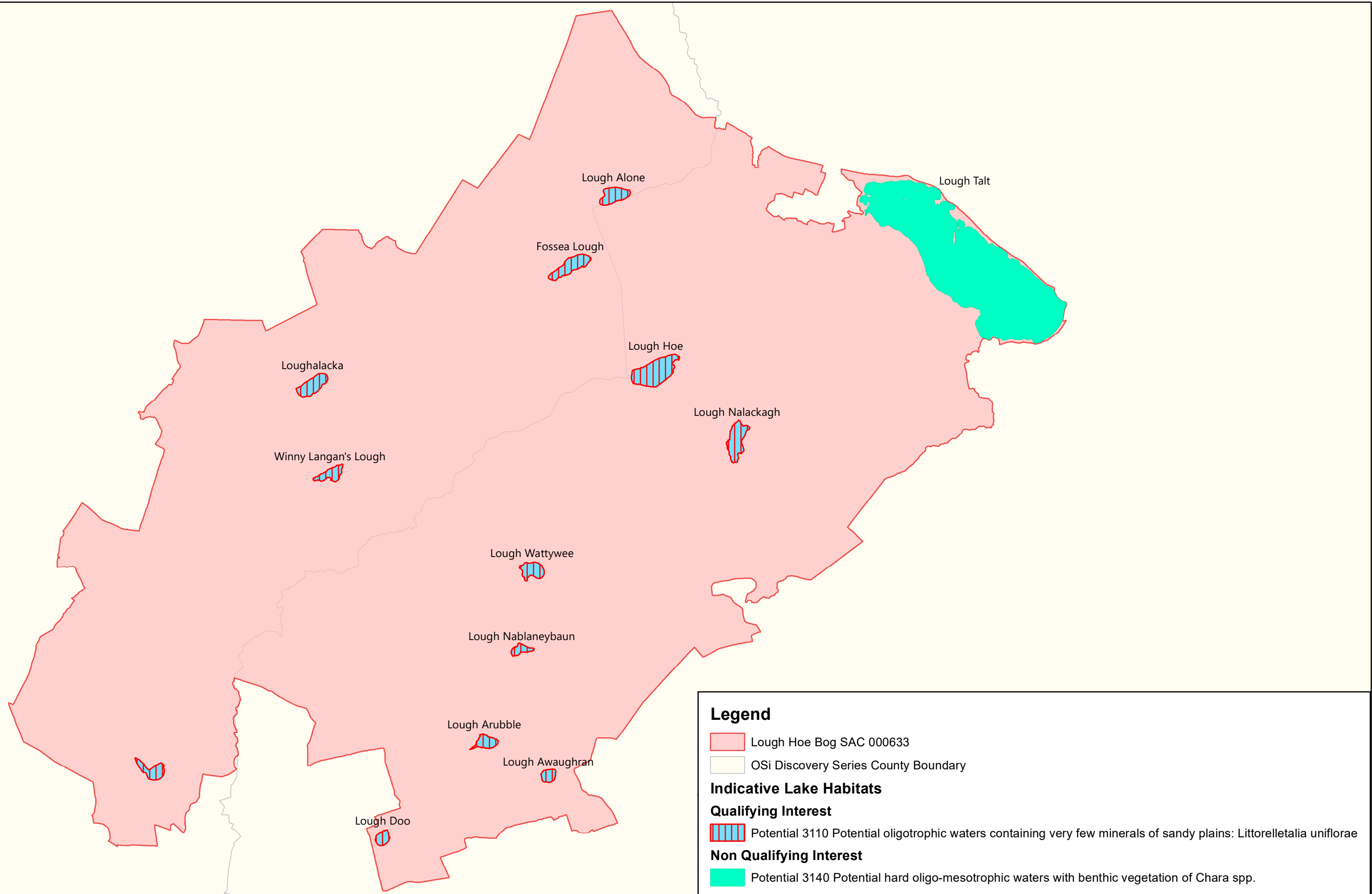
**SITE CODE:
SAC 000633; version 3. SAC 002298; version 3.01
CO. SLIGO / CO. MAYO**



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**Map Version 1
Date: Aug 2017**



Legend

- Lough Hoe Bog SAC 000633
- OSi Discovery Series County Boundary

Indicative Lake Habitats




Qualifying Interest

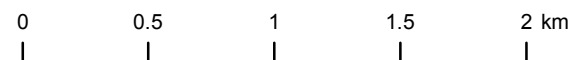
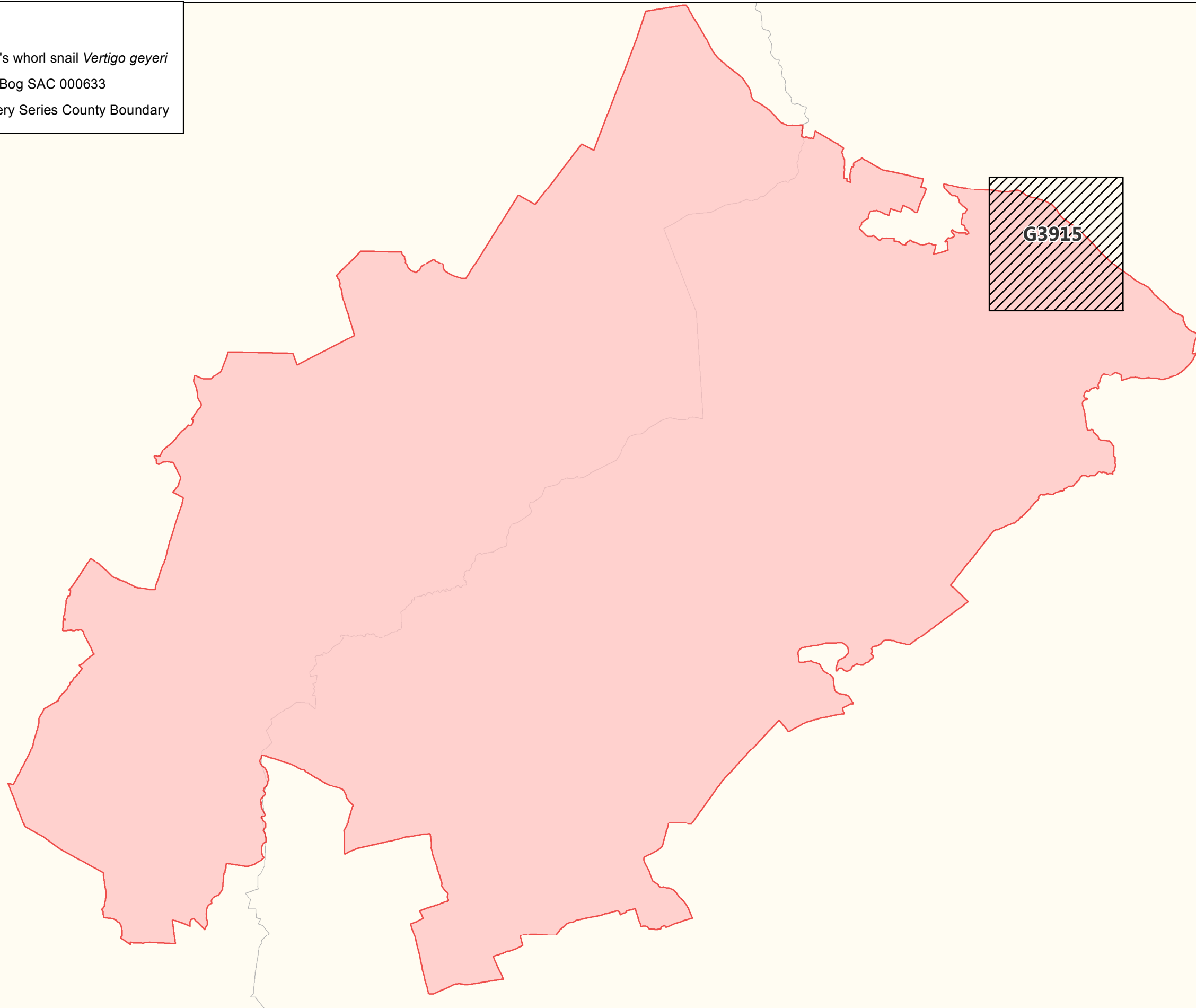
- Potential 3110 Potential oligotrophic waters containing very few minerals of sandy plains: *Littorelletalia uniflorae*

Non Qualifying Interest




- Potential 3140 Potential hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.

Legend

-  1013 Geyer's whorl snail *Vertigo geyeri*
-  Lough Hoe Bog SAC 000633
-  OSi Discovery Series County Boundary



Legend

-  1092 White-clawed Crayfish *Austropotamobius pallipes*
-  Lough Hoe Bog SAC 000633
-  OSi Discovery Series County Boundary

