

National Parks and Wildlife Service

Conservation Objectives Series

Fawnboy Bog/Lough Nacung SAC 000140



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

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



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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

000140	Fawnboy Bog/Lough Nacung SAC
1029	Freshwater Pearl Mussel <i>Margaritifera margaritifera</i>
4010	Northern Atlantic wet heaths with <i>Calluna vulgaris</i>
7130	Blanket bogs (* if active bog)
7150	Depressions on peat substrates of the Rhynchosporion

Please note that this SAC overlaps with Derryveagh and Glendowan Mountains SPA (004039) and adjoins Cloghernagore Bog and Glenveagh National Park SAC (002047). See map 2. The conservation objectives for this site should be used in conjunction with those for the overlapping and adjacent sites as appropriate.

Supporting documents, relevant reports & publications

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

NPWS Documents

Year :	1990
Title :	A survey to locate lowland blanket bogs of scientific interest in county Donegal and upland blanket bogs in counties Cavan, Leitrim and Roscommon
Author :	Douglas, C.; Dunnells, D.; Scally, L.; Wyse Jackson, M.
Series :	Unpublished report to NPWS
Year :	2009
Title :	NS II freshwater pearl mussel sub-basin management plans: monitoring of the freshwater pearl mussel in the Clady
Author :	Moorkens, E.
Series :	unpublished report to NPWS
Year :	2009
Title :	NS II freshwater pearl mussel sub-basin management plans: fisheries survey. Stage 1 report
Author :	Paul Johnston Associates
Series :	Unpublished report to NPWS
Year :	2009
Title :	NS II freshwater pearl mussel sub-basin management plans: phytobenthos monitoring of the Clady catchment, Co. Donegal
Author :	Ni Chathain, B.
Series :	Unpublished report to NPWS
Year :	2009
Title :	NS II freshwater pearl mussel sub-basin management plans. Report on biological monitoring of surface water quality in the Clady catchment, Co. Donegal
Author :	Williams, L.
Series :	Unpublished report to NPWS
Year :	2010
Title :	Second draft Clady freshwater pearl mussel sub-basin management plan (2009-2015) March 2010
Author :	NPWS
Series :	Unpublished document to the Department of Environment, Heritage and Local Government
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 :	2013
Title :	The status of EU protected habitats and species in Ireland. Volume 3. Species 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 : Monitoring populations of the freshwater pearl mussel *Margaritifera margaritifera*. 2014 monitoring survey of the river Clady, Co. Donegal
Author : Moorkens, E.
Series : Unpublished report to NPWS

Year : 2016
Title : Fawnboy Bog/Lough Nacung SAC (site code: 140) Conservation objectives supporting document- upland habitats V1
Author : NPWS
Series : Conservation objectives supporting document

Other References

Year : 1988
Title : The Irish red data book 1. Vascular plants
Author : Curtis, T.G.F; McGough, H.N.
Series : Wildlife Service, Dublin

Year : 2006
Title : The status of host fish populations and fish species richness in European freshwater pearl mussel (*Margaritifera margaritifera*) streams
Author : Geist, J.; Porkka, M.; Kuehn, R.
Series : Aquatic Conservation: Marine and Freshwater Ecosystems, 16: 251-266

Year : 2010
Title : Addressing the conservation and rehabilitation of *Margaritifera margaritifera* populations in the Republic of Ireland within the framework of the habitats and species directive
Author : Moorkens, E.
Series : Journal of Conchology, 40: 339

Year : 2014
Title : Assessing near-bed velocity in a recruiting population of the endangered freshwater pearl mussel (*Margaritifera margaritifera*) in Ireland
Author : Moorkens, E.; Killeen, I.
Series : Aquatic Conservation: Marine and Freshwater Ecosystems 24(6), 853-862

Spatial data sources

Year :	Revision 2012
Title :	Margaritifera Sensitive Areas data
GIS Operations :	Relevant catchment boundaries identified. Expert opinion used as necessary to resolve any issues arising
Used For :	1029 (map 3)
<hr/>	
Year :	2016
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 :	1029 (map 3)
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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 Fawnboy Bog/Lough Nacung SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Northern Atlantic wet heaths with <i>Erica tetralix</i> habitat has not been mapped in detail for Fawnboy Bog/Lough Nacung SAC, but from current available data the total area of the qualifying habitat is estimated to be approximately 150ha. Further information can be found in Douglas et al. (1990). Further details on this and the following attributes can be found in the Fawnboy Bog/Lough Nacung SAC conservation objectives supporting document for upland habitats
Habitat distribution	Occurrence	No decline, subject to natural processes	Areas of wet heath appear to be most extensive in the areas of the SAC north of Lough Nacung; information from the GIS files associated with NPWS (2013). Further information can be found within this source and 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	The diversity of wet heath communities within this SAC is unknown. Further information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: 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), where the list of positive indicator species for this habitat is also presented. Further details can be found in the uplands supporting document
Vegetation composition: 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), where the list of negative indicator species is also presented. Further details can be found in the uplands supporting document
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
Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 20%	Based on Perrin et al. (2014). See the uplands supporting document for further details

Vegetation composition: bracken	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of bracken (<i>Pteridium aquilinum</i>) less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: soft rush	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of soft rush (<i>Juncus effusus</i>) less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: <i>Sphagnum</i> condition	Condition at a representative number of 2m x 2m monitoring stops	Less than 10% of the <i>Sphagnum</i> cover is crushed, broken and/or pulled up	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Less than 33% collectively of the last complete growing season's shoots of ericoids, crowberry (<i>Empetrum nigrum</i>) and bog-myrtle (<i>Myrica gale</i>) showing signs of browsing	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: burning	Occurrence in local vicinity of a representative number of 2m x 2m monitoring stops	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning	Based on Perrin et al. (2014), where the list of sensitive areas is also presented. Further details can be found in the uplands supporting document
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	This includes species listed in the Flora (Protection) Order, 2015 and/or the red data lists, Curtis and McGough (1988) and Lockhart et al. (2012). See the uplands supporting document for further details. The red data book species <i>Erica mackaiana</i> is noted as being present within wet heath in the SAC (NPWS internal files)

Conservation Objectives for : Fawnboy Bog/Lough Nacung SAC [000140]

7130 Blanket bogs (* if active bog)

To restore the favourable conservation condition of Blanket bogs in Fawnboy Bog/Lough Nacung 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 Fawnboy Bog/Lough Nacung SAC, but from current available data the total area of the qualifying habitat is estimated to be approximately 250ha. Further information can be found in Douglas et al. (1990). Further details on this and the following attributes can be found in the Fawnboy Bog/Lough Nacung SAC conservation objectives supporting document for upland habitats
Habitat distribution	Occurrence	No decline, subject to natural processes	Extensive areas of blanket bog were recorded by Douglas et al. (1990). Further information can be found within this source and 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 habitat	At least 99% of the total Annex I blanket bog area is 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	Douglas et al. (1990) recorded a variety of blanket bog vegetation communities at this site, one of which corresponds to a community recorded in the National Survey of Upland Habitats and listed in the provisional list of vegetation communities described in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species at each monitoring stop is at least seven	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: 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), 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%	Based on Perrin et al. (2014). See the uplands supporting document for further details. The non-native species <i>Campylopus introflexus</i> was recorded by Douglas et al. (1990) within areas of fire damaged blanket bog in the SAC
Vegetation composition: native trees and scrub	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details

Vegetation structure: <i>Sphagnum</i> condition	Condition at a representative number of 2m x 2m monitoring stops	Less than 10% of the <i>Sphagnum</i> cover is crushed, broken and/or pulled up	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Last complete growing season's shoots of ericoids, crowberry (<i>Empetrum nigrum</i>) and bog-myrtle (<i>Myrica gale</i>) showing signs of browsing collectively less than 33%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning	Based on Perrin et al. (2014), where the list of sensitive areas is also presented. See the uplands supporting document for further details
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: drainage	Percentage area in local vicinity of a representative number of monitoring stops	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: erosion	Occurrence in local vicinity of a representative number of monitoring stops	Less than 5% of the greater bog mosaic comprises erosion gullies and eroded areas	Based on Perrin et al. (2014). See the uplands supporting document for further details
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat	This includes species listed in the Flora (Protection) Order, 2015 and/or the red data lists, Curtis and McGough (1988) and Lockhart et al. (2012). See the uplands supporting document for further details. The red data book species <i>Erica mackaiana</i> has been recorded within blanket bog in the SAC (Douglas et al., 1990)

Conservation Objectives for : Fawnboy Bog/Lough Nacung SAC [000140]

7150 Depressions on peat substrates of the Rhynchosporion

To restore the favourable conservation condition of Depressions on peat substrates of the Rhynchosporion in Fawnboy Bog/Lough Nacung 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	Depressions on peat substrates of the Rhynchosporion habitat has not been mapped in detail for Fawnboy Bog/Lough Nacung SAC and thus total area of the qualifying habitat is unknown. Further information can be found in Douglas et al. (1990). Further details on this and the following attributes can be found in the Fawnboy Bog/Lough Nacung SAC conservation objectives supporting document for upland habitats
Habitat distribution	Occurrence	No decline, subject to natural processes	Further information can be found within Douglas et al. (1990) and the uplands supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the uplands supporting document for further details
Vegetation composition: positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species at each monitoring stop is at least five	Based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented. See the uplands supporting document for further details
Vegetation composition: <i>Rhynchospora</i> spp.	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of white beaked sedge (<i>Rhynchospora alba</i>) and brown beaked sedge (<i>R. fusca</i>) at least 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: potential dominant species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of each of the potential dominant species less than 35%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented. See the uplands supporting document for further details
Vegetation composition: non-native species	Percentage cover at, 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
Vegetation composition: native trees and scrub	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: <i>Sphagnum</i> condition	Condition at a representative number of 2m x 2m monitoring stops	Less than 10% of the <i>Sphagnum</i> cover is crushed, broken and/or pulled up	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Last complete growing season's shoots of ericoids, crowberry (<i>Empetrum nigrum</i>) and bog-myrtle (<i>Myrica gale</i>) showing signs of browsing collectively less than 33%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning	Based on Perrin et al. (2014), where the list of sensitive areas is also presented. See the uplands supporting document for further details

Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: drainage	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	This includes species listed in the Flora (Protection) Order, 2015 and/or the red data lists, Curtis and McGough (1988) and Lockhart et al. (2012). See the uplands supporting document for further details

Conservation Objectives for : Fawnboy Bog/Lough Nacung SAC [000140]

1029 Freshwater Pearl Mussel *Margaritifera margaritifera*

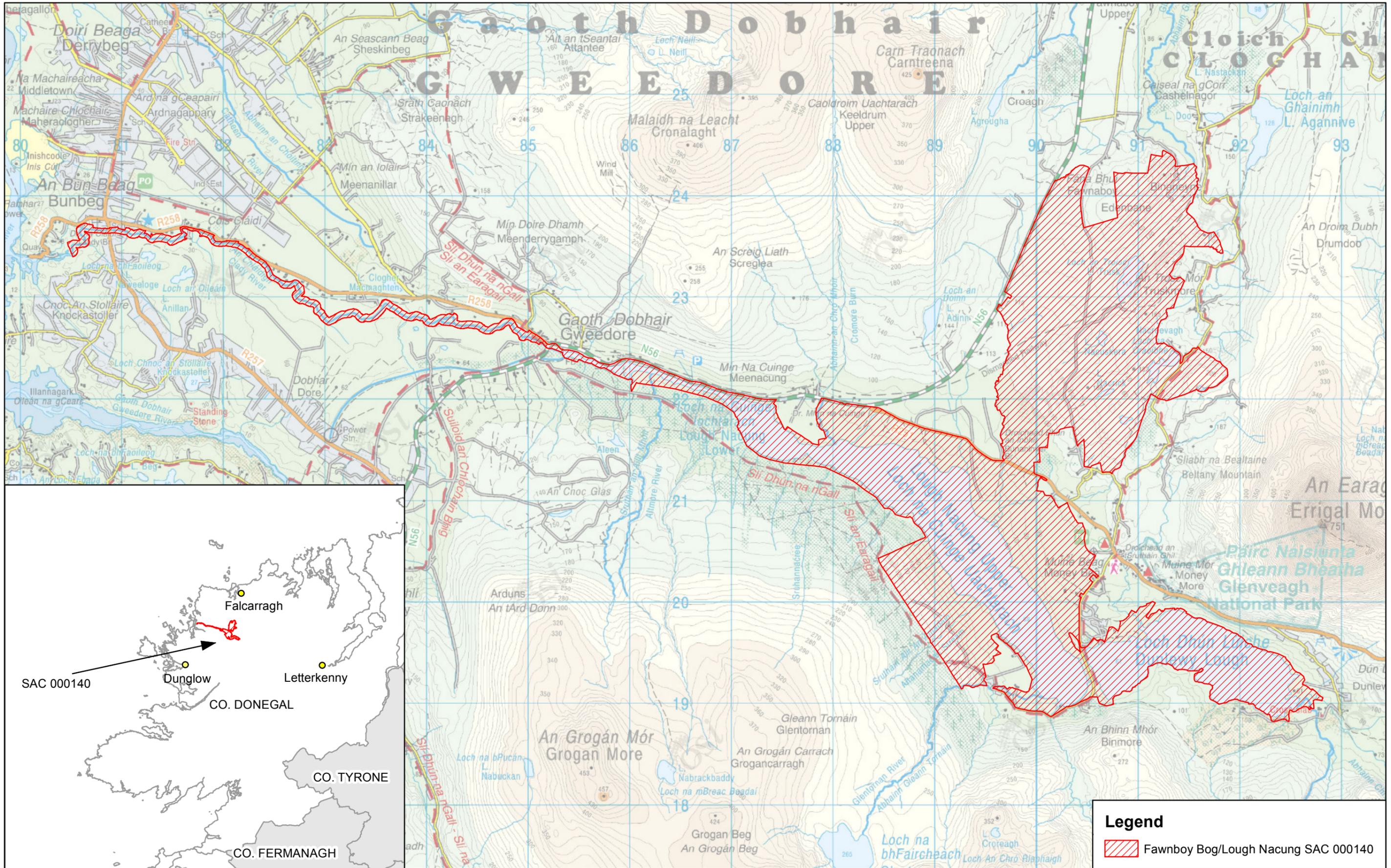
To restore the favourable conservation condition of Freshwater Pearl Mussel in Fawnboy Bog/Lough Nacung SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Kilometres	Maintain at 7.81km. See map 3	The conservation objective applies to the Clady freshwater pearl mussel (<i>Margaritifera margaritifera</i>) population, which is listed on SI 296 of 2009. The distribution and abundance of the freshwater pearl mussel in the Clady was mapped in 2006, as part of full, baseline monitoring (Moorkens, 2007). Mussels are distributed in the Clady River from near to Lough Nacung to the tidal limits downstream of Bunbeg. Mussels are occasional in the upper stretches near Lough Nacung, becoming frequent to common after 300m and abundant from 1km downstream of Gweedore to Bunbeg. The target is for the species to be sufficiently widespread to maintain itself on a long-term basis as a viable component of the Clady system. See NPWS (2010) for further information
Population size	Number of adult mussels	Restore Clady population to at least 250,000 adult mussels	Moorkens (2007) estimated the Clady population as at least 250,000. No elevated losses of adult mussels have been recorded since that baseline (Moorkens, 2009, 2015). As noted above, mussels were abundant from c.1km downstream of Gweedore to Bunbeg, and in one stretch downstream of Bunbeg (Moorkens, 2007). In 2006, mussel density of more than 100/m ² was recorded in places, while maximum density in transects was 58/m ² (Moorkens, 2007). The target is for the species to be sufficiently abundant to maintain itself on a long-term basis as a viable component of the Clady system
Population structure: recruitment	Percentage per size class	Restore to at least 20% of population no more than 65mm in length; and at least 5% of population no more than 30mm in length.	Mussels of no more than 65mm are considered 'young mussels' and may be found buried in the substratum and/or beneath adult mussels. Mussels of no more than 30mm are 'juvenile mussels' and are always buried in the substratum. See also the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. The Clady is a steadily ageing population with no evidence for successful recruitment in recent times. In 2006, the Clady failed both targets and no mussels under 71mm were found (Moorkens, 2007). It failed both targets again in 2009, with no mussels under 75mm (Moorkens, 2009; NPWS, 2010). In 2014, no mussels under 81mm were found (Moorkens, 2015). The Clady population is unsustainable owing to lack of survival of juvenile mussels. The target is for sufficient juvenile recruitment to allow the species to maintain itself on a long-term basis as a viable component of the Clady system
Population structure: adult mortality	Percentage	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution	5% is considered the cut-off between the combined errors associated with natural fluctuations and sampling methods and evidence of true population decline. 1% of dead shells is considered to be indicative of natural losses. There is no evidence for unnatural levels of mortality in the Clady since the baseline survey in 2006, and it passed both targets in 2009 and 2014 (Moorkens, 2007, 2009, 2015; NPWS, 2010). The Clady population is unsustainable owing to lack of survival of juvenile mussels. The target is for sufficient survival of adults to allow the species to maintain itself on a long-term basis as a viable component of the Clady system

Suitable habitat: extent	Kilometres	Restore suitable habitat in more than 7.81km in the Clady system (see map 3) and any additional stretches necessary for salmonid spawning	The extent of the mussel habitat in the Clady River is from downstream of Lough Nacung to the tidal limits (Moorkens, 2007, 2009; NPWS, 2010). Flow regulation and associated hydromorphological impacts are key issues for the mussel habitat in the Clady (Moorkens, 2007, 2009, 2015; NPWS, 2010). The mussel habitat also suffers from siltation and nutrient-enrichment, and drainage and other disturbance to peatland is a significant pressure. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clady system
Suitable habitat: condition	Kilometres	Restore condition of suitable habitat	The species' habitat is a combination of 1) the area of habitat adult and juvenile mussels can occupy and 2) the area of spawning and nursery habitats the host fish can occupy. Fish nursery and mussel habitat typically overlap. Fish spawning habitat is generally adjacent to mussel habitat, but may lie upstream of the generalised mussel distribution. Only those spawning areas that can regularly contribute juvenile fish to areas occupied by adult mussels should be considered. The availability of mussel and fish spawning/nursery habitat is determined by flow and substratum conditions. It is highly sensitive to hydromorphological changes, sedimentation and nutrient enrichment. Pressures from throughout the catchment (map 3) contribute to such impacts. The habitat in the Clady cannot support sufficient juvenile survival. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clady system
Water quality: macroinvertebrate and phytobenthos (diatoms)	Ecological quality ratio (EQR)	Restore water quality-macroinvertebrates: EQR greater than 0.90 (Q4-5 or Q5); phytobenthos: EQR greater than 0.93	These EQRs correspond to high ecological status for these two Water Framework Directive biological quality elements. They represent high water quality with very low nutrient concentrations (oligotrophic conditions). In 2009, the habitat in the Clady system failed the macroinvertebrate target, but passed the diatom target, however, the diatom coating was quite heavy in places (Ní Chatháin, 2009; Williams, 2009; NPWS, 2010). See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clady system
Substratum quality: filamentous algae (macroalgae); macrophytes (rooted higher plants)	Percentage	Restore substratum quality- filamentous algae: absent or trace (less than 5%); macrophytes: absent or trace (less than 5%)	The Clady failed both targets in 2009 (NPWS, 2010). High cover abundance of filamentous algae (up to 100%) and macrophytes (up to 75%) was recorded in the mussel quadrats (Moorkens, 2009). Plant abundance varied spatially and temporally, but failed the targets throughout the Clady system (Ní Chatháin, 2009; Williams, 2009; NPWS, 2010). There was evidence of significant enrichment just upstream of Bunbeg Bridge, including 50% <i>Myriophyllum</i> cover (Williams, 2009). The Clady failed the targets again in 2014, with both living and dead filamentous algae throughout the mussel habitat and very dense cover in most quadrats sampled (Moorkens, 2015). <i>Myriophyllum</i> cover was up to 10% in some quadrats (Moorkens, 2015). The poor condition of the river substratum is preventing sufficient recruitment of juvenile mussels. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clady system

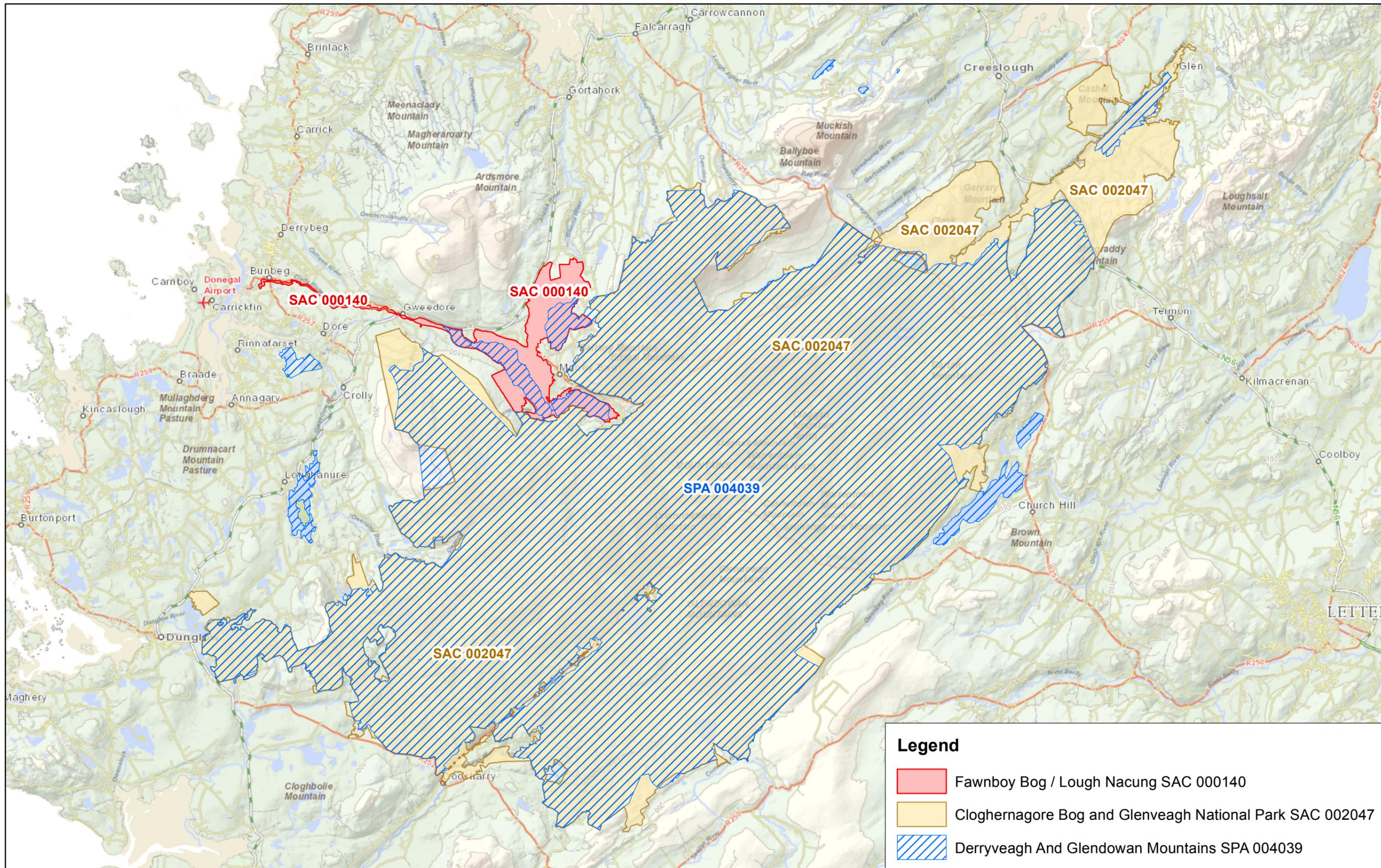
Substratum quality: sediment	Occurrence	Restore substratum quality- stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment	The Clady failed the target for the Sub-basin Management Plan (NPWS, 2010), with significant silt plumes in mussel habitat (Moorkens, 2009). Siltation impacts were patchily distributed throughout the Clady in both 2006 and 2009 (Moorkens, 2007; Williams, 2009). The Clady passed the target in 2014, when surface siltation was not evident (Moorkens, 2015). Siltation impacts in the Clady may be episodic and linked to flow regulation and/or damage to peatland. Sufficient survival of juvenile mussels is being prevented by the poor condition of the river substratum. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clady system
Substratum quality: oxygen availability	Redox potential	Restore to no more than 20% decline from water column to 5cm depth in substrate	Differences in redox potential between the water column and the substrate correlate with differences in oxygen levels. Juvenile mussels require full oxygenation while buried in gravel. In suitable habitat, there should be very little loss of redox potential between the water column and underlying gravels. The Clady failed the redox target in 2009, with an average loss of 29% redox potential at 5cm (Moorkens, 2009; NPWS, 2010). It failed again (marginally) in 2014, when the average redox loss was 20% (Moorkens, 2015). The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clady system
Hydrological regime: flow variability	Metres per second	Restore appropriate hydrological regimes	The availability of suitable habitat is largely determined by flow (catchment geology being the other important factor). To restore habitat for the species, flow variability over the annual cycle must be such that: 1) high flows can wash fine sediments from the substratum; 2) high flows are not artificially increased causing excessive scour of mussel habitat; 3) low flows do not exacerbate deposition of fine sediment or growth of algae/macrophytes and 4) low flows do not cause stress to mussels in terms of exposure, water temperatures, food availability or aspects of the reproductive cycle; see Moorkens and Killeen (2014). Groundwater inflow to substratum contributes to water-cycling. Low flows appear to be impacting mussels in the Clady. The effects of the ESB HEP scheme and peatland degradation require investigation. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clady system
Host fish	Number	Maintain sufficient juvenile salmonids to host glochidial larvae	Salmonid fish are host to the larval stage of the freshwater pearl mussel and, thus, are essential to the completion of the life cycle. 0+ and 1+ fish are typically used, because of habitat overlaps and the development of immunity with age in fish. Fish presence is considered sufficient, as higher fish density and biomass is indicative of enriched conditions in mussel rivers. Geist et al. (2006) found that higher densities of host fish coincided with eutrophication, poor substrate quality for pearl mussels and a lack of pearl mussel recruitment, while significantly lower densities and biomass of host fish were associated with high numbers of juvenile mussels. Fish movements must be such that 0+ fish remain in the mussel habitat until their 1+ summer. No fish stocking should occur within the mussel habitat, nor any works that may change the salmonid balance or residency time. In May 2009, glochidia were found on salmon, but not on trout in the Clady (Johnston et al., 2009; NPWS, 2010)

Fringing habitat	Hectares	Maintain the area and condition of fringing habitats necessary to support the population	Riparian habitats, including those along lake fringes, particularly natural/semi-natural woodlands and wetlands, even where they do not form part of a natural floodplain, are an integral part of the structure and functioning of river systems. Fringing habitats assist in the settlement of fine suspended material, protect banks from erosion, contribute to nutrient cycling and to the aquatic food web (e.g. allochthonous matter such as leaf fall), and provide habitat (refuge and resources) for certain life-stages of fish, birds and aquatic invertebrates. Shade may also be important in suppressing algal and macrophyte growth in enriched rivers and moderating temperatures. Equally, fringing habitats are dependent on rivers/lakes, particularly their water levels, and support wetland communities and species of conservation concern. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clady system
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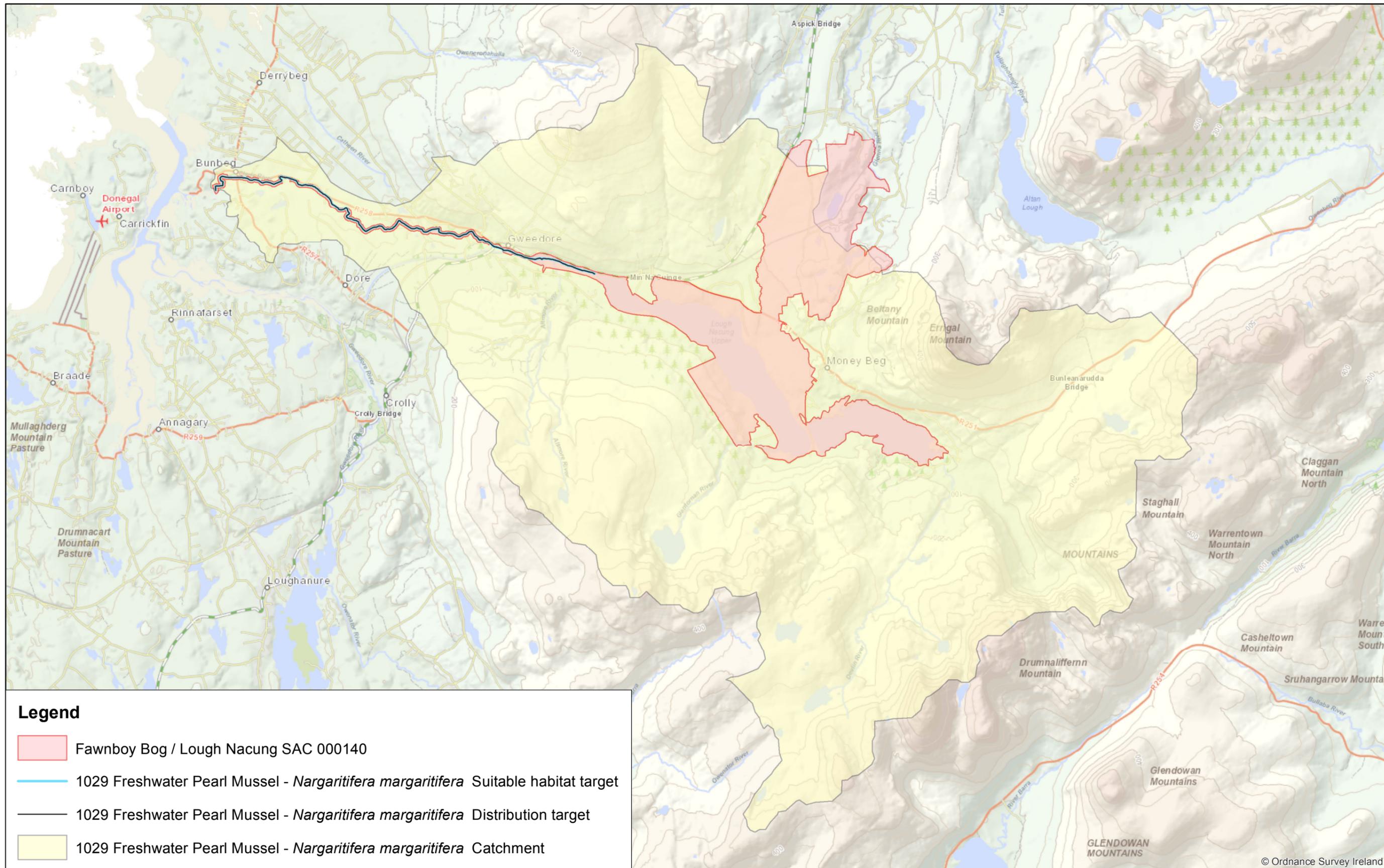
Legend

 Fawnboy Bog/Lough Nacung SAC 000140



Legend

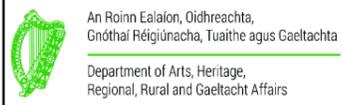
- Fawnboy Bog / Lough Nacung SAC 000140
- Cloghernagore Bog and Glenveagh National Park SAC 002047
- Derryveagh And Glendowan Mountains SPA 004039



Legend

- Fawnboy Bog / Lough Nacung SAC 000140
- 1029 Freshwater Pearl Mussel - *Nargaritifera margaritifera* Suitable habitat target
- 1029 Freshwater Pearl Mussel - *Nargaritifera margaritifera* Distribution target
- 1029 Freshwater Pearl Mussel - *Nargaritifera margaritifera* Catchment

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**MAP 3:
FAWNBOY BOG / LOUGH NACUNG SAC
CONSERVATION OBJECTIVES
FRESHWATER PEARL MUSSEL**

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

**SITE CODE:
SAC 000140 ; 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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