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Conservation Objectives Series

Lough Corrib SAC 000297

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

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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***

000297	Lough Corrib SAC
1029	Freshwater Pearl Mussel *Margaritifera margaritifera*
1092	White-clawed Crayfish *Austropotamobius pallipes*
1095	Sea Lamprey *Petromyzon marinus*
1096	Brook Lamprey *Lampetra planeri*
1106	Salmon *Salmo salar*
1303	Lesser Horseshoe Bat *Rhinolophus hipposideros*
1355	Otter *Lutra lutra*
1393	Slender Green Feather-moss *Drepanocladus vernicosus*
1833	Slender Naiad *Najas flexilis*
3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea
3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.
3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
6410	*Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)
7110	Active raised bogs*
7120	Degraded raised bogs still capable of natural regeneration
7150	Depressions on peat substrates of the Rhynchosporion
7210	Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae*
7220	Petrifying springs with tufa formation (Cratoneurion)*
7230	Alkaline fens
8240	Limestone pavements*
91A0	Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
91D0	Bog woodland*

Please note that this SAC overlaps with Lough Corrib SPA (004042). It is adjacent to Galway Bay Complex SAC (000268), Maumturk Mountains SAC (002008), Connemara Bog Complex SAC (002034) and Monivea Bog SAC (002352). See map 2. The conservation objectives for this site should be used in conjunction with those for overlapping and adjacent sites as appropriate.

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

NPWS Documents

Year :	1984
Title :	The vegetation of Irish lakes
Author :	Heuff, H.
Series :	Unpublished report to NPWS
Year :	1995
Title :	Mapping of proposed SAC rivers for *Margaritifera margaritifera*. A report for the National Parks and Wildlife Service on work carried out from August to October 1995
Author :	Moorkens, E.
Series :	Unpublished report to NPWS
Year :	1998
Title :	Conservation management of the white-clawed crayfish, *Austropotamobius pallipes*
Author :	Reynolds, J.D.
Series :	Irish Wildlife Manual No. 1
Year :	2002
Title :	*Najas flexilis* in Donegal
Author :	Roden, C.M.
Series :	Unpublished report to NPWS
Year :	2004
Title :	Pilot project for monitoring populations of the freshwater pearl mussel *Margaritifera margaritifera*. Baseline survey of the Owenriff River SAC, County Galway
Author :	Moorkens, E.
Series :	Unpublished report to NPWS
Year :	2004
Title :	The distribution of *Najas flexilis* in Ireland 2002-2004
Author :	Roden, C.M.
Series :	Unpublished report to NPWS
Year :	2005
Title :	Monitoring populations of the freshwater pearl mussel *Margaritifera margaritifera*. Repeat survey of the Owenriff River cSAC, County Galway
Author :	Moorkens, E.
Series :	Unpublished report to NPWS
Year :	2006
Title :	Otter survey of Ireland 2004/2005
Author :	Bailey, M.; Rochford, J.
Series :	Irish Wildlife Manual No. 23
Year :	2006
Title :	Bat mitigation guidelines for Ireland
Author :	Kelleher, C.; Marnell, F.
Series :	Irish Wildlife Manual No. 25
Year :	2007
Title :	A survey of juvenile lamprey populations in the Corrib and Suir catchments
Author :	O'Connor, W.
Series :	Irish Wildlife Manual No. 26

Year :	2007
Title :	Supporting documentation for the Habitats Directive Conservation Status Assessment - backing documents. Article 17 forms and supporting maps
Author :	NPWS
Series :	Unpublished report to NPWS
Year :	2008
Title :	Monitoring populations of freshwater pearl mussel *Margaritifera margaritifera*. 2008 repeat survey of the Owenriff River SAC, County Galway
Author :	Moorkens, E.; Killeen, I.
Series :	Unpublished report to NPWS
Year :	2008
Title :	National survey of native woodlands 2003-2008
Author :	Perrin, P.M.; Martin, J.; Barron, S.; O'Neill, F.H.; McNutt, K.E.; Delaney, A.
Series :	Unpublished report to NPWS
Year :	2009
Title :	NS II freshwater pearl mussel sub-basin management plans: monitoring of the freshwater pearl mussel in the Owenriff
Author :	Moorkens, E.
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 Owenriff catchment (Corrib sub-catchment), Co. Galway
Author :	Williams, L.
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 :	2010
Title :	A provisional inventory of ancient and long-established woodland in Ireland
Author :	Perrin, P.M.; Daly, O.H.
Series :	Irish Wildlife Manual No. 46
Year :	2010
Title :	A technical manual for monitoring white-clawed crayfish (*Austropotamobius pallipes*) in Irish lakes
Author :	Reynolds, J., O'Connor, W., O'Keeffe, C.; Lynn, D.
Series :	Irish Wildlife Manual No.45
Year :	2010
Title :	Second Draft Owenriff Freshwater Pearl Mussel Sub-basin Management Plan (2009-2015). March 2010
Author :	NPWS
Series :	Unpublished document to Department of the Environment, Heritage and Local Government
Year :	2011
Title :	Monitoring populations of the freshwater pearl mussel *Margaritifera margaritifera* – 2011 condition assessment survey of the freshwater pearl mussel in the Owenriff River, County Galway
Author :	Moorkens, E.
Series :	Unpublished report to NPWS

Year :	2012
Title :	Ireland Red List No. 8: Bryophytes
Author :	Lockhart, N.; Hodgetts, N.; Holyoak, D.
Series :	Ireland Red List series, NPWS
Year :	2013
Title :	Conservation status assessment for petrifying springs
Author :	Lyons, M.D.; Kelly, D.L.
Series :	Unpublished report to NPWS
Year :	2013
Title :	National otter survey of Ireland 2010/12
Author :	Reid, N.; Hayden, B.; Lundy, M.G.; Pietravalle, S.; McDonald, R.A.; Montgomery, W.I.
Series :	Irish Wildlife Manual No. 76
Year :	2013
Title :	Irish semi-natural grasslands survey 2007-2012
Author :	O'Neill, F.H.; Martin, J.R.; Devaney, F.M.; Perrin, P.M.
Series :	Irish Wildlife Manual No. 78
Year :	2013
Title :	National survey of limestone pavement and associated habitats in Ireland
Author :	Wilson, S.; Fernandez, F.
Series :	Irish Wildlife Manual No. 73
Year :	2013
Title :	Results of a monitoring survey of bog woodland
Author :	Cross, J.; Lynn, D.
Series :	Irish Wildlife Manual No. 69
Year :	2013
Title :	A survey of the benthic macrophytes of three hard-water lakes: Lough Bunny, Lough Carra and Lough Owel
Author :	Roden, C.; Murphy, P.
Series :	Irish Wildlife Manual No. 70
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 :	2014
Title :	Raised Bog Monitoring and Assessment Survey 2013
Author :	Fernandez, F.; Connolly, K.; Crowley, W.; Denyer, J.; Duff, K.; Smith, G.
Series :	Irish Wildlife Manual No. 81

Year :	2014
Title :	Addergoole Bog (SAC 000297), Co.Galway, Site Report
Author :	Fernandez, F.; Connolly, K.; Crowley, W.; Denyer, J.; Duff, K.; Smith, G.
Series :	Raised bog monitoring and assessment survey 2013
Year :	2014
Title :	National raised bog SAC management plan
Author :	Department of Arts, Heritage and the Gaeltacht
Series :	Draft for consultation. 15 January 2014
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 :	2015
Title :	Monitoring methods for *Hamatocaulis vernicosus* (Mitt.) Hedenäs (Slender green feather-moss) in the Republic of Ireland
Author :	Campbell, C.; Hodgetts, N.; Lockhart, N.
Series :	Irish Wildlife Manual No. 91
Year :	2015
Title :	Monitoring populations of the freshwater pearl mussel *Margaritifera margaritifera* – 2014 Monitoring survey of the Owenriff River, County Galway. March 2015
Author :	Moorkens, E.A.
Series :	Unpublished report to NPWS
Year :	2015
Title :	Monitoring populations of the freshwater pearl mussel *Margaritifera margaritifera* – 2015 Monitoring Survey of the Owenriff River, County Galway. November 2015
Author :	Moorkens, E.A.
Series :	Unpublished report to NPWS
Year :	2016
Title :	Monitoring guidelines for the assessment of petrifying springs in Ireland
Author :	Lyons, M.D.; Kelly, D.L.
Series :	Irish Wildlife Manual No. 94
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 :	2016 Survey and condition assessment of the population of the freshwater mussel *Margaritifera margaritifera* in the Owenriff River, County Galway
Author :	Moorkens, E.
Series :	Unpublished report to NPWS
Year :	2017
Title :	Lough Corrib SAC (site code: 297) Conservation objectives supporting document- *Najas flexilis* V1
Author :	NPWS
Series :	Conservation objectives supporting document

Year :	2017
Title :	Lough Corrib SAC (site code: 297) Conservation objectives supporting document- raised bog habitats V1
Author :	NPWS
Series :	Conservation objectives supporting document

Other References

Year :	1982
Title :	Otter survey of Ireland
Author :	Chapman, P.J.; Chapman, L.L.
Series :	Unpublished report to Vincent Wildlife Trust
Year :	1982
Title :	Eutrophication of waters. Monitoring assessment and control
Author :	OECD
Series :	OECD, Paris
Year :	1984
Title :	Studies on the biology of freshwater mussels (Lamellibranchia: Unionacea) in Ireland
Author :	Ross, E.D.
Series :	Unpublished MSc Thesis. National University of Ireland, Galway
Year :	1988
Title :	The reproductive biology of freshwater mussels in Ireland, with observations on their distribution and demography
Author :	Ross, E.D.
Series :	Unpublished Ph.D. Thesis, National University of Ireland, Galway
Year :	1989
Title :	The genera *Scorpidium* and *Hamatocaulis*, gen. nov., in northern Europe
Author :	Hedenäs, L.
Series :	Lindbergia, 15: 8-36
Year :	1990
Title :	The phytosociology and ecology of the aquatic and wetland communities of the lower Lough Corrib basin, County Galway
Author :	Mooney, E.P.; O'Connell, M.
Series :	Proceedings of the Royal Irish Academy. Section B: Biological, Geological, and Chemical Science, 90B(5): 58-97
Year :	1991
Title :	The spatial organization of otters (*Lutra lutra*) in Shetland
Author :	Kruuk, H.; Moorhouse, A.
Series :	Journal of Zoology, 224: 41-57
Year :	1994
Title :	The ecological status of Lough Corrib, Ireland, as indicated by physiographic factors, water chemistry and macrophytic flora
Author :	Krause, W.; King, J.J.
Series :	Vegetatio, 110: 149–161
Year :	1996
Title :	Studies on the biology and ecology of *Margaritifera* in Ireland
Author :	Moorkens, E.
Series :	Unpublished Ph.D. thesis, University of Dublin, Trinity College.

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 :	2001
Title :	Aquatic plants in Britain and Ireland
Author :	Preston, C.D.; Croft, J.M.
Series :	Harley Books, Colchester
Year :	2002
Title :	Reversing the habitat fragmentation of British woodlands
Author :	Peterken, G.
Series :	WWF-UK, London
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 :	2003
Title :	Monitoring the river, sea and brook lamprey, *Lampetra fluviatilis*, *L. planeri* and *Petromyzon marinus*
Author :	Harvey, J.; Cowx, I.
Series :	Conserving Natura 2000 Rivers Monitoring Series No. 5. English Nature, Peterborough
Year :	2003
Title :	Ecology of watercourses characterised by Ranunculion fluitantis and Callitricho-Batrachion Vegetation
Author :	Hatton-Ellis, T.W.; Grieve, N.
Series :	Conserving Natura 2000 Rivers Ecology Series No. 11. English Nature, Peterborough
Year :	2003
Title :	Identifying lamprey. A field key for sea, river and brook lamprey
Author :	Gardiner, R.
Series :	Conserving Natura 2000 rivers, Conservation techniques No. 4. English Nature, Peterborough
Year :	2004
Title :	The ecology of *Najas flexilis*
Author :	Wingfield, R.A.; Murphy, K.J.; Hollingsworth, P.; Gaywood, M.J.
Series :	Scottish Natural Heritage Commissioned Report No. 017 (ROAME No. F98PA02)
Year :	2005
Title :	Common standards monitoring guidance for freshwater fauna
Author :	JNCC
Series :	Joint Nature Conservation Committee, Peterborough
Year :	2006
Title :	Otters - ecology, behaviour and conservation
Author :	Kruuk, H.
Series :	Oxford University Press

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 :	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 :	2007
Title :	Evolutionary history of lamprey paired species *Lampetra fluviatilis* L. and *Lampetra planeri* Bloch as inferred from mitochondrial DNA variation
Author :	Espanhol, R.; Almeida, P.R.; Alves, M.J.
Series :	Molecular Ecology, 16: 1909-1924
Year :	2008
Title :	The lesser horseshoe bat conservation handbook
Author :	Schofield, H.W.
Series :	The Vincent Wildlife Trust
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 :	Otter tracking study of Roaringwater Bay
Author :	De Jongh, A.; O'Neill, L.
Series :	Unpublished draft report to NPWS
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 :	2010
Title :	Water quality in Ireland 2007-2009
Author :	McGarrigle, M.; Lucey, J.; Ó Cinnéide, M.
Series :	EPA, Wexford
Year :	2011
Title :	Comparison of field- and GIS-based assessments of barriers to Atlantic salmon migration: a case study in the Nore Catchment, Republic of Ireland
Author :	Gargan, P.G.; Roche, W.K.; Keane, S.; King, J.J.; Cullagh, A.; Mills, P.; O'Keeffe, J.
Series :	Journal of Applied Ichthyology, 27 (Suppl. 3): 66-72

Year :	2011
Title :	Review and revision of empirical critical loads and dose-response relationships. Proceedings of an expert workshop, Noordwijkerhout, 23-25 June 2010
Author :	Bobbink, R.; Hettelingh, J.P.
Series :	RIVM report 680359002, Coordination Centre for Effects, National Institute for Public Health and the Environment (RIVM)
Year :	2012
Title :	A report on the sub-littoral environment around selected navigation markers in the north west sector of Lough Corrib
Author :	Roden, C.
Series :	Unpublished report to RPS Group
Year :	2013
Title :	Aspects of brook lamprey (*Lampetra planeri* Bloch) spawning in Irish waters
Author :	Rooney, S.M.; O'Gorman, N.M.; Green, F.; King, J.J.
Series :	Biology and Environment: Proceedings of the Royal Irish Academy, 113B(1): 13-25
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
Year :	2014
Title :	Nitrogen deposition and exceedance of critical loads for nutrient nitrogen in Irish grasslands
Author :	Henry, J.; Aherne, J.
Series :	Science of the Total Environment, 470–471: 216–223
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
Year :	2015
Title :	Behaviour of sea lamprey (*Petromyzon marinus* L.) at man-made obstacles during upriver spawning migration: use of telemetry to access efficacy of weir modifications for improved passage
Author :	Rooney, S.M.; Wightman, G.D.; O Conchuir, R.; King, J.J.
Series :	Biology and Environment: Proceedings of the Royal Irish Academy, 115B: 1-12
Year :	2015
Title :	River engineering works and lamprey ammocoetes; impacts, recovery, mitigation
Author :	King, J.J.; Wightman, G.D.; Hanna, G.; Gilligan, N.
Series :	Water and Environment Journal, 29: 482-488
Year :	2015
Title :	The flora and conservation status of petrifying springs in Ireland
Author :	Lyons, M.D.
Series :	Unpublished Ph.D. Thesis, Trinity College Dublin
Year :	2016
Title :	The Status of Irish Salmon Stocks in 2015 with Precautionary Catch Advice for 2016
Author :	SSCS (Standing Scientific Committee on Salmon)
Series :	Independent Scientific Report to Inland Fisheries Ireland

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 habitats and to resolve any issues arising
Used For :	3110, 3130, 3140 (map 3)
Year :	2014
Title :	Scientific Basis for Raised Bog Conservation in Ireland
GIS Operations :	RBSB13_SACs_ARB_DRB dataset, RBSB13_SACs_2012_HB dataset and RBSB13_SACs_DrainagePatterns_5k dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	potential 7110; digital elevation model; drainage patterns (maps 4 and 6)
Year :	2003
Title :	Turf Cutting Impact Assesment Project
GIS Operations :	Ecotope dataset clipped to SAC boundary. Appropriate ecotopes selected and exported to new dataset. Expert opinion used as necessary to resolve any issues arising
Used For :	7110 ecotopes (map 5)
Year :	2013
Title :	Raised Bog Monitoring and Assessment Survey 2013
GIS Operations :	RBMA13_ecotope_map dataset clipped to SAC boundary. Appropriate ecotopes selected and exported to new dataset. Expert opinion used as necessary to resolve any issues arising
Used For :	7110 ecotopes, 91D0 (maps 5 and 8)
Year :	2013
Title :	National Survey of Limestone Pavement and Associated Habitats in Ireland distribution data
GIS Operations :	Dataset clipped to the SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	8240 (map 7)
Year :	Revision 2010
Title :	National Survey of Native Woodlands 2003-2008. Version 1
GIS Operations :	QIs selected; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	91A0 (map 8)
Year :	Revision 2012
Title :	Margaritifera Sensitive Areas data
GIS Operations :	Relevant catchment boundary identified. Expert opinion used as necessary to resolve any issues arising
Used For :	1029 (map 9)
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 :	1029, 1092, 1393 (maps 9 and 10)
Year :	2012
Title :	NPWS lesser horseshoe bat database
GIS Operations :	Relevant roost identified by clipping to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	1303 (map 11)
Year :	2007
Title :	Forest Inventory and Planning System (FIPS)
GIS Operations :	Dataset clipped to 2.5km buffer centred on roost location
Used For :	1303 (map 11)

Year :	2010
Title :	OSi 1:5000 IG vector dataset
GIS Operations :	Creation of 80m buffer on aquatic side of lake data; creation of 10m buffer on terrestrial side of lake data. These datasets combined with derived OSi Discovery Series river and canal datasets. Overlapping regions investigated and resolved; resulting dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising. Creation of 250m buffer on aquatic side of lake boundary to highlight potential commuting points
Used For :	1355 (map 12)
Year :	2005
Title :	OSi Discovery series vector data
GIS Operations :	Creation of 10m buffer on terrestrial side of river banks data; creation of 20m buffer applied to canal centreline data. Creation of 20m buffer applied to river and stream centreline data; These datasets combined with 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
Used For :	1355 (no map)
Year :	2013
Title :	*Najas flexilis* data
GIS Operations :	Lake habitat for species clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	1833 (map 13)

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

To restore the favourable conservation condition of Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) in Lough Corrib 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 distribution of lake habitat 3110 in Lough Corrib SAC has not been fully surveyed. Krause and King (1994) recorded it in the "western arm proper". Within Lough Corrib, it is likely to be restricted to this 'western arm' (the north-western bay). It may, however, occur elsewhere along the northern or western shoreline of Lough Corrib, in Ballydoo Lough (N. of Corrib) and in small lakes in the Owenriff catchment. Two measures of extent should be used: 1. the area of the lake itself; 2. the extent of the vegetation communities/zones that typify the habitat. Further information on this and all other 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. See map 3 for indicative lake habitat distribution	The selection of the SAC for lake habitat 3110 was based on data on the macrophyte flora of Lough Corrib, particularly the north-western bay, from Krause and King (1994). Despite the occurrence of slender naiad (*Najas flexilis*) in this bay, the vegetation appears to be typical of lake habitat 3110. It is possible that habitat 3110 occurs elsewhere along the northern and western shores of Lough Corrib, on acid geology, as well as within some smaller lakes in the SAC, e.g. Lough Ateean in the Owenriff catchment
Typical species	Occurrence	Typical species present, in good condition, and demonstrating typical abundances and distribution	For lists of typical plant species, see the Article 17 habitat assessment for 3110 (NPWS, 2013) and O Connor (2015)
Vegetation composition: characteristic zonation	Occurrence	All characteristic zones should be present, correctly distributed and in good condition	Further work is necessary to describe the characteristic zonation and other spatial patterns in lake habitat 3110 (see O Connor, 2015)
Vegetation distribution: maximum depth	Metres	Restore 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. Recent investigations have indicated a significant decline in depth of colonisation throughout Lough Corrib (Roden, 2012; Roden and Murphy, in prep.)
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	Restore appropriate substratum type, extent and chemistry to support the vegetation	Research is required to further characterise the substratum types (particle size and origin) and substratum quality (notably pH, calcium, iron and nutrient concentrations) favoured by each of the five Annex I lake habitats in Ireland. It is likely that the oligotrophic soft water habitat 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. Lake substratum quality in Lough Corrib is impaired as a result of peat deposition and possibly also nutrient enrichment (Roden, 2012; Roden and Murphy, in prep.)
Water quality: transparency	Metres	Restore 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. Habitat 3110 is associated with very clear water. 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. Free et al. (2009) found high isoetid abundance in lakes with Secchi depths of more than 3m. Secchi depth did not exceed 2m in the 'western arm' of Lough Corrib and approximately 5m in the northern basin in 2012 (Roden, 2012)
Water quality: 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	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 ≤10µg/l TP, average annual total ammonia concentration should be ≤0.040 mg/l N and annual 95th percentile for total ammonia should be ≤0.090 mg/l N. See also the European Communities Environmental Objectives (Surface Waters) Regulations 2009. TP has exceeded the 10µg/l target in Upper Corrib in a number of recent years (Clabby et al., 2008; McGarrigle et al., 2010)
Water quality: phytoplankton biomass	µg/l Chlorophyll *a*	Restore appropriate water quality to support the habitat, including high chlorophyll *a* status	Oligotrophic and WFD 'high' status targets apply to lake habitat 3110. Where a lake has a chlorophyll *a* 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 *a* concentration must be <5.8µg/l. The annual average chlorophyll *a* concentration should be <2.5µg/l and the annual peak chlorophyll *a* concentration should be ≤8.0µg/l. See also the European Communities Environmental Objectives (Surface Waters) Regulations 2009. Maximum chlorophyll *a* in Upper Corrib has exceeded the OECD target of ≤8.0µg/l in five of the nine monitoring cycles from 1976-2009 (McGarrigle et al., 2010)
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	Restore/maintain trace/absent attached algal biomass (<5% cover) and high phytobenthos status	Nutrient enrichment can favour epiphytic and epipelic algae that can out-compete the submerged vegetation. The cover abundance of attached algae in lake habitat 3110 should, therefore, be trace/absent (<5% cover). EPA phytobenthos can be used as an indicator of changes in attached algal biomass. As for other water quality indicators, lake 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 *Sphagnum* mosses and *Juncus bulbosus* (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 Water) Regulations (S.I. 272 of 2009)
Water colour	mg/l PtCo	Restore/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 oligotrophic soft water lakes (3110), where the peatland in the lake's catchment is intact. Roden (2012) recorded very dark water and poor visibility in Upper Corrib and the western arm
Dissolved organic carbon (DOC)	mg/l	Restore/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	Restore/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. Roden recorded low transparency, very hard water, poor visibiliy and peat deposition in Lough Corrib, all of which suggest increased turbidity (Roden, 2012)

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. Equally, fringing habitats are dependent on the lake, particularly its water levels, and support wetland communities and species of conservation concern. Many of the fringing wetland habitats support higher invertebrate and plant species-richness than the lake habitats themselves. Lough Corrib has important areas of fen, limestone pavement, marsh, reedswamp and some woodland along its shoreline. See also the conservation objectives for associated Annex I habitats and Annex II species within the SAC

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

To restore the favourable conservation condition of Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoëto-Nanojuncetea in Lough Corrib SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	The full distribution and characteristics of lake habitat 3130 in Lough Corrib SAC have not been mapped. While the characteristic species slender naiad (*Najas flexilis*) was recorded in the western arm of Lough Corrib, that area appears to be dominated by lake habitat 3110, with lake habitat 3130 found towards the northern basin proper. The division between lake habitats 3130 and 3140 may be difficult to determine, and both habitats may occur throughout the lake. Habitat 3130 is thought likely to dominate Ballycuirke Lake. Two measures of extent should be used: 1. the area of the lake itself; 2. the extent of the vegetation communities/zones that typify the habitat. For additional information see Krause and King (1994). Further information on this and all other attributes is contained in the lake habitats supporting document for the purposes of site-specific conservation objectives and Article 17 reporting (O Connor, 2015) and the *Najas flexilis* supporting document
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 3 for indicative lake habitat distribution	The characteristics and distribution of lake habitat 3130 in Ireland are not yet fully understood. The Annex II macrophyte slender naiad (*Najas flexilis*) is considered to be characteristic of the habitat and occurs in Lough Corrib. Based on Environmental Protection Agency (EPA) macrophyte data, lake habitat 3130 is also likely to occur in Ballycuirke Lough (Loch Bhaile Ui Choirc)
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 3130 (NPWS, 2013) and O Connor (2015)
Vegetation composition: characteristic zonation	Occurrence	All characteristic zones should be present, correctly distributed and in good condition	Further work is necessary to describe the characteristic zonation and other spatial patterns in lake habitat 3130 (see O Connor, 2015)
Vegetation distribution: maximum depth	Metres	Restore 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 3130. Recent investigations have indicated a significant decline in depth of colonisation throughout Lough Corrib (Roden, 2012; Roden and Murphy, in prep.)
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	Restore 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 3130 is associated with a range of substrate types that are more productive/base-rich relative to the substratum of lake habitat 3110. Substratum particle size is likely to vary with depth and along the shoreline within a single lake, however it should be noted that *Najas flexilis* is typically found on soft substrata of mud, silt or fine sand (Preston and Croft, 2001; Roden, 2002, 2004). Lake substratum quality in Lough Corrib is impaired as a result of peat deposition and possibly also nutrient enrichment (Roden, 2012; Roden and Murphy, in prep.)
Water quality: transparency	Metres	Restore 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 3130 (O Connor, 2015). Habitat 3130 is associated with clear water, as evidenced by the growth of the character species *Najas flexilis* at depths of up to 10m. 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. There is likely to be some variation across lakes with habitat 3130 in Secchi depth and site-specific conditions should also be considered. Secchi depth did not exceed 2m in the 'western arm' of Lough Corrib and approximately 5m in the northern basin in 2012 (Roden, 2012)
Water quality: 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	Lake habitat 3130 is associated with high water quality, with low dissolved nutrients. It is naturally more productive than 3110, probably reflecting higher concentrations of nutrients such as calcium, rather than P alone. 3130 may reach favourable condition slightly above the oligotrophic boundary for nutrients, but in the absence of habitat-specific targets, the targets are Water Framework Directive (WFD) 'High Status' or oligotrophic (OECD, 1982). The "good-moderate" boundary is too enriched to support the habitat. Annual average Total Phosphorus (TP) concentration should be ≤10µg/l TP, average annual total ammonia should be ≤0.04mg/l N and annual 95th percentile for total ammonia should be ≤0.09mg/l N. Where nutrient concentrations are lower, there should be no upward trend. See also the European Communities Environmental Objectives (Surface Waters) Regulations 2009. TP has exceeded the 10µg/l target in Upper Corrib in recent years (Clabby et al., 2008; McGarrigle et al., 2010)
Water quality: phytoplankton biomass	µg/l Chlorophyll *a*	Restore appropriate water quality to support the habitat, including high chlorophyll *a* status	Lake habitat 3130 is associated with high water quality, and naturally low algal growth. As for nutrients, the targets are WFD 'High Status' or oligotrophic (OECD, 1982). The "good-moderate" boundary is too enriched to support the habitat. The average growing season (March-October) chlorophyll *a* concentration must be <5.8µg/l. The annual average chlorophyll *a* should be <2.5µg/l and the annual peak chlorophyll *a* should be <8.0µg/l. Where a lake has a chlorophyll *a* concentration that is lower than this target, there should be no decline within class, i.e. no upward trend in phytoplankton biomass. See also the European Communities Environmental Objectives (Surface Waters) Regulations 2009. Maximum chlorophyll *a* in Upper Corrib has exceeded the OECD target of ≤8.0µg/l in five of the nine monitoring cycles from 1976-2009 (McGarrigle et al., 2010)

Water quality: phytoplankton composition	EPA phytoplankton composition metric	Maintain appropriate water quality to support the habitat, including high phytoplankton composition status	The EPA has developed a phytoplankton composition metric for nutrient enrichment of Irish lakes. As for other water quality indicators, lake habitat 3130 requires WFD high status
Water quality: attached algal biomass	Algal cover and EPA phytobenthos metric	Restore/maintain trace/absent attached algal biomass (<5% cover) and high phytobenthos status	Nutrient enrichment can favour epiphytic and epipelic algae that can out-compete the submerged vegetation. The cover abundance of attached algae in lake habitat 3130 should, therefore, be trace/absent (<5% cover). EPA phytobenthos can be used as an indicator of changes in attached algal biomass. As for other water quality indicators, lake habitat 3130 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 soft water lake habitat with base-rich influences (3130). The EPA monitors macrophyte status for WFD purposes using the 'Free Index'. The target for lake habitat 3130 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 habitat 3130. Acidification reduces the abundance and reproductive capacity of *Najas flexilis* (Wingfield et al., 2004). The specific requirements of lake habitat 3130, in terms of water and sediment pH, alkalinity and cation concentration, have not been determined. In line with targets for *Najas flexilis*, median pH values should be greater than 7 pH units. Water and sediment alkalinity and concentrations of cations (notably calcium) should be appropriate to the habitat. The target for WFD Acidification/Alkalisation status is high. Maximum pH should be <9.0 pH units, in line with the surface water standards. See the European Communities Environmental Objectives (Surface Waters) Regulations 2009
Water colour	mg/l PtCo	Restore/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 is generally <30mg/l PtCo or, more naturally, <20mg/l PtCo in lake habitat 3130, where the peatland in the lake's catchment is intact. Roden (2012) recorded very dark water and poor visibility in Upper Corrib and the western arm
Dissolved organic carbon (DOC)	mg/l	Restore/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	Restore/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. Roden recorded low transparency, very hard water, poor visibiliy and peat deposition in Lough Corrib, all of which suggest increased turbidity (Roden, 2012)
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	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. Equally, fringing habitats are dependent on the lake, particularly its water levels, and support wetland communities and species of conservation concern. Many of the fringing wetland habitats support higher invertebrate and plant species-richness than the lake habitats themselves. Lough Corrib has important areas of fen, limestone pavement, marsh, reedswamp and some woodland along its shoreline. See also the conservation objectives for associated Annex I habitats and Annex II species within the SAC

3140 Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.

To restore the favourable conservation condition of Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. in Lough Corrib 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 hard water lake habitat (3140) is found in Lough Corrib, notably the southern basin. Its exact distribution and area has not been mapped however, and it is likely to also extend along the eastern side of the northern basin. For additional information see Heuff (1984), Mooney and O'Connell (1990), Krause and King (1994) and Roden and Murphy (in prep.). Further information on this and all other 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. See map 3 for indicative lake habitat distribution	The distribution of the hard water lake habitat (3140) in Lough Corrib is determined, in the main, by geology and water chemistry. The hydrological regime (water circulation) in the Lough Corrib basins influences water mixing and, therefore, water chemistry. As a result, lake habitat 3140 is considered to dominate the southern basin, but is also likely to be widespread in the northern basin
Typical species	Occurrence	Typical species present, in good condition, and demonstrating typical abundances and distribution	For lists of typical species (cyanobacteria, algae, higher plants and water beetles), see the Article 17 habitat assessment for lake habitat 3140 (NPWS, 2013) and O Connor (2015). Lough Corrib is, naturally, a 'typical' marl lake as described by Roden and Murphy (2013; in prep.). Monitoring in 2012 demonstrated that the hard water vegetation in Lough Corrib is in bad condition, with shallow euphotic depth, some dead/dying charophytes and absent and decaying krustenstein (Roden and Murphy, in prep.)
Vegetation composition: characteristic zonation	Occurrence	All characteristic zones should be present, correctly distributed and in good condition	The characteristic zonation of lake habitat 3140 has been described (Roden and Murphy, 2013; in prep.). Charophyte zonation was reasonably intact in Lough Corrib in 2012, with *Chara curta, C. rudis, C. virgata* and *C. denudata* present, however the zones had become compressed since surveyed in 2004 and *C. contraria* and *Nitella flexilis* zones were not recorded (Roden and Murphy, in prep.). The krustenstein zone was either absent or decaying (Roden and Murphy, in prep.)
Vegetation distribution: maximum depth	Metres	Restore maximum depth of vegetation, subject to natural processes	The maximum depth of vegetation is likely to be specific to the lake shoreline in question, but is typically expected to be deep in clear, hard water lakes. An indicative target of more than 6m has been developed for hard water lakes (3140) (see Roden and Murphy, 2013; in prep.). Extremely clear marl lakes can have charophyte vegetation to far greater depths, such as Lough Rea (charophytes to 10-11m), or Coolorta (>9m) (Roden and Murphy, in prep.). In 2004, the euphotic zone of Lough Corrib extended to 6m, but in 2012 the maximum depth of vegetation was 4.2m (Roden and Murphy, in prep.). Decaying charophytes were recorded at 3m (Roden and Murphy, in prep.)

Hydrological regime: water level fluctuations	Metres	Maintain appropriate natural hydrological regime necessary to support the habitat	The hydrological regime of lakes with habitat 3140 is driven by groundwater flows. Groundwater can discharge directly to the lake, via springs or seepages, or to in-flowing rivers. 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, particularly the groundwater contribution, 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	Restore appropriate substratum type, extent and chemistry to support the vegetation	The hard water lake habitat is associated with a range of base-rich substratum types, from marl and limestone bedrock, through rocks, cobbles, gravel, muds and even peat. Lake substratum quality in Lough Corrib is impaired as a result of peat deposition, likely also nutrient enrichment, krustenstein decay and colonisation by zebra mussels (*Dreissena polymorpha*) (Roden, 2012; Roden and Murphy, in prep.). Further research into substratum quality (notably calcium, iron and nutrient concentrations) in the hard water lake habitat would be beneficial
Water quality: transparency	Metres	Restore appropriate Secchi transparency. There should be no decline in Secchi depth/transparency	Transparency relates to light penetration and, hence, to the depth of colonisation of vegetation. It can be affected by phytoplankton blooms, water colour and turbidity. A target has been set for hard water lakes (3140) of >6m (Roden and Murphy, in prep.). 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. Hard water lakes typically have high transparency, particularly in the very clear and typical marl forms (Roden and Murphy, in prep.). Secchi depth was 4m in lake habitat 3140 in 2012 (Roden and Murphy, in prep.)
Water quality: 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	Lake habitat 3140 is typically associated with high water quality, including low dissolved nutrients. Some forms of the habitat appear to be naturally more productive than others, e.g. the machair form may be naturally more nutrient-rich. The default target for typical marl lakes is Water Framework Directive (WFD) 'High Status' or oligotrophic (OECD, 1982). Annual average Total Phosphorus (TP) concentration should be ≤10µg/l TP, average annual total ammonia should be ≤0.040mg/l N and annual 95th percentile for total ammonia should be ≤0.090mg/l N. Where nutrient concentrations are lower than the targets, there should be no upward trend in nutrient concentrations. For further information see the European Communities Environmental Objectives (Surface Waters) Regulations 2009. TP has exceeded the 10µg/l target in Lower Corrib in a number of recent years (Clabby et al., 2008; McGarrigle et al., 2010)

Water quality: phytoplankton biomass	µg/l Chlorophyll *a*	Maintain appropriate water quality to support the habitat, including high chlorophyll *a* status	Lake habitat 3140 is associated with high water quality, as demonstrated by naturally low algal growth. As for nutrients, the default target is WFD 'High Status' or oligotrophic (OECD, 1982). Average growing season (March-October) chlorophyll *a* concentration must be <5.8µg/l. Annual average chlorophyll *a* concentration should be <2.5µg/l and the annual peak should be <8.0µg/l. Where chlorophyll *a* concentrations are lower than the targets, there should be no upward trend in phytoplankton biomass. See the European Communities Environmental Objectives (Surface Waters) Regulations 2009. Maximum chlorophyll *a* in Lower Corrib exceeded the OECD target of ≤8.0 µg/l in five of the six monitoring cycles from 1976-2000 (McGarrigle et al., 2010). In recent years, however maximum concentrations have dropped to c.8µg/l, probably as a result of zebra mussel (*Dreissena polymorpha*) activity
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, the default target for lake habitat 3140 is WFD high status
Water quality: attached algal biomass	Algal cover and EPA phytobenthos metric	Restore/maintain trace/absent attached algal biomass (<5% cover) and high phytobenthos status	Nutrient enrichment can favour epiphytic and epipelic algae that can out-compete the submerged vegetation. The cover abundance of attached algae in hard water lakes (3140) 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, the default target for lake habitat 3140 is high phytobenthos status
Water quality: macrophyte status	EPA macrophyte metric (The Free Index)	Restore high macrophyte status	Nutrient enrichment can favour more competitive submerged macrophyte species that out-compete the typical and characteristic species for hard water lakes (3140). The EPA monitors macrophyte status for WFD purposes using the 'Free Index'. The target for lake habitat 3140 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 Water) 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	The specific requirements of lake habitat 3140, in terms of water and sediment pH, alkalinity and cation concentration, have not been fully determined. Acidification is not considered a threat to habitat 3140, however eutrophication can lead to at least temporary increases in pH to toxic levels (>9/9.5 pH units). Maximum pH should be <9.0 pH units, in line with the surface water standards. See the European Communities Environmental Objectives (Surface Waters) Regulations 2009
Water colour	mg/l PtCo	Restore/maintain appropriate water colour to support the habitat	Increased colour decreases light penetration and reduces the area of macrophyte habitat, particularly at the lower euphotic depths. Higher colour also appears to favour angiosperms over charophytes in hard water lakes (Roden and Murphy, in prep.). The primary source of increased colour in Ireland is peatland disturbance. No habitat-specific or national standards for water colour 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). Lake habitat 3140 is typically associated with very clear waters and expected colour would be <10 or, more likely, <5mg/l PtCo. Higher colour is found in some hard water lakes with significant areas of peatland in their catchment, but it is not clear whether this is natural or the result of peatland degradation. Roden and Murphy (in prep.) recorded dark water in Lough Corrib

Dissolved organic carbon (DOC)	mg/l	Restore/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 unit	Restore/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 3140	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. Equally, fringing habitats are dependent on the lake, particularly its water levels, and support wetland communities and species of conservation concern. Many of the fringing wetland habitats support higher invertebrate and plant species-richness than the lake habitats themselves. Fringing fen habitats can be particularly important around hard water lakes, notably the Annex I habitats alkaline fen, *Cladium* fen and petrifying springs (habitat codes 7230, 7210 and 7220). Lough Corrib has important areas of fen, limestone pavement, marsh, reedswamp and some woodland along its shoreline. See also the conservation objectives for associated Annex I habitats and Annex II species within the SAC

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 Lough Corrib SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Kilometres	Area stable or increasing, subject to natural processes	The description of 3260 is broad, from upland bryophyte/macroalgal dominated stretches, to lowland depositing rivers with pondweeds and starworts. Selection of SACs for the habitat used this broad interpretation. Site-specific objectives for the habitat concentrate upon high conservation value sub-types. Little is known, however, about the characteristics or sub-types in Lough Corrib SAC. Many of the rivers were included in the SAC for Atlantic salmon (*Salmo salar*). Most of the rivers are in arterial drainage schemes that have altered aquatic plant distribution and species composition. Note: rooted macrophytes should be absent or trace (<5% cover) in freshwater pearl mussel (*Margaritifera margaritifera*) habitat. The freshwater pearl mussel (1029) conservation objective takes precedence over this objective for habitat 3260 in the Owenriff River within this SAC, because the mussel requires environmental conditions closer to natural background levels
Habitat distribution	Occurrence	No decline, subject to natural processes	As noted above, little is known about the distribution of the habitat and its sub-types in this SAC. The vegetation of the River Corrib was documented in Mooney and O'Connell (1990). Macrophyte vegetation has expanded in the Owenriff River resulting in a decline in the condition of this priority freshwater pearl mussel (*Margaritifera margaritifera*) population and its habitat (NPWS, 2010). The Cornamonna, Owennaraha, Owenakilla and other rivers flowing into the north-western part of Lough Corrib are worthy of further investigation
Hydrological regime: river flow	Metres per second	Maintain appropriate hydrological regimes	Any high conservation value sub-types in the SAC will be associated with natural, fast and highly variable flows. Owing to regular disturbance (through variations in flow), river macrophytes rarely reach a climax condition but frequently occur as transient communities. 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 of the sub-types of this habitat, 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 regimes	It is likely that rivers over limestone bedrock have a significant groundwater contribution. There may be tufa formation associated with such groundwater springs and seepages. Such petrifying springs are an in-stream form of the Habitats Directive priority Annex I habitat "Petrifying springs with tufa formation (Cratoneurion)" (7220) and of high conservation value

Substratum composition: particle size range	Millimetres	Maintain appropriate substratum particle size range, quantity and quality, subject to natural process	Although many of the high conservation value sub-types are dominated by coarse substrata, for certain sub-types, notably tidal forms, fine substrata are required. The size and distribution of particles is largely determined by the river flow. The chemical composition (particularly minerals and nutrients) of the substratum is also important. The quality of finer sediment particles is a notable driver for rooted plant communities
Water quality	Various	Maintain appropriate water quality to support the natural structure and functioning of the habitat	The specific targets may vary among sub-types. Bryophyte-rich and tufaceous streams and rivers are considered highly sensitive to nutrient enrichment and are likely to require high status waters. Water quality for other sub-types should reach a minimum of Water Framework Directive (WFD) good status, in terms of nutrient and oxygenation standards, and EQRs (Ecological Quality Ratios) for macroinvertebrates and phytobenthos
Vegetation composition: typical species	Occurrence	Typical species of the relevant habitat sub-type should be present and in good condition	The sub-types of this habitat are poorly understood and their typical species have not yet been fully defined. The typical species may include higher plants, bryophytes, macroalgae and microalgae, and invertebrates
Floodplain connectivity: area	Hectares	The area of active floodplain at and upstream of the habitat should be maintained	River connectivity with the floodplain is important for the functioning of this habitat. Channels with a naturally functioning floodplain are better able to maintain habitat and water quality (Hatton-Ellis and Grieve, 2003). Floodplain connectivity is particularly important in terms of sediment sorting and nutrient deposition. High conservation value rivers are intimately connected to floodplain habitats and function as important wildlife corridors, connecting otherwise isolated or fragmented habitats in the wider countryside (Hatton-Ellis and Grieve, 2003)
Riparian habitat: area	Hectares	Maintain the area and condition of fringing habitats necessary to support the habitat and its sub-types	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 can contribute to the aquatic food web (e.g. allochthonous matter such as leaf fall), provide habitat (refuge and resources) for certain life-stages of fish, birds and aquatic invertebrates, assist in the settlement of fine suspended material, protect banks from erosion and contribute to nutrient cycling. Shade may also be important in suppressing algal growth in enriched rivers and moderating temperatures. Equally, fringing habitats are dependent on rivers/lakes, particularly their water levels, and support wetland communities and species of conservation concern. See also the conservation objectives for associated Annex I habitats and Annex II species within the SAC

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) (* important orchid sites) in Lough Corrib SAC in owing list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) occurs mainly as small areas and in intimate association with other habitats in this SAC including other grassland types, fens and limestone pavements and is therefore difficult to map separately. O'Neill et al. (2013) surveyed and mapped some grassland sites within the SAC in detail and the surveys of limestone pavement sites carried out by Wilson and Fernandez (2013) included associated grassland habitats; however, as all areas of this habitat within the SAC have not been identified, the total area is unknown
Habitat distribution	Occurrence	No decline, subject to natural processes	See notes 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	Attribute and target based on O'Neill et al. (2013), where the list of positive indicator species, including high quality species, as identified by the Irish Semi-natural Grasslands Survey (ISGS) is presented. O'Neill et al. (2013) 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%	Attribute and target based on O'Neill et al. (2013), where the list of negative indicator species as identified by the ISGS is presented
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	Percentage at a representative number of monitoring stops	Cover of woody species (except certain listed species) and bracken (*Pteridium aquilinum*) not more than 5% cover	Attribute and target based on O'Neill et al. (2013). Woody species that can occur above 5% cover are juniper (*Juniperus communis*), burnet rose (*Rosa spinosissima*), mountain avens (*Dryas octopetala*) and hoary rock-rose (*Helianthemum oelandicum*)
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 20m²	Attribute and target based on O'Neill et al. (2013)

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

To maintain the favourable conservation condition of *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) in Lough Corrib 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	*Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) occurs mainly as small areas and in intimate association with other habitats in this SAC such as other grassland types and fens and is therefore difficult to map separately. O'Neill et al. (2013) surveyed and mapped some grassland sites within Lough Corrib SAC. However, the full extent of this habitat in this SAC is currently unknown
Habitat distribution	Occurrence	No decline, subject to natural processes	See notes 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)	Attribute and target based on O'Neill et al. (2013), where the list of positive indicator species, including high quality species, as identified by the Irish Semi-natural Grasslands Survey (ISGS) is presented. O'Neill et al. (2013) 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%	Attribute and target based on O'Neill et al. (2013), where the list of negative indicator species as identified by the ISGS is presented
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 (*Polytrichum* 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 (*Pteridium aquilinum*) not more than 5%	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 10cm and 80cm 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 20m²	Attribute and target based on O'Neill et al. (2013)

7110 Active raised bogs

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

Attribute	Measure	Target	Notes
Habitat area	Hectares	Restore the area of active raised bog to 78.8ha, subject to natural processes	There are two raised bogs for which Active Raised Bog (ARB) has been selected in Lough Corrib SAC: Addergoole Bog and Lough Tee Bog. The total area of ARB habitat for these two bogs was mapped as 45.2ha. The area of Degraded Raised Bog (DRB) on the High Bog (HB) has been modelled as 72.0ha. See map 4. However, it is estimated that only 24.1ha is potentially restorable to ARB by drain blocking. The total potential ARB on the HB is therefore estimated to be 69.3ha. Eco-hydrological assessments of cutover bog estimate that an additional 9.5ha of peat-forming habitats could be restored. The long-term target for ARB is therefore 78.8ha. See the Lough Corrib SAC conservation objectives supporting document for raised bog habitats for further details on this and the following attributes
Habitat distribution	Occurrence	Restore the distribution and variability of active raised bog across the SAC. See map 5 for distribution in 2012	ARB currently occurs on the north-eastern and southern parts of Addergoole Bog and the north-western part of Lough Tee Bog. DRB occurs over much of the remainder of the high bog at Addergoole and also occurs at Lough Tee Bog. Such areas will require restoration measures. See also the conservation objective for Bog woodland (91D0)
High bog area	Hectares	No decline in extent of high bog subject to the conservation requirements of the SAC. See map 4 for mapped extent	The area of HB within Addergoole Bog in 2012 (latest figure available) is 157.4ha and 79.6ha at Lough Tee Bog (DAHG, 2014)
Hydrological regime: water levels	Centimetres	Restore appropriate water levels throughout each site	For ARB, mean water level needs to be near or above the surface of the bog lawns for most of the year. Seasonal fluctuations should not exceed 20cm and water levels should not be more than 10cm below the bog surface, except for very short periods of time. Open water is often characteristic of soak systems
Hydrological regime: flow patterns	Flow direction; slope	Restore, where possible, appropriate high bog topography, flow directions and slopes. See map 6 for current situation	ARB depends on mean water levels being near or above the surface of bog lawns for most of the year. Long and gentle slopes are the most favourable to achieve these conditions. Changes to flow directions due to subsidence of bogs can radically change water regimes and cause drying out of high quality ARB areas and soak systems
Transitional areas between high bog and adjacent mineral soils (including cutover areas)	Hectares; distribution	Restore adequate transitional areas to support/protect the raised bog ecosystem and the services it provides	Cutting has continued until recently around the eastern and southern margins of Addergoole Bog. Remnant semi-natural margins occur elsewhere (locally along the north-east and east margins of the site) and there are interesting transitional wetland habitats to the east of the high bog. Transitional areas between Lough Tee Bog and the adjacent mineral soils mostly corresponds with cutover bog at different stages of re-colonisation by vegetation. Eco-hydrological assessments are evaluating the potential for ARB on cutover areas (see note for habitat area attribute above)
Vegetation quality: central ecotope, active flush, soaks, bog woodland	Hectares	Restore 39.4ha of central ecotope/active flush/soaks/bog woodland as appropriate	At least 50% of ARB habitat should be high quality (i.e. central ecotope, active flush, soaks, bog woodland). The target area of active raised bog for the site has been set at 78.8ha (see habitat area target above)

Vegetation quality: microtopograph-ical features	Hectares	Restore adequate cover of high quality microtopographical features	High quality microtopography (hummocks, hollows and pools) occurs at both Addergoole and Lough Tee bogs; however, both have been negatively affected by burning
Vegetation quality: bog moss (*Sphagnum*) species	Percentage cover	Restore adequate cover of bog moss (*Sphagnum*) species to ensure peat-forming capacity	*Sphagnum* cover varies naturally across Ireland with relatively high cover in the east to lower cover in the west. Hummock forming species such as *Sphagnum austinii* are particularly good peat formers
Typical ARB species: flora	Occurrence	Restore, where appropriate, typical active raised bog flora	Typical flora species include widespread species, as well as those with more restricted distributions, but typical of the habitat's subtypes or geographical range
Typical ARB species: fauna	Occurrence	Restore, where appropriate, typical active raised bog fauna	Typical fauna species include widespread species, as well as those with more restricted distributions, but typical of the habitat's subtypes or geographical range
Elements of local distinctiveness	Occurrence	Maintain features of local distinctiveness, subject to natural processes	Addergoole Bog is noted for the presence of a soak system, a rare feature of Irish raised bogs, which occurs in the centre of of the bog near two lakes. This soak includes an area of Bog woodland (91D0) which is a priority Annex I habitat and a qualifying interest for the SAC (see also the conservation objective for 91D0)
Negative physical indicators	Percentage cover	Negative physical features absent or insignificant	Negative physical indicators include: bare peat, algae dominated pools and hollows, marginal cracks, tear patterns, subsidence features such as dry mineral mounds/ridges emerging or expanding, and evidence of burning
Vegetation composition: native negative indicator species	Percentage cover	Native negative indicator species at insignificant levels	Disturbance indicators include species indicative of conditions drying out such as abundant bog asphodel (*Narthecium ossifragum*), deergrass (*Trichophorum germanicum*) and hare's-tail cotton-grass (*Eriophorum vaginatum*) forming tussocks; abundant magellanic bog-moss (*Sphagnum magellanicum*) in pools previously dominated by *Sphagnum* species typical of very wet conditions (e.g. feathery bog-moss (*S. cuspidatum*)); and indicators of frequent burning events such as abundant *Cladonia floerkeana* and high cover of carnation sedge (*Carex panicea*) (particularly in true midlands raised bogs)
Vegetation composition: non-native invasive species	Percentage cover	Non-native invasive species at insignificant levels and not more than 1% cover	The most common non-native invasive species include lodgepole pine (*Pinus contorta*), rhododendron (*Rhododendron ponticum*) and pitcherplant (*Sarracenia purpurea*)
Air quality: nitrogen deposition	kg N/ha/yr	Air quality surrounding the bogs close to natural reference conditions. The total nitrogen deposition should not exceed 5kg N/ha/yr	Change in air quality can result from fertiliser drift; adjacent quarry activities; or other atmospheric inputs. The critical load range for ombrotophic bogs has been set as between 5 and 10kg N/ha/yr (Bobbink and Hettelingh, 2011). The latest nitrogen deposition figures for the area around the bogs in Lough Corrib SAC suggests that the current level is approximately 8.5kg N/ha/yr (Henry and Aherne, 2014)
Water quality	Hydrochemical measures	Water quality on the high bog and in transitional areas close to natural reference conditions	Water chemistry within raised bogs is influenced by atmospheric inputs (rainwater). However, within soak systems, water chemistry is influenced by other inputs such as focused flow or interaction with underlying substrates. Water chemistry in marginal areas surrounding the high bog varies due to influences of different water types (bog water, regional groundwater and run-off from surrounding mineral lands)

7120	Degraded raised bogs still capable of natural regeneration

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

Attribute	Measure	Target	Notes

7150	Depressions on peat substrates of the Rhynchosporion

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

Attribute	Measure	Target	Notes

7210 Calcareous fens with Cladium mariscus and species of the Caricion davallianae

To maintain the favourable conservation condition of Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae in Lough Corrib 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	Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae have not been mapped in detail for Lough Corrib SAC and thus total area of the qualifying habitat is unknown. While the full extent of Annex I fen habitats (both this habitat and Alkaline fens (7230)) within the SAC is currently unknown, their area is extensive and they often occur in association with and transitional to other habitats including *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) (6410), Active raised bogs (7110), Petrifying springs with tufa formation (Cratoneurion) (7220) and Limestone pavements (8240) (NPWS internal files). The conservation objectives for all these habitats in the SAC should be used in conjunction with each other as appropriate
Habitat distribution	Occurrence	No decline, subject to natural processes	The full distribution of this habitat in this SAC is currently unknown - see notes for area above
Ecosystem function: hydrology	Metres	Maintain 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: peat formation	Flood duration	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 (Jim Ryan, pers. comm.)
Ecosystem function: water quality	Water chemistry measures	Maintain appropriate water quality, particularly 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
Vegetation structure: typical species	Presence	Maintain vegetation cover of typical species including brown mosses and vascular plants	Mosses listed for fen habitat in this SAC includes *Campylium stellatum*, while vascular plants include saw sedge (*Cladium mariscus*), slender sedge (*C. lasiocarpa*), long-stalked yellow sedge (*C. lepidocarpa*), black bog-rush (*Schoenus nigricans*), water mint (*Mentha aquatica*), wild angelica (*Angelica sylvestris*) and meadow thistle (*Cirsium dissectum*). Slender cottongrass (*Eriophorum gracile*) is known from fen habitat in this SAC (NPWS internal files)
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). 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: 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). Scrub and trees will tend to invade if fen conditions become drier
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 not more than 10%. Where tufa is present, disturbed bare ground not more than 1%	Attribute and target based on Perrin et al. (2014). While grazing may be appropriate in this habitat, excessive areas of disturbed bare ground may develop due to unsuitable grazing regimes

Physical structure: drainage	Percentage area in local vicinity of a representative number of monitoring stops	Areas showing signs of drainage as a result of drainage ditches or heavy trampling not more than 10%	Attribute and target based Perrin et al. (2014). Drainage can result in loss of characteristic species and transition to drier habitats
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 the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016)

7220 Petrifying springs with tufa formation (Cratoneurion)

To maintain the favourable conservation condition of Petrifying springs with tufa formation (Cratoneurion)* in Lough Corrib 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	Petrifying springs with tufa formation (Cratoneurion) have not been mapped within Lough Corrib SAC and thus the total area of the qualifying habitat in the SAC is unknown. However, the necessary ecological conditions required for this habitat occur around Lough Corrib
Habitat distribution	Occurrence	No decline, subject to natural processes	As mentioned above, this habitat has not been mapped within the SAC. It is often associated with other habitats including Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae (7210), Alkaline fens (7230) and Limestone pavements (8240). The conservation objectives for all these habitats in the SAC should be used in conjunction with each other as appropriate. Lyons and Kelly (2016) describe eight plant communities of Irish petrifying springs based on relevé data. Further information on the vegetation communities associated with this habitat is presented in Lyons and Kelly (2016)
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
Water quality - nitrate level	mg/l	No increase from baseline nitrate level and less than 10mg/l	Target based on data from McGarrigle et al. (2010). See Lyons and Kelly (2016) for further details
Water quality - phosphate level	µg/l	No increase from baseline phosphate level and less than 15µg/l	Based on data from Lyons (2015). See Lyons and Kelly (2016) for further details
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	Based on Lyons and Kelly (2016), where the lists of positive and high quality indicator species are presented
Vegetation composition: negative indicator species	Cover (DAFOR scale)	Potentially negative indicator species should not be Dominant or Abundant; invasive species should be absent	Based on Lyons and Kelly (2016), where the lists of potentially negative herbaceous, bryophyte (and alga) and woody species are presented. See Lyons and Kelly (2016) also for details on potentially invasive species, including sycamore (*Acer pseudoplatanus*) which is invasive in non-wooded springs and a negative indicator species in wooded springs. If two or more potentially negative bryophyte species are present, and if at least two are Frequent, or at least one is Abundant, then the habitat fails for this attribute. See Lyons and Kelly (2016) for further details
Vegetation structure: sward height	Centimetres	Field layer height between 10cm and 50cm (except for bryophyte-dominated ground <10cm)	See Lyons and Kelly (2016) for further details
Physical structure: trampling/dung	Cover (DAFOR scale)	Cover should not be Dominant or Abundant	See Lyons and Kelly (2016) for further details

7230 Alkaline fens

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

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Alkaline fens have not been mapped in detail for Lough Corrib SAC and thus total area of the qualifying habitat is unknown. While the full extent of Annex I fen habitats (both this habitat and Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae (7210)) within the SAC is currently unknown, their area is extensive and they often occur in association with and transitional to other habitats including *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) (6410), Active raised bogs (7110), Petrifying springs with tufa formation (Cratoneurion) (7220) and Limestone pavements (8240) (NPWS internal files). The conservation objectives for all these habitats in the SAC should be used in conjunction with each other as appropriate
Habitat distribution	Occurrence	No decline, subject to natural processes	The full distribution of this habitat in this SAC is currently unknown - see notes for area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat in NPWS (2013)
Ecosystem function: peat formation	Flood duration	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 (Jim Ryan, pers. comm.)
Ecosystem function: hydrology	Metres	Maintain 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 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
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Further information on the vegetation communities associated with alkaline fens in the uplands is presented in Perrin et al. (2014)
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 is 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. Mosses listed for fen in this SAC includes *Campylium stellatum* (NPWS internal files)
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 (*Schoenus nigricans*) flush and bottle sedge (*Carex rostrata*) fen	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented. Vascular plants listed for fen in this SAC include saw sedge (*Cladium mariscus*), slender sedge (*C. lasiocarpa*), long-stalked yellow sedge (*C. lepidocarpa*), black bog-rush (*Schoenus nigricans*), water mint (*Mentha aquatica*), wild angelica (*Angelica sylvestris*) and meadow thistle (*Cirsium dissectum*). Slender cottongrass (*Eriophorum gracile*) is known from fen habitat in this SAC (NPWS internal files)

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 (*Schoenus nigricans*) flush and bottle sedge (*Carex rostrata*) fen	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target 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: 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 Perrin et al. (2014). Scrub and trees will tend to invade if fen conditions become drier
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 (*Juncus effusus*) and common reed (*Phragmites australis*) less than 10%	Attribute and target based on Perrin et al. (2014)
Vegetation structure: height	Percentage of leaves/shoots at a representative number of 2m x 2m monitoring stops	Proportion of live leaves and/or flowering shoots of vascular plants that are more than 5cm above the ground surface should be at least 50%	Attribute and target based on Perrin et al. (2014). Vegetation heights lower than these would indicate undesirable levels of grazing
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). While grazing may be appropriate in this habitat, excessive areas of disturbed bare ground may develop due to unsuitable grazing regimes
Physical structure: drainage	Percentage area in local vicinity of a representative number of monitoring stops	Area showing signs of drainage as a result of drainage ditches or heavy trampling less than 10%	Attribute and target based Perrin et al. (2014). Drainage can result in loss of characteristic species and transition to drier habitats
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)
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 the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016)

8240 Limestone pavements

To maintain the favourable conservation condition of Limestone pavements* in Lough Corrib 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	Limestone pavements often occur in intimate association with other habitats including the Annex I habitats Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (6210), Petrifying springs with tufa formation (Cratoneurion) (7220) and Alkaline fens (7230). Therefore, these habitats cannot easily be mapped or considered separately. Conservation objectives for all these habitats should be used in conjunction with each other as appropriate. In Lough Corrib SAC, limestone pavements occur along the southern and eastern margins of Lough Corrib and more extensively in the southern part of the SAC. However, the total area of the Annex I habitat in the SAC is unknown. Wilson and Fernandez (2013) mapped the indicative area in the southern part, including mosaics with other habitats (map 7)
Distribution	Occurrence	No decline, subject to natural processes. Map 7 shows the indicative distribution in the southern part of the SAC, including mosaics with other habitats	See notes for area above. This habitat can be split into exposed pavement and wooded pavement (Wilson and Fernandez, 2013)
Vegetation composition: typical species	Number at a representative number of monitoring stops	At least seven positive indicator species present	Attribute and target based on Wilson and Fernandez (2013), where the positive indicator species for exposed and wooded pavement are listed
Vegetation composition: bryophyte layer	Percentage at a representative number of monitoring stops	Bryophyte cover at least 50% on wooded pavement	Attribute and target based on Wilson and Fernandez (2013)
Vegetation composition: negative indicator species	Percentage at a representative number of monitoring stops	Collective cover of negative indicator species on exposed pavement not more than 1%	Attribute and target based on Wilson and Fernandez (2013), where the negative indicator species are listed. Negative indicator species for wooded pavement overlap with non-native species (below)
Vegetation composition: non-native species	Percentage at a representative number of monitoring stops	Cover of non-native species not more than 1% on exposed pavement; on wooded pavement not more than 10% with no regeneration	Attribute and target based on Wilson and Fernandez (2013)
Vegetation composition: scrub	Percentage at a representative number of monitoring stops	Scrub cover no more than 25% of exposed pavement	Attribute and target based on Wilson and Fernandez (2013)
Vegetation composition: bracken cover	Percentage at a representative number of monitoring stops	Bracken (*Pteridium aquilinum*) cover no more than 10% on exposed pavement	Attribute and target based on Wilson and Fernandez (2013)
Vegetation structure: woodland canopy	Percentage at a representative number of monitoring stops	Canopy cover on wooded pavement at least 30%	Attribute and target based on Wilson and Fernandez (2013). Wooded limestone pavement is usually low-growing hazel (*Coryllus avellana*) woodland. Atlantic hazel woodland is an internationally rare woodland type. Despite its low stature it is nonetheless an important habitat for woodland species
Vegetation structure: dead wood	Occurrence in a representative number of monitoring stops	Sufficient quantity of dead wood on wooded pavement to provide habitat for saproxylic organisms	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Physical structure: disturbance	Occurrence in a representative number of monitoring stops	No evidence of grazing pressure on wooded pavement	Attribute and target based on Wilson and Fernandez (2013)

Indicators of local distinctiveness	Occurrence	Indicators of local distinctiveness are maintained	This includes species on the Flora (Protection) Order, 2015 and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016), and other rare or localised species, as well as archaeological and geological features, which often support distinctive species

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

To maintain the favourable conservation condition of Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles in Lough Corrib 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	Most of the woodland in Lough Corrib SAC occurs as narrow belts of low woodland around the lake, with occasional larger stands. Old sessile oakwoods are likely to occur as mosaics with other woodland types and the total extent within the SAC is unknown. As part of the National Survey of Native Woodlands (NSNW), Perrin et al. (2008) surveyed a number of sites in the SAC; one (Annaghwood; NSNW site no. 1624), contained this habitat (see map 8). It is important to note that further unsurveyed areas of old oak woodland are likely to be present within the SAC, including at the Hill of Doon and on some of the islands in the lake (NPWS internal files)
Habitat distribution	Occurrence	No decline. Surveyed location shown on map 8	Distribution shown based on Perrin et al. (2008). It is important to note that further unsurveyed areas are likely to be present within the SAC. See note on area above
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large"; woods at least 25ha in size and "small" woods at least 3ha in size.	The sizes of at least some of the existing woodlands need to be increased in order to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). Topographical and land ownership constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer	Described in Perrin et al (2008) and NPWS internal files
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Based on data from Perrin et al. (2008)
Woodland structure: natural regeneration	Seedling: sapling: pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Oak (*Quercus petraea*) regenerates poorly. In suitable sites, ash (*Fraxinus excelsior*) can regenerate in large numbers although few seedlings reach pole size
Woodland structure: dead wood	m^3 per hectare; number per hectare	At least 30m^3/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources
Woodland structure: indicators of local disctinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands, archaeological and geological features as well as red-data and other rare or localised species. Perrin and Daly (2010) identified Annaghwood (NSNW site code 1624) as "possible ancient woodland"
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008) and NPWS internal files

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

91D0 Bog woodland

To maintain the favourable conservation condition of Bog woodland* in Lough Corrib 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. At least 1.22ha. See map 8	Bog woodland occurs on Addergoole Bog in Lough Corrib SAC and is regarded as a component of the Active raised bogs habitat (7110) of that bog. Thus, the conservation objective and supporting document for active raised bog are also relevant to this habitat and common attributes have not been repeated here. The latest survey for bog woodland on Addergoole was carried out by the Raised Bog Monitoring Project (RBMP) in 2012 (Fernadez et al., 2014)
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 8	Bog woodland occurs at one known location in this SAC, on Addergoole Bog. This is the most westerly known location for this habitat in Ireland
Vegetation composition: positive indicator species	Number in a representative number of monitoring stops	Birch (*Betula pubescens*), bog moss (*Sphagnum*) species and at least five other indicator species present	Bog woodland is typically species-poor but with a characteristic and distinctive flora. Positive indicator species are listed in Cross and Lynn (2013). Fernandez et al. (2014) note that Scot's pine (*Pinus sylvestris*) could be considered to be a positive indicator species; however, strong regeneration of the species can indicate that the site is drying out
Vegetation composition: negative indicator species	Percentage cover at a representative number of monitoring stops	Both native and non-native invasive species absent or under control. Total cover should be less than 10%	Negative indicator species include bracken (*Pteridium aquilinum*) and bramble (*Rubus fruticosus*), which can become invasive if the site begins drying out
Woodland structure: cover and height of birch	Percentage cover and metres at a representative number of monitoring stops	A minimum 30% cover of birch (*Betula pubescens*) with a median canopy height of 4m	Attribute and target based on bog woodland monitoring survey (Cross and Lynn, 2013)
Woodland structure: dwarf shrub cover	Percentage cover at a representative number of monitoring stops	Dwarf shrub cover not more than 50%	Attribute and target based on bog woodland monitoring survey (Cross and Lynn, 2013)
Woodland structure: ling cover	Percentage cover at a representative number of monitoring stops	Ling (*Calluna vulgaris*) cover not more than 40%	Attribute and target based on bog woodland monitoring survey (Cross and Lynn, 2013)
Woodland structure: bryophyte cover	Percentage cover at a representative number of monitoring stops	Bryophyte cover at least 50%, with bog moss (*Sphagnum* spp.) cover at least 25%	Attribute and target based on bog woodland monitoring survey (Cross and Lynn, 2013)
Woodland structure: tree size classes	Occurrence	Each size class present	Size classes are defined in Cross and Lynn (2013). The presence of all size classes suggests that a woodland has good structural variety with trees of varying ages
Woodland structure: senescent and dead wood	Occurrence	Senescent or dead wood present	Mature and veteran trees and dead wood are important for bryophytes, lichens, saproxylic organisms and some bird species. Their retention within a woodland is important to ensure continuity of habitats/niches and propagule sources over time. However, as birch (*Betula pubescens*) trees seldom exceed 30cm in diameter in this habitat and dead wood rots quickly and is engulfed by bog mosses (*Sphagnum* spp.), volume of dead wood may not be as high as in other woodland types

1029 Freshwater Pearl Mussel *Margaritifera margaritifera*

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

Attribute	Measure	Target	Notes
Distribution	Kilometres	Maintain at 9.1km. See map 9	The conservation objective applies to the Owenriff freshwater pearl mussel (*Margaritifera margaritifera*) population in Lough Corrib SAC, which is of international importance and one of eight Irish populations prioritised for conservation action (Moorkens, 2010; NPWS, 2011). Its distribution is well-documented and full baseline monitoring took place in 2004 (Moorkens, 2004). The species is widespread in the Owenriff catchment, being found in the lower reaches of the Glengawbeg River, from Lough Agraffard to just upstream of the mouth of Lough Corrib in the Owenriff, and also in the Derrygauna tributary (Moorkens, 2004; NPWS, 2010). The Derrygauna River is in Connemara Bog Complex SAC (002034). The target length relates to the part of the distribution within Lough Corrib SAC. The objective is for the species to be sufficiently widespread to maintain itself on a long-term basis as a viable component of the Owenriff system. See NPWS (2010) for further information
Population size	Number of adult mussels	Restore Owenriff population to at least one million adult mussels	The Owenriff population was estimated as c.1 million in 2009 (NPWS, 2010). NPWS (2013) estimated that it had reduced to 940,000 in 2012, based on a 1% per year decline owing to insufficient recruitment. Declines were detected in 2011, 2014 and 2015. A large kill followed a drought in 2014 (Moorkens, 2015). The Owenriff population has been surveyed frequently since the 1990s, and monitored regularly since the baseline survey in 2004 (Moorkens, 2004, 2005, 2006, 2009, 2015, 2017; Moorkens and Killeen, 2008, 2014). Mussels are abundant (over 250 per 100m, often 150/m²) from the hatchery at Canrawer East to upstream of Oughterard wastewater treatment plant (WWTP) discharge (Moorkens, 2004). The target is for the species to be sufficiently abundant to maintain itself on a long-term basis as a viable component of the Owenriff 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 ≤65mm are considered 'young mussels' and may be found buried in the substratum and/or beneath adult mussels. Mussels ≤30mm are 'juvenile mussels' and are always buried in the substratum. See the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. The Owenriff had one of the best population profiles of any Irish population (Moorkens, 2004, 2009). NPWS (2010) summarises demographic work up to 2010. In 2013, it passed the targets, but failed both targets in 2011 (0% ≤65mm), 2014 (13.6% ≤65mm; 2% ≤30mm) and 2016 (10% ≤65mm; 0% ≤30mm) (Moorkens, 2011, 2015, 2017). In 2014, juveniles died owing to a combination of low flows and algal growth. In 2016, the smallest mussel was 11mm. The Owenriff 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 Owenriff 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. Significant kills have been recorded on a number of occasions in the Owenriff, notably in 2004 and 2014. The Owenriff failed the target for dead shells in 2009, 2011, 2015 and 2016, but passed in 2014; and failed the 5% target in 2011, 2014 and 2015, but passed in 2016 (Moorkens, 2009, 2011, 2015, 2017; NPWS, 2010). 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 Owenriff system
Suitable habitat: extent	Kilometres	Restore suitable habitat in more than 8.3km in the Owenriff and Glenawbeg rivers (see map 9) and any additional stretches necessary for salmonid spawning	The extent of the freshwater pearl mussel habitat in the Owenriff is well-documented; from the early surveys of Ross (1984, 1988) and Moorkens (1995, 1996) to full baseline monitoring in 2004 (Moorkens, 2004). Most of the available habitat in the Owenriff system is occupied by adult mussels, but below carrying capacity (Moorkens, 2004, 2005, 2006, 2009, 2011, 2015, 2017; Moorkens and Killeen, 2008, 2014). Annual monitoring has shown that episodes of poor habitat condition are causing loss of juveniles in the Owenriff, with very poor conditions recorded in 2011, 2014 and 2015, but near-favourable conditions in 2013 and 2016. Flow, macroalgal, macrophyte and sedimentation impacts are all concerns. Pollution appears to be chronic and episodes of good mussel habitat condition are found at higher flows. 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 Owenriff system
Suitable habitat: condition	Kilometres	Restore condition of suitable habitat	The habitat is a combination of the area of 1) habitat adult and juvenile mussels can occupy; 2) spawning and nursery habitats 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 spawning areas that regularly contribute juvenile fish to adult mussel habitat should be considered. Availability of mussel and fish habitat is determined by flow and substratum conditions. It is highly sensitive to hydromorphological changes, sedimentation and nutrient enrichment. Pressures throughout the catchment contribute to such impacts. The habitat in the Owenriff cannot support sufficient juvenile survival owing to nutrient and sediment pollution and hydrological impacts (Moorkens, 2017). 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 Owenriff 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 Owenriff River failed the macroinvertebrate standard at all sites and passed the phytobenthos standard (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 Owenriff 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 habitat in the Owenriff failed the macrophyte and the filamentous algal targets in 2009 (Moorkens, 2009; NPWS, 2010). Abundances of up to 100% filamentous algae and/or *Myriophyllum* were recorded in the best mussel habitat (Williams, 2009; NPWS, 2010). High cover abundance of both algae and macrophytes has been recorded regularly in the Owenriff from 2004-present, indicating on-going nutrient enrichment. In 2016, the algal target was exceeded in 57 of 65 quadrats and both filamentous algal and diatom biomass was elevated (Moorkens, 2017). Algae were abundant in 2015 and 2014 (Moorkens, 2015). Episodic poor habitat condition is leading to losses of juveniles. Good condition is linked to higher flows. Sufficient recruitment 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 Owenriff 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 habitat for the species in the Owenriff is unsuitable for the recruitment of juveniles owing to sedimentation and enrichment. The habitat failed this target in 2009 and significant sedimentation was recorded during all monitoring to 2009 (NPWS, 2010). Silt plumes and/or infiltration have been recorded 2010-2016 and the target was failed in 2011 and 2015 (Moorkens, 2011, 2015). Episodic poor habitat condition is leading to losses of juveniles. Good condition is linked to higher flows. 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 Owenriff 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. In 2009, the Owenriff failed the redox target, with averages at three locations of 18.9%, 24.2% and 24.5% at 5cm depth, giving an overall average of 22.5% (Moorkens, 2009; NPWS, 2010). The Owenriff passed the redox target in 2014 (average of 14.6%) and failed in 2011 (24%) and 2015 (22%) (Moorkens, 2011, 2015). In 2016, the average was 10.5%, and 100% of measurements had <20% loss (Moorkens, 2017). Episodic poor habitat condition is leading to losses of juveniles. Good condition is linked to higher flows. 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 Owenriff 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 key factor). In order to restore the 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 so as to cause excessive scour of mussel habitat; 3) low flows do not exacerbate the 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 the substratum also contributes to water-cycling and favourable habitat condition. Hydrological change and wetland loss in the Owenriff are significant concerns. 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 Owenriff 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 essential to completion of the life cycle. 0+ and 1+ fish are typically used, both because of habitat overlaps and the development of immunity with age in fish. Fish presence is 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 mussels and a lack of 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. No glochidia were found on fish in 2009, possibly owing to mussel stress (Johnston, 2009; NPWS, 2010). A fish host survey is planned for 2017/18
Fringing habitat: area and condition	Hectares	Maintain the area and condition of fringing habitats necessary to support the population	Riparian habitats, including those along lake fringes, even where not part of a natural floodplain, are integral to the structure and functioning of river systems. Fringing habitats aid in settlement of fine suspended material, protect banks from erosion, contribute to nutrient cycling and 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 be important in suppressing algal/macrophyte growth in enriched rivers and moderating temperatures. Fringing habitats are dependent on rivers/lakes, particularly water levels, and support wetland communities and species of conservation concern. Riparian wetlands and woodland are very important in the Owenriff and wetland damage is a significant 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 Owenriff system

1092 White-clawed Crayfish *Austropotamobius pallipes*

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

Attribute	Measure	Target	Notes
Distribution: rivers	Occurrence	No reduction from baseline. See map 10	White-clawed crayfish (*Austropotamobius pallipes*) is recorded from the entire lengths of the four main tributaries of the River Clare. There are post-1996 records from the following tributaries: Abbert, Grange, Dalgan and Sinking Rivers. It is also present in some minor lower order streams within the Clare catchment
Distribution: Lough Corrib	Occurrence	No reduction from baseline. See map 10	The distribution of crayfish in Lough Corrib is uncertain. It certainly occurs in three 1km squares in the northern section of the lower basin (M2341, M2342, M2941) and is probably more widely distributed
Population structure: recruitment	Occurrence of juveniles and females with eggs	Juveniles and/or females with eggs in all occupied tributaries and occupied parts of Lough Corrib	See Reynolds et al. (2010) for further details
Negative indicator species	Occurrence	No alien crayfish species	Alien crayfish species are identified as a major direct threat to this species and as a disease vector. Ireland is currently free of non-native invasive crayfish species. See Reynolds (1998) for further details
Disease	Occurrence	No instances of disease	Disease is identified as a major threat and crayfish plague has occurred in Ireland even in the absence of alien vectors. Disease can, in some circumstances, be introduced through contaminated equipment and water in the absence of vector species. See Reynolds (1998) for further details
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 heterogeneity or habitat quality	Crayfish need high habitat heterogeneity. Larger crayfish must have stones to hide under, or an earthen bank in which to burrow. Hatchlings shelter in vegetation, gravel and among fine tree-roots. Smaller crayfish are typically found among weed and debris in shallow water. Larger juveniles in particular may also be found among cobbles and detritus such as leaf litter. These conditions must be available throughout the occupied habitat

1095 Sea Lamprey *Petromyzon marinus*

To restore the favourable conservation condition of Sea Lamprey in Lough Corrib 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	Sea lamprey (*Petromyzon marinus*) traditionally congregate and build spawning nests in the River Corrib in Galway city, both up- and downstream of the Salmon Weir Bridge. Their further upstream passage is impeded by the regulating weir immediately upstream. The combination of barriers to passage and low flows can impede further upstream passage in Irish catchments and prevent or reduce penetration and extensive colonisation (Gargan et al., 2011; Rooney et al., 2015). Sea lamprey have been recorded passing through the denil fish passage facility at the regulating weir. However, no quantitative assessment has been made, nor has any annual record been maintained. Sea lamprey have also been observed using their sucker mouths to project themselves up the damp concrete faces of the weir structure at low water levels (J. King, Inland Fisheries Ireland (IFI), pers. comm.)
Population structure of juveniles	Number of age/size groups	At least three age/size groups present	Attribute and target based on Harvey and Cowx (2003) and O'Connor (2007)
Juvenile density in fine sediment	Juveniles/m²	Mean catchment juvenile density at least 1/m²	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on Harvey and Cowx (2003). No sites surveyed in 2006 (O'Connor, 2007) or 2013 (IFI, unpublished data) were positive for sea lamprey ammocoetes
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed habitat mapping by Inland Fisheries Ireland (IFI). Lampreys spawn in clean gravels. Artificial barriers can prevent lampreys from accessing suitable spawning habitat. As mentioned above, artificial barriers are currently preventing lamprey from accessing suitable spawning habitat above the regulating weir in the River Corrib
Availability of juvenile habitat	Number of positive sites in 3rd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive, with a minimum of four positive sites in a catchment, which are at least 5km apart	Artificial barriers can prevent juvenile lampreys from accessing the full extent of suitable habitat. Silting habitat is essential for larval lamprey and they can be severely impacted by sediment removal. Recovery can be rapid and newly-created habitat can be rapidly colonised (King et al., 2015). However, it is vital that such sedimenting habitats are retained

1096 Brook Lamprey *Lampetra planeri*

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

Attribute	Measure	Target	Notes
Distribution	Percentage of river accessible	Access to all watercourses down to first order streams	Artificial barriers can block or cause difficulties to brook lampreys' migration both up- and downstream, thereby possibly limiting species to specific stretches, restricting access to spawning areas and creating genetically isolated populations (Espanhol et al., 2007)
Population structure of juveniles	Number of age/size groups	At least three age/size groups of brook/river lamprey present	Attribute and target based on data from Harvey and Cowx (2003) and JNCC (2005). It is impossible to distinguish between brook and river lamprey ammocoetes in the field (Gardiner, 2003), hence they are considered together in this target
Juvenile density in fine sediment	Ammocoetes/m²	Mean catchment ammocoete density of brook/river lamprey at least 5/m²	Ammocoetes burrow in areas of fine sediment in still water. Attribute target revised upward based on more recent proposals of JNCC (2005) and replacing initial proposals of Harvey and Cowx (2003). New criterion set at 5 ammocoetes/m² on a catchment basis. The majority of sub-catchments in the SAC achieved this target in 2013 (IFI, unpublished data)
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by Inland Fisheries Ireland (IFI). Brook lamprey spawning habitat attributes compiled in Rooney et al. (2013) and the particle size required is considered to be available very widely in all river systems within the SAC, apart from very steep and torrential areas of boulder and bedrock. It is not considered that spawning habitat is a limiting feature for the conservation status of this species
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Target of 50% presence in suitable habitat based on Irish experience to date in catchment-wide surveys. 50% of surveyed sites in the catchment were positive in 2013 (IFI, unpublished data) compared with 49% in 2006 (O'Connor, 2007). Silting habitat is essential for larval lamprey and they can be severely impacted by sediment removal. Recovery can be rapid and newly-created habitat can be rapidly colonised (King et al., 2015). However, it is vital that such sedimenting habitats are retained

1106 Salmon *Salmo salar*

To maintain the favourable conservation condition of Atlantic Salmon in Lough Corrib 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	There are no barriers to migration of salmon (*Salmo salar*) in Lough Corrib SAC. Salmon spawn in the headwaters of Lough Corrib tributaries. There is an artificial canal joining Lough Corrib and Lough Mask where salmon did not have access historically and does not constistute a limit on the distribution of salmon in Lough Corrib SAC
Adult spawning fish	Number	Conservation limit (CL) for each system consistently exceeded	A conservation limit (CL) is defined by the North Atlantic Salmon Conservation Organisation (NASCO) as "the spawning stock level that produces long-term average maximum sustainable yield as derived from the adult to adult stock and recruitment relationship". The target is based on the Standing Scientific Committee on Salmon (SSCS) annual model output of CL attainment levels. See SSCS (2016). Attainment of CL estimates are derived from direct counts of adults (rod catch, fish counter) or indirectly by fry abundance counts. The Corrib catchment is currently exceeding its CL
Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 minutes sampling	The target is the threshold value for rivers currently exceeding their conservation limit (CL)
Out-migrating smolt abundance	Number	No significant decline	Smolt abundance can be negatively affected by a number of impacts such as estuarine pollution, predation and sea lice (*Lepeophtheirus salmonis*)
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. The habitat for salmon is good and habitat rehabilitation programmes have been undertaken throughout the Corrib catchment to restore drained channels and repair habitat damaged by overgrazing
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)

1303 Lesser Horseshoe Bat *Rhinolophus hipposideros*

To restore the favourable conservation condition of Lesser Horseshoe Bat in Lough Corrib SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population per roost	Number	Minimum number of 100 bats for summer roost (roost id. 217 in NPWS database). See map 11	A figure of 100 bats for summer roosts was set as a minimum qualifying standard (MQS) when SACs were being selected for lesser horseshoe bats (*Rhinolophus hipposideros*). NPWS conduct annual counts at each qualifying roost. Qualified means from the 2006-2012 data have been calculated whereby the year with the highest maximum count and the year with the lowest maximum count were removed and the mean of the remaining years was calculated. This mean, or the MQS (i.e. 100 bats), whichever is higher, is set as the target figure for the roost
Summer roosts	Condition	No decline	Lough Corrib SAC has been selected for lesser horseshoe bats because of the presence of one important summer roost (roost id. 217 in NPWS database). Damage or disturbance to the roost or to the habitat immediately surrounding the roost will lead to a decline in its condition (Kelleher and Marnell, 2006)
Number of auxillary roosts	Number and condition	No decline	Lesser horseshoe bat populations will use a variety of roosts during the year besides the main summer maternity roost. Such additional roosts within the SAC may be important as night roosts/satellite roosts etc. A database of all known lesser horseshoe roosts is available on the National Biodiversity Data Centre website. NB further unrecorded roosts may also be present within this SAC
Extent of potential foraging habitat	Hectares	No significant decline	Lesser horseshoe bats normally forage in woodlands/scrub within 2.5km of their roosts (Schofield, 2008). See map 11 which shows a 2.5km zone around the above named roost and identifies potential foraging grounds
Linear features	Kilometres	No significant loss, within 2.5km of qualifying roosts. See map 11	This species follows commuting routes from its roost to its foraging grounds. Lesser horseshoe bats will not cross open ground. Consequently, linear features such as hedgerows, treelines and stone walls provide vital connectivity for this species, most importantly within 2.5km around each roost (Schofield, 2008)
Light pollution	Lux	No significant increase in artificial light intensity adjacent to named roost or along commuting routes within 2.5km of the roost. See map 11	Lesser horseshoes are very sensitive to light pollution and will avoid brightly lit areas. Inappropriate lighting around roosts may cause abandonment; lighting along commuting routes may cause preferred foraging areas to be abandoned, thus increasing the energetic cost for bats (Schofield, 2008)

1355 Otter *Lutra lutra*

To maintain the favourable conservation condition of Otter in Lough Corrib 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 1,054ha along river banks/ lake shoreline/around ponds	No field survey. Areas mapped to include 10m terrestrial buffer along shoreline and river banks identified as critical for otters (NPWS, 2007)
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 314.2km	No field survey. River length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters (Chapman and Chapman, 1982)
Extent of freshwater (lake) habitat	Hectares	No significant decline. Area mapped and calculated as 4,178ha	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 12	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

1393 Slender Green Feather-moss *Drepanocladus vernicosus*

To maintain the favourable conservation condition of Slender Green Feather-moss (Shining Sickle-moss) in Lough Corrib SAC, which is defined by the following list of attributes and targets:

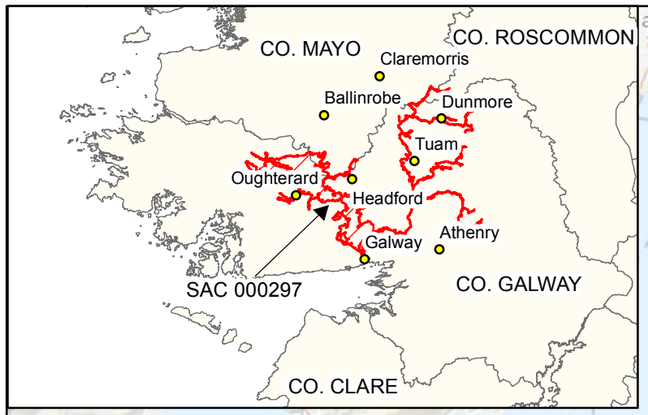
Attribute	Measure	Target	Notes
Distribution of populations	Number and geographical spread of populations	No decline, subject to natural processes. See map 10 for known location at NW of Gortachalla Lough	(Please note that *Drepanocladus vernicosus* was reclassified as *Hamatocaulis vernicosus* by Hedenäs (1989)). The known population of slender green feather-moss (*Hamatocaulis vernicosus*) in Lough Corrib SAC occurs at NW of Gortachalla Lough in transition mire which is bounded to the west by acid bog. Data from NPWS surveys (NPWS internal files), Campbell (2013) and Campbell et al. (2015)
Population size	Number of individuals	No decline, subject to natural processes	The population at NW of Gortachalla Lough was estimated by Campbell (2013) to be 153,376,875 shoots (c.153,377,000 shoots). Counts of shoots were based on the mean of number of shoots in four 10cm x 10cm areas, extrapolated to 41,175 shoots/m² in 3,725m² (Campbell, 2013). See Campbell et al. (2015) for further details
Population cover	Percentage cover in a representative number of 2m x 2m monitoring plots	Mean percentage cover of slender green feather-moss (*Hamatocaulis vernicosus*) should be at least 45%	The mean percentage cover of slender green feather-moss (*Hamatocaulis vernicosus*) recorded in four 2m x 2m plots at NW of Gortachalla Lough was c.60% (Campbell, 2013). The target cover figure is a c.20% reduction of the recorded cover to allow for a margin of error and variability over monitoring seasons. See Campbell et al. (2015) for further details
Area of suitable habitat	Hectares	No decline, subject to natural processes	The area of occupancy at NW of Gortachalla Lough is estimated from mapping of GPS co-ordinates to be 6,209m². However, only c.60% of this is suitable habitat i.e. c.3,725m² (0.373ha). See Campbell et al. (2015) for further details
Hydrological conditions: water table level	Metres	Maintain suitable hydrological conditions	Slender green feather-moss (*Hamatocaulis vernicosus*) is mostly confined to mesotrophic fens, a transitional habitat between acid bog and base-rich fen. This appears to occur in at least two forms in Ireland: upland transitional flushes, where the plants can occur in lawns that rise and fall with fluctuating water table levels; and wet lowland sedge meadows, where plants can be inundated in winter, but may be subject to some desiccation in the summer, such as at NW of Gortachalla Lough. Based on Campbell (2013) and Campbell et al. (2015)
Vegetation composition: tree cover	Percentage cover in a representative number of 2m x 2m monitoring plots	Mean percentage tree cover should be less than 15%	Slender green feather-moss (*Hamatocaulis vernicosus*) grows in moss-dominated, open communities, generally with a low cover of trees and shrubs. Campbell (2013) recorded 0% tree cover at NW of Gortachalla Lough. See also Campbell et al. (2015)
Vegetation composition: shrub cover	Percentage cover in a representative number of 2m x 2m monitoring plots	Mean percentage shrub cover should be less than 20%	Slender green feather-moss (*Hamatocaulis vernicosus*) grows in moss-dominated, open communities, generally with a low cover of trees and shrubs. Campbell (2013) recorded 0-1% shrub cover at NW of Gortachalla Lough. See also Campbell et al. (2015)
Vegetation composition: grass cover	Percentage cover in a representative number of 2m x 2m monitoring plots	Mean percentage grass species cover should be less than 25%	Slender green feather-moss (*Hamatocaulis vernicosus*) grows in moss-dominated, open communities, generally with a low cover of grasses, maintained by a low grazing intensity by rabbits (*Oryctolagus cuniculus*) at NW of Gortachalla Lough. Campbell (2013) recorded grass cover of 0-10% in four 2m x 2m plots at NW of Gortachalla Lough. See also Campbell et al. (2015)

Vegetation composition: bryophyte cover	Percentage cover in a representative number of 2m x 2m monitoring plots	Mean percentage bryophyte cover should be more than 50%	Campbell (2013) recorded bryophyte cover of 34-95% in four 2m x 2m plots at NW of Gortachalla Lough. See also Campbell et al. (2015)
Vegetation composition: cover of *Calliergonella cuspidata*	Percentage cover in a representative number of 2m x 2m monitoring plots	Mean percentage cover of *Calliergonella cuspidata* should be less than 15%	*Calliergonella cuspidata*, a moss species often associated with high nutrient conditions, is usually present, but with low cover and never dominant. Cover of *Calliergonella cuspidata* was 0-3% in four 2m x 2m plots recorded by Campbell (2013) at NW of Gortachalla Lough. See also Campbell et al. (2015)
Vegetation structure: vegetation height	Centimetres in a representative number 2m x 2m monitoring plots	Mean vegetation height should not exceed 40cm	Campbell (2013) recorded a mean vegetation height of 40cm in four 2m x 2m plots at NW of Gortachalla Lough. See also Campbell et al. (2015)

1833 Slender Naiad *Najas flexilis*

To restore the favourable conservation condition of Slender Naiad in Lough Corrib 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 *Najas flexilis* within the lake, subject to natural processes. See map 13 for known locations	See the *Najas flexilis* supporting document for further details
Population depth	Metres	Restore the depth range of *Najas flexilis* within the lake, subject to natural processes	See the *Najas flexilis* supporting document for further details
Population viability	Plant traits	Restore plant fitness, subject to natural processes	See the *Najas flexilis* supporting document for further details
Population abundance	Square metres	Restore the cover abundance of *Najas flexilis*, subject to natural processes	See the *Najas flexilis* supporting document for further details
Species distribution	Occurrence	Restore to at least the north-western bay, subject to natural processes	See the *Najas flexilis* supporting document for further details
Habitat extent	Hectares	Restore, subject to natural processes	See the *Najas flexilis* supporting document for further details
Hydrological regime: water level fluctuations	Metres	Maintain appropriate natural hydrological regime necessary to support the habitat for the species	See the *Najas flexilis* supporting document for further details
Lake substratum quality	Various	Restore appropriate substratum type, extent and chemistry to support the population of the species	See the *Najas flexilis* supporting document for further details
Water quality	Various	Restore appropriate water quality to support the population of the species	See the *Najas flexilis* supporting document for further details
Acidification status	pH units; mg/l	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the population of *Najas flexilis*, subject to natural processes	See the *Najas flexilis* supporting document for further details
Water colour	mg/l PtCo	Restore/maintain appropriate water colour to support the population of *Najas flexilis*	See the *Najas flexilis* supporting document for further details
Associated species	Species composition and abundance	Restore appropriate associated species and vegetation communities to support the population of *Najas flexilis*	See the *Najas flexilis* supporting document for further details
Fringing habitat: area and condition	Hectares	Maintain the area and condition of fringing habitats necessary to support the population of *Najas flexilis*	See the *Najas flexilis* supporting document for further details



MAP 1:
LOUGH CORRIB SAC
CONSERVATION OBJECTIVES
SAC DESIGNATION

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

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SITE CODE:
SAC 000297; version 3.09.
CO. GALWAY / MAYO / ROSCOMMON

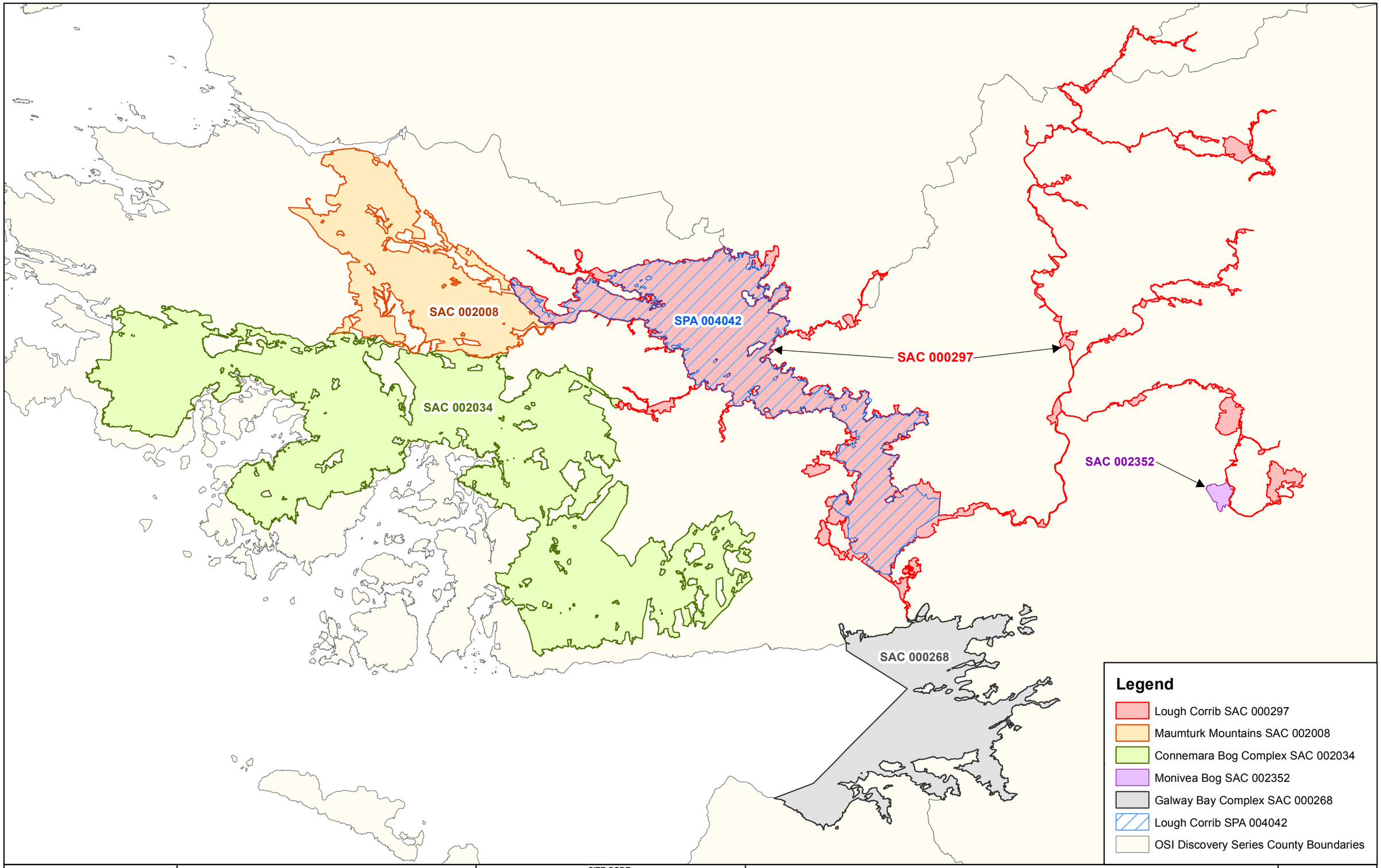
0 2 4 6 8 10 km

N

Map Version 1
Date: April 2017

Legend

Lough Corrib SAC 000297



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MAP 2: LOUGH CORRIB SAC CONSERVATION OBJECTIVES ADJACENT / ADJOINING & OVERLAPPING DESIGNATIONS

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

SITE CODE:
SAC 000297; version 3.09, SAC 000268; version 3.01, SAC 002008; version 3, SAC 002034; version 3.01, SAC 002352; version 3.1. SPA 004042; version 2.02. CO. GALWAY / MAYO / ROSCOMMON

0 2 4 6 8 10 km

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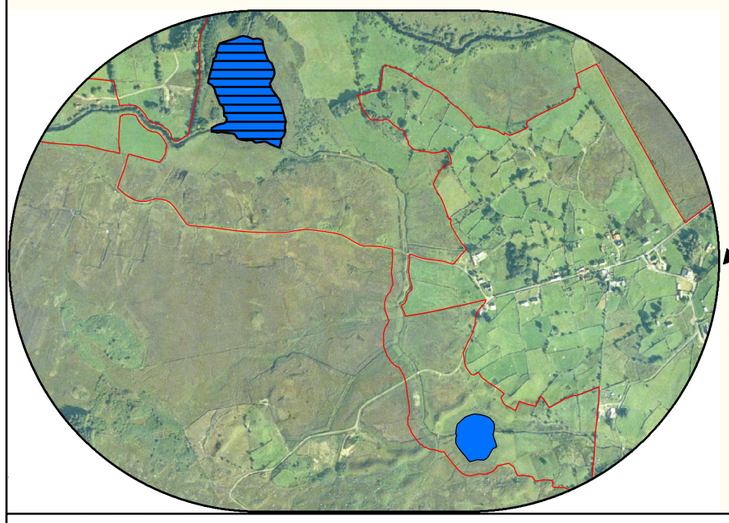
Map Version 1
Date: April 2017



Legend

- Lough Corrib SAC 000297
- OSI Discovery Series County Boundaries

Indicative Lake Habitats

- Dominant 3110, Dominant Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorarae)
- Dominant 3130, Dominant Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorarae and/or Isoeto-Nanojuncetea
- Dominant 3140, Dominant Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.
- Potential 3110, Potential Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorarae)
- Potential 3130, Potential Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorarae and/or Isoeto-Nanojuncetea
- Potential 3110 / Potential 3130, Potential Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorarae) / Potential Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorarae and/or Isoeto-Nanojuncetea

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MAP 3:
LOUGH CORRIB SAC
CONSERVATION OBJECTIVES
INDICATIVE LAKE HABITATS

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

SITE CODE:
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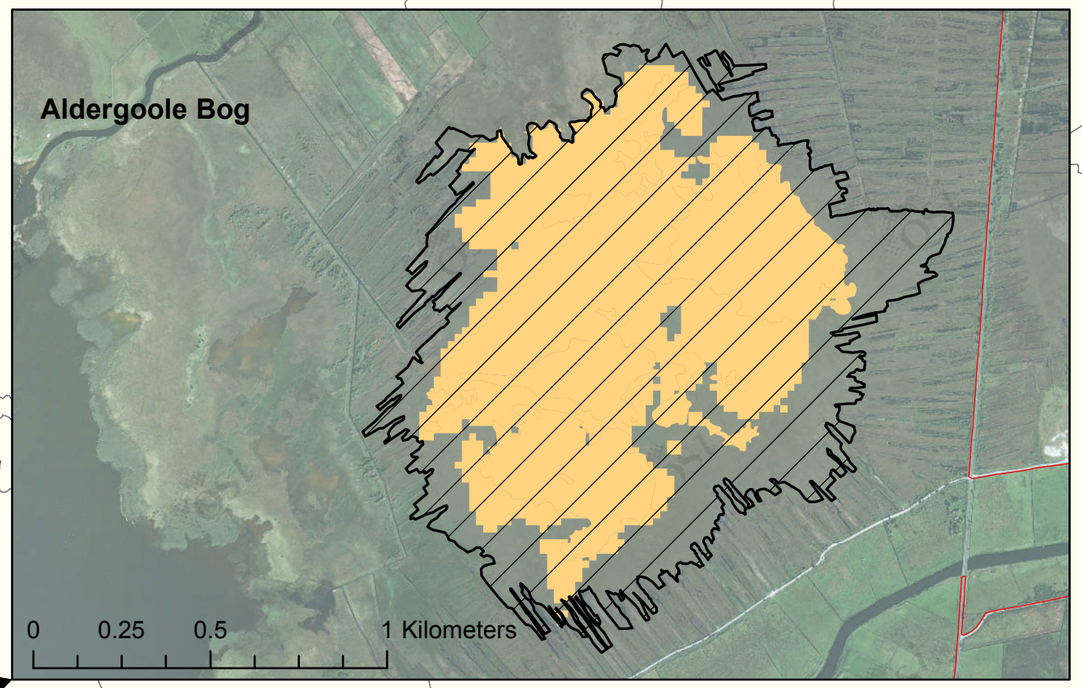
CO. GALWAY / MAYO / ROSCOMMON

0 1 2 3 4 5 km

N

Map Version 1
Date: April 2017



Legend

- Lough Corrib SAC 000297
- High Bog Boundary
- Potential 7110 Active Raised Bogs
- OSI Discovery Series County Boundaries

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MAP 4:
LOUGH CORRIB SAC
CONSERVATION OBJECTIVES
EXTENT OF POTENTIAL
ACTIVE RAISED BOGS

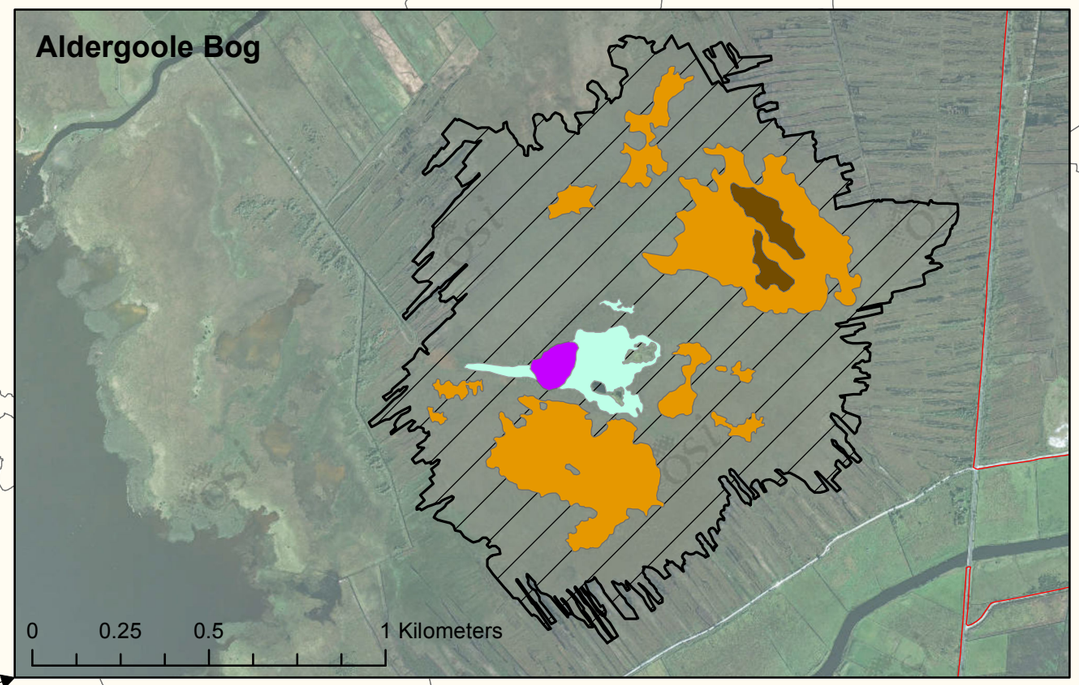
Map to be read in conjunction with the NPWS Conservation Objectives Document.

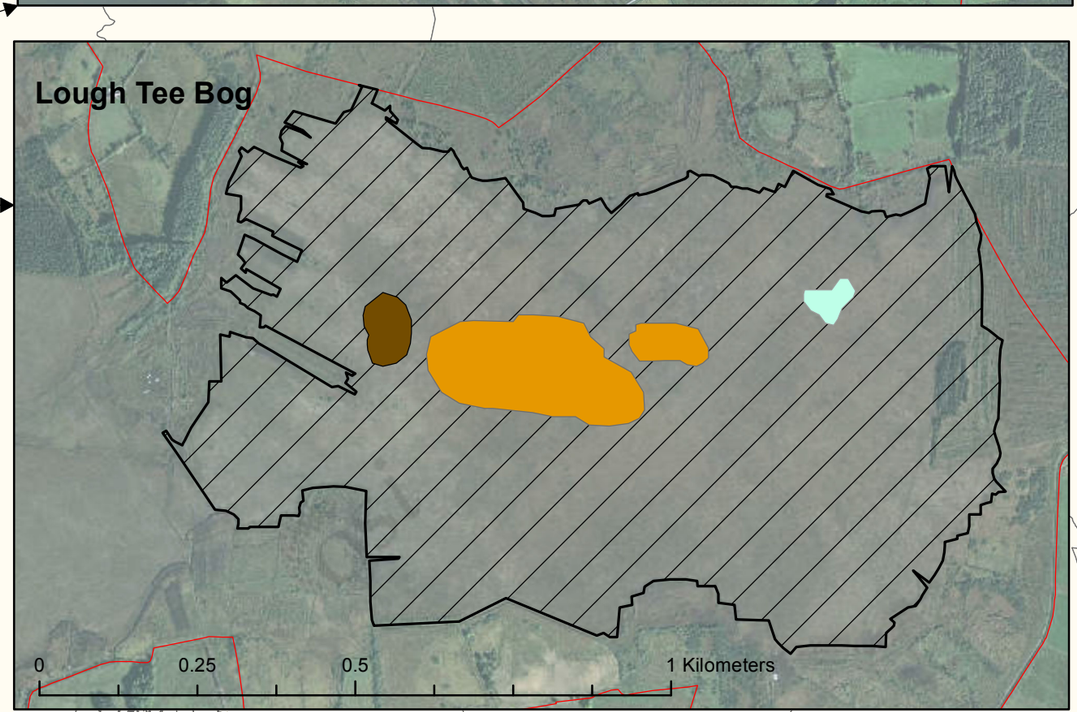
SITE CODE:
SAC 000297; version 3.09.
CO. GALWAY / MAYO / ROSCOMMON

0 3 6 9 12 15 Kilometers

N

Map Version 1
Date: April 2017





Legend

- Lough Corrib SAC 000297
- High Bog Boundary

Active Raised Bog Ecotopes

- Active Flush
- Bog Woodland
- Central
- Sub-central
- OSI Discovery Series County Boundaries

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MAP 5:
LOUGH CORRIB SAC
CONSERVATION OBJECTIVES
ACTIVE RAISED BOGS
ECOTOPES

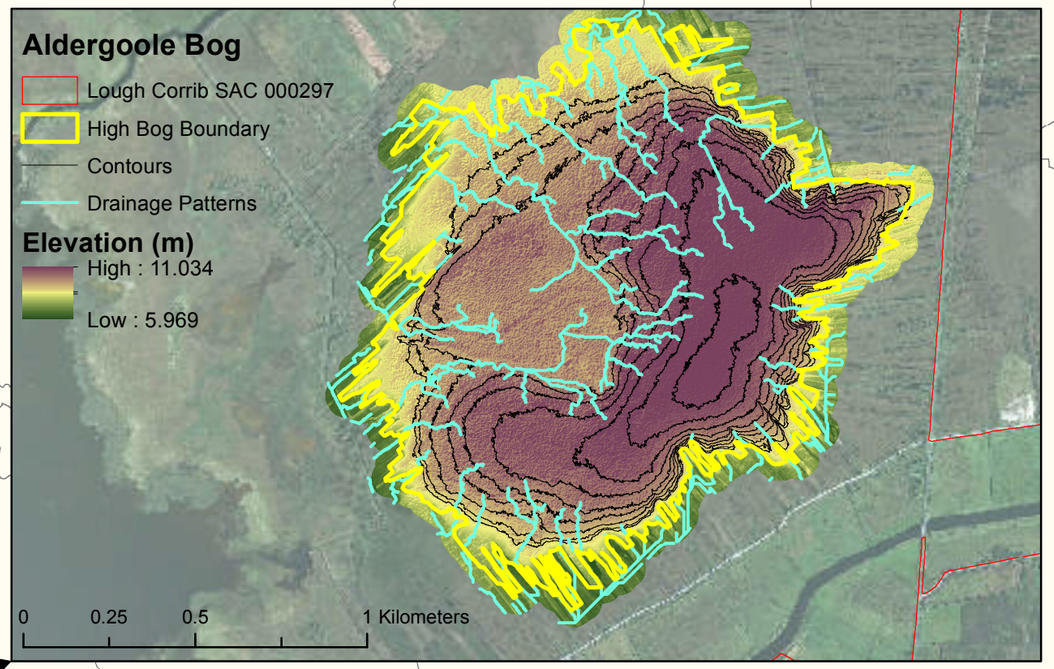
Map to be read in conjunction with the NPWS Conservation Objectives Document.

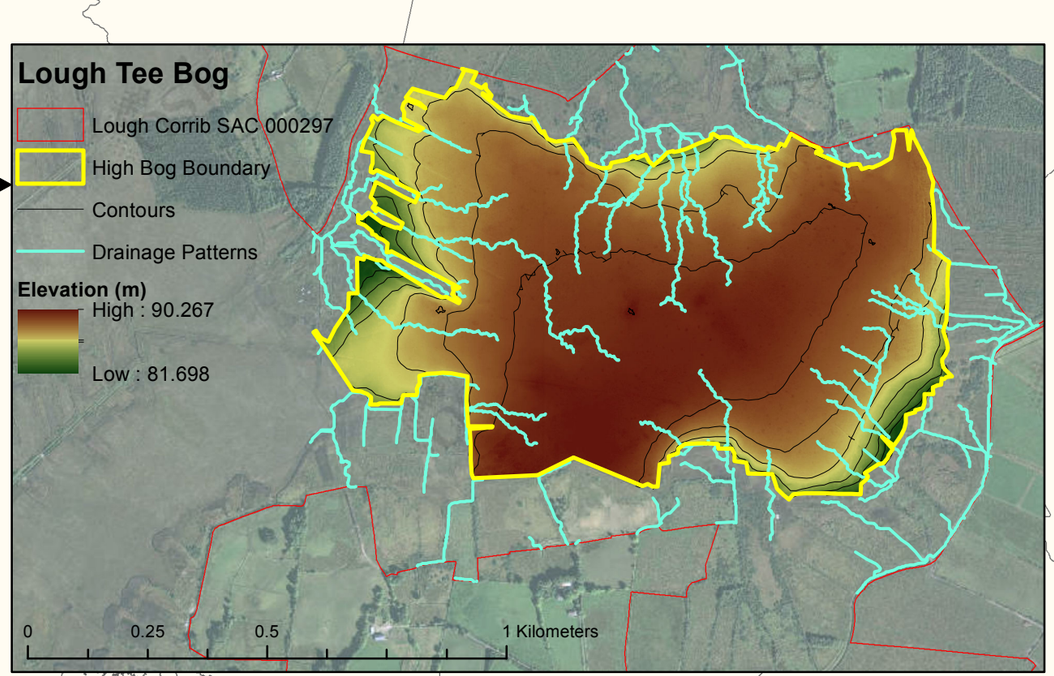
SITE CODE:
SAC 000297; version 3.09.
CO. GALWAY / MAYO / ROSCOMMON

0 4 8 12 16 20 Kilometers

N

Map Version 1
Date: April 2017





Legend

- Lough Corrib SAC 000297
- OSI Discovery Series County Boundaries

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MAP 6:
LOUGH CORRIB SAC
CONSERVATION OBJECTIVES
DIGITAL ELEVATION MODEL
& DRAINAGE PATTERNS

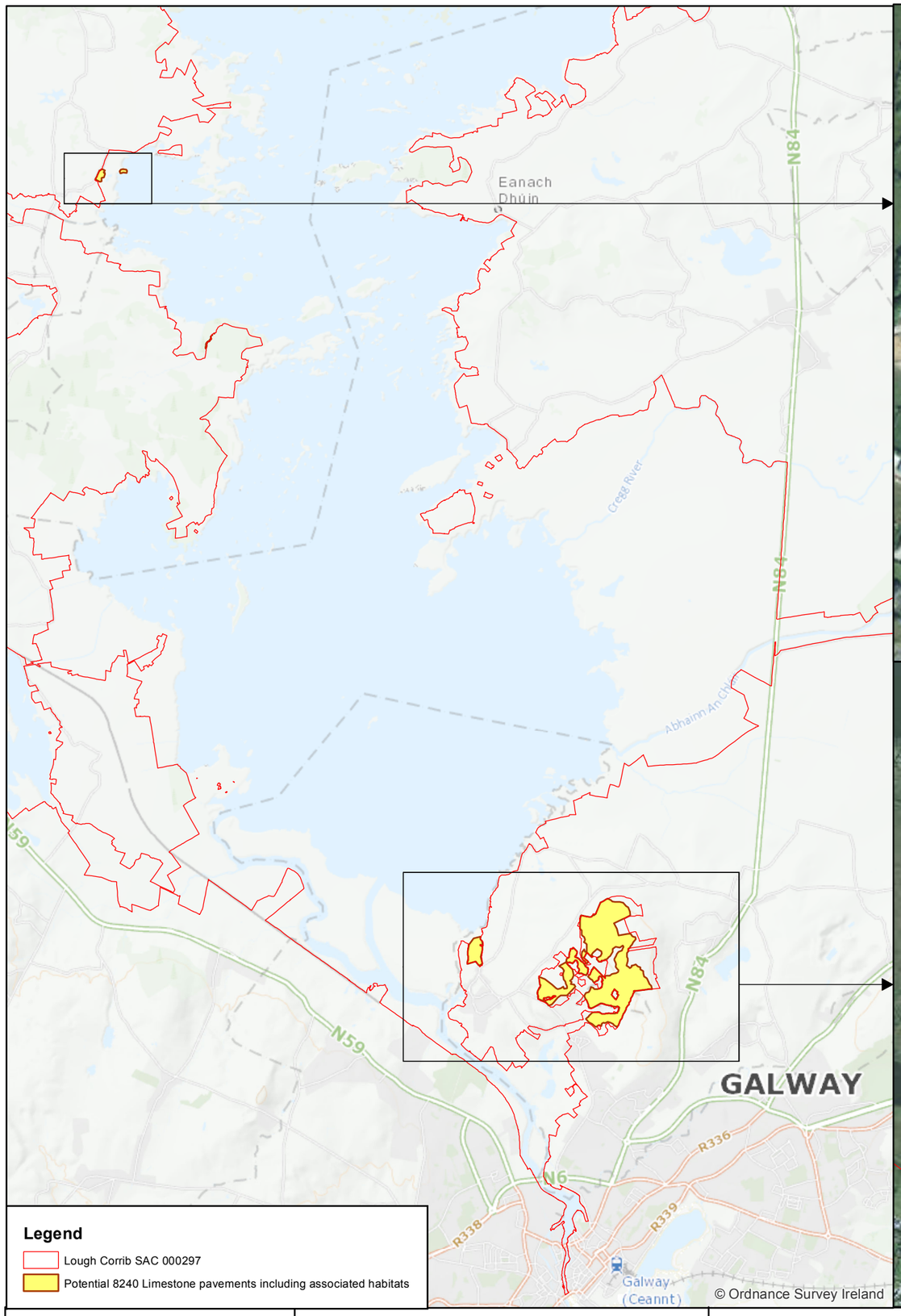
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 000297; version 3.09.
CO. GALWAY / MAYO / ROSCOMMON

0 3 6 9 12 15 Kilometers

N

Map Version 1
Date: April 2017



Legend

- Lough Corrib SAC 000297
- Potential 8240 Limestone pavements including associated habitats

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MAP 7: LOUGH CORRIB SAC CONSERVATION OBJECTIVES LIMESTONE PAVEMENTS

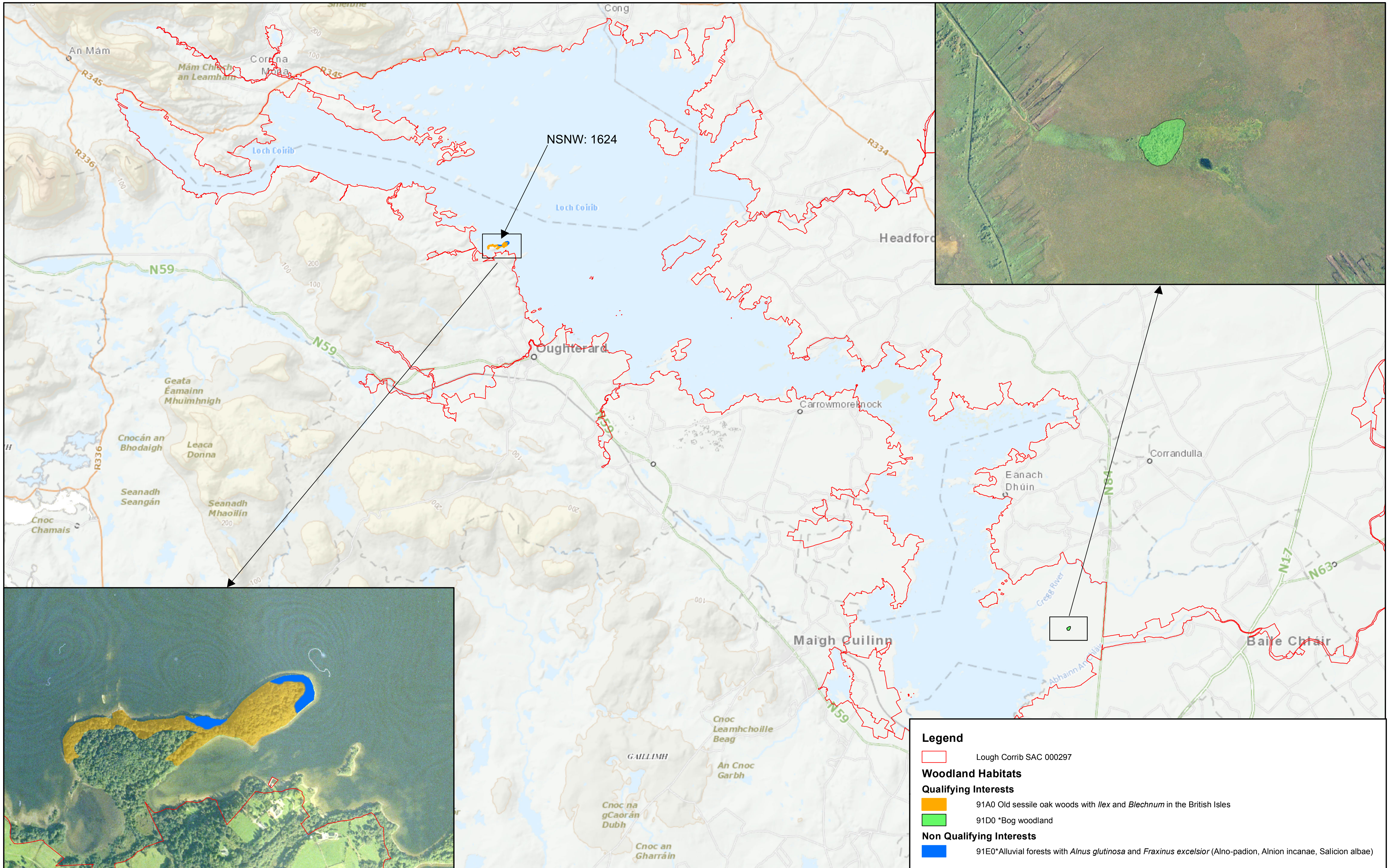
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 000297; version 3.09.
CO. GALWAY / MAYO / ROSCOMMON

0 1 2 4 km

N

Map Version 1
Date: April 2017



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MAP 8:
LOUGH CORRIB SAC
CONSERVATION OBJECTIVES
WOODLAND HABITATS

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

SITE CODE:
SAC 000297; version 3.09.
CO. GALWAY / MAYO / ROSCOMMON

0 1 2 3 4 5 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 comharthaithe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh EN 0059216. © Suirbhéarachta Ordonáis na hÉireann Rialtas na hÉireann

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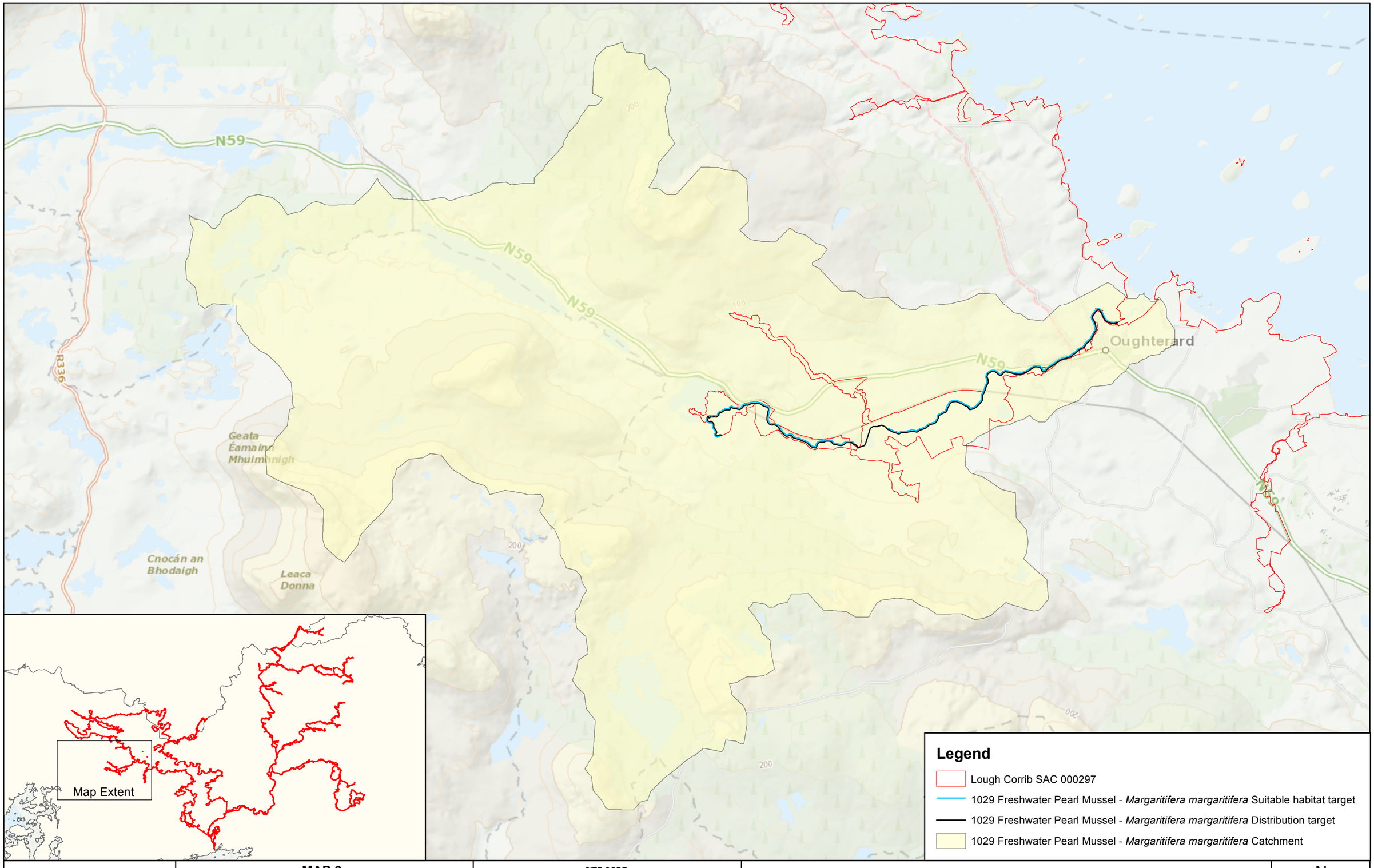
Map Version 1
Date: April 2017



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MAP 9:
LOUGH CORRIB SAC
CONSERVATION OBJECTIVES
FRESHWATER PEARL MUSSEL - *MARGARITIFERA MARGARITIFERA*

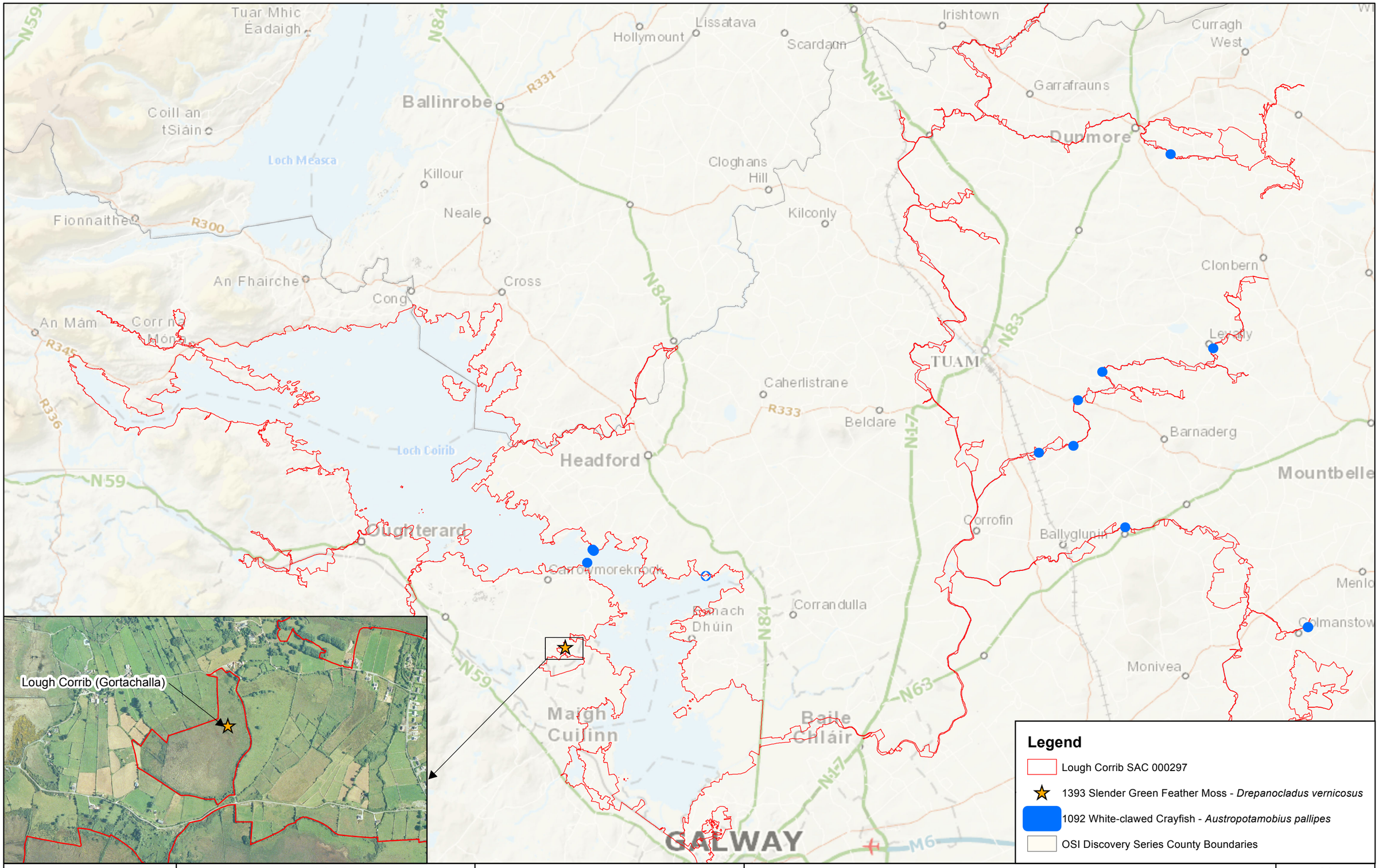
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 000297; version 3.09.
CO. GALWAY / MAYO / ROSCOMMON

0 0.5 1 1.5 2 km

N

Map Version 1
Date: April 2017



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MAP 10:
LOUGH CORRIB SAC
CONSERVATION OBJECTIVES
WHITE-CLAWED CRAYFISH
& SLENDER GREEN FEATHER-MOSS

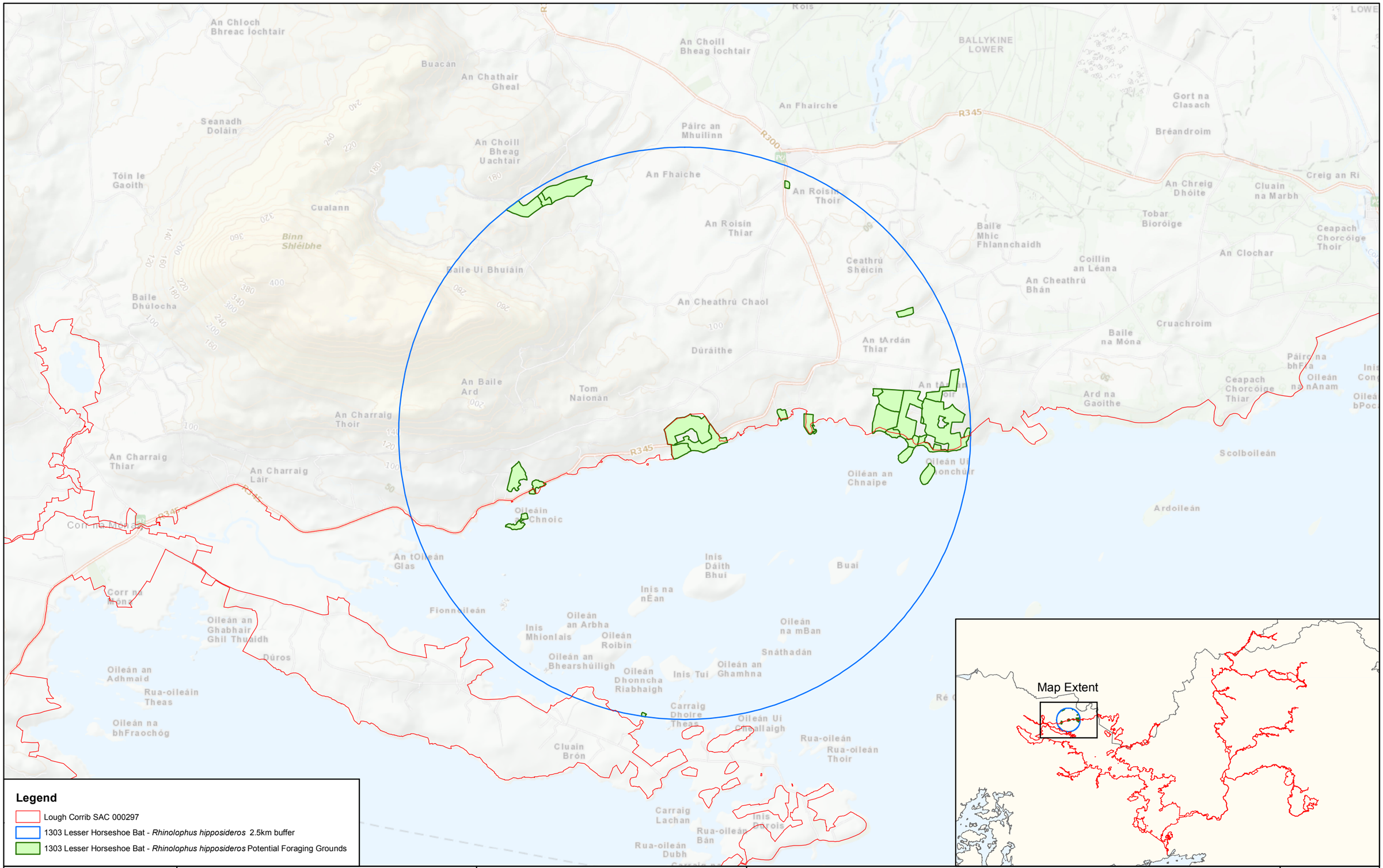
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 000297; version 3.09.
CO. GALWAY / MAYO / ROSCOMMON

0 1.5 3 4.5 6 7.5 km

N

Map Version 1
Date: April 2017



Legend

- Lough Corrib SAC 000297
- 1303 Lesser Horseshoe Bat - *Rhinolophus hipposideros* 2.5km buffer
- 1303 Lesser Horseshoe Bat - *Rhinolophus hipposideros* Potential Foraging Grounds

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MAP 11:
LOUGH CORRIB SAC
CONSERVATION OBJECTIVES
LESSER HORSESHOE BAT

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

SITE CODE:
SAC 000297; version 3.09.
CO. GALWAY / MAYO / ROSCOMMON

0 0.5 1 1.5 2 km

N

Map Version 1
Date: April 2017

Legend

- Lough Corrib SAC 000297
- 1355 Otter - *Lutra lutra* Commuting 250m buffer

Map Extent

MAP 12:
LOUGH CORRIB SAC
CONSERVATION OBJECTIVES
OTTER COMMUTING

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

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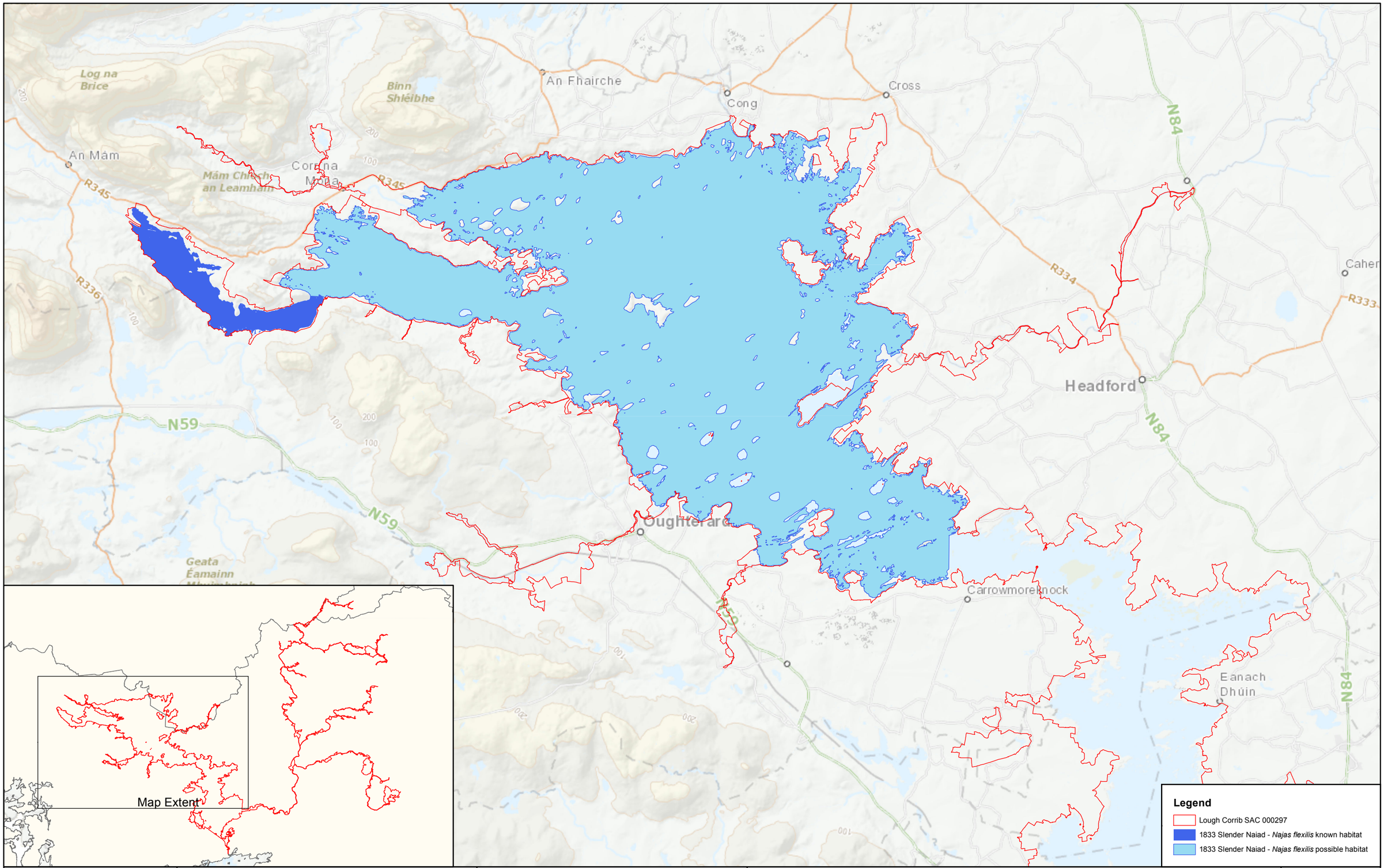
SITE CODE:
SAC 000297; version 3.04.
CO. GALWAY / MAYO / ROSCOMMON

0 1 2 3 4 5 km

N

Map Version 1
Date: April 2017



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MAP 13:
LOUGH CORRIB SAC
CONSERVATION OBJECTIVES
SLENDER NAIAD - *NAJAS FLEXILIS*

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

SITE CODE:
SAC 000297; version 3.09.
CO. GALWAY / MAYO / ROSCOMMON

0 1.5 3 4.5 6 km

N

Map Version 1
Date: April 2017