ISSN 2009-4086

National Parks and Wildlife Service

Conservation Objectives Series

Lower River Shannon SAC 002165

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Citation:
NPWS (2012) Conservation Objectives: Lower River Shannon SAC 002165. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

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

Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

Qualifying Interests

**** indicates a priority habitat under the Habitats Directive***

002165 Lower River Shannon SAC

1029	Freshwater Pearl Mussel *Margaritifera margaritifera*
1095	Sea Lamprey *Petromyzon marinus*
1096	Brook Lamprey *Lampetra planeri*
1099	River Lamprey *Lampetra fluviatilis*
1106	Atlantic Salmon *Salmo salar* (only in fresh water)
1110	Sandbanks which are slightly covered by sea water all the time
1130	Estuaries
1140	Mudflats and sandflats not covered by seawater at low tide
1150	*Coastal lagoons
1160	Large shallow inlets and bays
1170	Reefs
1220	Perennial vegetation of stony banks
1230	Vegetated sea cliffs of the Atlantic and Baltic coasts
1310	*Salicornia* and other annuals colonizing mud and sand
1330	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
1349	Bottlenose Dolphin *Tursiops truncatus*
1355	Otter *Lutra lutra*
1410	Mediterranean salt meadows (*Juncetalia maritimi*)
3260	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation
6410	*Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)
91E0	*Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)

Please note that this SAC overlaps with River Shannon and River Fergus Estuaries SPA (004077), Loop Head SPA (004119), Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161), Slievefelim to Silvermines Mountains SPA (004165) and Kerry Head SPA (004189). It is also adjacent to Clare Glen SAC (00930). See map 2. The conservation objectives for this site should be used in conjunction with those for the overlapping and adjacent sites as appropriate.

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

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

Title: Aspects of brook lamprey (*Lampetra planeri* Bloch) spawning in Irish waters

Year: in press

Author: Rooney, S.M.; O'Gorman, N.M.; Green, F.; King, J.J.

Series: Biology and Environment

Title: Lower River Shannon SAC (002170): Conservation objectives supporting document - Coastal lagoons [Version 1]

Year: 2012

Author: NPWS

Series: Unpublished Report to NPWS

Title: Lower River Shannon SAC (002170): Conservation objectives supporting document - Marine habitats and species [Version 1]

Year: 2012

Author: NPWS

Series: Unpublished Report to NPWS

Title: Lower River Shannon SAC (002170): Conservation objectives supporting document - Coastal habitats [Version 1]

Year: 2012

Author: NPWS

Series: Unpublished Report to NPWS

Title: Lower River Shannon SAC (002170): Conservation objectives supporting document - Woodland habitats [Version 1]

Year: 2012

Author: NPWS

Series: Unpublished Report to NPWS

Title: Lower River Shannon SAC (002170): Conservation objectives supporting document - Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [Version 1]

Year: 2012

Author: NPWS

Series: Unpublished Report to NPWS

Title: Intertidal Hard and Soft Bottom Investigations in Lower River Shannon cSAC (Site Code: IE002165)/Shannon Fergus Estuary SPA (Site Code: IE004077)

Year: 2011c

Author: Aquafact

Series: Unpublished Report to NPWS

Title: Reef Investigations in Lower River Shannon cSAC (cSAC Site Code: IE002165)

Year: 2011b

Author: Aquafact

Series: Unpublished Report to NPWS

Title: Subtidal Benthic Investigations in Lower River Shannon cSAC (cSAC Site Code: IE002165)
Year: 2011a
Author: Aquafact
Series: Unpublished Report to NPWS

Title: National survey and assessment of the conservation status of Irish sea cliffs
Year: 2011
Author: Barron, S.J.; Delaney, A.; Perrin, P.M.; Martin, J.; O'Neill, F.
Series: Irish Wildlife Manuals No. 53

Title: Comparison of field- and GIS-based assessments of barriers to Atlantic salmon migration: a case study in the Nore Catchment, Republic of Ireland
Year: 2011
Author: Gargan, P. G.; Roche, W. K.; Keane, S.; King, J.J.; Cullagh, A.; Mills, P.; O'Keeffe, J.
Series: J. Appl. Ichthyol. 27 (Suppl. 3), 66–72

Title: Fine-scale population genetic structuring of bottlenose dolphins in Irish coastal waters
Year: 2011
Author: Mirimin, L.; Miller, R.; Dillane, E.; Berrow, S.D.; Ingram, S.; Cross, T.F.; Rogan, E.
Series: Animal Conservation 2011: 1–12

Title: The use of Cork Harbour by bottlenose dolphins (*Tursiops truncatus* (Montagu, 1821))
Year: 2011
Author: Ryan, C.; Cross, T.F.; Rogan, E.
Series: Irish Naturalists' Journal 31(1): 1-9

Title: Irish cetacean review (2000-2009)
Year: 2010
Author: Berrow, S.D.; Whooley, P.; O'Connell, M.; Wall, D.
Series: Irish Whale and Dolphin Group

Title: Bottlenose Dolphin SAC Survey 2010
Year: 2010
Author: Berrow, S.D.; O'Brien, J.; Groth, L.; Foley, A.; Voigt, K.
Series: Unpublished Report to NPWS

Title: Otter tracking study of Roaringwater Bay
Year: 2010
Author: De Jongh, A.; O'Neill, L.
Series: Unpublished Draft Report to NPWS

Title: Second Draft Cloon (Shannon Estuary) Freshwater Pearl Mussel Sub-basin Management Plan (2009-2015)
Year: 2010
Author: DEHLG
Series: Unpublished Report to NPWS

Title: Social structure within the bottlenose dolphin (*Tursiops truncatus*) population in the Shannon Estuary, Ireland

Year: 2010

Author: Foley, A.; McGrath, D.; Berrow, S.D.; Gerritsen, H.

Series: Aquatic Mammals 36(4): 372-381

Title: Irish Semi-natural Grasslands Survey. Annual report no. 3: Counties Donegal, Dublin, Kildare & Sligo

Year: 2010

Author: O'Neill, F.H.; Martin, J.R.; Devaney, F.M.; McNutt, K.E.; Perrin, P.M. ; Delaney, A.

Series: Unpublished Report to NPWS

Title: A provisional inventory of ancient and long-established woodland in Ireland

Year: 2010

Author: Perrin, P.M.; Daly, O.H.

Series: Irish Wildlife Manuals No. 46

Title: Monitoring and Assessment of Irish Lagoons for the purpose of the EU Water Framework Directive

Year: 2010

Author: Roden, C.M,; Oliver, G.

Series: EPA

Title: Report of the standing scientific committee to the DCENR. The status of Irish salmon stocks in 2010 and precautionary catch advice for 2011

Year: 2010

Author: SSC

Series: Unpublished Report to DCENR

Title: The European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. [S.I. 296 of 2009]

Year: 2009b

Author: Government of Ireland

Series: Irish Statute Book

Title: The European Communities Environmental Objectives (Surface Water) Regulations 2009. [S.I. 272 of 2009]

Year: 2009a

Author: Government of Ireland

Series: Irish Statute Book

Title: Winter distribution of bottle-nosed dolphins (*Tursiops truncatus* (Montagu)) in the inner Shannon Estuary

Year: 2009

Author: Berrow, S.D.

Series: Irish Naturalists' Journal 30(1): 35-39

Title: Towards a bottlenose dolphin whistle ethogram from the Shannon Estuary, Ireland

Year: 2009

Author: Hickey, R.; Berrow, S.D.; Goold, J.

Series: Biology and Environment: Proceedings of the Royal Irish Academy 109B (2), 89–94

Title: Saltmarsh Monitoring Report 2007-2008

Year: 2009

Author: McCorry, M.; Ryle, T.

Series: Unpublished Report to NPWS

Title: Cetaceans in Irish waters: A review of recent research

Year: 2009

Author: O'Brien, J.; Berrow, S.D.; McGrath, D.; Evans, P.G.H.

Series: Biology and Environment: Proceedings of the Royal Irish Academy 109B (2): 63-88

Title: A note on long-distance matches of bottlenose dolphins (*Tursiops truncatus*) around the Irish coast using photoidentification

Year: 2009

Author: O'Brien, J.; Berrow, S.D.; Ryan, C.; McGrath, D.; O'Connor, I.; Pesante, G.; Burrows, G.; Massett, N.; Klotzer, V.; Whooley, P.

Series: Journal Cetacean Res. Mgmt. 11: 69–74

Title: An updated population status report for bottlenose dolphins using the Lower River Shannon SAC in 2008

Year: 2008

Author: Englund, A.; Ingram, S.; Rogan, E.

Series: Unpublished Report to NPWS

Title: National Survey of Native Woodlands 2003-2008

Year: 2008

Author: Perrin, P.; Martin, J.; Barron, S.; O'Neill, F.; McNutt, K.; Delaney, A.

Series: Unpublished Report to NPWS

Title: Rapid Assessment of *Margaritifera margaritifera* (L.) populations in Ireland: Rivers assessed in 2007

Year: 2008

Author: Ross, E.D.

Series: Unpublished Report to NPWS

Title: Marine surveys of two Irish sandbank cSACs

Year: 2007

Author: Aquafact

Series: Unpublished Report to NPWS

Title: Population status report for bottlenose dolphins using the Lower River Shannon SAC, 2006-2007

Year: 2007

Author: Englund, A.; Ingram, S.; Rogan, E.

Series: Unpublished Report to NPWS

Title: Evolutionary history of lamprey paired species *Lampetra fluviatilis* (L.) and *Lampetra planeri* (Bloch) as inferred from mitochondrial DNA variation

Year: 2007

Author: Espanhol, R.; Almeida, P.R.; Alves, M.J.

Series: Molecular Ecology 16, 1909-1924

Title: Supporting documentation for the Habitats Directive Conservation Status Assessment - backing documents, Article 17 forms and supporting maps
Year: 2007
Author: NPWS
Series: Unpublished Report to NPWS

Title: A Survey of Juvenile Lamprey Populations in the Corrib and Suir Catchments
Year: 2007
Author: O'Connor, W.
Series: Irish Wildlife Manuals No. 26

Title: Inventory of Irish coastal lagoons
Year: 2007
Author: Oliver, G.
Series: Unpublished Report to NPWS

Title: Using T-PODs to investigate the echolocation of coastal bottlenose dolphins
Year: 2007
Author: Philpott, E.; Englund, A.; Ingram, S.; Rogan, E.
Series: Journal of Marine Biological Association, UK. 87: 11-17

Title: Otter Survey of Ireland 2004/2005
Year: 2006
Author: Bailey, M.; Rochford, J.
Series: Irish Wildlife Manuals No. 23

Title: Whistle Production by Bottlenose Dolphins *Tursiops truncatus* in the Shannon Estuary
Year: 2006
Author: Berrow, S.D.; O'Brien, J.; Holmes, B.
Series: Irish Naturalists' Journal. 28(5): 208-213

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

Title: Otters - ecology, behaviour and conservation
Year: 2006
Author: Kruuk, H.
Series: Oxford University Press

Title: A survey of rare and scarce vascular plants in County Limerick
Year: 2006
Author: Reynolds, S.; Conaghan, J.; Fuller, J.
Series: Unpublished Report to NPWS

Title: National Inventory of sea cliffs and coastal heaths

Year: 2005

Author: Browne, A.

Series: Unpublished Report to NPWS

Title: Developing sustainable whalewatching in the Shannon estuary

Year: 2003

Author: Berrow, S.D.

Series: p198-203; In Marine Ecotourism: Issues and Experiences. Garrod, B and Wilson. J. (Eds.) Channel View Publications

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Title: Identifying lamprey. A field key for sea, river and brook lamprey

Year: 2003

Author: Gardiner, R.

Series: Conserving Natura 2000 rivers, Conservation techniques No. 4. English Nature, Peterborough

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Title: Monitoring the river, sea and brook lamprey, *Lampetra fluviatilis*, *L. planeri* and *Petromyzon marinus*

Year: 2003

Author: Harvey, J.; Cowx, I.

Series: Conserving Natura 2000 Rivers Monitoring Series No. 5. English Nature, Peterborough

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Title: Bottlenose dolphins (*Tursiops truncatus*) in the Shannon Estuary and selected areas of the west-coast of Ireland

Year: 2003

Author: Ingram, S.; Rogan, E.

Series: Unpublished Report to NPWS

Title: The ecology of seabirds and marine mammals in a fluctuating marine environment

Year: 2003

Author: Rogan, E.; Kelly, T.; Ingram, S.; Roycroft, D.

Series: Unpublished Report to Higher Education Authority of Ireland

---

Title: Irish Whale and Dolphin Group cetacean sighting review (1991-2001)

Year: 2002

Author: Berrow, S.D.; Whooley, P.; Ferriss, S.

Series: Irish Whale and Dolphin Group

Title: Organochlorine concentrations in resident bottlenose dolphins (*Tursiops truncatus*) in the Shannon estuary, Ireland

Year: 2002

Author: Berrow, S.D.; McHugh, B.; Glynn, D.; McGovern, E.; Parsons, K.; Baird, R.W.; Hooker, S.D.

Series: Marine Pollution Bulletin 44: 1296-1313

Title: Identifying critical areas and habitat preferences of bottlenose dolphins (*Tursiops truncatus*)

Year: 2002

Author: Ingram, S.; Rogan, E.

Series: Marine Ecology Progress Series 244: 247-255

Title: Reversing the habitat fragmentation of British woodlands

Year: 2002

Author: Peterken, G.

Series: WWF-UK, London

Title: An extensive survey of bottlenose dolphins (*Tursiops truncatus*) on the west coast of Ireland

Year: 2001

Author: Ingram, S.; Englund, A.; Rogan, E.

Series: Unpublished Report to the Heritage Council

Title: The ecology and conservation of bottlenose dolphins in the Shannon Estuary, Ireland

Year: 2000

Author: Ingram, S.

Series: Unpublished PhD thesis, University College Cork

Title: A survey of bottlenose dolphins (*Tursiops truncatus*) in the Shannon Estuary

Year: 2000

Author: Rogan, E.; Ingram, S.; Holmes, B.; O'Flanagan, C.

Series: Marine Institute Marine Resource Series No. 9

Title: Tour boats and dolphins: A note on quantifying the activities of whale watching boats in the Shannon estuary, Ireland

Year: 1999

Author: Berrow, S.D.; Holmes, B.

Series: Journal of Cetacean Research and Management 1(2): 199-200

Title: Diet of Otters *Lutra lutra* on Inishmore, Aran Islands, west coast of Ireland

Year: 1999

Author: Kingston, S.; O'Connell, M.; Fairley, J.S.

Series: Biol & Environ Proc R Ir Acad B 99B:173–182

Title: National Shingle Beach Survey of Ireland 1999

Year: 1999

Author: Moore, D.; Wilson, F.

Series: Unpublished Report to NPWS

Title: The saltmarshes of Ireland: an inventory and account of their geographical variation

Year: 1998

Author: Curtis, T.G.F.; Sheehy-Skeffington, M.J.

Series: Biology and Environment, Proceedings of the Royal Irish Academy 98B: 87-104

Title: A survey of intertidal sediment biotopes in estuaries in Ireland

Year: 1997

Author: Falvey, J.P.; Costello, M.J.; Dempsey, S.

Series: Unpublished Report

Title:	Distribution and Abundance of Bottle-nosed Dolphins *Tursiops truncatus* (Montagu) in the Shannon Estuary, Ireland
Year:	1996
Author:	Berrow, S.D.; Holmes, B.; Kiely, O.
Series:	Biology and Environment: Proceedings of the Royal Irish Academy 96B (1), 1-9
Title:	The spatial organization of otters (*Lutra lutra*) in Shetland
Year:	1991
Author:	Kruuk, H.; Moorhouse, A.
Series:	J. Zool, 224: 41-57
Title:	Otter survey of Ireland
Year:	1982
Author:	Chapman, P.J.; Chapman, L.L.
Series:	Unpublished Report to Vincent Wildlife Trust

Spatial data sources

Year:	Interpolated 2012
Title:	Sandbank Survey 2007
GIS operations:	Clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used for:	1110 (map 3)
Year:	Interpolated 2012
Title:	Sandbank survey 2007; subtidal benthic survey 2010; reef survey 2010; intertidal hard and soft bottom survey 2010
GIS operations:	Polygon feature classes from marine community types base data sub-divided based on interpolation of marine survey data. Expert opinion used as necessary to resolve any issues arising
Used for:	Marine community types, 1110, 1140, 1170 (maps 3, 5, 8, 9)
Year:	2010
Title:	EPA WFD transitional waterbody data
GIS operations:	Clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used for:	1130 (map 4)
Year:	Revision 2011
Title:	Inventory of Irish Coastal Lagoons. Version 3
GIS operations:	Clipped to SAC boundary
Used for:	1150 (map 6)
Year:	2005
Title:	OSi Discovery series vector data
GIS operations:	High Water Mark (HWM) polyline feature class converted into polygon feature class; clipped to SAC boundary. EPA WFD transitional waterbody data erased from extent. Expert opinion used as necessary to resolve any issues arising
Used for:	1160 (map 7)
Year:	2005
Title:	OSi Discovery series vector data
GIS operations:	High water mark (HWM) and low water mark (LWM) polyline feature classes converted into polygon feature classes and combined; EU Annex I Saltmarsh and Coastal data erased out if present
Used for:	Marine community types base data (map 9)
Year:	Revision 2012
Title:	National Shingle Beach Survey
GIS operations:	Clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used for:	1220 (map 10)
Year:	2011
Title:	National Survey and assessment of the conservation status of Irish sea cliffs
GIS operations:	Clipped to SAC boundary
Used for:	1230 (map 11)

Year:	Revision 2010
Title:	Saltmarsh Monitoring Project 2007-2008. Version 1
GIS operations:	QIs selected; clipped to SAC boundary; overlapping regions with Coastal CO data investigated and resolved with expert opinion used
Used for:	1310, 1330, 1410 (map 12)
Year:	Derived 2012
Title:	Internal NPWS files
GIS operations:	Dataset created from spatial references supplied by NPWS experts. Expert opinion used as necessary to resolve any issues arising
Used for:	3260 (map 13)
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:	91E0 (map 14)
Year:	2012
Title:	NPWS rare and threatened species database
GIS operations:	Dataset created from spatial references in database records. Expert opinion used as necessary to resolve any issues arising
Used for:	1029 (map 15)
Year:	Revision 2012
Title:	Margaritifera Sensitive Areas data
GIS operations:	Relevant catchment boundaries identified. Expert opinion used as necessary to resolve any issues arising
Used for:	1029 (map 15)
Year:	2005
Title:	OSi Discovery series vector data
GIS operations:	Low Water Mark (LWM) polyline feature class converted into polygon feature class; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used for:	1349 (map 16)
Year:	2005
Title:	OSi Discovery series vector data
GIS operations:	Creation of an 80m buffer on the marine side of the high water mark (HWM); creation of a 10m buffer on the terrestrial side of the HWM; combination of 80m and 10m HWM buffer datasets; creation of a 10m buffer on the terrestrial side of the river banks data; creation of 20m buffer applied to canal centreline data. These datasets are combined with the derived EPA WFD Waterbodies data and Coastal Lagoon data for the 1355 CO. Overlapping regions investigated and resolved; resulting dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising. Creation of 250m buffer on marine side of HWM to highlight potential commuting points
Used for:	1355 (map 17)

Year:	2010
Title:	EPA WFD Waterbodies data
GIS operations:	Creation of a 20m buffer applied to river and stream centreline data; creation of 80m buffer on the aquatic side of lake data; creation of 10m buffer on the terrestrial side of lake data. These datasets are combined with the derived OSi data and Coastal Lagoon data for the 1355 CO. 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:	Revision 2011
Title:	Inventory of Irish Coastal Lagoons. Version 3
GIS operations:	Creation of 80m buffer on the aquatic side of lagoon data; creation of 10m buffer on the terrestrial side of lagoon data. These datasets are combined with the derived OSi data and EPA WFD Waterbodies data for the 1355 CO. Overlapping regions are investigated and resolved; resulting dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used for:	1355 (no map)

1029 Freshwater Pearl Mussel *Margaritifera margaritifera*

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

Attribute	Measure	Target	Notes
Distribution	Kilometres	Maintain at 7km. See map 15	This conservation objective applies to the freshwater pearl mussel population in the Cloon River, Co. Clare only (see also the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 (Government of Ireland, 2009b)). The Cloon population is confined to the main channel and is distributed from Croany Bridge to approx. 1.5km upstream of Clonderalaw Bridge (Ross, 2008; DEHLG, 2010)
Population size	Number of adult mussels	Restore to 10,000 adult mussels	The Cloon population was estimated as less than 10,000 in 2009 (DEHLG, 2010)
Population structure: recruitment	Percentage per size class	Restore to least 20% of population no more than 65mm in length; and at least 5% of population no more than 30mm in length	Mussels of no more than 65mm are considered 'young mussels' and may be found buried in the substratum and/or beneath adult mussels. Mussels of no more than 30mm are 'juvenile mussels' and are always buried in the substratum. No juvenile or young mussels were found in the Cloon in 2007, with the smallest mussel measuring 80.3mm (Ross, 2008). A single 'young mussel' measuring 61.3mm was recorded in 2009 (DEHLG, 2010)
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. The Cloon failed the target for dead shells in 2009, with 31% dead shells across the single transect counted. There were no previous data on the number of live adults (DEHLG, 2010)

1029 Freshwater Pearl Mussel *Margaritifera margaritifera*

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

Attribute	Measure	Target	Notes
Habitat extent	Kilometres	Restore suitable habitat in more than 3.3km (see map 15) and any additional stretches necessary for salmonid spawning	The species' habitat covers stretches of a short coastal river; and is a combination of 1) the area of habitat adult and juvenile mussels can occupy and 2) the area of spawning and nursery habitats the host fish can occupy. Fish nursery habitat typically overlaps with mussel habitat. Fish spawning habitat is generally adjacent to mussel habitat, but may lie upstream of the generalised mussel distribution. Only those salmonid spawning areas that could regularly contribute juvenile fish to the areas occupied by adult mussels should be considered. The availability of mussel habitat and fish spawning and nursery habitats are determined by flow and substratum conditions. The habitat for the species is currently unsuitable for the survival of adult mussels or the recruitment of juveniles (DEHLG, 2010). The target is based on the stretches of river identified, from a combination of dedicated survey and incidental records, as having habitat for the species
Water quality: macroinvertebrate and phytobenthos (diatoms)	Ecological quality ratio (EQR)	Restore water quality-macroinvertebrates: EQR greater than 0.90; 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). The habitat in the Cloon failed both standards during 2009 sampling for the Sub-basin Management Plans (DEHLG, 2010). See also The European Communities Environmental Objectives (Surface Water) Regulations 2009 (Government of Ireland, 2009a)
Substratum quality: filamentous algae (macroalgae), macrophytes (rooted higher plants)	Percentage	Restore substratum quality-filamentous algae: absent or trace (<5%); macrophytes: absent or trace (<5%)	The habitat in the Cloon failed both standards during 2009 sampling for the Sub-basin Management Plans, with cover abundance values of up to 50% recorded for filmentous algae and 80% for macrophytes (DEHLG, 2010). Recruitment of juvenile mussels is being prevented by the poor quality of the river substrata

1029 Freshwater Pearl Mussel *Margaritifera margaritifera*

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

Attribute	Measure	Target	Notes
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 is currently unsuitable for the recruitment of juveniles owing to sedimentation of the substratum. In many locations, it is also unsuitable for the survival of adult mussels (DEHLG, 2010). Significant sedimentation has been recorded during all recent mussel monitoring surveys (Ross, 2008; DEHLG, 2010). Recruitment of juvenile mussels is being prevented by the poor quality of the river substrate
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. Redox potential measurements in 2009 yielded losses of 32.3 - 43.5% (average of 39%) at 5cm depth (DEHLG, 2010)
Hydrological regime: flow variability	Metres per second	Restore appropriate hydrological regimes	The availability of suitable freshwater pearl mussel habitat is largely determined by flow (catchment geology being the other important 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) low flows do not exacerbate the deposition of fines and 3) low flows do not cause stress to mussels in terms of exposure, water temperatures, food availability or aspects of the reproductive cycle

1029 Freshwater Pearl Mussel *Margaritifera margaritifera*

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

Attribute	Measure	Target	Notes
Host fish	Number	Maintain sufficient juvenile salmonids to host glochidial larvae	Salmonid fish are host to the larval form of the freshwater pearl mussel and, thus, they are essential to the completion of the life cycle. 0+ and 1+ fish are typically used, both because of the habitat overlaps and the development of immunity with age in the fish. Fish presence is considered sufficient, as higher densities and biomass of fish are indicative of enriched conditions in mussel rivers. Geist et al. (2006) found that higher densities of host fish coincided with eutrophication, poor substrate quality for pearl mussels and a lack of pearl mussel recruitment, while significantly lower densities and biomass of host fish were associated with high numbers of juvenile mussels. Fish movement patterns must be such that 0+ fish in the vicinity of the mussel habitat 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. The Cloon freshwater pearl mussel population appears to favour native brown trout, with 17.2% of 1+ and older trout caught in 2009 hosting glochidia (DEHLG, 2010). Therefore, it is particularly important that trout are not out-competed by stocked fish

1095 Sea Lamprey *Petromyzon marinus*

To restore the favourable conservation condition of Sea Lamprey in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	% of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	Artificial barriers can block or cause difficulties to lampreys' upstream migration, thereby limiting the species to lower stretches and restricting access to spawning areas. See Gargan et al. (2011). Specific barriers serve to constrain the up-river migration of sea lamprey. The upper extent of the SAC in the R. Fergus is delineated by a barrier to migration. Barriers are also present in the Mulkear and Feale
Population structure of juveniles	Number of age/size groups	At least three age/size groups present	Attribute and target based on data from Harvey and Cowx (2003) and O'Connor (2007)
Juvenile density in fine sediment	Juveniles/m²	Juvenile density at least 1/m²	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003)
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	Lampreys spawn in clean gravels. Surveys by Inland Fisheries ireland (IFI) commonly indicated accumulations of redds downstream of major weirs. (See also Gargan et al., 2011)
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	Despite observed spawning activity, sampling for ammocoetes consistently fails to find these in many samplling stations and never in any great numbers

1096 Brook Lamprey *Lampetra planeri*

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

Attribute	Measure	Target	Notes
Distribution	% of river accessible	Access to all water courses down to first order streams	Artificial barriers can block or cause difficulties to brook lampreys' migration, both up- and downstream, thereby possibly limiting the species to specific stretches 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). It is impossible to distinguish between brook and river lamprey juveniles in the field (Gardiner, 2003), hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m²	Mean catchment juvenile density of brook/river lamprey at least 2/m²	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003) who state 10/m² in optimal conditions and more than 2/m² on a catchment basis
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	Spawning site and redd attributes established by IFI (Rooney et al., in press)
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	Many sites with suitable larval attributes i.e. fine sediment in low velocity habitat, are found not to contain larval lamprey. This may be a function of chance or probability, or may be a consequence of insufficient recruitment to fill all spatial niches. Occupancy in excess of 50% of sites would be 'reasonable' for the Irish catchments examined to date (King et al., unublished data)

1099 River Lamprey *Lampetra fluviatilis*

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

Attribute	Measure	Target	Notes
Distribution	% of river accessible	Access to all water courses down to first order streams	Artificial barriers can block or cause difficulties to river lampreys' migration, both up- and downstream, thereby possibly limiting species to specific stretches 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 river/brook lamprey present	Attribute and target based on data from Harvey and Cowx (2003). It is impossible to distinguish between river and brook lamprey juveniles in the field (Gardiner 2003), hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m²	Mean catchment juvenile density of river/brook lamprey at least 2/m²	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003) who state 10/m² in optimal conditions and more than 2/m² on a catchment basis
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	
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	Many sites with suitable larval attributes i.e. fine sediment in low velocity habitat, are found not to contain larval lamprey. This may be a function of chance or probability, or may be a consequence of insufficient recruitment to fill all spatial niches. Occupancy in excess of 50% of sites would be 'reasonable' for the Irish catchments examined to date (King et al., unpublished data)

1106 Atlantic Salmon *Salmo salar* (only in fresh water)

To restore the favourable conservation condition of Salmon in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	% of river accessible	100% of river channels down to second order accessible from estuary	Artificial barriers block salmons' upstream migration, thereby limiting the species to lower stretches and restricting access to spawning areas. The large hyrdo-electric station at Ardnacrusha and the Parteen regulating weir present considerable obstructions to upstream passage of salmon on the Shannon main channel. While both have fish passes installed, upstream migration of salmon is still problematical. Further weirs upstream on the Shannon also restrict access to spawning habitat. No such obstacles, causing significant fish passage issues for salmon are present on the Feale and Mulkear rivers
Adult spawning fish	Number	Conservation Limit (CL) for each system consistently exceeded	A conservation limit is defined by the North Atlantic Salmon Conservation Organisation (NASCO) as "the spawning stock level that produces long-term average maximum sustainable yield as derived from the adult to adult stock and recruitment relationship". The target is based on the Standing Scientific Committee of the National Salmon Commission's annual model output of CL attainment levels. See SSC (2010). Stock estimates are either derived from direct counts of adults (rod catch, fish counter) or indirectly by fry abundance counts. The salmon stocks in the Shannon above the impoundments are significantly below their Conservation Limits. Salmon stocks in the Feale and Mulkear rivers are above 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 min sampling	Target is threshold value for rivers currently exceeding their conservation limit (CL). The abundance of salmon fry at monitored sites on the Shannon main channel, above the hydro-electric station, is significantly below this target
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*). On the Shannon main channel, salmon smolt abundance may be significantly affected by mortality passing through hydro-electric turbines
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. Artificial barriers are currently preventing salmon from accessing suitable spawning habitat on the Shannon main channel

1106 Atlantic Salmon *Salmo salar* (only in fresh water)

To restore the favourable conservation condition of Salmon in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
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)

1110 Sandbanks which are slightly covered by sea water all the time

To maintain the favourable conservation condition of Sandbanks which are slightly covered by sea water all the time in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat distribution	Occurrence	The distribution of sandbanks is stable, subject to natural processes. See map 3	Distribution established using the Valentia Island to River Shannon Admiralty Chart (no. 1819_0)
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 3	Habitat area was estimated as 1,353ha using the Valentia Island to River Shannon Admiralty Chart (no. 1819_0)
Community distribution	Hectares	Conserve the following community type in a natural condition: Subtidal sand to mixed sediment with *Nephtys* spp. community complex. See map 9	The likely area of the community was derived from a sandbank survey in 2007 (Aquafact, 2007) and a subtidal survey in 2010 (Aquafact, 2011a). See marine supporting document for further details

1130 Estuaries

To maintain the favourable conservation condition of Estuaries in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 4	Habitat area was estimated as 24,273ha using OSi data and the Transitional Water Body area as defined under the Water Framework Directive
Community distribution	Hectares	Conserve the following community types in a natural condition: Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex; Estuarine subtidal muddy sand to mixed sediment with gammarids community complex; Subtidal sand to mixed sediment with *Nucula nucleus* community complex; Subtidal sand to mixed sediment with *Nephtys* spp. community complex; Fucoid-dominated intertidal reef community complex; Faunal turf-dominated subtidal reef community; and Anemone-dominated subtidal reef community. See map 9	The likely area of these communities was derived from intertidal and subtidal surveys undertaken in 2010 (Aquafact, 2011a and c). See marine supporting document for further details

1140 Mudflats and sandflats not covered by seawater at low tide

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

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 5	Habitat area was estimated using OSi data as 8,808ha
Community distribution	Hectares	Conserve the following community types in a natural condition: Intertidal sand with *Scolelepis squamata* and *Pontocrates* spp. community; and Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex. See map 9	The likely area of these communities was derived from an intertidal survey in 2010 (Aquafact, 2011c). See marine supporting document for further details

1150 *Coastal lagoons

To restore the favourable conservation condition of Coastal lagoons in the Lower River Shannon 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. Favourable reference area 33.4ha- Shannon Airport Lagoon 24.2ha; Cloonconeen Pool 3.9ha; Scattery Lagoon 2.8ha; Quayfield and Poulaweala Loughs 2.5ha. See map 6	Areas calculated from spatial data derived from Oliver, 2007. Site codes IL031- IL034. See lagoon supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 6	Sites IL031-IL034 in Oliver, 2007. See lagoon supporting document for further details
Salinity regime	practical salinity units (psu)	Median annual salinity and temporal variation within natural ranges	The lagoons in the site vary from oligohaline to euhaline. See lagoon supporting document for further details
Hydrological regime	Metres	Annual water level fluctuations and minima within natural ranges	Lagoons listed for this site are all considered to be shallow. See lagoon supporting document for further details
Barrier: connectivity between lagoon and sea	Permeability	Appropriate hydrological connections between lagoons and sea, including where necessary, appropriate management	The lagoons within this site exhibit a variety of barrier types including cobble/shingle, karst and artificial embankment. See lagoon supporting document for further details
Water quality: chlorophyll a	µg/L	Annual median chlorophyll a within natural ranges and less than 5µg/L	Target based on Roden and Oliver (2010). See lagoon supporting document for further details
Water quality: Molybdate Reactive Phosphorus (MRP)	mg/L	Annual median MRP within natural ranges and less than 0.1mg/L	Target based on Roden and Oliver (2010). See lagoon supporting document for further details
Water quality: Dissolved Inorganic Nitrogen (DIN)	mg/L	Annual median DIN within natural ranges and less than 0.15mg/L	Target based on Roden and Oliver, 2010). See lagoon supporting document for further details
Depth of macrophyte colonisation	Metres	Macrophyte colonisation to maximum depth of lagoons	As these lagoons are all shallow, it is expected the macrophytes should extend to their deepest points. See lagoon supporting document for further details
Typical plant species	number and m^2	Maintain number and extent of listed lagoonal specialists, subject to natural variation	Species listed in Oliver, 2007. See lagoon supporting document for further details
Typical animal species	number	Maintain listed lagoon specialists, subject to natural variation	Species listed in Oliver, 2007. See lagoon supporting document for further details
Negative indicator species	Number and % cover	Negative indicator species absent or under control	Low salinity, shallow water and elevated nutrient levels increase the threat of un-natural encroachment by reedbeds

1160 Large shallow inlets and bays

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

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 7	Habitat area was estimated as 35,282ha using OSi data and the Transitional Water Body area as defined under the Water Framework Directive
Community distribution	Hectares	Conserve the following community types in a natural condition: Intertidal sand with *Scolelepis squamata* and *Pontocrates* spp. community; Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex; Subtidal sand to mixed sediment with *Nucula nucleus* community complex; Subtidal sand to mixed sediment with *Nephtys* spp. community complex; Fucoid-dominated intertidal reef community complex; Mixed subtidal reef community complex; Faunal turf-dominated subtidal reef community; Anemone-dominated subtidal reef community; and *Laminaria*-dominated community complex. See map 9	The likely area of these communities was derived from intertidal and subtidal surveys in 2010 (Aquafact, 2011a and c). See marine supporting document for further details

1170 Reefs

To maintain the favourable conservation condition of Reefs in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat distribution	Occurrence	The distribution of Reefs is stable, subject to natural processes. See map 8	Distribution is established from intertidal and subtidal reef surveys in 2010 (Aquafact, 2011b and c)
Habitat area	Hectares	The permanent habitat area is stable, subject to natural processes. See map 8	Habitat area was estimated as 21,421ha from the 2010 intertidal and subtidal reef survey (Aquafact 2011b and c)
Community distribution	Hectares	Conserve the following reef community types in a natural condition: Fucoid-dominated intertidal reef community complex; Mixed subtidal reef community complex; Faunal turf-dominated subtidal reef community; Anemone-dominated subtidal reef community; and *Laminaria*-dominated community complex. See map 9	Based on the 2010 intertidal and subtidal reef survey (Aquafact, 2011b and c). See marine supporting document for further details

1220 Perennial vegetation of stony banks

To maintain the favourable conservation condition of Perennial vegetation of stony banks in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession	Current area unknown. It was recorded to be present but extent was not mapped from nine sub-sites during the National Shingle Beach Survey (Moore and Wilson, 1999): Ross Bay, Kilbaha Bay, Cloonconeen Lough and Rinevella Bay, Carrigholt Bay, Ballymacrinan Bay, Bunaclugga Bay, Corcas and Sandhills, Bromore and Ballybunnion. NB further unsurveyed areas maybe present within the site
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes. See map 10 for recorded locations	Full distribution currently unknown. An excellent array of shingle beaches is known to occur, including three that are ranked of high interest (Ross Bay, Bunaclugga Bay and Cloonconeen Lough and Rinevella), the last of which is associated with a lagoonal system (Moore and Wilson, 1999). Habitat likely to be more widespread. See coastal habitats supporting document for further details. See also the conservation objective for coastal lagoons (1150)
Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Based on data from Moore and Wilson (1999). Shingle features are relatively stable in the long-term and shingle beaches within this SAC appear to be functioning naturally with few artifical restrictions to beach dynamics (Moore and Wilson, 1999). See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Moore and Wilson (1999). Lichens are present at Ross Bay and Cloonconeen and Rinevella Bay indicating a degree of stability. See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain the typical vegetated shingle flora including the range of sub-communities within the different zones	The Carrigaholt sub-site is a small site with a diverse flora. The Bunaclugga Bay sub-site supports yellow horned-poppy (*Glaucium flavum*), which contributes to the site's high interest ranking. Based on data from Moore and Wilson (1999). See coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from Moore and Wilson (1999). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. See coastal habitats supporting document for further details

1230 Vegetated sea cliffs of the Atlantic and Baltic coasts

To maintain the favourable conservation condition of Vegetated sea cliffs in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat length	Kilometres	Area stable or increasing, subject to natural processes, including erosion. For sub-sites mapped: Kilbaha- 4.1km; Ladder Rock- 1.0km; Moyarta- 0.9km; Lisheencrony- 1.1km; Burrane- 0.2km; Kerry Head- 33.4km; Ballybunion- 15.6km; Kilclogher- 4.9km; Loop Head- 6.1km. See map 11	Based on data from the Irish Sea Cliff Survey (ISCS) (Barron et al., 2011). Nine sub-sites were identified using a combination of aerial photos and the DCENR helicopter viewer. The length of each cliff was measured (in some cases the cliff was measured in sections) to give a total estimated area of 67.3km within the SAC. Cliffs are linear features and are therefore measured in kilometres. Length of cliff likely to be underestimated. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 11	Based on data from the Irish Sea Cliff Survey (Barron et al., 2011). Most of the SAC west of Kilcredaun Point and Kilconly Point is bounded by high rocky sea cliffs. Both hard and soft cliffs occur in this SAC (ISCS; Browne, 2005). See coastal habitats supporting document for further details
Physical structure: functionality and hydrological regime	Occurrence of artificial barriers	No alteration to natural functioning of geomorphological and hydrological processes due to artificial structures	Based on data from the Irish Sea Cliff Survey (Barron et al., 2011). Maintaining natural geomorphological processes including natural erosion is important for the health of vegetated sea cliff. Hydrological processes maintain flushes and in some cases tufa formations that can be associated with sea cliffs. Freshwater seepage was noted from the cliffs at Loop Head and Kilclogher. Stream or cascade was noted from Kerry Head. Sea coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain range of sea cliff habitat zonations including transitional zones, subject to natural processes including erosion and succession	Based on data from the Irish Sea Cliff Survey (Barron et al., 2011). At Loop Head sub-site the zones recorded were: splash, crevice ledge and ungrazed coastal grassland on hard cliffs. At Kerry Head sub-site the zones recorded were: splash, pioneer, crevice ledge, ungrazed/grazed coastal grassland on hard cliffs and coastal grassland on soft cliffs. See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	Based on data from the Irish Sea Cliff Survey (Barron et al., 2011). See coastal habitats supporting document for further details

1230 Vegetated sea cliffs of the Atlantic and Baltic coasts

To maintain the favourable conservation condition of Vegetated sea cliffs in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in the Irish Sea cliff survey (Barron et al., 2011)	Based on data from the Irish Sea Cliff Survey (Barron et al., 2011). See coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from the Irish Sea Cliff Survey (Barron et al., 2011). See coastal habitats supporting document for further details
Vegetation composition: bracken and woody species	Percentage	Cover of bracken (*Pteridium aquilinum*) on grassland and/or heath to be less than 10%. Cover of woody species on grassland and/or heath to be less than 20%	Based on data from the Irish Sea Cliff Survey (Barron et al., 2011). See coastal habitats supporting document for further details

1310 *Salicornia* and other annuals colonizing mud and sand

To maintain the favourable conservation condition of *Salicornia* and other annuals colonizing mud and sand in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Carrigafoyle - 0.005ha; Inishdea, Owenshere - 0.003ha; Knock - 0.029ha; Querin - 0.185ha; Rinevilla Bay - 0.001ha. See map 12	Based on data from Saltmarsh Monitoring Project (SMP) (McCorry and Ryle, 2009). Habitat recorded at five of the ten sub-sites surveyed and mapped, giving a total estimated area of 0.223ha. NB further unsurveyed areas maybe present within the site. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes. See map 12 for known distribution	Based on data from McCorry and Ryle (2009). Habitat recorded at six out of ten sub-sites by McCorry and Ryle (2009). NB further unsurveyed areas maybe present within the site. *Salicornia* is an annual species, so its distribution can vary significantly from year to year. See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/ absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions	Sediment supply is particularly important for this pioneer saltmarsh community, as the distribution of this habitat depends on accretion rates. See coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession	Based on data from McCorry and Ryle (2009). Creeks deliver sediment throughout saltmarsh system. Creeks and pan structures well developed in the larger sections of the marsh at Carrigafoyle, Shepperton/Fergus Estuary and Inishdea/Owenshere. See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	This pioneer saltmarsh community requires regular tidal inundation. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimeters	Maintain structural variation within sward	Based on data from McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated	Based on data from McCorry and Ryle (2009). See coastal habitats supporting document for further details

1310 *Salicornia* and other annuals colonizing mud and sand

To maintain the favourable conservation condition of *Salicornia* and other annuals colonizing mud and sand in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Vegetation composition: typical species and sub-communities	Percentage cover	Maintain the presence of species-poor communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009)	Based on data from McCorry and Ryle (2009). Species of local distinctiveness recorded include sea wormwood (*Seriphidium maritimum*), meadow barley (*Hordeum secalinum*) and hard grass (*Parapholis strigosa*) (McCorry and Ryle, 2009; internal NPWS files). See coastal habitats supporting document for further details
Vegetation structure: negative indicator species-*Spartina anglica*	Hectares	No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	Based on data from McCorry and Ryle (2009). *Spartina* was recorded at all sub-sites and is considered a significant threat to the habitat. See coastal habitats supporting document for further details

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

To restore the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Carrigafoyle- 6.774ha; Barrigone, Aughinish- 10.288ha; Beagh- 0.517ha; Bunratty- 26.939ha; Shepperton, Fergus Estuary- 37.925ha; Inishdea, Owenshere- 18.127ha; Killadysert, Inishcorker- 2.604ha; Knock- 0.576ha; Querin- 3.726ha; Rinevilla Bay- 11.883ha. See map 12	Based on data from the Saltmarsh Monitoring Project (SMP) (McCorry and Ryle 2009). Ten sub-sites that supported Atlantic salt meadow were mapped (119.36ha) and additional areas of potential saltmarsh (376.07ha) were identified from an examination of aerial photographs, giving a total estimated area of 495.43ha. Saltmarsh habitat also occurs at 11 other sub-sites within the SAC (Curtis and Sheehy-Skeffington, 1998). NB further unsurveyed areas maybe present within the site. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes. See map 12 for mapped distribution	Based on data from McCorry and Ryle (2009). Within the sites surveyed by the SMP, estuary type saltmarsh over a mud substrate is most common and ASM is the dominant saltmarsh habitat. See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/ absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions	Based on data from McCorry and Ryle (2009). Embankments along much of the shoreline are a feature of this SAC. These embankments were erected in the past and much of the site has been remodelled and large areas of land reclaimed as a result. See coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession	Based on data from McCorry and Ryle (2009). Creeks and pan structures well developed at the larger sections of ASM in the Carrigafoyle sub-site. At the ASM at Shepperton, Fergus Estuary, the larger patches still retain a natural creek and salt pan structure. At Inishdea, Owenshere sub-site within some of the intact saltmarsh, there is a complex network of creeks, salt pans and depressions. At Killadysart, Inishcorker and Querin, creek and pan development is generally poor. See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	See coastal habitats supporting document for further details

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

To restore the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from McCorry and Ryle (2009). Zonations to other saltmarsh habitats as well as brackish and terrestrial habitats were recorded at all sub-sites. See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimeters	Maintain structural variation within sward	Based on data from McCorry and Ryle (2009). All of the sub-sites are grazed to some extent. Overgrazing was noted from Carrigafoyle, Shepperton, Fergus Estuary and Knock sub-sites. See coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of the saltmarsh area vegetated	Based on data from McCorry and Ryle (2009). Some poaching was noted from most of the sub-sites. See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009)	See coastal habitats supporting document for further details
Vegetation structure: negative indicator species-*Spartina anglica*	Hectares	No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	Based on data from McCorry and Ryle (2009). *Spartina* is a major element of the vegetation at all sub-sites in this SAC. See coastal habitats supporting document for further details

1349 Bottlenose Dolphin *Tursiops truncatus*

To maintain the favourable conservation condition of Bottlenose Dolphin in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Access to suitable habitat	Number of artificial barriers	Species range within the site should not be restricted by artificial barriers to site use. See map 16 for suitable habitat	See marine supporting document for further details
Habitat use: critical areas	Location and hectares	Critical areas, representing habitat used preferentially by bottlenose dolphin, should be maintained in a natural condition. See map 16	Attribute and target based on Ingram and Rogan (2002), Englund et al. (2007), Englund et al. (2008), Berrow (2009), Berrow et al. (2010) and review of data from other studies. See marine supporting document for further details
Disturbance	Level of impact	Human activities should occur at levels that do not adversely affect the bottlenose dolphin population at the site	See marine supporting document for further details

1355 Otter *Lutra lutra*

To restore the favourable conservation condition of Otter in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Percentage positive survey sites	No significant decline	Measure based on standard otter survey technique. FCS target, based on 1980/81 survey findings, is 88% in SACs. Current range in Shannon catchment estimated at 70.5% (Bailey and Rochford 2006)
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 596.8ha above high water mark (HWM); 958.9ha along river banks/ around ponds	No field survey. Areas mapped to include 10m terrestrial buffer along shoreline (above HWM and along river banks) identified as critical for otters (NPWS, 2007)
Extent of marine habitat	Hectares	No significant decline. Area mapped and calculated as 4,461.6ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (HWM) (NPWS, 2007; Kruuk, 2006)
Extent of freshwater (river) habitat	Kilometers	No significant decline. Length mapped and calculated as 500.1km	No field survey. River length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters (Chapman and Chapman, 1982)
Extent of freshwater (lake/lagoon) habitat	Hectares	No significant decline. Area mapped and calculated as 125.6ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (NPWS, 2007)
Couching sites and holts	Number	No significant decline	Otters need lying up areas throughout their territory where they are secure from disturbance (Kruuk, 2006; Kruuk and Moorhouse, 1991)
Fish biomass available	Kilograms	No significant decline	Broad diet that varies locally and seasonally, but dominated by fish, in particular salmonids, eels and sticklebacks in freshwater (Bailey and Rochford, 2006) and wrasse and rockling in coastal waters (Kingston et al., 1999)
Barriers to connectivity	Number	No significant increase. For guidance, see map 17	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

1410 Mediterranean salt meadows (*Juncetalia maritimi*)

To restore the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Carrigafoyle- 4.193ha; Barrigone, Aughinish- 2.407ha; Bunratty- 0.865ha; Inishdea, Owenshere- 11.609ha; Killadysert, Inishcorker- 0.705ha; Knock- 0.143ha, Querin- 0.008ha; Rinevilla Bay- 2.449ha. See map 12	Based on data from the Saltmarsh Monitoring Project (SMP) (McCorry and Ryle, 2009). Eight sub-sites that support Mediterranean salt meadow were mapped (22.379ha) and additional areas of potential saltmarsh (25.646ha) were identified from an examination of aerial photographs, giving a total estimated area of 48.025ha. Saltmarsh habitat also occurs at 11 other sub-sites within the SAC (Curtis and Sheehy-Skeffington, 1998). NB further unsurveyed areas maybe present within the site. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes. See map 12 for known distribution	Based on data from McCorry and Ryle (2009). Within the sites surveyed by the SMP, estuary type saltmarsh over a mud substrate is most common. See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions	Based on data from McCorry and Ryle (2009). Embankments along much of the shoreline are a feature of this SAC. These embankments were erected in the past and much of the site has been remodelled and large areas of land reclaimed because of them. See coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession	Based on data from the Saltmarsh Monitoring Project (McCorry and Ryle, 2009). The MSM at Carrigafoyle contains some large salt pans. See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	Mediterranean salt meadow is found high up in the saltmarsh but requires occasional tidal inundation. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from McCorry and Ryle (2009). Zonations to other saltmarsh habitats as well as brackish and terestrial habitats were recorded at most sub-sites. See coastal habitats supporting document for further details

1410 Mediterranean salt meadows (*Juncetalia maritimi*)

To restore the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	Based on data from McCorry and Ryle (2009). All of the sub-sites are grazed to some extent. Overgrazing was noted from Inishdea, Owenshere and Knock sub-sites. See coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated	Based on data from McCorry and Ryle (2009). Some poaching was noted from most of the sub-sites. See coastal habitats supporting document for further details
Vegetation composition: typical species	Percentage cover	Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009)	See coastal habitats supporting document for further details
Vegetation structure: negative indicator species - *Spartina anglica*	Hectares	No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	Based on data from McCorry and Ryle (2009). *Spartina* is a major element of the vegetation at all sub-sites in this SAC. See coastal habitats supporting document for further details

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 the Lower River Shannon 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	Three sub-types of high conservation value are know to occur in the site. See Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation supporting document for further details. **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 Cloon River within this SAC, because the mussel requires environmental conditions closer to natural background levels**
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 13	See Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation supporting document for further details
Hydrological regime: river flow	Metres per second	Maintain appropriate hydrological regimes	See Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation supporting document for further details
Hydrological regime: tidal influence	Daily water level fluctuations - metres	Maintain natural tidal regime	See Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation supporting document for further details
Hydrological regime: freshwater seepages	Metres per second	Maintain appropriate freshwater seepage regimes	See Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation supporting document for further details
Substratum composition: particle size range	Millimetres	The substratum should be dominated by the particle size ranges, appropriate to the habitat sub-type (frequently sands, gravels and cobbles)	Although many of the high-conservation-value sub-types are dominated by coarse substrata, for certain sub-types, notably triangular club-rush (*Schoenoplectus triqueter*) and opposite-leaved pondweed (*Groenlandia densa*), fine substrata are required. See Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation supporting document for further details

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 the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Water quality: nutrients	Milligrammes per litre	The concentration of nutrients in the water column should be sufficiently low to prevent changes in species composition or habitat condition	The specific targets may vary among sub-types. See Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation supporting document for further details
Vegetation composition: typical species	Occurrence	Typical species of the relevant habitat sub-type should be present and in good condition	See Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation supporting document for further details
Floodplain connectivity	Area	The area of active floodplain at and upstream of the habitat should be maintained	See Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation supporting document for further details
Riparian habitat	Area	The area of riparian woodland at and upstream of the bryophyte-rich sub-type should be maintained	See Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation supporting document for further details. See also the conservation objective for Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) (91E0)

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 the Lower River Shannon 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	Full extent of this habitat in this site is currently unknown- see distribution below
Habitat distribution	Occurrence	No decline, subject to natural processes	This habitat has been recorded on the eastern bank of the Shannon, just north of Castleconnell, Co. Limerick (NPWS internal files). Full distribution of this habitat in this site is currently unknown and it almost certainly occurs elsewhere. The Irish semi-natural grasslands survey will cover Co. Limerick in 2012 and additional information is likely to be available following this survey
Vegetation structure: broadleaf herb: grass ratio	Percentage	Broadleaf herb component of vegetation between 40 and 90%	Attribute and target based on O'Neill et al. (2010)
Vegetation structure: sward height	Percentage	30-70% of sward between 10 and 80cm high	Attribute and target based on O'Neill et al. (2010)
Vegetation composition: typical species	Number	At least 7 positive indicator species present, including 1 "high quality" species	List of positive indicator species, including high quality species, identified by O'Neill et al. (2010). Note that purple moor-grass (*Molinia caerulea*) is a positive indicator species, but not necessarily an essential component of the habitat
Vegetation composition: notable species	Number	No decline, subject to natural processes	A number of notable species have been recorded in this habitat at this site including smooth brome (*Bromus racemosus*), pale sedge (*Carex pallescens*) and blue-eyed grass (*Sisyrinchium bermudiana*) (Reynolds et al., 2006)
Vegetation composition: negative indicator species	Percentage	Negative indicator species collectively not more than 20% cover, with cover by an individual species less than 10%. Non-native invasive species, absent or under control	List of negative indicator species identified by O'Neill et al. (2010)
Vegetation composition: negative indicator moss species	Percentage	Bog mosses (*Sphagnum* spp.) not more than 10% cover; hair mosses (*Polytrichum* spp.) not more than 25% cover	Attribute and target based on O'Neill et al. (2010)

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 the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Vegetation structure: woody species and bracken (*Pteridium aquilinum*)	Percentage	Cover of woody species and bracken not more than 5% cover	Attribute and target based on O'Neill et al. (2010)
Physical structure: bare ground	Percentage	Not more than 10% bare ground	Attribute and target based on O'Neill et al. (2010)

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

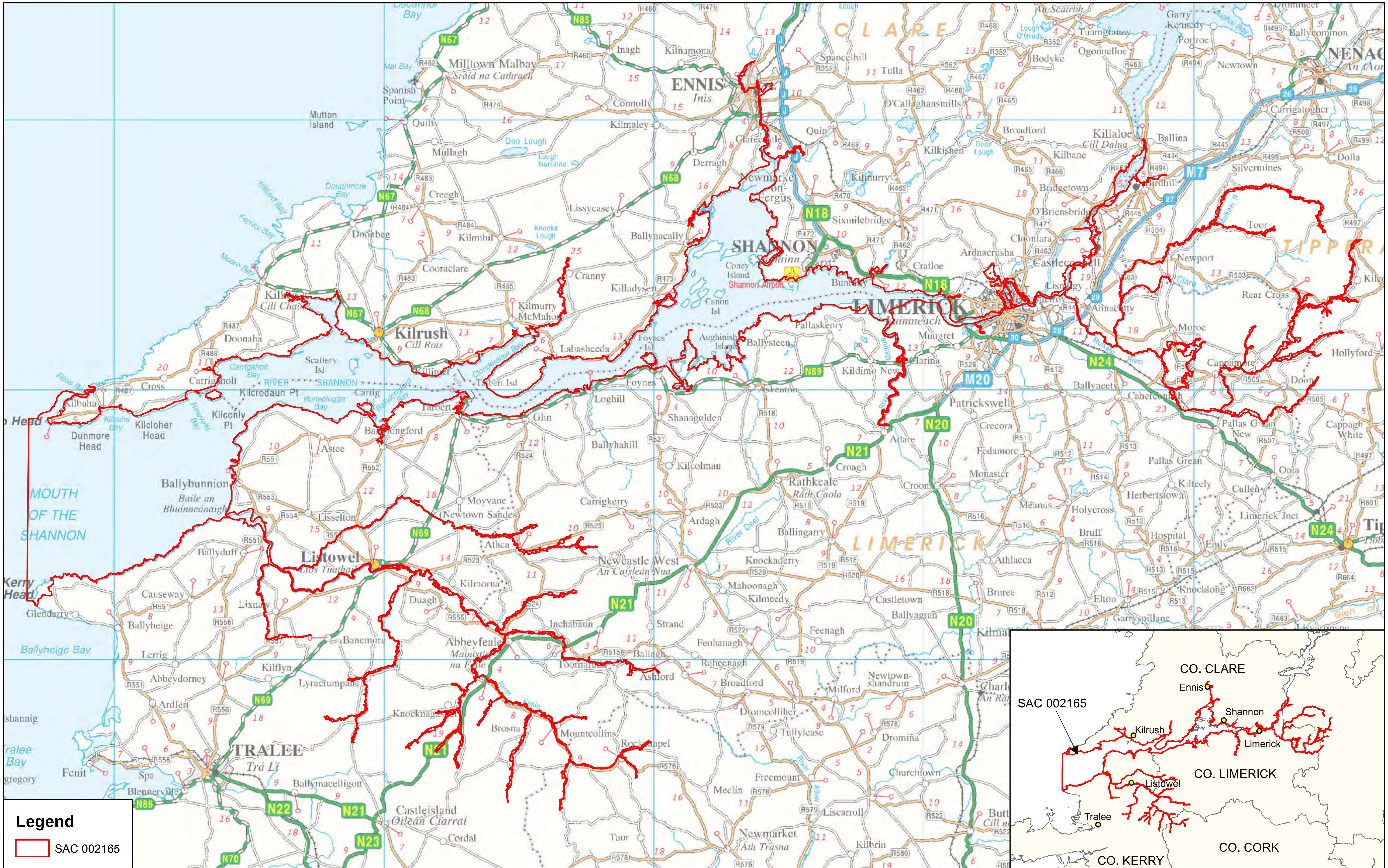
To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) in the Lower River Shannon SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, at least c.8.5ha for sites surveyed. See map 14	Minimum area, based on 5 sites surveyed by Perrin et al. (2008) - site codes 1286, 1577, 1857, 1861, 1995. See woodland habitats supporting document for further details. NB further areas are likely to be present within the SAC
Habitat distribution	Occurrence	No decline. Surveyed locations shown on map 14	Distribution based on Perrin et al. (2008). NB further areas are likely to be present within the SAC
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and “small” woods at least 3ha in size	The 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). See woodland habitats supporting document for further details
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008). See woodland habitats supporting document for further details
Woodland structure: natural regeneration	Seedling: sapling: pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Alder and oak regenerate poorly. Ash often regenerates in large numbers although few seedlings reach pole size
Hydrological regime: flooding depth/height of water table	Metres	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	Periodic flooding is essential to maintain alluvial woodlands along river floodplains
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 (greater than 20cm diameter in the case of alder)	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem

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

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

Attribute	Measure	Target	Notes
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) list four sites as containing potential ancient/long established woodland. See woodland habitats supporting document for further details
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008)
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including alder (*Alnus glutinosa*), willows (*Salix* spp) and, locally, oak (*Quercus robur*) and ash (*Fraxinus excelsior*)	Species reported in Perrin et al. (2008). See woodland habitats supporting document for further details
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: Himalayan balsam (*Impatiens glandulifera*), giant hogweed (*Heracleum mantegazzianum*), sycamore (*Acer pseudoplatanus*)



MAP 1:
LOWER RIVER SHANNON SAC
CONSERVATION OBJECTIVES
SAC DESIGNATION

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

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SITE CODE: SAC 002165
CO. CLARE; version 1.2, CO. CORK; version 1.01, CO. KERRY; version 1.11, CO. LIMERICK; version 1.11, CO. TIPPERARY; version 1.05

0 5 10 15 20 km

N

Map Version 1
Date: June 2012

SPA 004119

SAC 002165

SPA 004189

SPA 004077

SPA 004161

SAC 000930

SPA 004165

Legend

- 002165 Lower River Shannon SAC
- 000930 Clare Glen SAC
- 004077 River Shannon and River Fergus Estuaries SPA
- 004119 Loop Head SPA
- 004161 Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA
- 004165 Slievefelim to Silvermines Mountains SPA
- 004189 Kerry Head SPA
- OSi Discovery Series County Boundaries

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MAP 2:
LOWER RIVER SHANNON SAC CONSERVATION OBJECTIVES ADJOINING / OVERLAPPING DESIGNATIONS

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

SITE CODE:
SAC 002165 CO. CLARE; v1.2, CO. CORK; v1.01, CO. KERRY; v1.11, CO. LIMERICK; v1.11, CO. TIPPERARY; v1.05/SAC 000930 CO LIMERICK; v1, CO. TIPPERARY; v1
SPA 004077 CO CLARE; v 1.03, CO KERRY; v1.02, CO LIMERICK; v1.03/SPA 004119 CO CLARE; v1.02
SPA 004161 CO CORK; v2.12, CO KERRY; v2.17, CO LIMERICK; v2.14
SPA 004165 CO LIMERICK; v2.05, CO TIPPERARY; v2.09/SPA 004189 CO KERRY; v2.01

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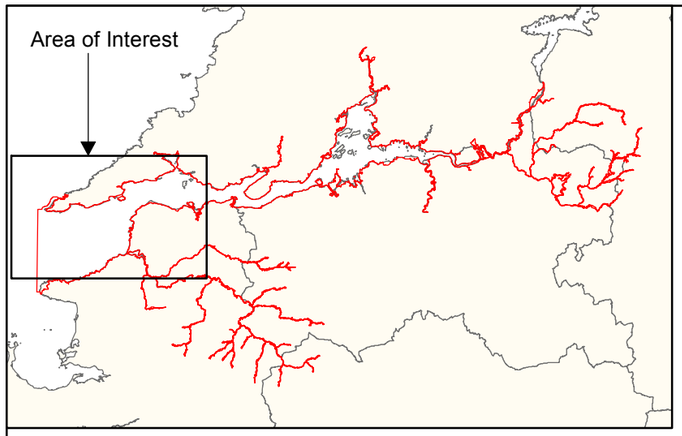
Map Version 1
Date: June 2012



Legend

- SAC 002165
- 1110 Sandbanks which are slightly covered by sea water all the time
- OSi Discovery Series County Boundaries

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MAP 3:
LOWER RIVER SHANNON SAC
CONSERVATION OBJECTIVES
SANDBANKS

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

SITE CODE: SAC 002165
CO. CLARE; version 1.2, CO. CORK; version 1.01, CO. KERRY; version 1.11, CO. LIMERICK; version 1.11, CO. TIPPERARY; version 1.05

0 1 2 3 4 5 km

N

Map Version 1
Date: June 2012

Legend

- SAC 002165
- 1130 Estuaries
- OSi Discovery Series County Boundaries

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MAP 4:
LOWER RIVER SHANNON SAC
CONSERVATION OBJECTIVES
ESTUARIES

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

SITE CODE: SAC 002165
CO. CLARE; version 1.2, CO. CORK; version 1.01, CO. KERRY; version 1.11,
CO. LIMERICK; version 1.11, CO. TIPPERARY; version 1.05

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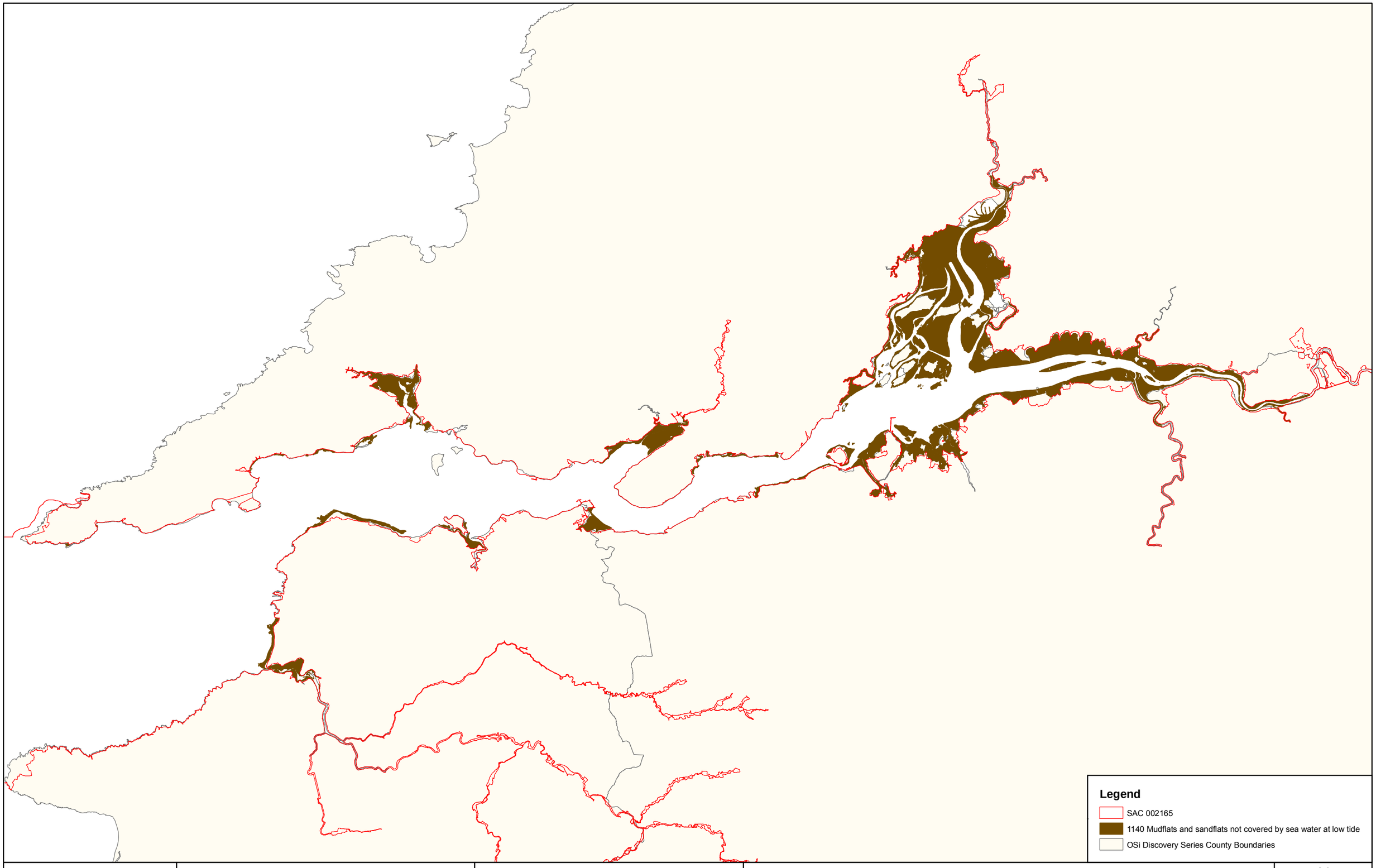
Map Version 1
Date: June 2012



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MAP 5:
LOWER RIVER SHANNON SAC
CONSERVATION OBJECTIVES
TIDAL MUDFLATS AND SANDFLATS

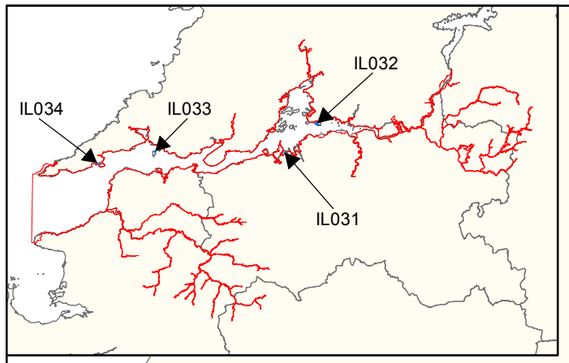
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SAC 002165
CO. CLARE; version 1.2, CO. CORK; version 1.01, CO. KERRY; version 1.11, CO. LIMERICK; version 1.11, CO. TIPPERARY; version 1.05

0 5 10 15 km

N

Map Version 1
Date: June 2012



Quayfield and Poulaweala Loughs
IL031

Shannon Airport Lagoon
IL032

Scattery Lagoon
IL033

Cloonconeen Pool
IL034

Legend

- SAC 002165
- 1150 Coastal lagoons
- OSi Discovery Series County Boundaries

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MAP 6:
LOWER RIVER SHANNON SAC
CONSERVATION OBJECTIVES
COASTAL LAGOONS

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

SITE CODE: SAC 002165
CO. CLARE; version 1.2, CO. CORK; version 1.01, CO. KERRY; version 1.11, CO. LIMERICK; version 1.11, CO. TIPPERARY; version 1.05

0 100 200 300 400 500 m

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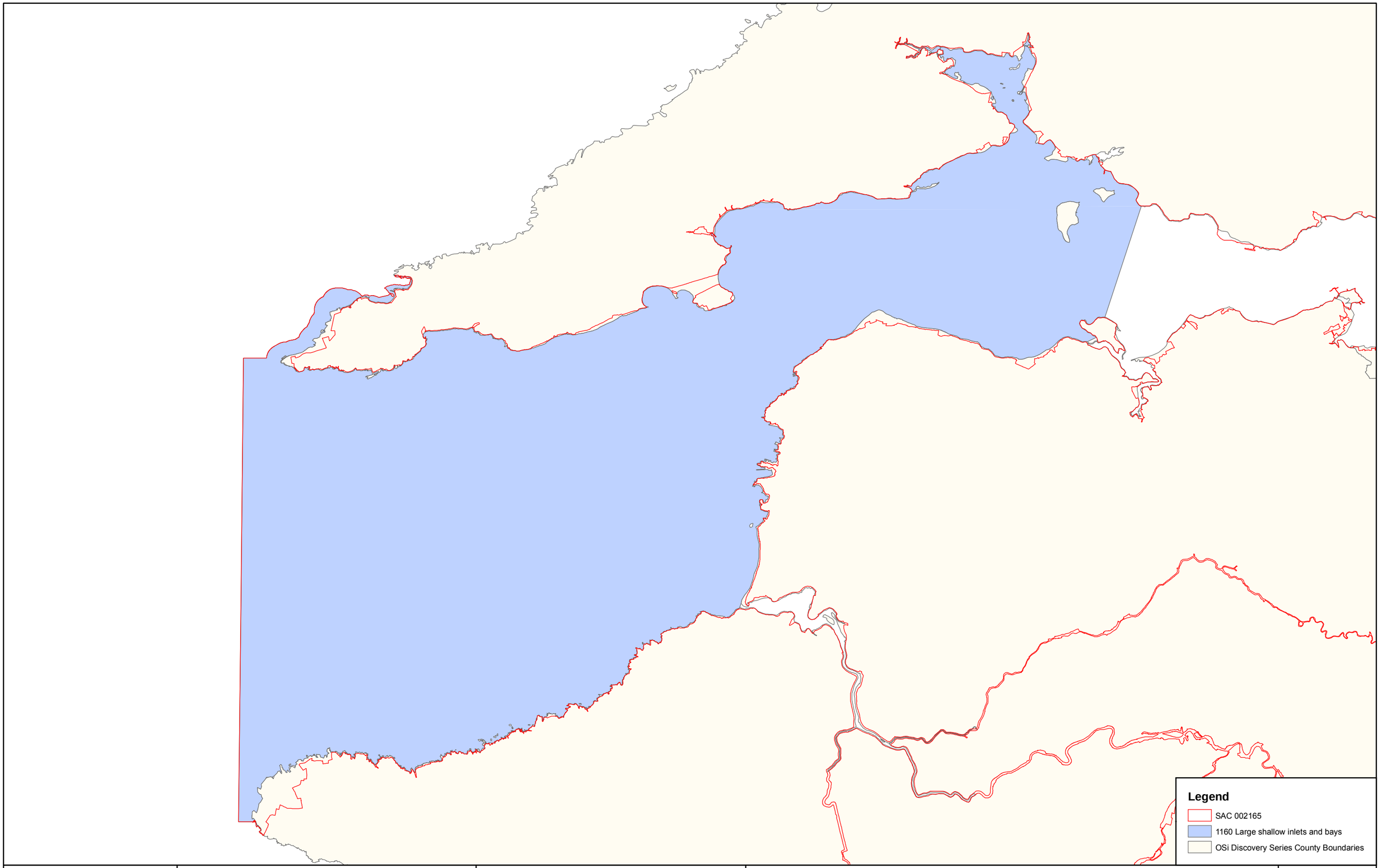
Map Version 1
Date: June 2012



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MAP 7:
LOWER RIVER SHANNON SAC
CONSERVATION OBJECTIVES
LARGE SHALLOW INLETS AND BAYS

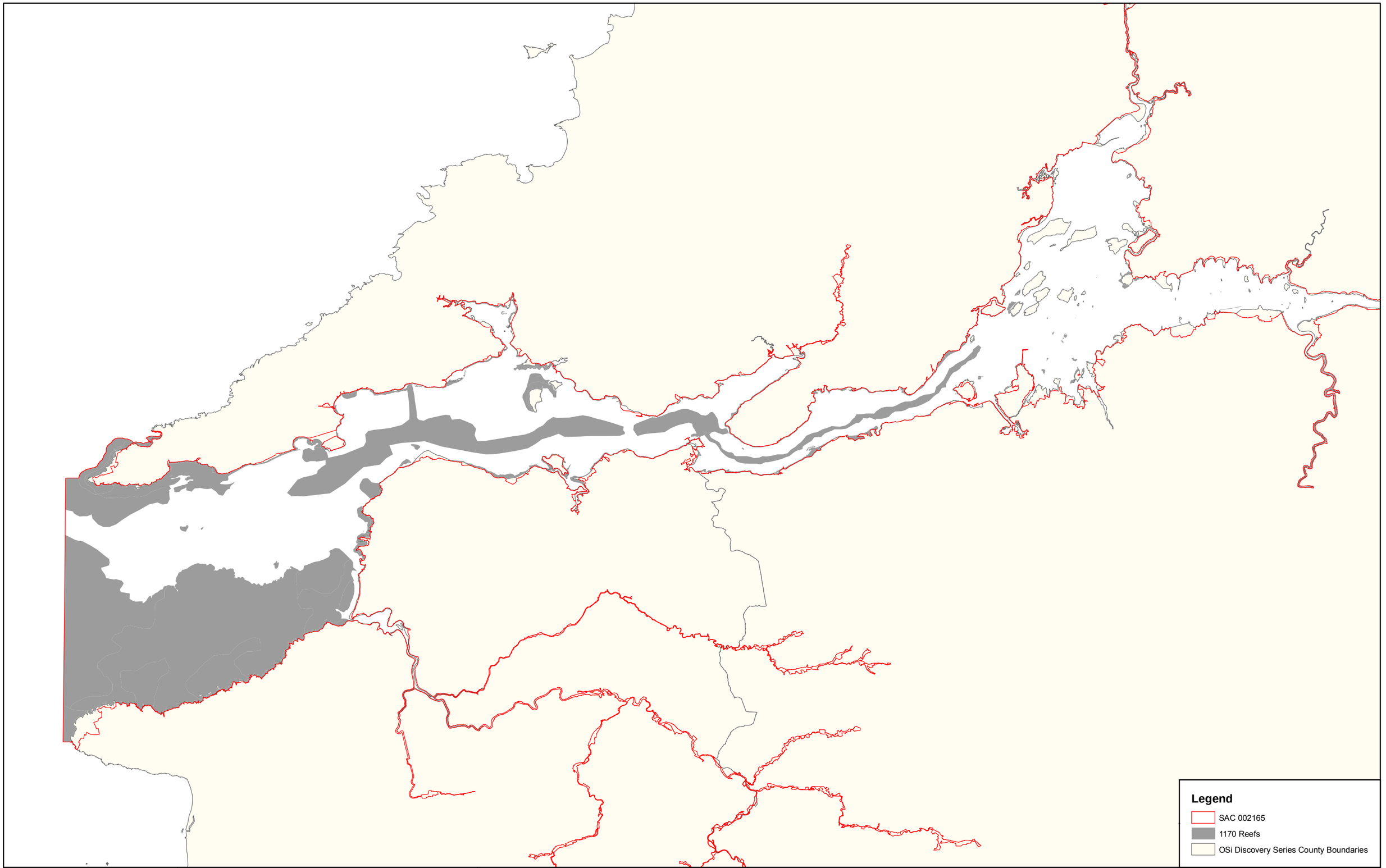
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SAC 002165
CO. CLARE; version 1.2, CO. CORK; version 1.01, CO. KERRY; version 1.11, CO. LIMERICK; version 1.11, CO. TIPPERARY; version 1.05

0 1 2 3 4 5 km

N

Map Version 1
Date: June 2012



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MAP 8:
LOWER RIVER SHANNON SAC
CONSERVATION OBJECTIVES
REEFS

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

SITE CODE: SAC 002165
CO. CLARE; version 1.2, CO. CORK; version 1.01, CO. KERRY; version 1.11,
CO. LIMERICK; version 1.11, CO. TIPPERARY; version 1.05

0 5 10 15 km

N

Map Version 1
Date: June 2012

Legend

- SAC 002165
- OSi Discovery Series County Boundaries

Marine Community Types

- Anemone-dominated subtidal reef community
- Estuarine subtidal muddy sand to mixed sediment with gammarids community complex
- Faunal turf-dominated subtidal reef community
- Fucoid-dominated intertidal reef community complex
- Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex
- Intertidal sand with *Scolelepis squamata* and *Pontocrates* spp. community
- *Laminaria*-dominated community complex
- Mixed subtidal reef community complex
- River
- Subtidal sand to mixed sediment with *Nephtys* spp. community complex
- Subtidal sand to mixed sediment with *Nucula nucleus* community complex

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MAP 9:
LOWER RIVER SHANNON SAC
CONSERVATION OBJECTIVES
MARINE COMMUNITY TYPES

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

SITE CODE: SAC 002165
CO. CLARE; version 1.2, CO. CORK; version 1.01, CO. KERRY; version 1.11, CO. LIMERICK; version 1.11, CO. TIPPERARY; version 1.05

0 5 10 15 km

N

Map Version 1
Date: June 2012

Carrigaholy Bay

Ballymacrinan Bay

Ross Bay

Kilbaha Bay

Cloonconeen Lough and Rinevella Bay

Bunaclugga Bay

Corcas and Sandhills

Bromore

Ballybunion

Area of Interest

Legend

- SAC 002165
- 1220 Perennial vegetation of stony banks
- OSi Discovery Series County Boundaries

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MAP 10:
LOWER RIVER SHANNON SAC
CONSERVATION OBJECTIVES
PERENNIAL VEGETATION OF STONY BANKS

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

SITE CODE: SAC 002165
CO. CLARE; version 1.2, CO. CORK; version 1.01, CO. KERRY; version 1.11, CO. LIMERICK; version 1.11, CO. TIPPERARY; version 1.05

0 1 2 3 4 5 km

N

Map Version 1
Date: June 2012

Moyarta

Lisheencrony

Burrane

Loop Head
Site Id: 01006

Kilclogher
Site Id: 01007

Ladder Rock

Kilbaha

Ballybunion
Site Id: 06001

Kerry Head
Site Id: 06002

Legend

- SAC 002165
- 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts
- Undocumented 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts
- OSi Discovery Series County Boundaries

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MAP 11:
LOWER RIVER SHANNON SAC
CONSERVATION OBJECTIVES
VEGETATED SEA CLIFFS

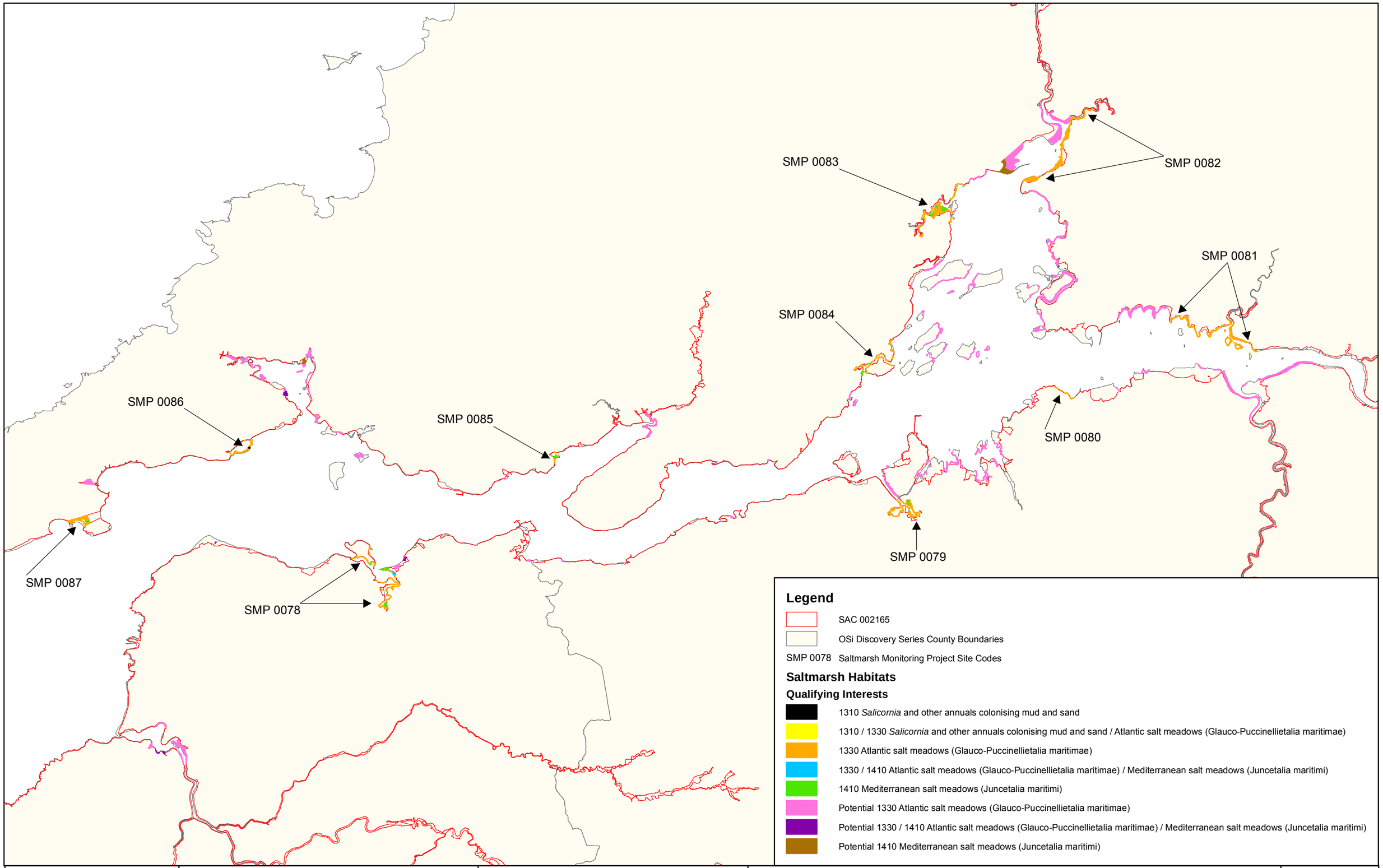
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SAC 002165
CO. CLARE; version 1.2, CO. CORK; version 1.01, CO. KERRY; version 1.11,
CO. LIMERICK; version 1.11, CO. TIPPERARY; version 1.05

0 1 2 3 4 5 km

N

Map Version 1
Date: June 2012



Legend

- SAC 002165
- OSi Discovery Series County Boundaries
- SMP 0078 Saltmarsh Monitoring Project Site Codes

Saltmarsh Habitats

Qualifying Interests

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

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MAP 12:
LOWER RIVER SHANNON SAC
CONSERVATION OBJECTIVES
SALTMARSH HABITATS

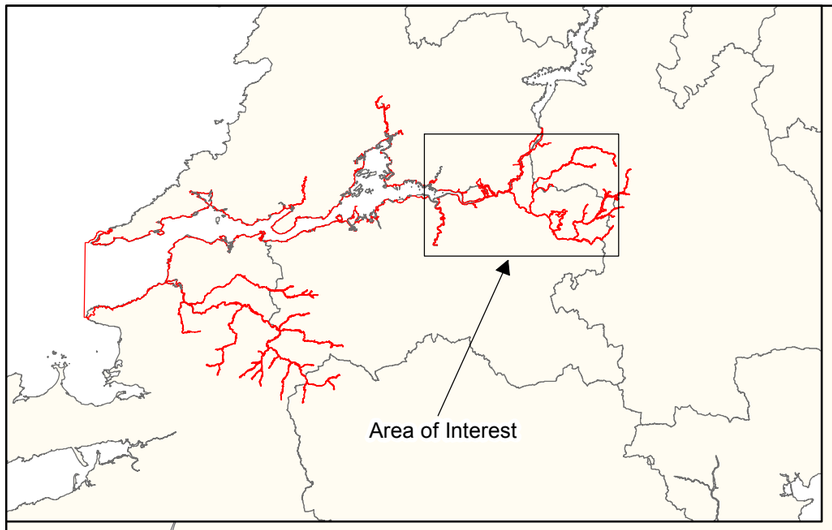
Map to be read in conjunction with the NPWS Conservation Objectives Document.

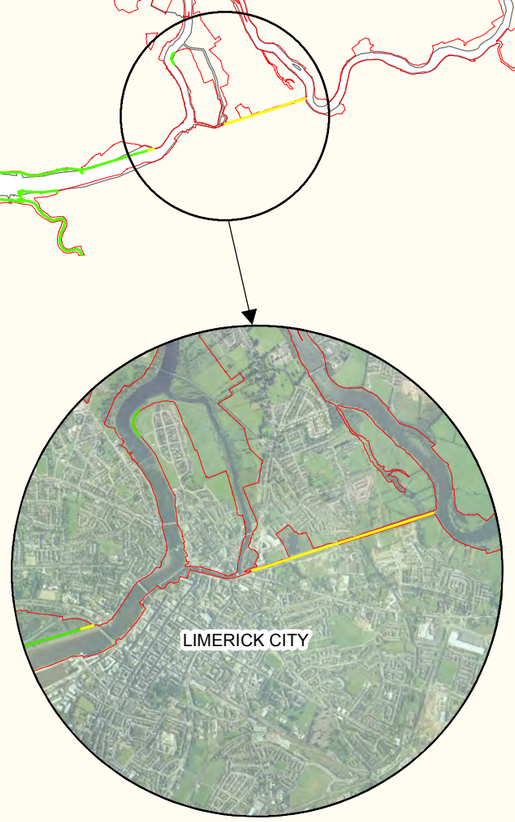
SITE CODE: SAC 002165
CO. CLARE; version 1.2, CO. CORK; version 1.01, CO. KERRY; version 1.11, CO. LIMERICK; version 1.11, CO. TIPPERARY; version 1.05

0 2 4 6 8 10 km

N

Map Version 1
Date: June 2012





Legend

- SAC 002165
- OSi Discovery Series County Boundaries

3260 Watercourses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation

- *Groenlandia densa*
- *Schoenoplectus triqueter*
- Bryophyte-rich streams and rivers sub-type

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MAP 13:
LOWER RIVER SHANNON SAC
CONSERVATION OBJECTIVES
FLOATING RIVER VEGETATION

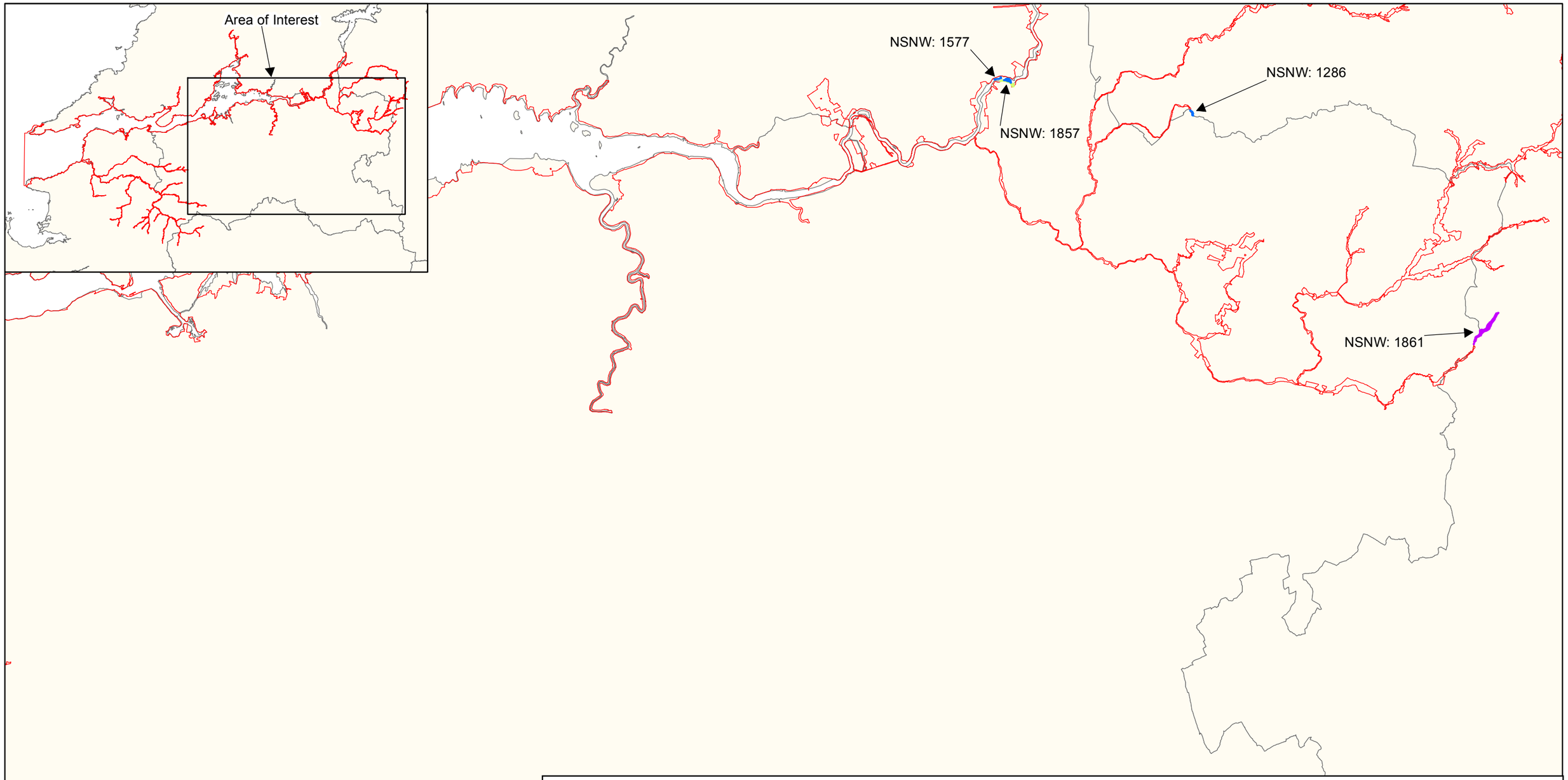
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SAC 002165
CO. CLARE; version 1.2, CO. CORK; version 1.01, CO. KERRY; version 1.11, CO. LIMERICK; version 1.11, CO. TIPPERARY; version 1.05

0 1 2 3 4 5 km

N

Map Version 1
Date: June 2012



Legend

- SAC 002165
- OSi Discovery Series County Boundaries
- NSNW: 1857 National Survey of Native Woodland Site Codes

Woodland Habitats

- 91E0 *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-padion, Alnion incanae, Salicion albae) Qualifying Interest
- 91A0 / 91E0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles / *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-padion, Alnion incanae, Salicion albae) Qualifying Interest
- 91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
- WN2 Oak-ash-hazel woodland

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MAP 14:
LOWER RIVER SHANNON SAC
CONSERVATION OBJECTIVES
WOODLAND HABITATS

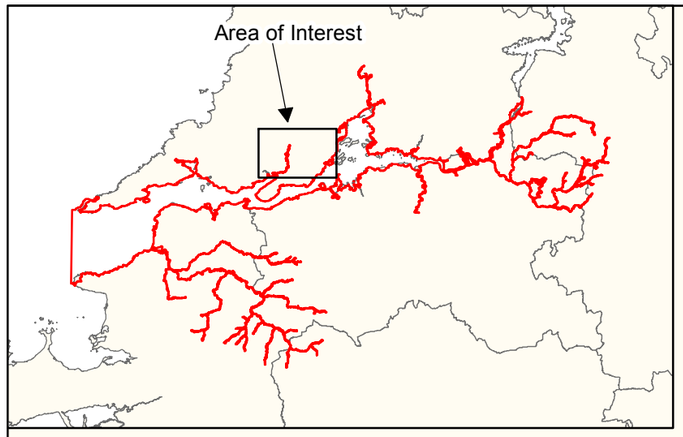
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SAC 002165
CO. CLARE; version 1.2, CO. CORK; version 1.01, CO. KERRY; version 1.11, CO. LIMERICK; version 1.11, CO. TIPPERARY; version 1.05

0 2 4 6 8 10 km

N

Map Version 1
Date: June 2012



Legend

- SAC 002165
- 1029 Freshwater Pearl Mussel - *Margaritifera margaritifera* Suitable Habitat
- 1029 Freshwater Pearl Mussel - *Margaritifera margaritifera* Distribution
- 1029 Freshwater Pearl Mussel - *Margaritifera margaritifera* Catchment
- OSi Discovery Series County Boundaries

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MAP 15:
LOWER RIVER SHANNON SAC
CONSERVATION OBJECTIVES
FRESHWATER PEARL MUSSEL

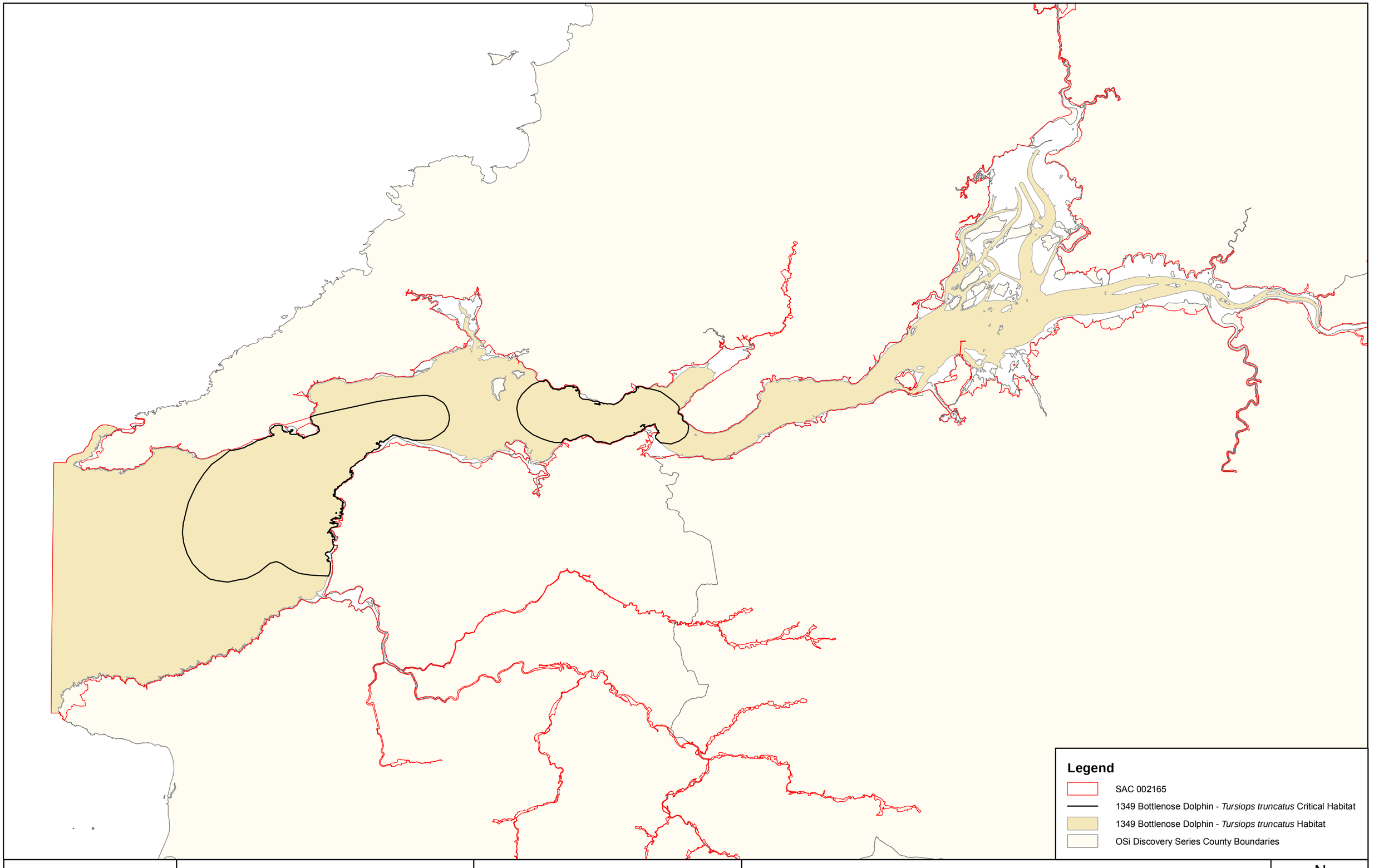
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SAC 002165
CO. CLARE; version 1.2, CO. CORK; version 1.01, CO. KERRY; version 1.11, CO. LIMERICK; version 1.11, CO. TIPPERARY; version 1.05

0 0.5 1 1.5 2 km

N

Map Version 1
Date: June 2012



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MAP 16:
LOWER RIVER SHANNON SAC
CONSERVATION OBJECTIVES
BOTTLENOSE DOLPHIN

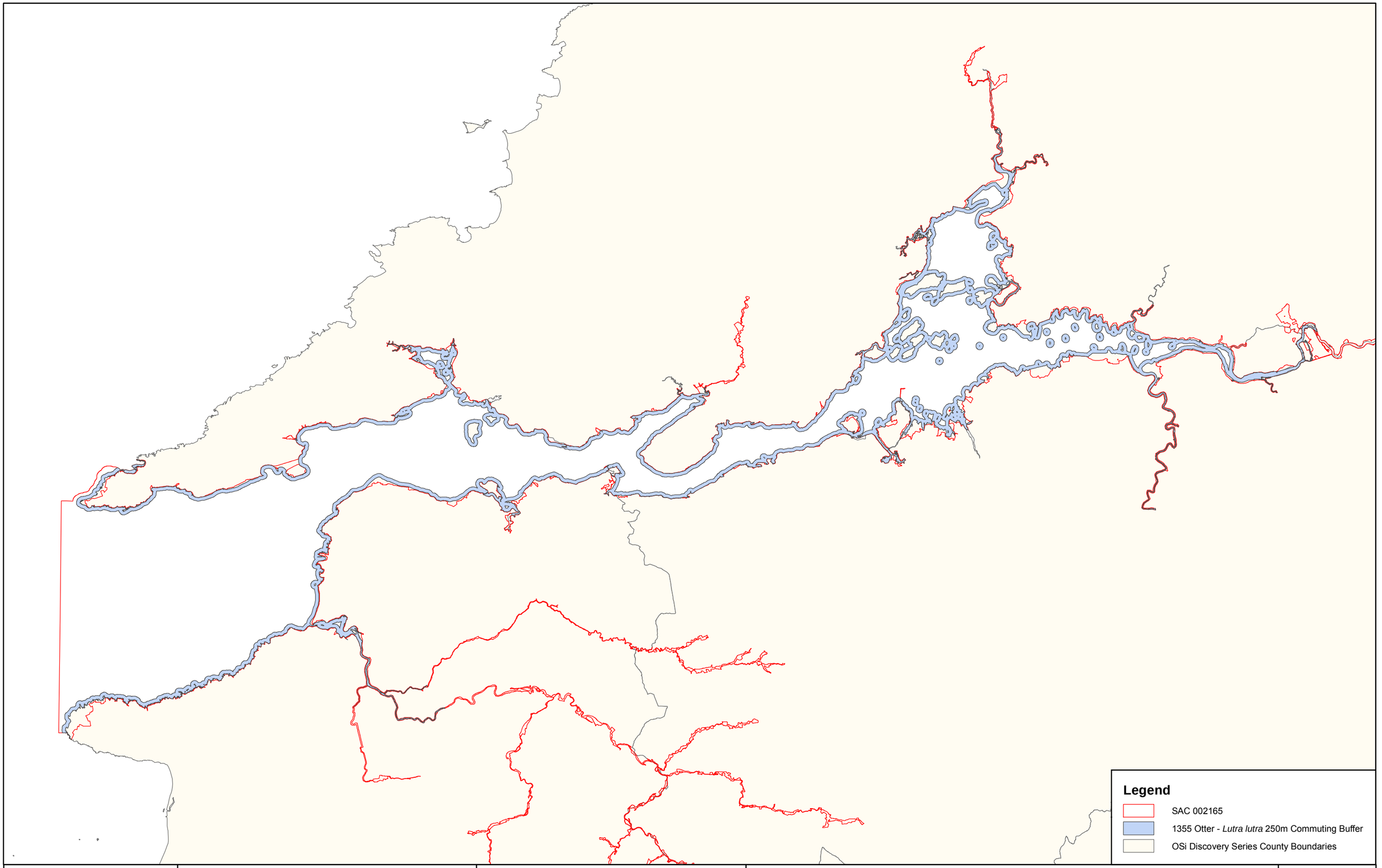
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SAC 002165
CO. CLARE; version 1.2, CO. CORK; version 1.01, CO. KERRY; version 1.11, CO. LIMERICK; version 1.11, CO. TIPPERARY; version 1.05

0 5 10 15 km

N

Map Version 1
Date: June 2012



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MAP 17:
LOWER RIVER SHANNON SAC
CONSERVATION OBJECTIVES
OTTER COMMUTING

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

SITE CODE: SAC 002165
CO. CLARE; version 1.2, CO. CORK; version 1.01, CO. KERRY; version 1.11, CO. LIMERICK; version 1.11, CO. TIPPERARY; version 1.05

0 5 10 15 km

N

Map Version 1
Date: June 2012

ISSN 2009-4086

National Parks and Wildlife Service

Conservation Objectives Series

Carrowmore Dunes SAC 002250

An Roinn
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Citation:

NPWS (2014) Conservation Objectives: Carrowmore Dunes SAC 002250. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Series Editor: Rebecca Jeffrey
ISSN 2009-4086

Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

Qualifying Interests

**** indicates a priority habitat under the Habitats Directive***

002250	Carrowmore Dunes SAC
1014	Narrow-mouthed Whorl Snail *Vertigo angustior*
1170	Reefs
2110	Embryonic shifting dunes
2120	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)
2130	Fixed coastal dunes with herbaceous vegetation (grey dunes)*

Please note that this SAC overlaps with Mid-Clare Coast SPA (004182) and adjoins Carrowmore Point to Spanish Point and Islands SAC (001021). See map 2. The conservation objectives for this site should be used in conjunction with those for the overlapping and adjacent sites as appropriate.

Supporting documents, relevant reports & publications

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

NPWS Documents

Year :	2009
Title :	Coastal Monitoring Project 2004-2006
Author :	Ryle, T.; Murray, A.; Connolly, K.; Swann, M.
Series :	Unpublished report to NPWS
Year :	2011
Title :	Monitoring and condition assessment of populations of *Vertigo geyeri*, *Vertigo angustior* and *Vertigo moulinsiana* in Ireland
Author :	Moorkens, E.A.; Killeen, I.J.
Series :	Irish Wildlife Manual No. 55
Year :	2014
Title :	Carrowmore Dunes SAC (site code: 2250) Conservation objectives supporting document-marine habitats V1
Author :	NPWS
Series :	Conservation objectives supporting document
Year :	2014
Title :	Carrowmore Dunes SAC (site code: 2250) Conservation objectives supporting document V1
Author :	NPWS
Series :	Conservation objectives supporting document

Other References

Year :	1997
Title :	The BioMar biotope viewer: a guide to marine habitats, fauna and flora in Britain and Ireland
Author :	Picton, B.E.; Costello, M.J.
Series :	Environmental Science Unit, Trinity College Dublin
Year :	2000-2002
Title :	Annual conservation reports for the development and maintenance of the golf links at Doonbeg, Co. Clare 2000-2002
Author :	Moorkens, E.; Gaynor, K.
Series :	Unpublished reports for Doonbeg Golf Club Ltd
Year :	2003
Title :	Annual conservation report for the development and maintenance of the golf links at Doonbeg, Co. Clare 2003
Author :	Moorkens, K; Browne, A.
Series :	Unpublished report for Doonbeg Golf Club Ltd
Year :	2004-2011
Title :	Annual conservation reports for the development and maintenance of the golf links at Doonbeg, Co. Clare 2004-2011
Author :	Moorkens, E.
Series :	Unpublished reports for Doonbeg Golf Club Ltd
Year :	2008
Title :	The phytosociology and conservation value of Irish sand dunes
Author :	Gaynor, K.
Series :	Unpublished PhD thesis, National University of Ireland, Dublin

Year :	2012
Title :	Subtidal reef survey of Carrowmore Point to Spanish Point and Islands SAC, Carrowmore Dunes SAC and Mid-Clare Coast SPA
Author :	MERC
Series :	Unpublished report to the Marine Institute and NPWS
Year :	2013
Title :	Intertidal benthic survey and intertidal reef survey of Carrowmore Point to Spanish Point and Islands SAC, Carrowmore Dunes SAC and Mid-Clare Coast SPA
Author :	MERC
Series :	Unpublished report to the Marine Institute and NPWS

Spatial data sources

Year :	Interpolated 2014
Title :	1996 BioMar Survey; 2011, 2012 intertidal and subtidal surveys
GIS Operations :	Polygon feature classes from marine community types base data sub-divided based on interpolation of marine survey data. Expert opinion used as necessary to resolve any issues arising
Used For :	1170, marine community types (maps 3 and 4)
Year :	2005
Title :	OSi Discovery series vector data
GIS Operations :	High water mark (HWM) and low water mark (LWM) polyline feature classes converted into polygon feature classes and combined; EU Annex I Saltmarsh and Coastal data erased out if present
Used For :	Marine community types base data (map 4)
Year :	2009
Title :	Coastal Monitoring Project 2004-2006. Version 1
GIS Operations :	QIs selected; clipped to SAC boundary; overlapping regions with Saltmarsh CO data investigated and resolved with expert opinion used
Used For :	2110, 2120, 2130 (map 5)
Year :	2014
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 :	1014 (map 6)

1170 Reefs

To maintain the favourable conservation condition of Reefs in Carrowmore Dunes SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 3	Habitat area estimated as 211ha from a 1996 BioMar survey (Picton and Costello, 1997) and 2011 and 2012 intertidal and subtidal reef surveys (MERC, 2012, 2013). See marine supporting document for further details
Distribution	Occurrence	The distribution of reefs is stable or increasing, subject to natural processes. See map 3	Based on information from a 1996 BioMar survey (Picton and Costello, 1997) and 2011 and 2012 intertidal and subtidal reef surveys (MERC, 2012, 2013). See marine supporting document for further details
Community structure	Biological composition	Conserve the following community types in a natural condition: Intertidal reef community complex; *Laminaria*-dominated community complex. See map 4	Reef mapping based on information from a 1996 BioMar survey (Picton and Costello, 1997) and 2011 and 2012 intertidal and subtidal reef surveys (MERC, 2012, 2013). See marine supporting document for further details

2110 Embryonic shifting dunes

To restore the favourable conservation condition of Embryonic shifting dunes in Carrowmore Dunes SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area increasing, subject to natural processes, including erosion and succession. For sub-site mapped: White Strand-0.19ha. See map 5	Based on data from the Coastal Monitoring Project (CMP) (Ryle et al., 2009). Habitat is very difficult to measure in view of its dynamic nature. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 5 for known distribution	Based on data from Ryle et al. (2009). Embryonic dunes are present along the seaward side of the dune system at the foot of tall marram dunes. Due to the high exposure and retreating conditions of the west coast, typically the fore dunes are poorly developed. See coastal habitats supporting document for further details
Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Dunes are naturally dynamic systems that require continuous supply and circulation of sand. Physical barriers can lead to fossilisation or over-stabilisation of dunes, as well as beach starvation resulting in increased rates of erosion. Soft erosion protection measure have been installed to protect eroding areas of the golf course since 2001. These measures are absent from areas fronting the high dune sections within the SAC. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data Ryle et al. (2009). Carrowmore dunes support a range of other dune habitats including marram dunes, fixed dunes, dune slacks, annual vegetation of driftlines and perennial vegetation of stony banks. The dunes are also connected to a significant wetland area known as Carrowmore Marsh. See coastal habitats supporting document for further details
Vegetation composition: plant health of foredune grasses	Percentage cover	More than 95% of sand couch (*Elytrigia juncea*) and/or lyme-grass (*Leymus arenarius*) should be healthy (i.e. green plant parts above ground and flowering heads present)	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain the presence of species-poor communities with typical species: sand couch (*Elytrigia juncea*) and/or lyme-grass (*Leymus arenarius*)	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-native species) to represent less than 5% cover	Based on data from Ryle et al. (2009). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. Sea-buckthorn (*Hippophae rhamnoides*) should be absent or effectively controlled. This species has not been recorded at this site. See coastal habitats supporting document for further details

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

To restore the favourable conservation condition of Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes') in Carrowmore Dunes SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes including erosion and succession. For sub-site mapped: White Strand- 2.15ha. See map 5	Based on data from the Coastal Monitoring Project (CMP) (Ryle et al. 2009). Habitat mapped at one sub-site to give a total estimated area of 2.15ha. Habitat is very difficult to measure in view of its dynamic nature. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes. See map 5 for known distribution	Shifting dunes along the shoreline with *Ammophila arenaria*, or marram dunes, occur on the seaward steeper slopes of the dunes above the beach and at the edges of blowouts. See coastal habitats supporting document for further details
Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Dunes are naturally dynamic systems that require continuous supply and circulation of sand. Marram grass (*Ammophila arenaria*) reproduces vegetatively and requires constant accretion of fresh sand to maintain active growth. Soft coastal protection measures have been installed since 2001 to protect eroding parts of the golf course. These measures are absent from the front of the north and south high dune sections within the SAC. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Gaynor (2008) and Ryle et al. (2009). Carrowmore dunes support a range of other dune habitats including embryonic dunes, fixed dunes, dune slacks, annual vegetation of driftlines and perennial vegetation of stony banks. The dunes are also connected to a significant wetland area known as Carrowmore Marsh. See coastal habitats supporting document for further details
Vegetation composition: plant health of dune grasses	Percentage cover	More than 95% of marram grass (*Ammophila arenaria*) and/or lyme-grass (*Leymus arenarius*) should be healthy (i.e. green plant parts above ground and flowering heads present)	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain the presence of species-poor communities dominated by marram grass (*Ammophila arenaria*) and/or lyme-grass (*Leymus arenarius*)	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from Ryle et al. (2009). Negative indicators include non-native species; species indicative of changes in nutrient status and species not considered characteristic of the habitat. Sea-buckthorn (*Hippophae rhamnoides*) should be absent or effectively controlled. This species has not been recorded at this site. See coastal habitats supporting document for further details

2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)

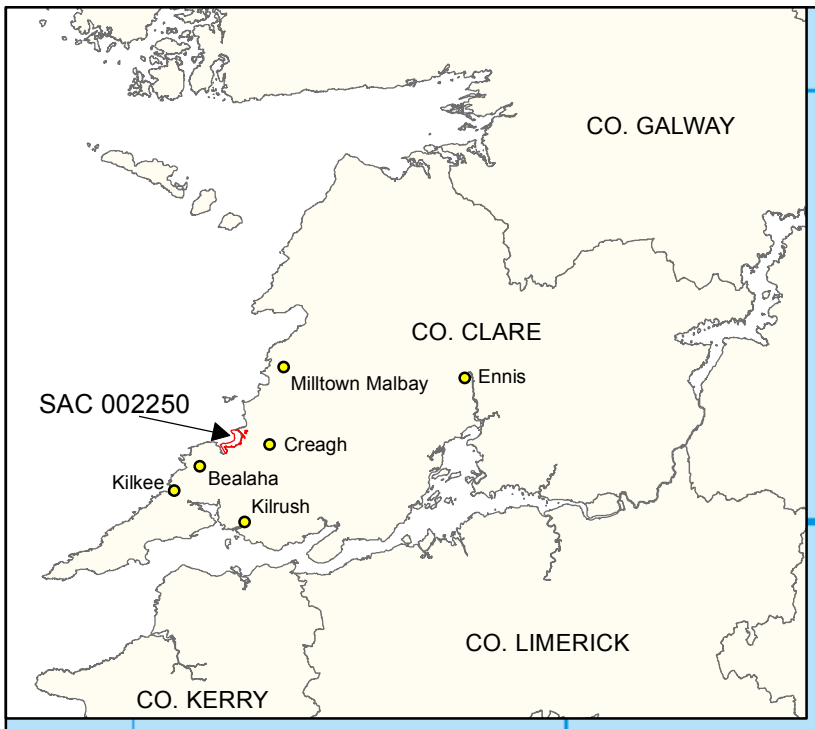
To restore the favourable conservation condition of Fixed coastal dunes with herbaceous vegetation ('grey dunes') in Carrowmore Dunes SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes including erosion and succession. For sub-site mapped: White Strand- 10.46ha. See map 5	Based on data from Coastal Monitoring Project (CMP) (Ryle et al., 2009). One sub-site was mapped, giving a total estimated area of 10.46ha. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes. See map 5 for known distribution	Based on data from Ryle et al. (2009). Fixed dunes represent the largest dune habitat present within the SAC. See coastal habitats supporting document for further details
Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Physical barriers can lead to fossilisation or over-stabilisation of dunes, as well as beach starvation resulting in increased rates of erosion. Soft coastal protection measures have been installed since 2001 to protect eroding parts of the golf course. These measures are absent from the front of the north and south high dune sections within the SAC. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Ryle et al. (2009). Carrowmore dunes support a range of other dune habitats including embryonic dunes, marram dunes, dune slacks, annual vegetation of driftlines and perennial vegetation of stony banks. The dunes are also connected to a significant wetland area known as Carrowmore Marsh. See coastal habitats supporting document for further details
Vegetation structure: bare ground	Percentage cover	Bare ground should not exceed 10% of fixed dune habitat, subject to natural processes	Based on data from Gaynor (2008) and Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation structure: sward height	Centimetres	Maintain structural variation within sward	Based on data from Gaynor (2008) and Ryle et al. (2009). The dunes are moderately grazed as part of an agreed management plan. See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain range of sub-communities with typical species listed in Ryle et al. (2009)	Based on data from Gaynor (2008) and Ryle et al. (2009). Mountain pansy (*Viola lutea*) is considered an indicator of local distinctiveness. See coastal habitats supporting document for further details.
Vegetation composition: negative indicator species (including *Hippophae rhamnoides*)	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from Ryle et al. (2009). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. Sea-buckthorn (*Hippophae rhamnoides*) should be absent or effectively controlled. This species has not been recorded at this site. See coastal habitats supporting document for further details
Vegetation composition: scrub/trees	Percentage cover	No more than 5% cover or under control	Based on data from CMP (Ryle et al. 2009). See coastal habitats supporting document for further details

1014 Narrow-mouthed Whorl Snail *Vertigo angustior*

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

Attribute	Measure	Target	Notes
Distribution: occupied sites	Number	No decline. There are four known terrestrial sub-sites for this species in this SAC, which overlap three 1km squares. See map 6	From Moorkens and Killeen (2011) (site code Va CAM18), Moorkens (2004-2011); Moorkens and Browne (2003); and Moorkens and Gaynor (2000-2002)
Presence on transect	Occurrence	Adult or sub-adult snails are present in at least four of the six maritime grassland zones on the transect where optimal or sub-optimal habitat occurs	Transect established as part of condition assessment monitoring at this site (Moorkens and Killeen, 2011). See habitat extent target below for definition of optimal and sub-optimal habitat
Abundance on transect	Number per sample	At least two samples on the transect should have more than 20 *V. angustior* individuals	From Moorkens and Killeen (2011)
Transect habitat quality	Metres	At least 75m of habitat of the transect is classed as optimal or sub-optimal, with at least 40m classed as optimal	From Moorkens and Killeen (2011). See habitat extent target below for definition of optimal and sub-optimal habitat
Transect optimal wetness	Metres	Soils, at time of sampling, are damp (optimal wetness) and covered with a layer of humid thatch for at least 40m along the transect	From Moorkens and Killeen (2011)
Habitat extent	Hectares	A minimum of 19ha of the SAC is in optimal/sub-optimal condition, subject to natural processes. Optimal habitat is defined as fixed dune vegetation of species-rich grassland dominated by red fescue (*Festuca rubra*), with sparse marram grass (*Ammophila arenaria*), lady's bedstraw (*Galium verum*) and other low growing herbs, with height of 10-30cm, growing on damp, friable soil covered with a layer of humid, open structured thatch. Sub-optimal habitat is as optimal habitat but either vegetation height is less than 10cm or is between 30 and 50cm; or the soil is dry and sandy; or the thatch is wetter with a denser structure. Also included in this definition are the wetland areas with yellow iris (*Iris pseudacorus*) and taller sedge species	From Moorkens and Killeen (2011). Note, there are additional areas of optimal and sub-optimal habitat beyond the SAC boundary (Moorkens, 2004-2011; Moorkens and Browne, 2003; Moorkens and Gaynor, 2000-2002). See also the conservation objective for fixed dunes (2130)



MAP 1: CARROWMORE DUNES SAC CONSERVATION OBJECTIVES SAC DESIGNATION

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

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

SITE CODE:
SAC 002250; version 3.01. CO. CLARE

0 250 500 m

N

Map Version 1
Date: Feb 2014

Legend

Carrowmore Dunes SAC 002250

SAC 001021

SPA 004182

SAC 002250

Legend

- Carrowmore Point to Spanish Point and Islands SAC 001021
- Carrowmore Dunes SAC 002250
- Mid-Clare Coast SPA 004182
- OSi Discovery Series County Boundary

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

MAP 2:
CARROWMORE DUNES SAC CONSERVATION OBJECTIVES ADJOINING & OVERLAPPING DESIGNATIONS

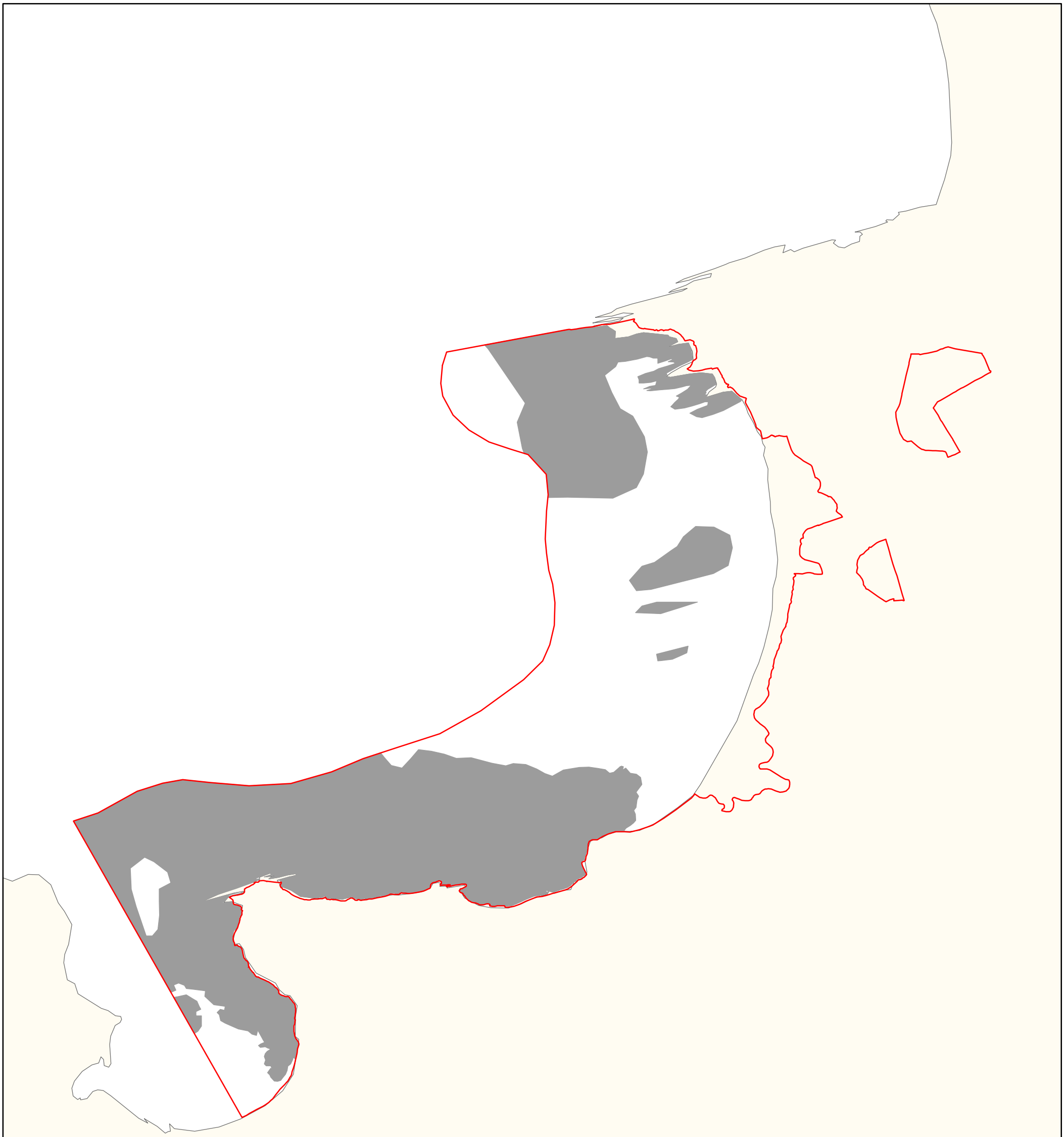
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 001021; version 3.01, SAC 002250; version 3.01.
SPA 004182; version 2. CO. CLARE

0 1 2 km

N

Map Version 1
Date: Feb 2014



Legend

- Carrowmore Dunes SAC 002250
- 1170 Reefs
- OSi Discovery Series County Boundary

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Department of Arts, Heritage and the Gaeltacht

MAP 3: CARROWMORE DUNES SAC CONSERVATION OBJECTIVES REEFS

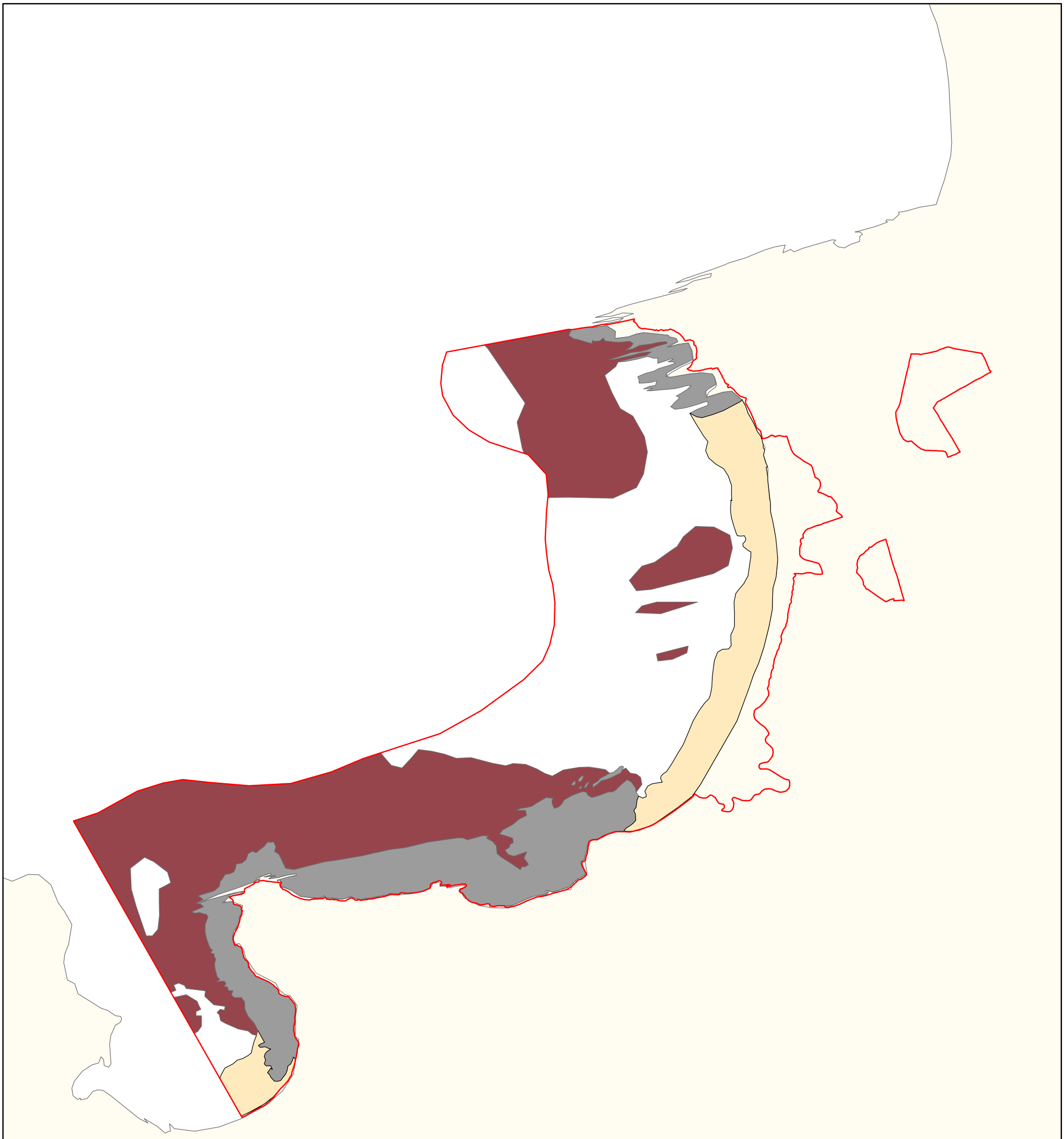
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 002250; version 3.01. CO. CLARE

0 250 500 m

N

Map Version 1
Date: Feb 2014



Legend

Carrowmore Dunes SAC 002250

OSi Discovery Series County Boundary

Marine Community Types

Intertidal reef community complex

Laminaria-dominated community complex

Mobile sand community complex

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Department of Arts, Heritage and the Gaeltacht

MAP 4:
CARROWMORE DUNES SAC
CONSERVATION OBJECTIVES
MARINE COMMUNITY TYPES

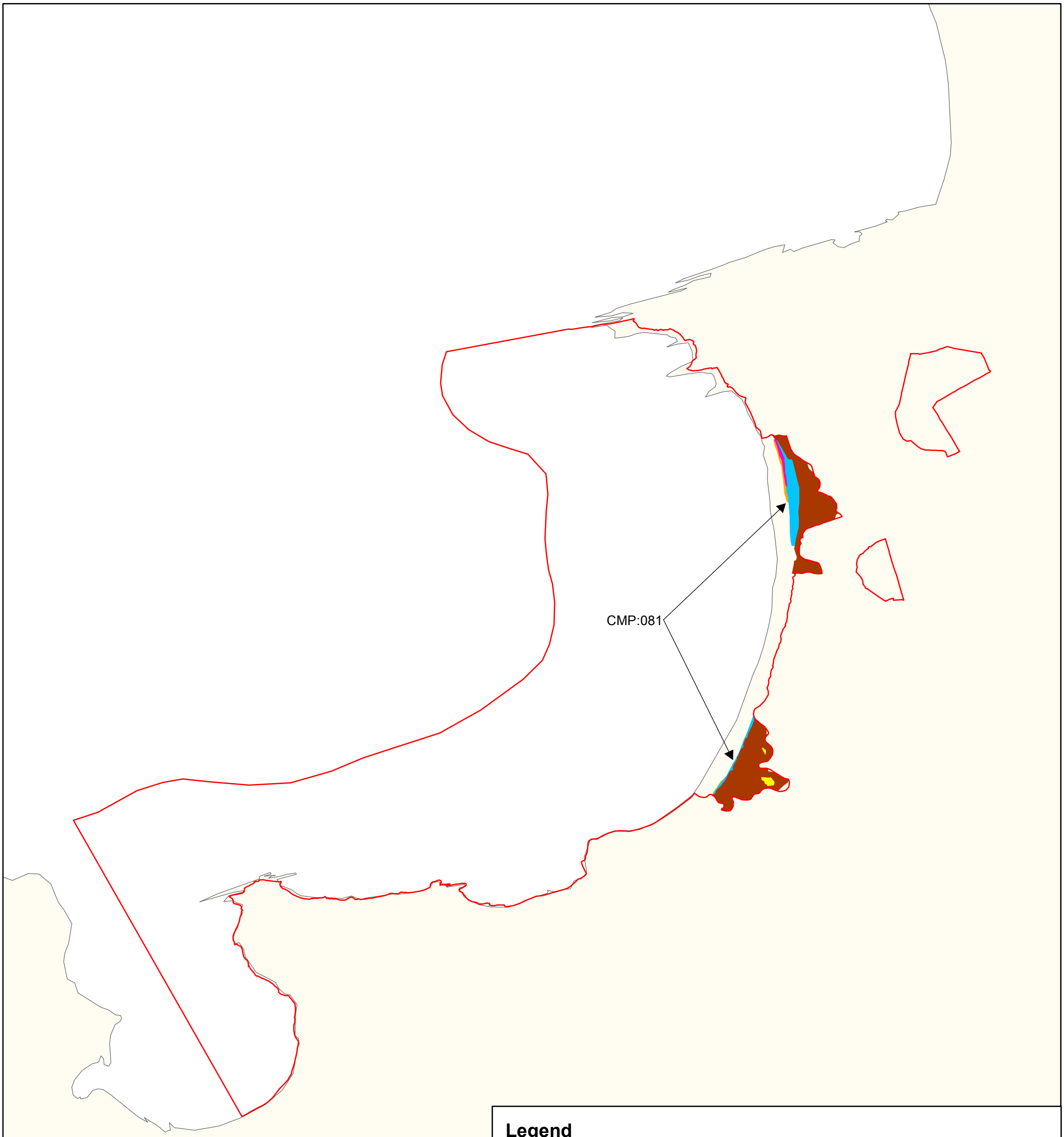
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 002250; version 3.01. CO. CLARE

0 250 500 m

N

Map Version 1
Date: Feb 2014



Legend

- Carrowmore Dunes SAC 002250
- OSi Discovery Series County Boundary
- CMP:081 Coastal Monitoring Project Site Codes

Sand Dune Habitats

Qualifying Interests

- 2110 Embryonic shifting dunes
- 2120 Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes')
- 2130 *Fixed coastal dunes with herbaceous vegetation ('grey dunes')

Non Qualifying Interests

- 1210 Annual vegetation of drift lines
- 2190 Humid dune slacks

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Department of Arts, Heritage and the Gaeltacht

MAP 5: CARROWMORE DUNES SAC CONSERVATION OBJECTIVES SAND DUNE HABITATS

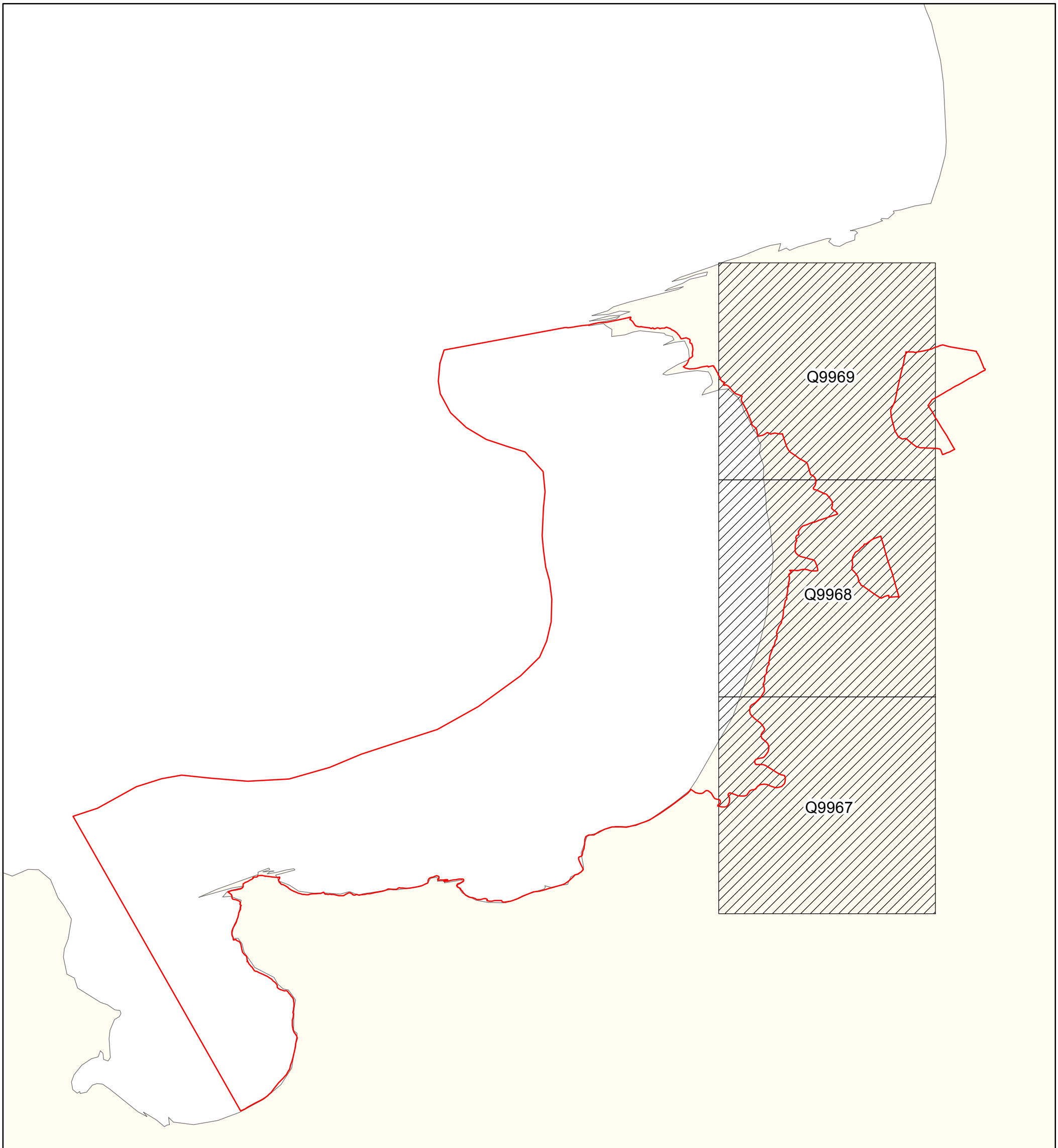
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 002250; version 3.01. CO. CLARE

0 250 500 m

N

Map Version 1
Date: Feb 2014



Legend

- Carrowmore Dunes SAC 002250
- 1014 Narrow-Mouthed Whorl Snail - *Vertigo angustior*
- OSi Discovery Series County Boundary

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Department of Arts, Heritage and the Gaeltacht

MAP 6: CARROWMORE DUNES SAC CONSERVATION OBJECTIVES NARROW-MOUTHED WHORL SNAIL

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

SITE CODE:
SAC 002250; version 3.01. CO. CLARE

0 250 500 m

N

Map Version 1
Date: Feb 2014

ISSN 2009-4086

National Parks and Wildlife Service

Conservation Objectives Series

Kilkee Reefs SAC 002264

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

National Parks and Wildlife Service,
Department of Arts, Heritage and the Gaeltacht,

7 Ely Place, Dublin 2, Ireland.

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E-mail: nature.conservation@ahg.gov.ie

Citation:

NPWS (201п) Conservation Objectives: Kilkee Reefs SAC 002264. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Series Editor: Rebecca Jeffrey
ISSN 2009-4086

Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

Qualifying Interests

**** indicates a priority habitat under the Habitats Directive***

002264	Kilkee Reefs SAC
1160	Large shallow inlets and bays
1170	Reefs
8330	Submerged or partially submerged sea caves

Please note that this SAC overlaps with Illaunonearaun SPA (004114). See map 2. The conservation objectives for this site should be used in conjunction with those for the overlapping site as appropriate.

Supporting documents, relevant reports & publications

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

NPWS Documents

Year :	2014
Title :	Kilkee Reefs SAC (site code: 2264) Conservation objectives supporting document- marine habitats V1
Author :	NPWS
Series :	Conservation objectives supporting document

Other References

Year :	1997
Title :	The BioMar biotope viewer: a guide to marine habitats, fauna and flora in Britain and Ireland
Author :	Picton, B.E.; Costello, M.J.
Series :	Environmental Science Unit, Trinity College Dublin
Year :	2014
Title :	Subtidal benthic survey and subtidal reef survey of Kilkee Reefs SAC
Author :	MERC
Series :	Unpublished report to the Marine Institute and NPWS
Year :	2014
Title :	Intertidal benthic survey and intertidal reef survey of Kilkee Reefs SAC
Author :	MERC
Series :	Unpublished report to the Marine Institute and NPWS

Spatial data sources

Year :	2005
Title :	OSi Discovery series vector data
GIS Operations :	High Water Mark (HWM) polyline feature class converted into polygon feature class; clipped to SAC boundary. EPA WFD transitional waterbody data erased from extent. Expert opinion used as necessary to resolve any issues arising
Used For :	1160 (map 3)
Year :	Interpolated 2014
Title :	1994 BioMar survey; 2011, 2012 reef surveys
GIS Operations :	Polygon feature classes from marine community types base data sub-divided based on interpolation of marine survey data. Expert opinion used as necessary to resolve any issues arising
Used For :	1170, marine community types (maps 3 and 5)
Year :	Derived 2014
Title :	Coast of Ireland Oblique Imagery Survey 2003
GIS Operations :	Point dataset created from visual inspection of survey
Used For :	8330 (map 4)
Year :	2005
Title :	OSi Discovery series vector data
GIS Operations :	High water mark (HWM) and low water mark (LWM) polyline feature classes converted into polygon feature classes and combined; EU Annex I Saltmarsh and Coastal data erased out if present
Used For :	Marine community types base data (map 5)

1160 Large shallow inlets and bays

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

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 3	Habitat area estimated as 1350ha using OSi data and expert judgement
Community distribution	Hectares	Conserve the following community types in a natural condition: Sediment community complex; Exposed intertidal reef community complex; Exposed subtidal reef community complex. See map 5	Based on a 1994 BioMar survey (Picton and Costello, 1997) and 2011 and 2012 reef surveys (MERC, 2012). See marine supporting document for further details

1170 Reefs

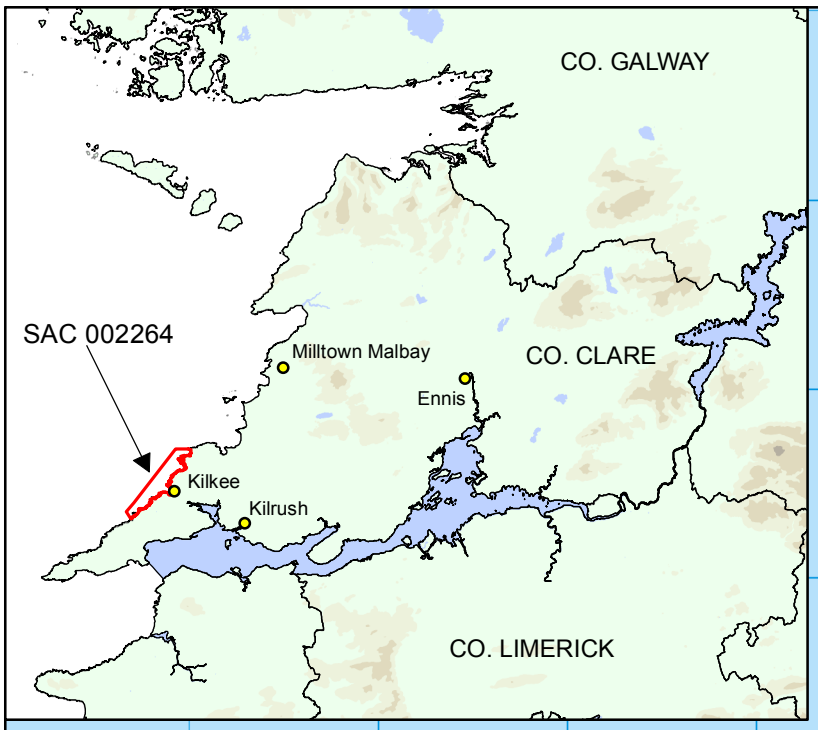
To maintain the favourable conservation condition of Reefs in Kilkee Reefs SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 4	Habitat area estimated as 2391ha from a 1994 BioMar survey (Picton and Costello, 1997) and 2011 and 2012 reef surveys (MERC, 2012)
Distribution	Occurrence	The distribution of reefs is stable or increasing, subject to natural processes. See map 4	Based on information from a 1994 BioMar survey (Picton and Costello, 1997) and 2011 and 2012 reef surveys (MERC, 2012)
Community structure	Biological composition	Conserve the following community types in a natural condition: Exposed intertidal reef community complex; Exposed subtidal reef community complex. See map 5	Based on information from a 1994 BioMar survey (Picton and Costello, 1997) and 2011 and 2012 reef surveys (MERC, 2012). See marine supporting document for further details

8330 Submerged or partially submerged sea caves

To maintain the favourable conservation condition of Submerged or partially submerged sea caves in Kilkee Reefs SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Occurrence	The distribution of sea caves is stable, subject to natural processes. See map 4 for known caves	Sea cave distribution at this site was derived from an oblique aerial survey and therefore only detects the presence of sea caves visible intertidally in the flight path. NB other sea caves may occur within the SAC
Community structure	Biological composition	Human activities should occur at levels that do not adversely affect the ecology of sea caves in the SAC	See marine supporting document for further details



MAP 1: KILKEE REEFS SAC CONSERVATION OBJECTIVES SAC DESIGNATION

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

SITE CODE:
SAC 002264; version 3.01. CO. CLARE

0 0.5 1 1.5 2 km

N

Map Version 1
Date: July 2014

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Department of Arts, Heritage and the Gaeltacht

Legend

Kilkee Reefs SAC 002264

SAC 002264

SPA 004114

Legend

- Kilkee Reefs SAC 002264
- Illaunonearaun SPA 004114
- OSi Discovery Series County Boundary

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

MAP 2: KILKEE REEFS SAC CONSERVATION OBJECTIVES ADJOINING / OVERLAPPING DESIGNATIONS

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

SITE CODE:
SAC 002264; version 3.01.
SPA 004114; version 2. CO. CLARE

0 0.5 1 1.5 2 km

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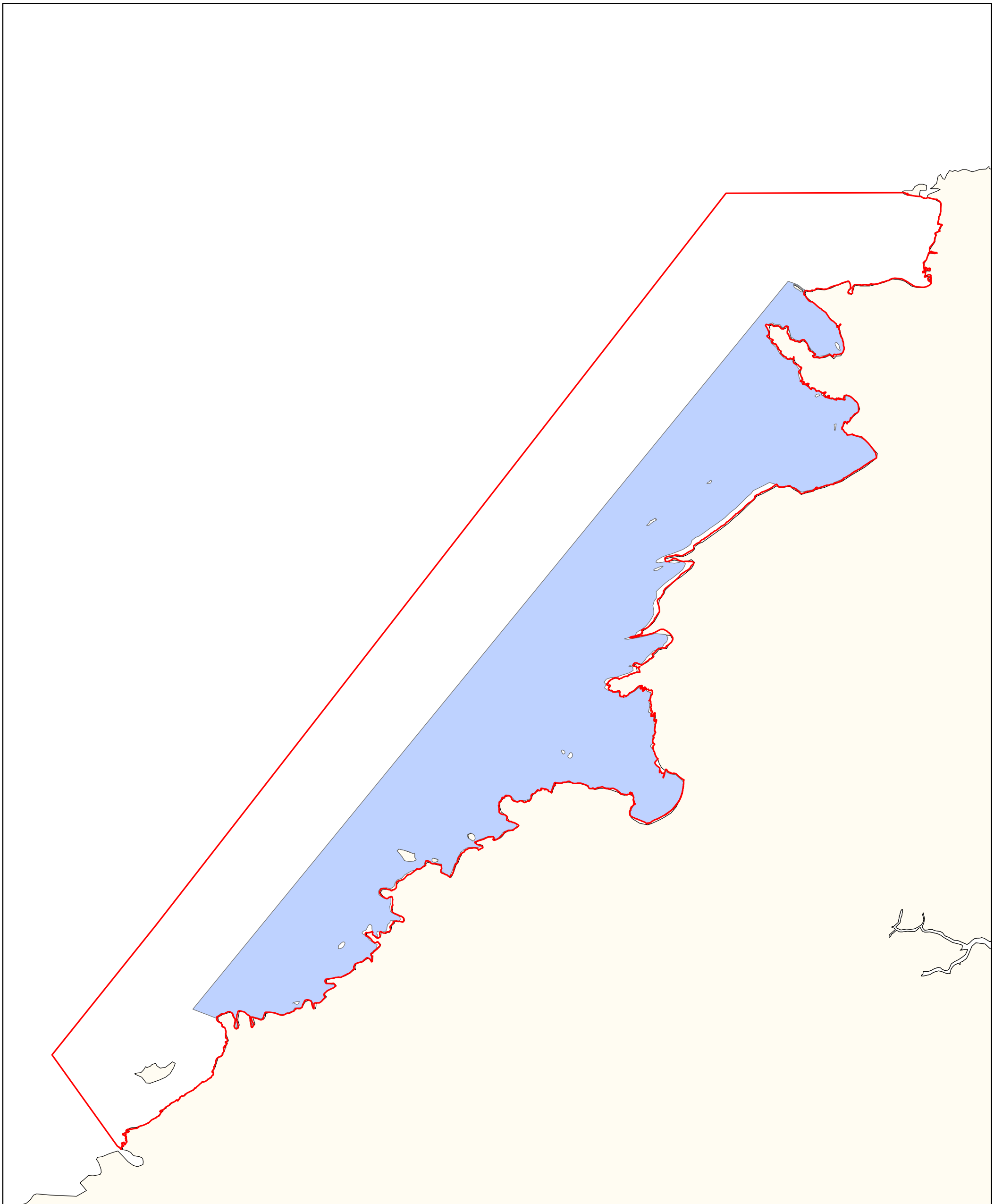
Map Version 1
Date: July 2014



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Department of Arts, Heritage and the Gaeltacht

MAP 3: KILKEE REEFS SAC CONSERVATION OBJECTIVES LARGE SHALLOW INLETS AND BAYS

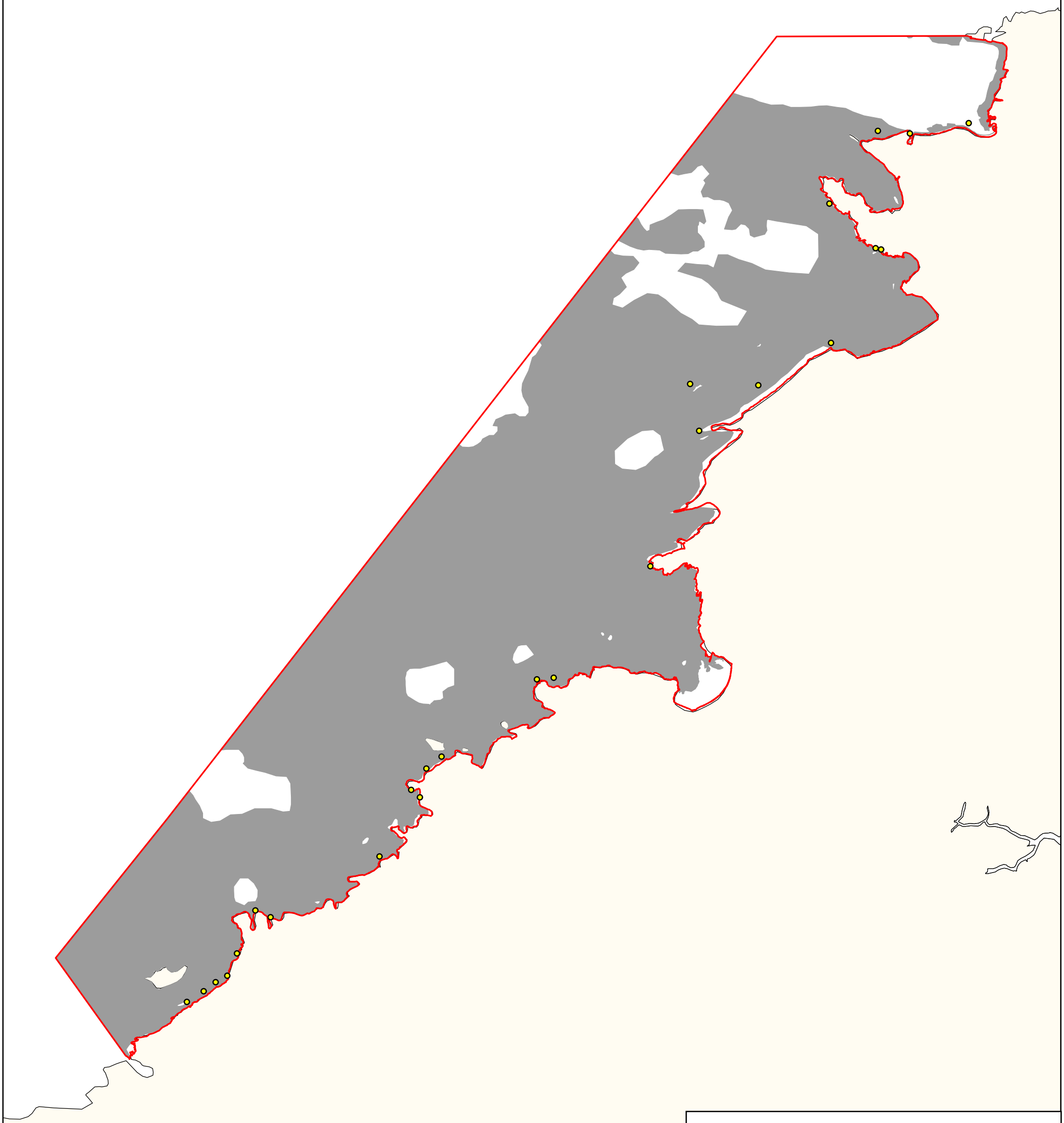
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 002264; version 3.01. CO. CLARE

0 0.5 1 1.5 2 km

N

Map Version 1
Date: July 2014



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Department of Arts, Heritage and the Gaeltacht

MAP 4: KILKEE REEFS SAC CONSERVATION OBJECTIVES REEFS & SEA CAVES

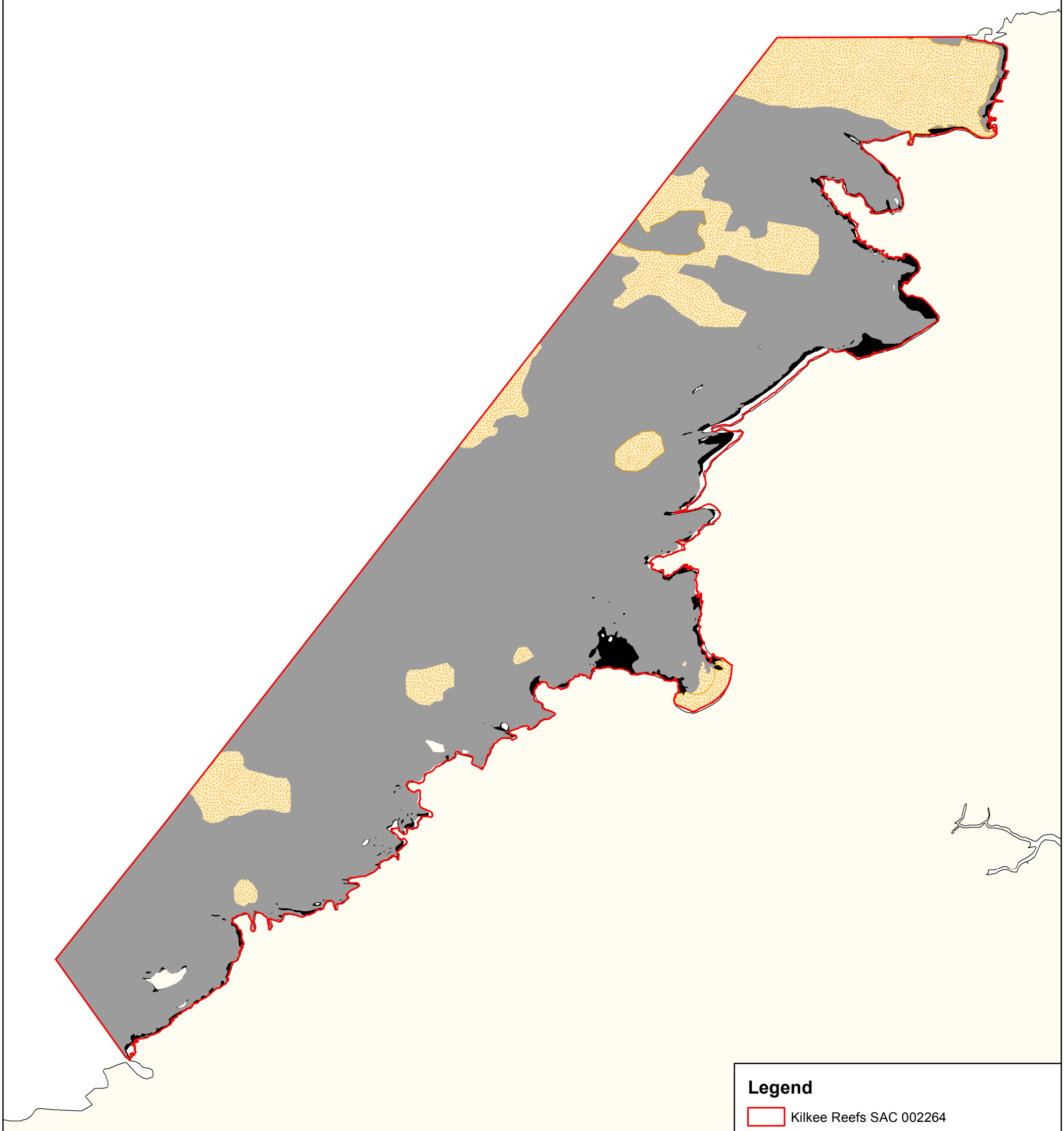
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 002264; version 3.01. CO. CLARE

0 0.5 1 1.5 2 km

N

Map Version 1
Date: July 2014



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

MAP 5: KILKEE REEFS SAC CONSERVATION OBJECTIVES MARINE COMMUNITY TYPES

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

SITE CODE:
SAC 002264; version 3.01. CO. CLARE

0 0.5 1 1.5 2 km

N

Map Version 1
Date: July 2014

ISSN 2009-4086

National Parks and Wildlife Service

Conservation Objectives Series

Tullaher Lough and Bog SAC 002343

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

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

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

7 Ely Place, Dublin 2, Ireland.

Web: www.npws.ie
E-mail: nature.conservation@ahg.gov.ie

Citation:

NPWS (2016) Conservation Objectives: Tullaher Lough and Bog SAC 002343. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

Series Editor: Rebecca Jeffrey
ISSN 2009-4086

Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

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- the 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***

002343	Tullaher Lough and Bog SAC
7110	Active raised bogs*
7120	Degraded raised bogs still capable of natural regeneration
7140	Transition mires and quaking bogs
7150	Depressions on peat substrates of the Rhynchosporion

Supporting documents, relevant reports & publications

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

NPWS Documents

Year :	2000
Title :	Raised bog restoration project. A continuation of the investigation into the conservation and restoration of selected raised bog sites in Ireland
Author :	Derwin, J.; Mac Gowan, F.
Series :	Unpublished report to Duchas, the Heritage Service
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 :	2016
Title :	Tullaher Lough and Bog SAC (site code: 2343) Conservation objectives supporting document-raised bog habitats V1
Author :	NPWS
Series :	Conservation objectives supporting document

Other References

Year :	1991
Title :	Tullaher Lough & Bog wetland heritage zone. Feasibility study
Author :	Foss, P.; O'Connell, C.
Series :	Report on behalf the Irish Peatland Conservation Council
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 :	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

Spatial data sources

Year :	2014
Title :	Scientific Basis for Raised Bog Conservation in Ireland
GIS Operations :	RBSB13_SACs_ARB_DRB dataset, RBSB13_SACs_2012_HB dataset, RBSB13_SACs_DrainagePatterns_5k dataset and RBSB13_SAC_LIDAR_DTMs dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	Potential 7110; digital elevation model; drainage patterns (maps 2 and 4)
Year :	Digitised 2006
Title :	Raised Bog Restoration Project 1999
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 3)
Year :	2016
Title :	Internal NPWS data
GIS Operations :	Potential habitat distribution created from spatial references supplied by NPWS expert. Expert opinion used as necessary to resolve any issues arising
Used For :	7140 (map 5)

7110 Active raised bogs

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

Attribute	Measure	Target	Notes
Habitat area	Hectares	Restore area of active raised bog to 13.2ha, subject to natural processes	Active Raised Bog (ARB) habitat is estimated to have been 6.8ha in extent in 1999 when the site was last surveyed (Derwin and MacGowan, 2000). Area of Degraded Raised Bog (DRB) on the High Bog (HB) has been modelled as 8.0ha. See map 2. It is estimated that 4.0ha of this area is potentially restorable to ARB by drain blocking. The total potential ARB on the HB is therefore estimated to be 10.8ha. Eco-hydrological assessments of the cutover estimates that an additional 2.4ha of bog forming habitats could be restored. The long term target for ARB is therefore 13.2ha. See raised bog supporting document for further details on this and following attributes
Habitat distribution	Occurrence	Restore the distribution and variability of active raised bog across the SAC. See map 3 for distribution in 1999	ARB habitat at Tullaher Lough and Bog is sub-central ecotope only, and occurs to the north and south of the central bog. DRB occurs adjacent to the central areas , which will require restoration measures. There is also potential for ARB restoration on cutover areas of the bog (see area target above)
High bog area	Hectares	No decline in extent of high bog necessary to support the development and maintenance of active raised bog. See map 2	The area of high bog within Tullaher Bog in 2012 (latest figure available) was 19.6ha (DAHG 2014)
Hydrological regime: water levels	Centimetres	Restore appropriate water levels throughout the site	For ARB, mean water level needs to be near or above the surface of the bog lawns for most of the year. Seasonal fluctuations should not exceed 20cm, and should only be 10cm below the surface, except for very short periods of time
Hydrological regime: flow patterns	Flow direction; slope	Restore, where possible, appropriate high bog topography, flow directions and slopes. See map 4 for current situation	ARB depends on mean water levels being near or above the surface of bog lawns for most of the year. Long and gentle slopes are the most favourable to achieve these conditions. Changes to flow directions due to subsidence of bogs can radically change water regimes and cause drying out of high quality ARB
Transitional areas between high bog and adjacent mineral soils (including cutover areas)	Hectares; distribution	Restore adequate transitional areas to support/protect active raised bog and the services it provides	No semi-natural margins exist along the edges of Tullaher Bog. Eco-hydrological assessments have evaluated the potential for ARB restoration on cutover areas (see note for habitat area attribute above)
Vegetation quality: central ecotope, active flush, soaks, bog woodland	Hectares	Restore 6.6ha of central ecotope/active flush/soaks/bog woodland as appropriate	At least 50% of ARB habitat should be high quality (i.e. central ecotope, active flush, soaks, bog woodland). Target area of active raised bog for the site has been set at 13.2ha (see area target above)
Vegetation quality: microtopograph-ical features	Hectares	Restore adequate cover of high quality microtopographical features	Hummock and hollow microtopography is moderately well developed on Tullaher Lough and Bog
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. *Sphagnum* cover and distribution also varies naturally across a site

Typical ARB species: flora	Occurrence	Restore, where appropriate, typical active raised bog flora	Typical flora species include widespread species, as well as those with more restricted distributions but typical of the habitat's subtypes or geographical range
Typical ARB species: fauna	Occurrence	Restore, where appropriate, typical active raised bog fauna	Typical fauna species include widespread species, as well as those with more restricted distributions but typical of the habitat's subtypes or geographical range
Elements of local distinctiveness	Occurrence	Maintain features of local distinctiveness, subject to natural processes	Tullaher Bog is at the south-western limit of raised bog distribution in Ireland. The SAC, including the bog, supports a small flock of wintering Greenland white-fronted geese (*Anser albifrons flavirostris*)
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	Native negative indicator species that suggest drying out include abundant bog asphodel (*Narthecium ossifragum*), deergrass (*Trichophorum germanicum*) and harestail 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. denticulatum*)). Indicators of frequent burning events include 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	Most common non-native invasive species on raised bogs include lodgepole pine (*Pinus contorta*), rhododendron (*Rhododendron ponticum*) and pitcherplant (*Sarracenia purpurea*)
Air quality: nitrogen deposition	kg N/ha/year	Air quality surrounding bog close to natural reference conditions. The total N deposition should not exceed 5kg N/ha/yr	Change in air quality can result from fertiliser drift; adjacent quarry activities; or other atmospheric inputs. The critical load range for ombrotrophic bogs has been set as between 5 and 10kg N/ha/yr (Bobbink and Hettelingh, 2011). The latest N deposition figures for the area around Tullaher Lough and Bog suggests that the current level is approximately 9.5kg N/ha/yr (Henry and Aherne, 2014)
Water quality	Hydrochemical measure	Water quality on the high bog and 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 and lagg zone 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 Tullaher Lough and Bog SAC

Attribute	Measure	Target	Notes

7140 Transition mires and quaking bogs

To maintain the favourable conservation condition of Transition mires and quaking bogs in Tullaher Lough and Bog SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Transition mires and quaking bogs has not been mapped in detail for this SAC and thus the total area of the qualifying habitat is unknown. However, previous surveys (Foss and O'Connell, 1991; NPWS internal files) indicate that the habitat is mostly confined to an area in the south of the SAC, which is part of a mosaic of habitats (including some open water)within a shallow basin that lies c.500m west of Tullaher Lough (and locally known as Letts Lough)
Habitat distribution	Occurrence	Maintain the habitat within the shallow topographic basin in the south of the SAC	See above note and map 5 for indicative distribution. NB other areas of this habitat may occur in the SAC
Hydrological regime: water levels	Centimetres	Restore appropriate water levels throughout the site	The transition mire and quaking bog habitat in this SAC requires shallow water levels to be maintained in the basin where it occurs
Hydrological regime: flow patterns	Flow direction; slope	Maintain appropriate topography and water movement regime	The surface topography and water levels of areas of cutover bog to the north of the transition mire are similar to those of the basin in which it occurs. It is important that this situation is maintained in order to ensure the hydrological integrity of the Annex I habitat
Vegetation quality: plant community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	There is a variety of vegetation communities associated with the habitat, from open water to higher, hummocky vegetation (Foss and O'Connell, 1991); however, it has not been surveyed in detail
Vegetation quality: microtopograph-ical features	Hectares	Maintain high quality microtopographical features	Hummocky microtopographical features are part of the transition mire habitat complex, which also includes pool features closer to the main body of open water
Vegetation quality: bog moss and other moss species	Percentage cover	Maintain adequate cover of bog moss (*Sphagnum*) and other moss species	High moss cover is expected in this habitat. Foss and O'Connell (1991) list moss species, but cover has not been mapped in detail
Vegetation composition: typical species	Occurrence	Maintain typical flora	Typical species are listed in Foss and O'Connell (1991) and NPWS internal files
Elements of local distinctiveness	Occurrence	Maintain features of local distinctiveness, subject to natural processes	The transitions from open water to extensive transition mire communities are the main features of local distinctiveness. Both Foss and O'Connell (1991) and NPWS internal files note the exceptional abundance of cranberry (*Vaccinium oxycoccus*), which covers the *Sphagnum*-dominated hummocks. This feature was also noted on a site visit in October 2016 (Maurice Eakin, pers. comm.)
Negative physical indicators	Percentage cover	Negative physical features absent or insignificant	Negative physical indicators include: algae-dominated pools, evidence of burning, signs of desiccation and moribund *Sphagnum*
Vegetation composition: native negative indicator species	Percentage cover	Native negative indicator species at insignificant levels	Native negative indicator species that could suggest drying out include ling (*Calluna vulgaris*) and birch (*Betula pubescens*)
Vegetation composition: non-native invasive species	Percentage cover	Non-native invasive species at insignificant levels and not more than 1% cover	The most likely non-native invasive species that could encroach are conifers (colonising from plantation to the south of the SAC) and rhododendron (*Rhododendron ponticum*)

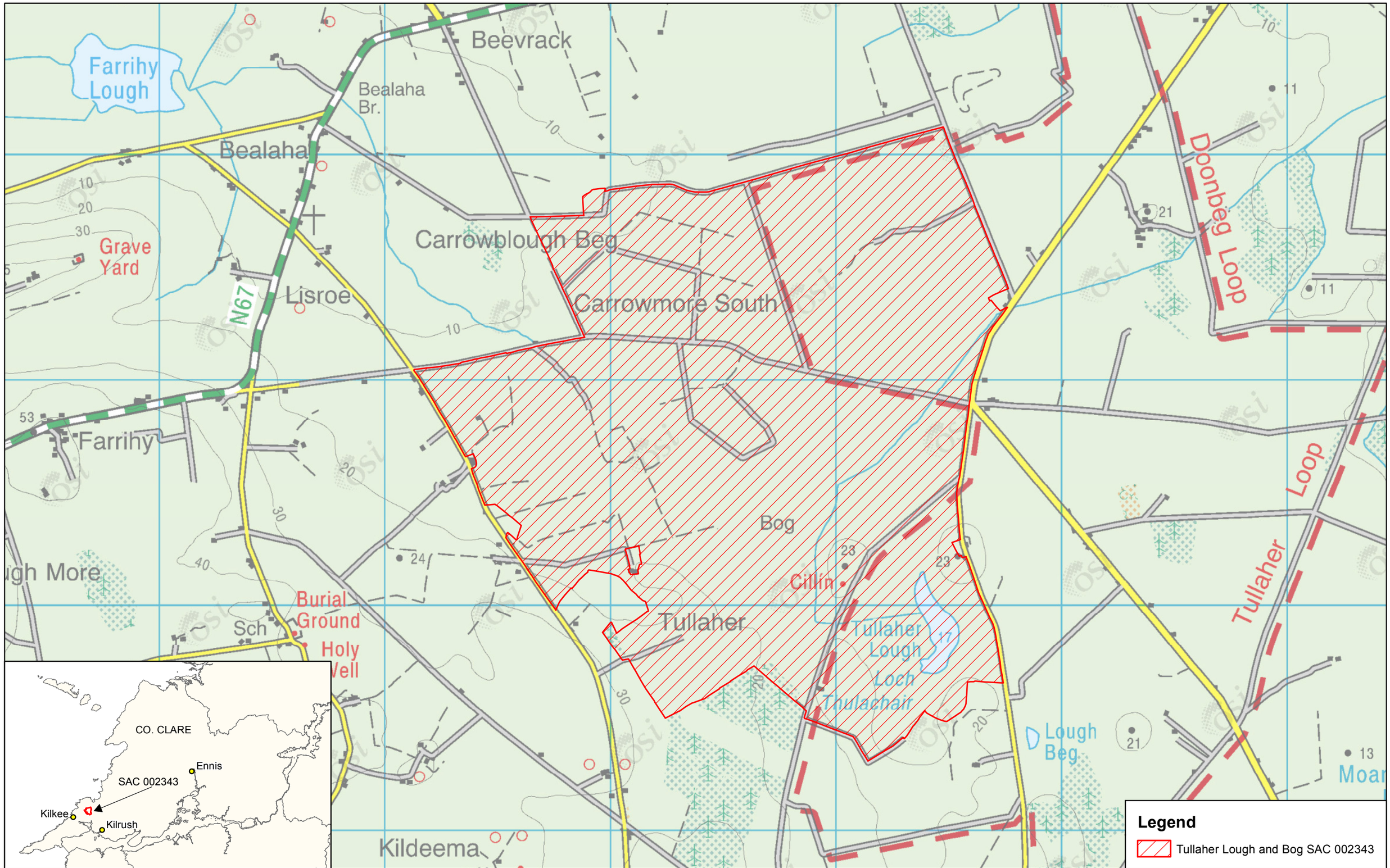
Air quality: nitrogen deposition	kg N/ha/year	Air quality surrounding transition mire habitat close to natural reference conditions. The total N deposition should not exceed 5kg N/ha/yr	Change in air quality can result from fertiliser drift; adjacent quarry activities; or other atmospheric inputs. The critical load range for ombrotrophic bogs has been set as between 5 and 10kg N/ha/yr (Bobbink and Hettelingh, 2011). The latest N deposition figures for the area around Tullaher Lough and Bog suggests that the current level is approximately 9.5kg N/ha/yr (Henry and Aherne, 2014)
Water quality	Hydrochemical measure	Water quality in the basin close to natural reference conditions	The surface conditions necessary to maintain transition mire range from acidic to slightly base-rich. The vegetation normally has intimate mixtures of species considered to be acidophile and others thought of as calciphile or basophile. In other cases these intermediate properties may reflect the actual process of succession, as peat accumulates in groundwater-fed fen or open water to produce rainwater-fed bog isolated from groundwater influence. The most obvious source of enrichment is off the higher mineral ridges that surround the basin, including the afforested area to the south

Conservation Objectives for : Tullaher Lough and Bog SAC [002343]

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 Tullaher Lough and Bog SAC

Attribute	Measure	Target	Notes



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MAP 1:
TULLAHER LOUGH BOG SAC
CONSERVATION OBJECTIVES
SAC DESIGNATION

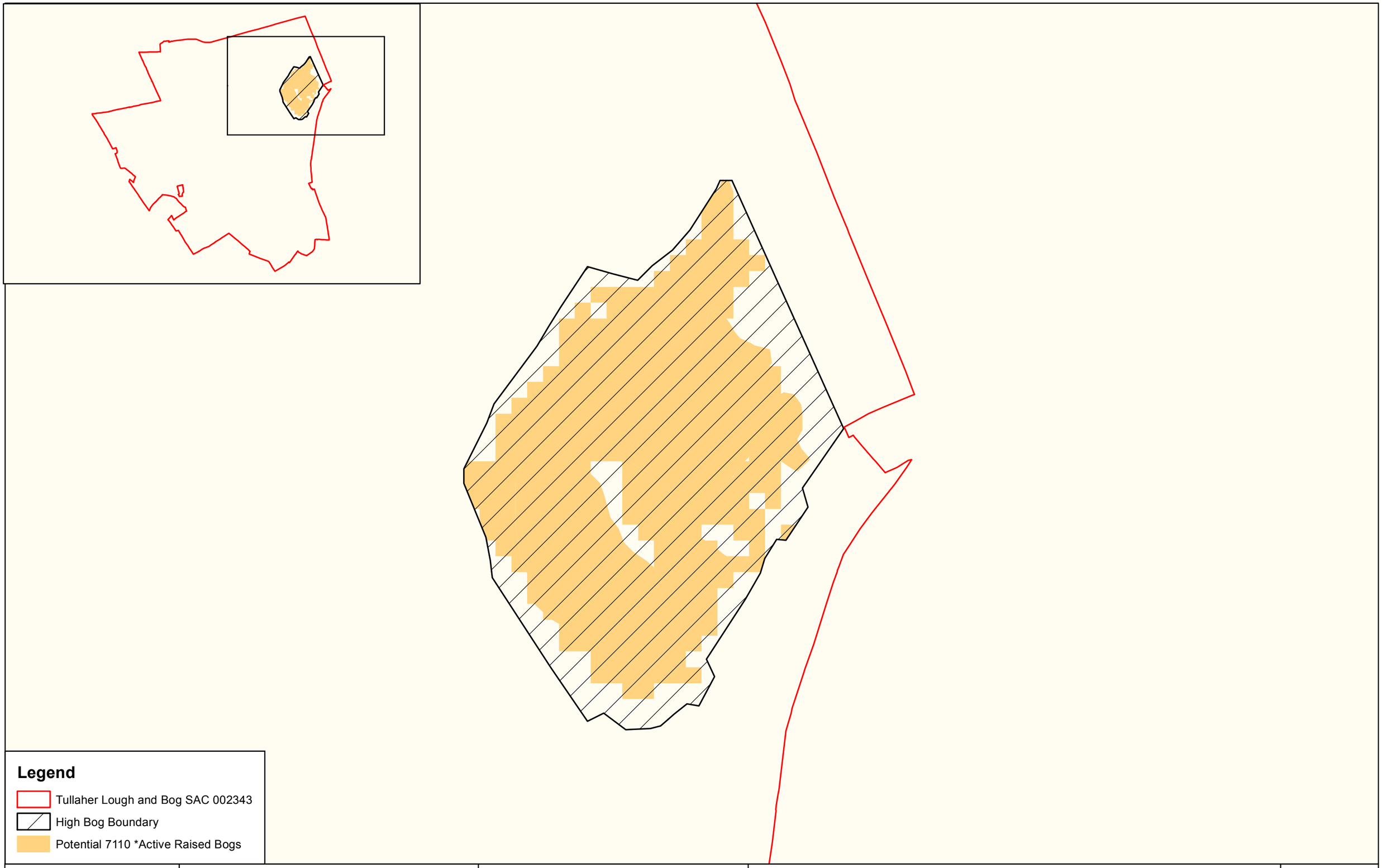
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 002343; version 3.01. Co. Clare

0 250 500 750 1,000 m

N

Map Version 1
Date: July2015



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MAP 2:
TULLAHER LOUGH AND BOG SAC
CONSERVATION OBJECTIVES
EXTENT OF POTENTIAL
ACTIVE RAISED BOGS

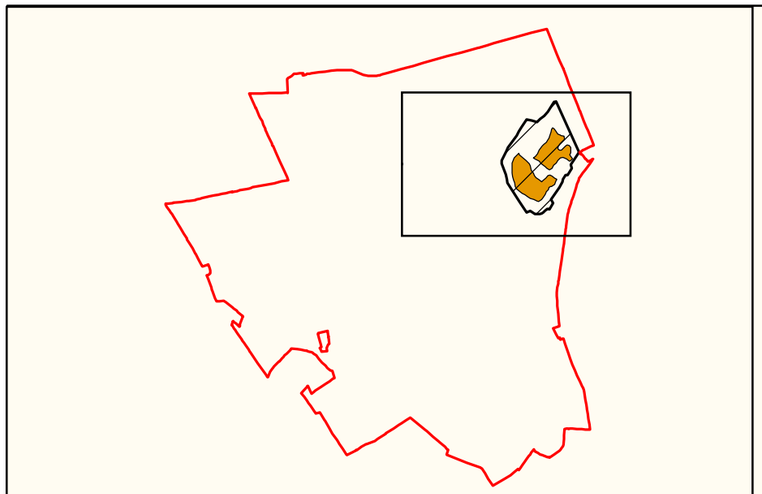
Map to be read in conjunction with the NPWS Conservation Objectives Document.

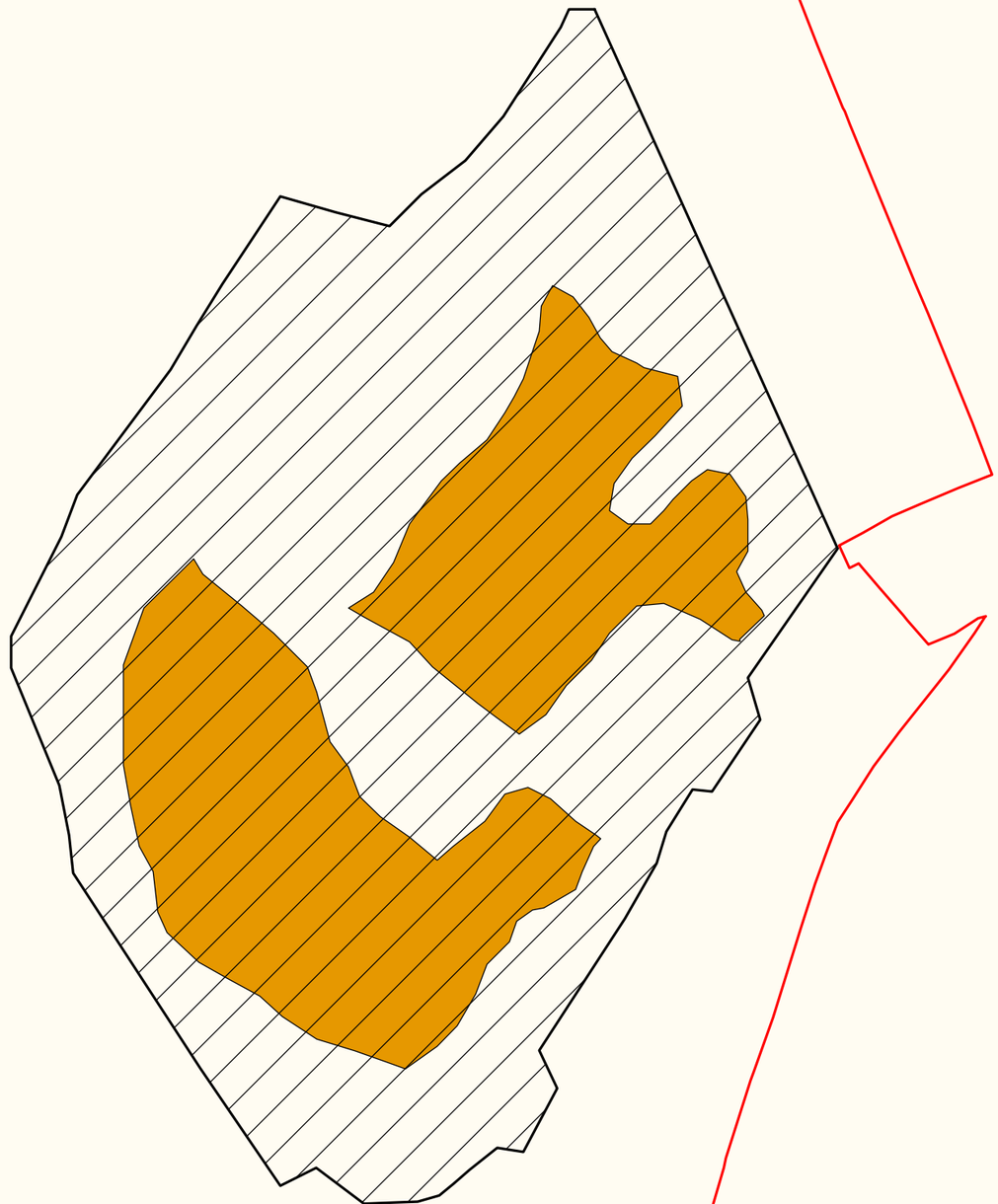
SITE CODE:
SAC 002343; version 3.01. Co. Clare

0 70 140 210 280 m

N

Map Version 1
Date: Nov 2016





Legend

- Tullaher Lough and Bog SAC 002343
- High Bog Boundary

Active Raised Bogs Ecotopes

- Sub-central ecotope

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MAP 3:
TULLAHER LOUGH AND BOG SAC
CONSERVATION OBJECTIVES
ACTIVE RAISED BOGS
ECOTOPES

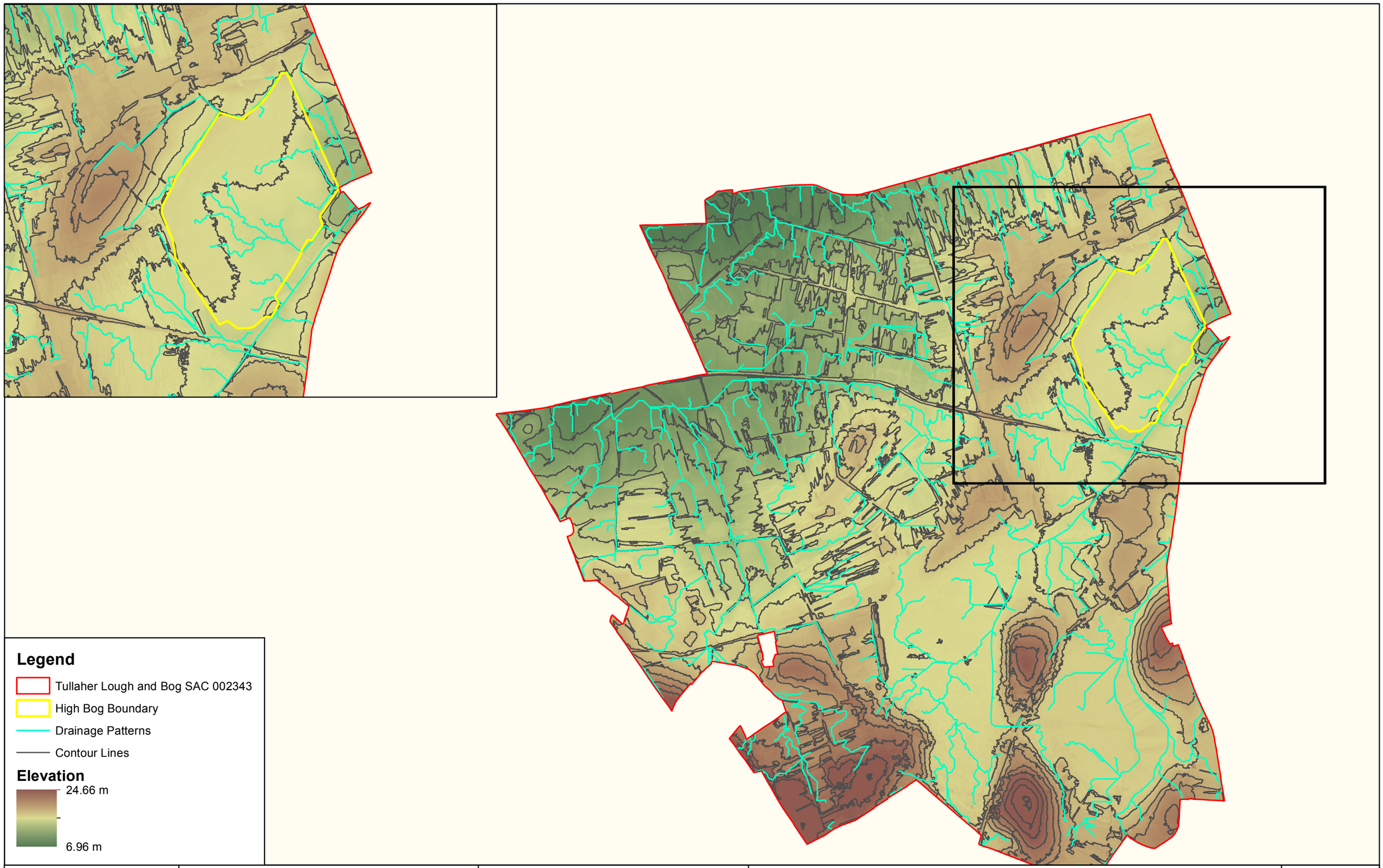
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 002343; version 3.01. Co. Clare

0 50 100 150 200 m

N

Map Version 1
Date: Nov 2016



Legend

- Tullaher Lough and Bog SAC 002343
- High Bog Boundary
- Drainage Patterns
- Contour Lines

Elevation

24.66 m

6.96 m

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MAP 4:
TULLAHER LOUGH AND BOG SAC
CONSERVATION OBJECTIVES
RAISED BOG
DIGITAL ELEVATION MODEL
& DRAINAGE PATTERNS

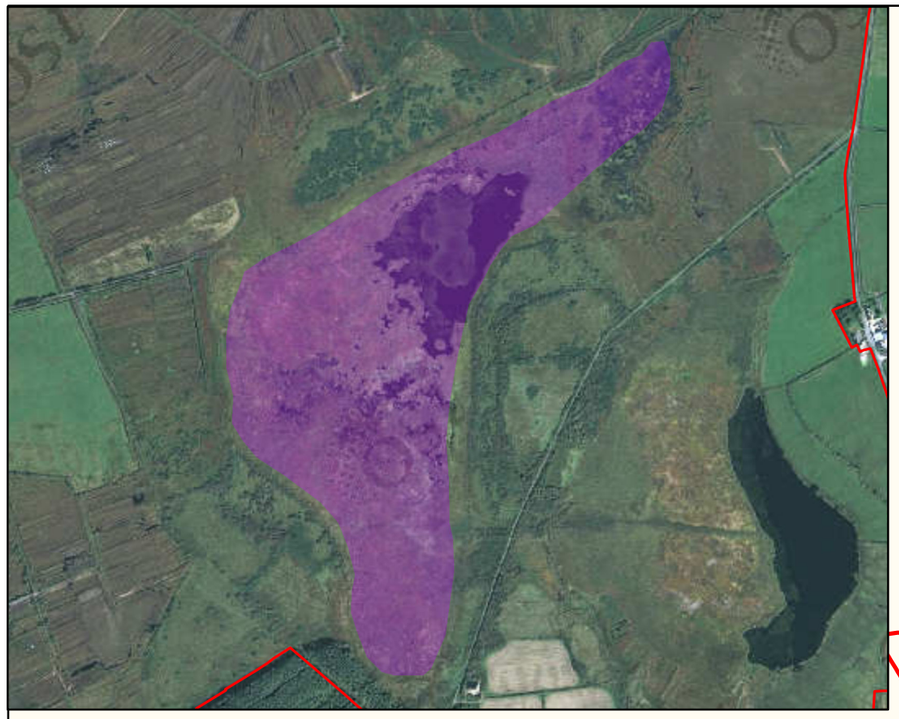
Map to be read in conjunction with the NPWS Conservation Objectives Document.

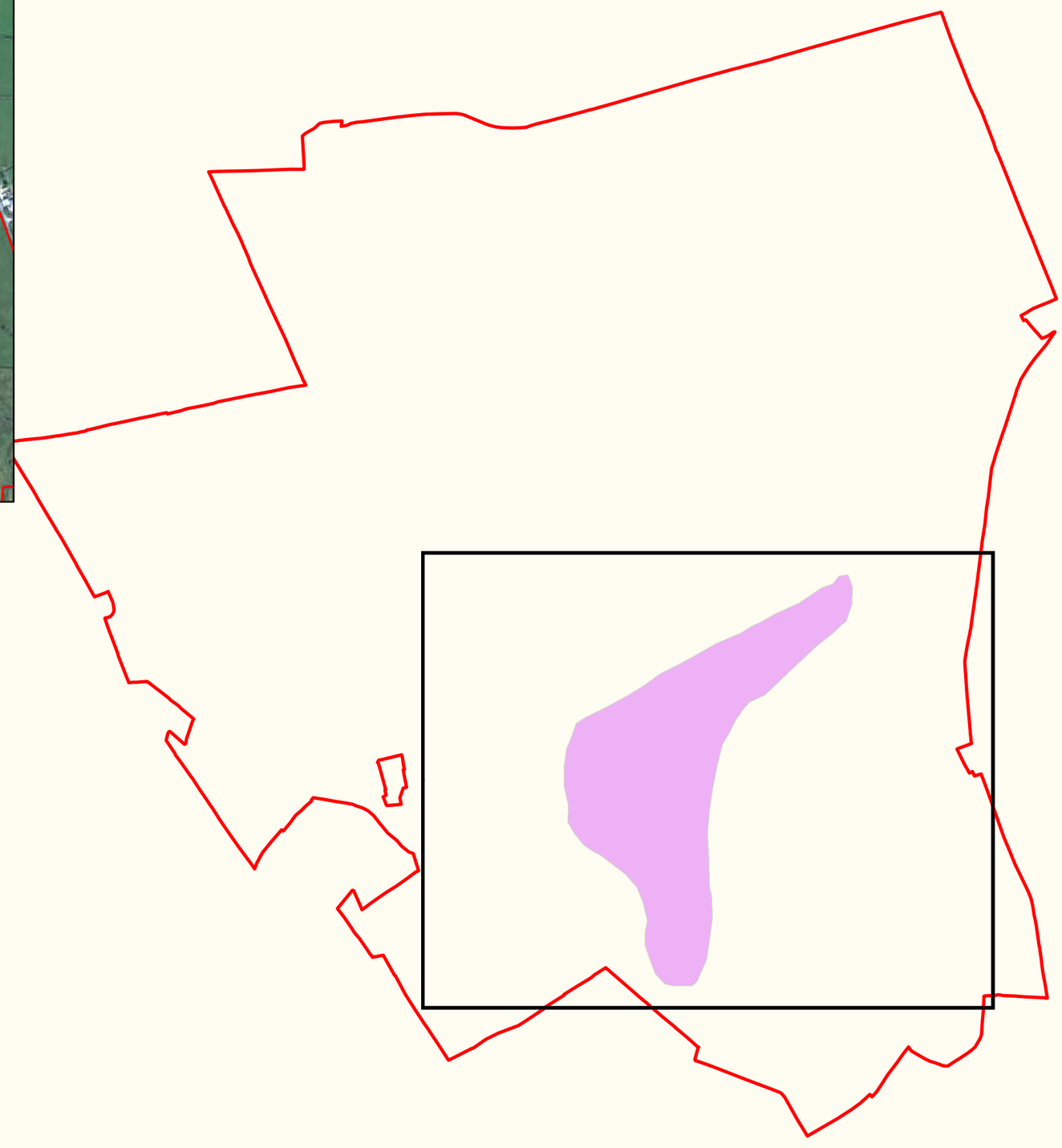
SITE CODE:
SAC 002343; version 3.01. Co. Clare

0 200 400 600 800 m

N

Map Version 1
Date: Nov 2016





Legend

Tullaher Lough and Bog SAC 002343

Indicative 7140 Indicative transition mires and quaking bogs

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MAP 5:
TULLAHER LOUGH AND BOG SAC
CONSERVATION OBJECTIVES
INDICATIVE TRANSITION MIRE
AND QUAKING BOG HABITAT

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

SITE CODE:
SAC 002343; version 3.01. Co. Clare

0 200 400 600 800 m

N

Map Version 1
Date: Nov 2016

ISSN 2009-4086

National Parks and Wildlife Service

Conservation Objectives Series

River Shannon and River Fergus Estuaries SPA 004077

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

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Citation:
NPWS (2012) Conservation Objectives: River Shannon and River Fergus Estuaries SPA 004077. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

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

Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

Qualifying Interests

**** indicates a priority habitat under the Habitats Directive***

004077 River Shannon and River Fergus Estuaries SPA

A017	Cormorant *Phalacrocorax carbo*	breeding + wintering
A038	Whooper Swan *Cygnus cygnus*	wintering
A046	Light-bellied Brent Goose *Branta bernicla hrota*	wintering
A048	Shelduck *Tadorna tadorna*	wintering
A050	Wigeon *Anas penelope*	wintering
A052	Teal *Anas crecca*	wintering
A054	Pintail *Anas acuta*	wintering
A056	Shoveler *Anas clypeata*	wintering
A062	Scaup *Aythya marila*	wintering
A137	Ringed Plover *Charadrius hiaticula*	wintering
A140	Golden Plover *Pluvialis apricaria*	wintering
A141	Grey Plover *Pluvialis squatarola*	wintering
A142	Lapwing *Vanellus vanellus*	wintering
A143	Knot *Calidris canutus*	wintering
A149	Dunlin *Calidris alpina*	wintering
A156	Black-tailed Godwit *Limosa limosa*	wintering
A157	Bar-tailed Godwit *Limosa lapponica*	wintering
A160	Curlew *Numenius arquata*	wintering
A162	Redshank *Tringa totanus*	wintering
A164	Greenshank *Tringa nebularia*	wintering
A179	Black-headed Gull *Chroicocephalus ridibundus*	wintering
A999	Wetlands	

Please note that this SPA overlaps with Lower River Shannon SAC (002165). See map 2. The conservation objectives for this site should be used in conjunction with those for the overlapping site as appropriate.

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

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

Title:	BirdLife International Seabird Ecology and Foraging Range Database
Year:	2012
Author:	BirdLife International
Series:	http://seabird.wikispaces.com
Title:	Seabird Monitoring Programme (SMP) Database
Year:	2012
Author:	JNCC
Series:	http://jncc.defra.gov.uk/smp/Default.aspx
Title:	River Shannon and River Fergus Estuaries SPA (004077). Conservation objectives supporting document. [Version 1]
Year:	2012
Author:	NPWS
Series:	Unpublished Report to NPWS
Title:	Seabird Populations of Britain and Ireland
Year:	2004
Author:	Mitchell, P.I.; Newton, S.F.; Ratcliffe, N.; Dunn, T.E.
Series:	Poyser, London
Title:	Seabird monitoring handbook for Britain and Ireland: a compilation of methods for survey and monitoring of breeding seabirds.
Year:	1995
Author:	Walsh, P.; Halley, D.J.; Harris, M.P.; del Nevo, A.; Sim, I.M.W.; Tasker, M.L.
Series:	JNCC, Peterborough

A017 Cormorant *Phalacrocorax carbo*

To maintain the favourable conservation condition of Cormorant in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Breeding population abundance: apparently occupied nests (AONs)	Number	No significant decline	This attribute applies to breeding cormorant. Measure based on standard survey methods (see Walsh et al., 1995). Mitchell et al. (2004) provides summary population information. The Seabird Monitoring Programme (SMP) online database (JNCC, 2012) provides population data for this species
Productivity rate	Mean number	No significant decline	This attribute applies to breeding cormorant. Measure based on standard survey methods (see Walsh et al., 1995). The Seabird Monitoring Programme (SMP) online database (JNCC, 2012) provides population data for this species
Distribution: breeding colonies	Number; location; area (hectares)	No significant decline	This attribute applies to breeding cormorant. Cormorant colonies are usually sited on flat or rocky islets or sea stack tops, less often on cliffs but they can also nest in trees (Walsh et al., 1995)
Prey biomass available	Kilogrammes	No significant decline	This attribute applies to breeding cormorant. Key prey items: fish (mostly benthic), some crustaceans. Key habitats: populations use sandy areas, rocky and vegetated substrate. Foraging range: max. 50km, mean max. 31.67km, mean 8.46km (BirdLife International Seabird Database (Birdlife International, 2012))
Barriers to connectivity	Number; location; shape; area (hectares)	No significant increase	This attribute applies to breeding cormorant. Seabird species can make extensive use of the marine waters adjacent to their breeding colonies. Foraging range: max. 50km, mean max. 31.67km, mean 8.46km (BirdLife International Seabird Database (Birdlife International, 2012))
Disturbance at the breeding site	Level of impact	Human activities should occur at levels that do not adversely affect the breeding cormorant population	This attribute applies to breeding cormorant. Cormorant colonies are usually sited on flat or rocky islets or sea stack tops, less often on cliffs but they can also nest in trees (Walsh et al., 1995)
Population trend	Percentage change	Long term population trend stable or increasing	This attribute applies to non-breeding cormorant. Waterbird population trends are presented in part four of the conservation objectives supporting document

A017 Cormorant *Phalacrocorax carbo*

To maintain the favourable conservation condition of Cormorant in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by cormorant other than that occurring from natural patterns of variation	This attribute applies to non-breeding cormorant. As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A038 Whooper Swan *Cygnus cygnus*

To maintain the favourable conservation condition of Whooper Swan in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by whooper swan other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A046 Light-bellied Brent Goose *Branta bernicla hrota*

To maintain the favourable conservation condition of Light-bellied Brent Goose in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by light-bellied brent goose other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A048 Shelduck *Tadorna tadorna*

To maintain the favourable conservation condition of Shelduck in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by shelduck other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A050 Wigeon *Anas penelope*

To maintain the favourable conservation condition of Wigeon in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by wigeon other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A052 Teal *Anas crecca*

To maintain the favourable conservation condition of Teal in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by teal other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A054 Pintail *Anas acuta*

To maintain the favourable conservation condition of Pintail in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by pintail other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A056 Shoveler *Anas clypeata*

To maintain the favourable conservation condition of Shoveler in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by shoveler other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A062 Scaup *Aythya marila*

To maintain the favourable conservation condition of Scaup in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by scaup other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A137 Ringed Plover *Charadrius hiaticula*

To maintain the favourable conservation condition of Ringed Plover in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by ringed plover other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A140 Golden Plover *Pluvialis apricaria*

To maintain the favourable conservation condition of Golden Plover in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by golden plover other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A141 Grey Plover *Pluvialis squatarola*

To maintain the favourable conservation condition of Grey Plover in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by grey plover other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A142 Lapwing *Vanellus vanellus*

To maintain the favourable conservation condition of Lapwing in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by lapwing other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A143 Knot *Calidris canutus*

To maintain the favourable conservation condition of Knot in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by knot other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A149 Dunlin *Calidris alpina*

To maintain the favourable conservation condition of Dunlin in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by dunlin other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A156 Black-tailed Godwit *Limosa limosa*

To maintain the favourable conservation condition of Black-tailed Godwit in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by black-tailed godwit other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A157 Bar-tailed Godwit *Limosa lapponica*

To maintain the favourable conservation condition of Bar-tailed Godwit in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by bar-tailed godwit other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A160 Curlew *Numenius arquata*

To maintain the favourable conservation condition of Curlew in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by curlew other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A162 Redshank *Tringa totanus*

To maintain the favourable conservation condition of Redshank in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by redshank other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A164 Greenshank *Tringa nebularia*

To maintain the favourable conservation condition of Greenshank in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by greenshank other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A179 Black-headed Gull *Chroicocephalus ridibundus*

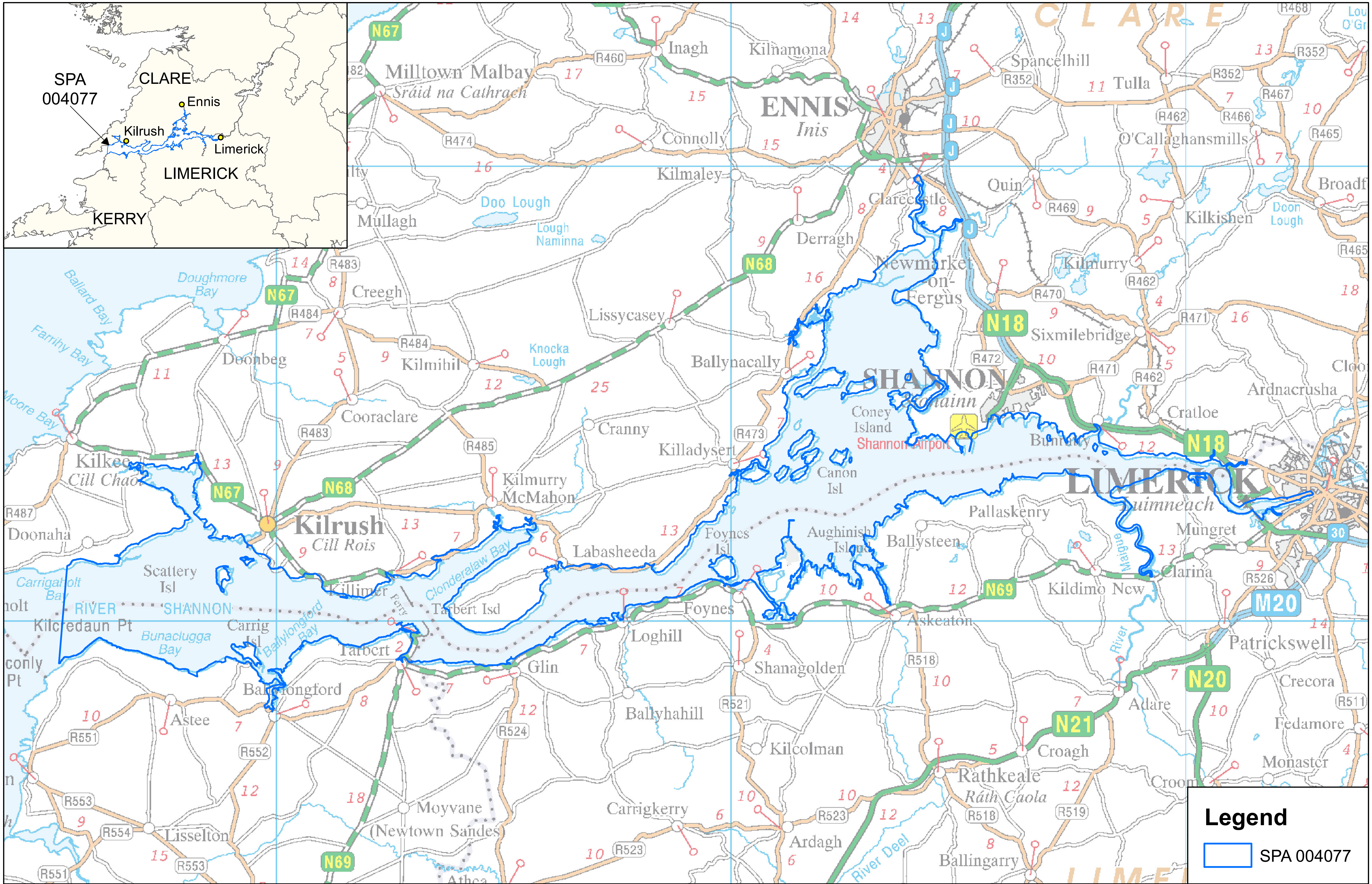
To maintain the favourable conservation condition of Black-headed Gull in the River Shannon and River Fergus Estuaries SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by black-headed gull other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2010/2011 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A999 Wetlands

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

Attribute	Measure	Target	Notes
Wetland habitat area	hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation	The wetland habitat area was estimated as 32,261ha using OSi data and relevant orthophotographs. For further information see part three of the conservation objectives supporting document


SPA 004077
CLARE
Ennis
Kilrush
Limerick
LIMERICK
KERRY
Legend
SPA 004077
ENNIS
Inis
SHANNON
LIMERICK
Luimneach
Kilrush
Cill Rois
Milltown Malbay
Sráid na Cathrach
Kilkee
Doonbeg
Creegh
Cooraclare
Kilmihil
Kilmurry McMahon
Labasheeda
Killadysert
Ballynacally
Lissycasey
Newmarket-on-Fergus
Clarecastle
Shannon Airport
Coney Island
Canon Isl
Foynes Isl
Aughinish Island
Scattery Isl
Carrig Isl
Tarbert Isd
Tarbert
Killimer
Glin
Loghill
Foynes
Askeaton
Ballylongford
Kilcredaun Pt
RIVER SHANNON
Clonderalaw Bay
Ballylongford Bay
Bunaclugga Bay
Carrigaholt Bay
Doughmore Bay
Ballard Bay
Farrihy Bay
Moore Bay
Pallaskenry
Ballysteen
Mungret
Clarina
Kildimo New
Patrickswell
Adare
Croagh
Rathkeale
Ráth Caola
Shanagolden
Ballyhahill
Kilcolman
Carrigkerry
Ardagh
Ballingarry
Moyvane
(Newtown Sandes)
Lisselton
Astee
Bunratty
Cratloe
Sixmilebridge
Ardnacrusha
Quin
Tulla
Spancelhill
Kilmurry
Kilkishen
O'Callaghansmills
Inagh
Kilnamona
Connolly
Kilmaley
Derragh
Mullagh
Doo Lough
Lough Naminna
Knocka Lough
Cranny
Doonaha
River Deel
River Maigue
N18
N20
N21
N67
N68
N69
M20

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Department of Arts, Heritage and the Gaeltacht

MAP 1:
RIVER SHANNON AND RIVER FERGUS ESTUARIES
CONSERVATION OBJECTIVES
SPA DESIGNATION

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

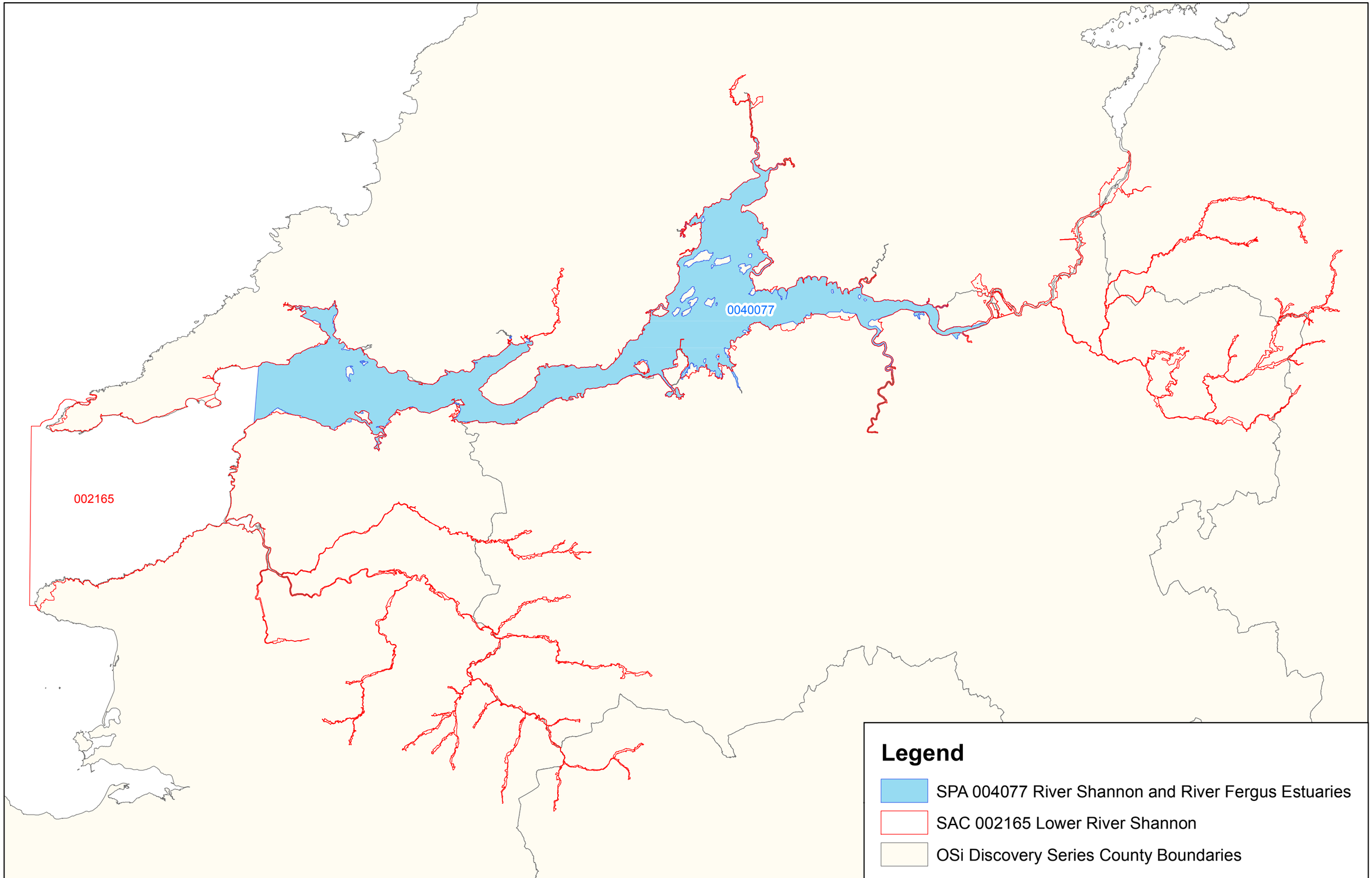
0 2 4 6 8 10 km

N

Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material by permission of the Government (Permit number EN 0059208).

Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. EN 0059208)

Site Code
SPA 004077
Version: CL 1.03 / LI 1.03 / KE 1.02
Map Version 1
Date: May 2012



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MAP 2:
RIVER SHANNON AND RIVER FERGUS ESTUARIES
CONSERVATION OBJECTIVES
ADJOINING / OVERLAPPING
DESIGNATIONS

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

0 5 10 15 20 km

N

Site Code
SPA 004077
Version: CL 1.03 / LI 1.03 / KE 1.02
Map Version 1
Date: May 2012

Conservation objectives for Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA [004161]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

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

Bird Code	**Common Name**	**Scientific Name**
A082	Hen Harrier	*Circus cyaneus*

Citation: *NPWS (2020) Conservation objectives for Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA [004161]. Generic Version 7.0. Department of Culture, Heritage and the Gaeltacht.*

ISSN 2009-4086

National Parks and Wildlife Service

Conservation Objectives Series

Mid-Clare Coast SPA 004182

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

National Parks and Wildlife Service,
Department of Arts, Heritage and the Gaeltacht,

7 Ely Place, Dublin 2, Ireland.

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E-mail: nature.conservation@ahg.gov.ie

Citation:

NPWS (2014) Conservation Objectives: Mid-Clare Coast SPA 004182. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Series Editor: Rebecca Jeffrey
ISSN 2009-4086

Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

Qualifying Interests

**** indicates a priority habitat under the Habitats Directive***

004182	Mid-Clare Coast SPA
A017	Cormorant *Phalacrocorax carbo*
A045	Barnacle Goose *Branta leucopsis*
A137	Ringed Plover *Charadrius hiaticula*
A144	Sanderling *Calidris alba*
A148	Purple Sandpiper *Calidris maritima*
A149	Dunlin *Calidris alpina alpina*
A169	Turnstone *Arenaria interpres*
A999	Wetlands

Please note that this SPA overlaps with Carrowmore Point to Spanish Point and Islands SAC (001021) and Carrowmore Dunes SAC (002250). See map 2. The conservation objectives for this site should be used in conjunction with those for the overlapping sites as appropriate.

Supporting documents, relevant reports & publications

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

NPWS Documents

Year :	2014
Title :	Mid-Clare Coast SPA (site code: 4182) Conservation objectives supporting document V1
Author :	NPWS
Series :	Conservation objectives supporting document

Other References

Year :	1995
Title :	Seabird monitoring handbook for Britain and Ireland: a compilation of methods for survey and monitoring of breeding seabirds
Author :	Walsh, P.; Halley, D.J.; Harris, M.P.; del Nevo, A.; Sim, I.M.W.; Tasker, M.L.
Series :	JNCC, Peterborough
Year :	2014
Title :	Seabird Monitoring Programme (SMP) Database
Author :	JNCC
Series :	http://jncc.defra.gov.uk/smp/Default.aspx
Year :	2014
Title :	BirdLife International Seabird Ecology and Foraging Range Database
Author :	BirdLife International
Series :	http://seabird.wikispaces.com

Conservation Objectives for : Mid-Clare Coast SPA [004182]

A045 Barnacle Goose *Branta leucopsis*

To maintain the favourable conservation condition of Barnacle Goose in Mid-Clare Coast SPA, which is defined by the following list of attributes and targets:

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

A017 Cormorant *Phalacrocorax carbo*

To maintain the favourable conservation condition of Cormorant in Mid-Clare Coast SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Breeding population abundance: apparently occupied nests (AONs)	Number	No significant decline	Measure based on standard survey methods (see Walsh et al., 1995). The Seabird Monitoring Programme (SMP) online database (JNCC, 2014) provides population data for this species
Productivity rate	Mean number	No significant decline	Measure based on standard survey methods (see Walsh et al., 1995). The Seabird Monitoring Programme (SMP) online database (JNCC, 2014) provides population data for this species
Distribution: breeding colonies	Number; location; area	No significant decline	Cormorant colonies are usually sited on flat or rocky islets or sea stack tops, less often on cliffs (Walsh et al., 1995). Mattle Island is a traditional breeding colony in this SPA
Prey biomass available	Kilogrammes	No significant decline	Key prey items: fish (mostly benthic), some crustaceans. Key habitats: populations use sandy areas as well as rocky and vegetated substrates. Foraging range: max. 50km, mean max. 31.67km, mean 8.46km (BirdLife International Seabird Database (Birdlife International, 2014))
Barriers to connectivity	Number; location; shape; area	No significant increase	Seabird species make extensive use of the marine waters adjacent to their breeding colonies. Foraging range: max. 50km, mean max. 31.67km, mean 8.46km (BirdLife International Seabird Database (Birdlife International, 2014))
Disturbance at the breeding site	Level of impact	Human activities should occur at levels that do not adversely affect the breeding cormorant population	Cormorant colonies are usually sited on flat or rocky islets or stack stops, less often on cliffs (Walsh et al., 1995). Mattle Island is a traditional breeding site

A137 Ringed Plover *Charadrius hiaticula*

To maintain the favourable conservation condition of Ringed Plover in Mid-Clare Coast SPA, which is defined by the following list of attributes and targets:

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

A144 Sanderling *Calidris alba*

To maintain the favourable conservation condition of Sanderling in Mid-Clare Coast SPA, which is defined by the following list of attributes and targets:

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

Conservation Objectives for : Mid-Clare Coast SPA [004182]

A148 Purple Sandpiper *Calidris maritima*

To maintain the favourable conservation condition of Purple Sandpiper in Mid-Clare Coast SPA, which is defined by the following list of attributes and targets:

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

A149 Dunlin *Calidris alpina alpina*

To maintain the favourable conservation condition of Dunlin in Mid-Clare Coast SPA, which is defined by the following list of attributes and targets:

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

A169 Turnstone *Arenaria interpres*

To maintain the favourable conservation condition of Turnstone in Mid-Clare Coast SPA, which is defined by the following list of attributes and targets:

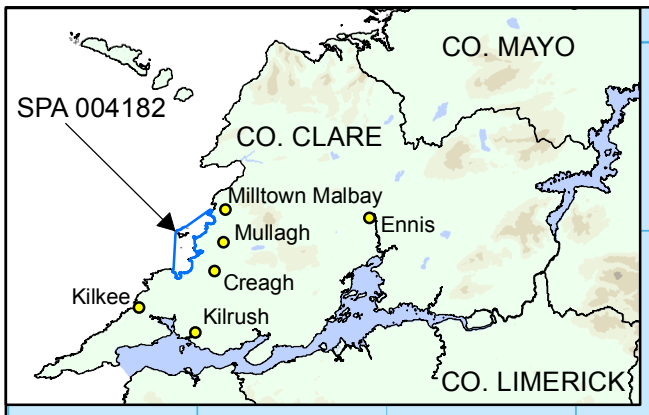
Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range,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

Conservation Objectives for : Mid-Clare Coast SPA [004182]

A999 Wetlands

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

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 4,641 hectares, other than that occurring from natural patterns of variation	The wetland habitat area was estimated as 4,641ha using OSi data and relevant orthophotographs. For further information see part three of the conservation objectives supporting document



MAP 1: MID-CLARE COAST SPA CONSERVATION OBJECTIVES SPA DESIGNATION

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

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SITE CODE:
SPA 004182; version 2. CO. CLARE

0 0.5 1 km

N

Map Version 1
Date: July 2014

Legend

Mid-Clare Coast SPA 004182

SAC 001021

SPA 004182

SAC 002250

Legend

- Carrowmore Point to Spanish Point and Islands SAC 001021
- Carrowmore Dunes SAC 002250
- Mid-Clare Coast SPA 004182
- OSi Discovery Series County Boundary

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MAP 2: MID-CLARE COAST SPA CONSERVATION OBJECTIVES ADJOINING / OVERLAPPING DESIGNATIONS

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

SITE CODE:
SAC 001021; version 3.01, SAC 002250; version 3.01.
SPA 004182; version 2. CO. CLARE.

0 0.5 1 1.5 2 km

N

Map Version 1
Date: July 2014