

National Parks and Wildlife Service

Conservation Objectives Series

Blackwater River (Kerry) SAC 002173



**An Roinn Cultúir,
Oidhreachta agus Gaeltachta**
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Heritage and the Gaeltacht

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Introduction

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

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

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

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

Favourable conservation status of a habitat is achieved when:

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

The favourable conservation status of a species is achieved when:

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

Notes/Guidelines:

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

Qualifying Interests

* indicates a priority habitat under the Habitats Directive

002173 Blackwater River (Kerry) SAC

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|------|--|
| 1024 | Kerry Slug <i>Geomalacus maculosus</i> |
| 1029 | Freshwater Pearl Mussel <i>Margaritifera margaritifera</i> |
| 1106 | Salmon <i>Salmo salar</i> |
| 1303 | Lesser Horseshoe Bat <i>Rhinolophus hipposideros</i> |
| 1355 | Otter <i>Lutra lutra</i> |
| 4030 | European dry heaths |

Please note that this SAC is adjacent to Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC (000365) and Kenmare River SAC (002158). See map 2. The conservation objectives for this site should be used in conjunction with those for the adjacent sites as appropriate.

Supporting documents, relevant reports & publications

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

NPWS Documents

Year :	1999
Title :	A survey of four rivers in the south-west of Ireland for the freshwater pearl mussel, <i>Margaritifera margaritifera</i> (L.)
Author :	Ross, E.
Series :	Unpublished report to Dúchas, the Heritage Service
Year :	2004
Title :	A pilot project to develop a monitoring protocol for the freshwater pearl mussel <i>Margaritifera margaritifera</i> (L.) in the River Caragh, County Kerry, Ireland
Author :	Ross, E.
Series :	Unpublished report to NPWS
Year :	2006
Title :	Otter survey of Ireland 2004/2005
Author :	Bailey, M.; Rochford, J.
Series :	Irish Wildlife Manuals, No. 23
Year :	2006
Title :	Bat mitigation guidelines for Ireland
Author :	Kelleher, C.; Marnell, F.
Series :	Irish Wildlife Manuals, No. 25
Year :	2006
Title :	Report on searches for juvenile <i>Margaritifera margaritifera</i> (L.) in the Blackwater River, Co. Kerry
Author :	Ross, E.
Series :	Unpublished report to NPWS
Year :	2007
Title :	Supporting documentation for the Habitats Directive Conservation Status Assessment - backing documents. Article 17 forms and supporting maps
Author :	NPWS
Series :	Unpublished report to NPWS
Year :	2009
Title :	Ireland Red List No. 2: Non-marine molluscs
Author :	Byrne, A.; Moorkens, E.A.; Anderson, R.; Killeen, I.J.; Regan, E.C.
Series :	Ireland Red List series, NPWS
Year :	2009
Title :	NS II Freshwater pearl mussel sub-basin management plans: fisheries survey. Stage 1 report
Author :	Paul Johnston Associates
Series :	Unpublished report to NPWS
Year :	2009
Title :	NS II Freshwater Pearl Mussel Sub-basin Management Plans: Report on Biological Monitoring of Surface Water Quality in Kerry Blackwater River Catchment
Author :	Conservation Services
Series :	Unpublished report to NPWS
Year :	2009
Title :	NS II Freshwater Pearl Mussel Sub-basin Management Plans: Monitoring of the Freshwater Pearl Mussel in the Kerry Blackwater
Author :	Ross, E.
Series :	Unpublished report to NPWS

Year :	2010
Title :	Ireland Red List No. 4: Butterflies
Author :	Regan, E.C.; Nelson, B.; Aldwell, B.; Bertrand, C.; Bond, K.; Harding, J.; Nash, D.; Nixon, D.; Wilson, C.J.
Series :	Ireland Red List series, NPWS
Year :	2010
Title :	Second Draft Kerry Blackwater Freshwater Pearl Mussel Sub-basin Management Plan (2009-2015). March 2010
Author :	NPWS
Series :	Unpublished document to the Department of Environment, Heritage and Local Government
Year :	2011
Title :	Distribution and population dynamics of the Kerry Slug, <i>Geomalacus maculosus</i> (Arionidae)
Author :	Mc Donnell, R.J.; Gormally, M.J.
Series :	Irish Wildlife Manuals, No. 54
Year :	2011
Title :	Blackwater (Kerry) River 2011 <i>Margaritifera</i> monitoring results
Author :	Ross, E.D.
Series :	Unpublished report to NPWS
Year :	2012
Title :	An assessment of the use of conifer plantations by the Kerry Slug <i>Geomalacus maculosus</i> with reference to the potential impacts of forestry operations
Author :	Reich, I.; O'Meara, K.; Mc Donnell, R.J.; Gormally, M.J.
Series :	Irish Wildlife Manuals, No. 64
Year :	2012
Title :	Ireland Red List No. 8: Bryophytes
Author :	Lockhart, N.; Hodgetts, N.; Holyoak, D.
Series :	Ireland Red List series, NPWS
Year :	2013
Title :	National otter survey of Ireland 2010/12
Author :	Reid, N.; Hayden, B.; Lundy, M.G.; Pietravalle, S.; McDonald, R.A.; Montgomery, W.I.
Series :	Irish Wildlife Manuals, No. 76
Year :	2013
Title :	The status of EU protected habitats and species in Ireland. Volume 2. Habitats assessments
Author :	NPWS
Series :	Conservation assessments
Year :	2013
Title :	The status of EU protected habitats and species in Ireland. Volume 3. Species assessments
Author :	NPWS
Series :	Conservation assessments
Year :	2014
Title :	Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland, Version 2.0
Author :	Perrin, P.M.; Barron, S.J.; Roche, J.R.; O'Hanrahan, B.
Series :	Irish Wildlife Manuals, No. 79
Year :	2015
Title :	KerryLIFE Project, 2014 surveys of the Kerry Blackwater and Caragh Rivers
Author :	Moorkens, E.A.
Series :	Unpublished report to NPWS

Year :	2016
Title :	Ireland Red List No. 10: Vascular Plants
Author :	Wyse Jackson, M.; FitzPatrick, Ú.; Cole, E.; Jebb, M.; McFerran, D.; Sheehy Skeffington, M.; Wright, M.
Series :	Ireland Red List Series, NPWS
Year :	2016
Title :	KerryLIFE Project. Condition assessment of freshwater pearl mussel populations in the Kerry Blackwater and Caragh rivers in 2016
Author :	Moorkens, E.
Series :	Unpublished report to NPWS
Year :	2017
Title :	KerryLIFE Project (LIFE13 NAT/IE/000144), 2016 and 2017 surveys of the Kerry Blackwater and Caragh Rivers
Author :	Moorkens, E.
Series :	Unpublished report to NPWS
Year :	2018
Title :	Conservation objectives supporting document – lesser horseshoe bat (<i>Rhinolophus hipposideros</i>)
Author :	NPWS
Series :	Conservation objectives supporting document
Year :	2019
Title :	The Status of EU Protected Habitats and Species in Ireland. Volume 3: Species Assessments
Author :	NPWS
Series :	Conservation assessments

Other References

Year :	1982
Title :	Otter survey of Ireland
Author :	Chapman, P.J.; Chapman, L.L.
Series :	Unpublished report to Vincent Wildlife Trust
Year :	1991
Title :	The spatial organization of otters (<i>Lutra lutra</i>) in Shetland
Author :	Kruuk, H.; Moorhouse, A.
Series :	Journal of Zoology, 224: 41-57
Year :	2006
Title :	Otters - ecology, behaviour and conservation
Author :	Kruuk, H.
Series :	Oxford University Press
Year :	2006
Title :	The status of host fish populations and fish species richness in European freshwater pearl mussel (<i>Margaritifera margaritifera</i>) streams
Author :	Geist, J.; Porkka, M.; Kuehn, R.
Series :	Aquatic Conservation: Marine and Freshwater Ecosystems, 16: 251-266
Year :	2007
Title :	Protecting and managing underground sites for bats
Author :	Mitchell-Jones, A.J.; Bihari, Z.; Masing, M.; Rodrigues, L.
Series :	EUROBATS Publication Series No. 2

Year :	2008
Title :	The lesser horseshoe bat conservation handbook
Author :	Schofield, H.W.
Series :	The Vincent Wildlife Trust
Year :	2009
Title :	Importance of night roosts for bat conservation: roosting behaviour of the lesser horseshoe bat <i>Rhinolophus hipposideros</i>
Author :	Knight, T.; Jones, G.
Series :	Endangered Species Research, 8: 79-86
Year :	2010
Title :	Otter tracking study of Roaringwater Bay
Author :	De Jongh, A.; O'Neill, L.
Series :	Unpublished draft report to NPWS
Year :	2014
Title :	Assessing near-bed velocity in a recruiting population of the endangered freshwater pearl mussel (<i>Margaritifera margaritifera</i>) in Ireland
Author :	Moorkens, E.; Killeen, I.
Series :	Aquatic Conservation: Marine and Freshwater Ecosystems, 24(6): 853-862
Year :	2017
Title :	Irish Vegetation Classification: Technical Progress Report No. 3
Author :	Perrin, P.
Series :	Report submitted to National Biodiversity Data Centre
Year :	2019
Title :	The Status of Irish Salmon Stocks in 2018 with Catch Advice for 2019
Author :	Technical Expert Group on Salmon (TEGOS)
Series :	Report of the Technical Expert Group on Salmon (TEGOS) to Inland Fisheries Ireland (IFI)

Spatial data sources

Year :	2019
Title :	NPWS rare and threatened species database
GIS Operations :	Datasets created from spatial references in database records. Expert opinion used as necessary to resolve any issues arising
Used For :	1024 (map 3) and 1029 (map 4)
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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 4)
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Year :	2018
Title :	NPWS lesser horseshoe bat database
GIS Operations :	Roosts identified, clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	1303 (map 5)
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Year :	2007
Title :	Forest Inventory and Planning System (FIPS)
GIS Operations :	Dataset clipped to 2.5km buffer centred on roost location
Used For :	1303 (map 5)
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Conservation Objectives for : Blackwater River (Kerry) SAC [002173]

4030 European dry heaths

To maintain the favourable conservation condition of European dry heaths in Blackwater River (Kerry) 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	European dry heaths has not been mapped in detail for Blackwater River (Kerry) SAC and thus the total area of the qualifying habitat in the SAC is unknown. The habitat occurs in association with upland acid grassland and wet heath in the SAC (NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See the notes for Habitat area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil pH and nutrient status within natural ranges	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat (NPWS, 2013)
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	The entire diversity of dry heath vegetation communities within this SAC is currently unknown. Information on vegetation communities associated with this habitat in the uplands is presented in Perrin et al. (2014). See also the Irish Vegetation Classification (Perrin, 2017; www.biodiversityireland.ie/projects/national-vegetation-database/irish-vegetation-classification)
Vegetation composition: lichens and bryophytes	Number of species at a representative number of 2m x 2m monitoring stops	Number of bryophyte or non-crustose lichen species present at each monitoring stop is at least three, excluding <i>Campylopus</i> and <i>Polytrichum</i> mosses	Attribute and target based on Perrin et al. (2014). Dry heath is not necessarily rich in lichen and bryophyte species, but a minimum amount should still be present
Vegetation composition: number of positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species present at each monitoring stop is at least two	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat, which is composed of dwarf shrubs, is also presented. See also NPWS (2013). Positive indicator species recorded in the habitat in the SAC include western gorse (<i>Ulex gallii</i>), bilberry (<i>Vaccinium myrtillus</i>), bell heather (<i>Erica cinerea</i>) and ling (<i>Calluna vulgaris</i>) (NPWS internal files)
Vegetation composition: cover of positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of positive indicator species at least 50% for siliceous dry heath and 50-75% for calcareous dry heath	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat, which is composed of dwarf shrubs, is also presented. See also NPWS (2013)
Vegetation composition: dwarf shrub composition	Percentage cover at a representative number of 2m x 2m monitoring stops	Proportion of dwarf shrub cover composed collectively of bog-myrtle (<i>Myrica gale</i>), creeping willow (<i>Salix repens</i>) and western gorse (<i>Ulex gallii</i>) is less than 50%	Attribute and target based on Perrin et al. (2014). Bog-myrtle is indicative of flushed conditions and is more characteristic of wet heaths and blanket bogs. Creeping willow is more characteristic of dune heaths. Western gorse is a component of dry heath, but high proportions of it may indicate a history of undesirable levels of grazing
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014). Non-native species can be invasive and have deleterious effects on native vegetation. A low target is set as non-native species can spread rapidly and are most easily dealt with when still at lower abundances
Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 20%	Attribute and target based on Perrin et al. (2014). High cover of native trees and shrubs would indicate that the habitat may be succeding towards scrub or woodland due to lack of grazing

Vegetation composition: bracken	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of bracken (<i>Pteridium aquilinum</i>) less than 10%	Attribute and target based on Perrin et al. (2014). High cover of bracken would indicate that the habitat may be succeeding towards a dense bracken community
Vegetation composition: soft rush	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of soft rush (<i>Juncus effusus</i>) less than 10%	Attribute and target based on Perrin et al. (2014). High cover of soft rush would suggest undesirable hydrological conditions. Note, however, that poor flushes dominated by soft rush can naturally occur in mosaic with this habitat. Discrete areas of this separate habitat should not be considered here
Vegetation structure: senescent ling	Percentage cover at a representative number of 2m x 2m monitoring stops	Senescent proportion of ling (<i>Calluna vulgaris</i>) cover less than 50%	Attribute and target based on Perrin et al. (2014). Senescence is part of the natural cycle of ling, but a dominance of ling in the senescent phase would indicate a lack of management (appropriate grazing or burning) to promote ling regeneration
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Less than 33% collectively of the last complete growing season's shoots of ericoids showing signs of browsing	Attribute and target based on Perrin et al. (2014). In this SAC, some areas of heath and upland grassland have been overgrazed in the past (NPWS internal files)
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas	Attribute and target based on Perrin et al. (2014), where the list of sensitive areas is also presented. Fires can be part of the natural cycle of heaths and may, under carefully controlled circumstances, be used as an occasional management tool to promote regeneration of, or diversity of growth phases, in ling (<i>Calluna vulgaris</i>). However, currently most hill fires in Ireland are intentionally started to encourage grass growth for livestock. Fires which are too intense, too frequent, too extensive or which occur in sensitive areas are damaging to the habitat
Vegetation structure: growth phases of ling	Percentage cover in local vicinity of a representative number of monitoring stops	Outside sensitive areas, all growth phases of ling (<i>Calluna vulgaris</i>) should occur throughout, with at least 10% of cover in the mature phase	Attribute and target based on Perrin et al. (2014), where the list of sensitive areas is also presented. The growth phases of ling are pioneer (<10cm high), building (10-30cm high) and mature (<30cm high). As burning is undesirable in sensitive areas, it is not reasonable to require the stated diversity of growth phases within these areas
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Attribute and target based on Perrin et al. (2014). Disturbance can include hoof marks, wallows, human foot prints and vehicle and machinery tracks. Excessive disturbance can result in loss of characteristic species and presage erosion for heaths and peatlands
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat	This includes species on the Flora (Protection) Order, 2015 and/or Red Lists (Byrne et al., 2009; Regan et al., 2010; Lockhart et al., 2012; Wyse Jackson et al., 2016, etc.)

Conservation Objectives for : Blackwater River (Kerry) SAC [002173]

1024 **Kerry Slug *Geomalacus maculosus***

To maintain the favourable conservation condition of Kerry Slug (*Geomalacus maculosus*) in Blackwater River (Kerry) SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: occupied 1km grid squares	Number	Number of occupied 1km grid squares at least stable, subject to natural processes. See map 3	The distribution of Kerry slug (<i>Geomalacus maculosus</i>) within Blackwater River (Kerry) SAC is not known in detail. There are records from seven 1km grid squares (V7473; V7571; V7572; V7773; V7774; V7874; V8473) that are within/overlap the SAC boundary (NPWS species database; Mc Donnell and Gormally, 2011). See map 3. It is documented that Kerry slug is found wherever suitable habitat is present in the SAC; the species has been found in wet heath and blanket bog habitat that has outcropping boulders of Old Red Sandstone and in coniferous woodland (NPWS internal files). Broadleaved woodland is also likely to be occupied. Given the extent of suitable habitat in the SAC, it is likely that the species is widespread, but this has not been confirmed by positive records
Habitat extent: area of heath/bog with sandstone outcrops	Hectares	Stable or increasing, subject to natural processes	The underlying geology of Blackwater River (Kerry) SAC is Old Red Sandstone and wherever this is exposed, there is likely to be suitable habitat for Kerry slug (<i>Geomalacus maculosus</i>). Slugs will occur on bare rock faces where they feed (mainly at night) on their preferred species of lichens and mosses. The quality of habitats surrounding rock outcrops is not considered important for the species as there is no evidence that the slug feeds away from the rock surfaces. However, surrounding habitat that is highly nutritionally enriched may have local impacts on the adjacent rock face flora. The species is thought to retreat during dry periods to refuges around the interface between rock and soil and crevices and holes in trees. Slugs presumably move between rocks, but the conditions needed to facilitate this are not known
Habitat extent: woodland area	Hectares	Stable or increasing, subject to natural processes	Kerry slug (<i>Geomalacus maculosus</i>) is found in areas of woodland supporting its preferred foodplants, which are species of epiphytic lichens and mosses, particularly <i>Platismatia glauca</i> , <i>Usnea cornuta</i> , <i>Cladonia uncialis</i> , <i>Paromotrema perlatum</i> and <i>Lepraria incana</i> (Reich et al., 2012). The preferred trees are those with rough bark, such as sessile oak (<i>Quercus petraea</i>), but also conifers (Reich et al., 2012). The species occurrence in conifer woodland is confirmed by recent records; the distribution in broadleaved woods is unknown
Habitat quality: woodland	Proportion of oak trees	Proportion of sessile oak (<i>Quercus petraea</i>) in canopy at least stable	Oak is the preferred tree for Kerry slug (<i>Geomalacus maculosus</i>) within native broadleaved woodland
Habitat quality: non-native invasive species	Occurrence	Rhododendron (<i>Rhododendron ponticum</i>) in woodland and heath/bog absent or under control	Kerry slug (<i>Geomalacus maculosus</i>) is negatively impacted by the presence of rhododendron (<i>Rhododendron ponticum</i>) which creates excessive shade and reduces cover of its epiphytic foodplants (Mc Donnell and Gormally, 2011). This is primarily, but not exclusively, a problem in woodland and rhododendron may also impact open heath and bog

Conservation Objectives for : Blackwater River (Kerry) SAC [002173]

1029

Freshwater Pearl Mussel *Margaritifera margaritifera*

To restore the favourable conservation condition of Freshwater Pearl Mussel (*Margaritifera margaritifera*) in Blackwater River (Kerry) SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Kilometres	Maintain distribution at 18.95km. See map 4	The widespread distribution of the freshwater pearl mussel (<i>Margaritifera margaritifera</i>) in the Blackwater catchment was mapped by Ross (1999). It was re-examined as part of baseline monitoring in 2004 (Ross, 2004). The distribution extends through the Blackwater from just downstream of The Pocket at Coolumminy to Blackwater Bridge, through the Kealduff River (from just downstream of Lough Brin) and Derreendarragh River and Lough Beg stream (from near Derreendarragh). The target is for the species to be sufficiently widespread to maintain itself on a long-term basis as a viable component of the Kerry Blackwater system. See the Kerry Blackwater Freshwater Pearl Mussel Sub-basin Management Plan (2009-2015) (SBMP; NPWS, 2010) for further information. Further relevant information on all attributes and targets may be available from the KerryLIFE project (LIFE13 NAT/IE/000144 - http://kerrylife.ie/)
Population size	Number of adult mussels	Restore population to at least 2.7 million adult mussels	Ross (1999) estimated the Blackwater population as 2,765,333. Mussel density was variable; maximum abundance was 360/m ² (Ross, 1999). Very high densities continue to be recorded, particularly in the Kealduff (up to 270/m ² in 2016/17); however, significant declines have also been documented (Ross, 2004, 2006, 2009, 2011; Moorkens, 2015, 2016, 2017). NPWS (2010) predicted that, based on rate of decline, the population would be extinct by c.2100. NPWS (2013) assumed the Kerry Blackwater population had declined at a rate of 1% per year to c.2.54 million. Moorkens (2015) recorded an 8% decline in adult numbers between 2004 and 2014 at 6 transects. Moorkens (2017) recorded a 60% decline at one Kealduff transect between 2014 and 2016. A population estimate of 862,920-2,030,400 was used for the 2013-18 Article 17 period (NPWS, 2019). The target is for the species to be sufficiently abundant to maintain itself on a long-term basis as a viable component of the Kerry Blackwater system
Population structure: recruitment	Percentage per size class	Restore to at least 20% of population no more than 65mm in length; and at least 5% of population no more than 30mm in length	Mussels ≤65mm are 'young mussels' and found buried in the substratum and/or beneath adult mussels. Mussels ≤30mm are 'juvenile mussels' and are always buried in the substratum. See the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 and I.S. EN 16859:2017. The SBMP (NPWS, 2010) summarises the demographic work up to 2010 (Ross, 1999, 2004, 2006, 2009). The Blackwater failed both targets in 2009 (2.2% ≤65mm, 0% ≤30mm) (Ross, 2009). It failed again in 2011, 2014 and 2016/17 (2016/17- 6.14% ≤65mm, 1.35% ≤30mm); recruitment was best in the lower Kealduff on all occasions (2016/17- 19.13% ≤65mm, 8.09% ≤30mm), no juveniles were recorded in the main Blackwater in 2016/17 (Ross, 2011; Moorkens, 2015, 2017). The Blackwater population is unsustainable owing to lack of survival of juvenile mussels. The target is for sufficient juvenile recruitment to allow the species to maintain itself on a long-term basis as a viable component of the Blackwater system

Population structure: adult mortality	Percentage	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution	5% is considered the cut-off between the combined errors associated with natural fluctuations and sampling methods and evidence of true population decline. 1% of dead shells is indicative of natural losses. The Blackwater failed the targets in 2009: adults decreased at the 3 transects examined; high numbers of dead shells at Kealduff transect (Ross, 2009; NPWS, 2010). It passed the targets in 2011, but increases in adult numbers at 2 of 3 transects were likely a result of 'wash-in' during flood flows (Ross, 2011). In 2014, it failed the live adult target (8% decline since 2004), but passed the dead shell target (Moorkens, 2015). It failed both targets in 2016: live mussels at T10 declined from 212 in 2014 to 84 in 2016 (60% in 2 years) (Moorkens, 2016, 2017). 68 dead shells were recorded in T10 and 253 in KA5 (Moorkens, 2016, 2017). The target is for sufficient survival of adults to allow the species to maintain itself on a long-term basis as a viable component of the Blackwater system
Suitable habitat: extent	Kilometres	Maintain habitat extent at 18.26km in the Blackwater system (see map 4) and any additional stretches necessary for salmonid spawning	The widespread extent of the mussel habitat in the Blackwater system is well-documented; it was first mapped in 1999 (Ross, 1999) and full baseline monitoring took place in 2004 (Ross, 2004). Most of the available habitat in the Blackwater system is occupied by adult mussels (e.g. 85.5% surveyed area occupied in Kealduff, 42% in main Blackwater in 2016/17); however, the habitat is unsuitable for juvenile recruitment (Ross, 2009, 2011; NPWS, 2010; Moorkens, 2015, 2017). Moorkens (2017) surveyed habitat quality and condition in six stretches; 54% of the Kealduff was good juvenile habitat, with only 13% in good condition; 31.5% of the main Blackwater was good juvenile habitat, 62% of it in good condition. The target is for the species' habitat to be sufficiently widespread to allow the species to maintain itself on a long-term basis as a viable component of the Blackwater system
Suitable habitat: condition	Kilometres	Restore condition of suitable habitat	The habitat is a combination of the area of 1) habitat adult and juvenile mussels can occupy; 2) spawning and nursery habitats host fish can occupy. Fish nursery and mussel habitat typically overlap. Fish spawning habitat is generally adjacent to mussel habitat, but may lie upstream of the generalised mussel distribution. Only spawning areas that regularly contribute juvenile fish to adult mussel habitat should be considered. Mussel and fish habitat availability is determined by flow and substratum and is highly sensitive to hydromorphological, sedimentation and enrichment pressures from throughout the catchment. See I.S. EN 16859:2017. Mussel habitat is widespread in the Blackwater and abundant in the lower Kealduff, but is unsuitable for juvenile recruitment (NPWS, 2010; Ross, 2009, 2011; Moorkens, 2015, 2016, 2017). The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Blackwater system

Water quality: macroinvertebrate (EQR) and phytoplankton (diatoms)	Ecological quality ratio (EQR)	Restore water quality-macroinvertebrates: EQR greater than 0.90 (Q4-5 or Q5); phytoplankton: EQR greater than 0.93	The EQR targets 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). Reaching these targets does not, however, guarantee achieving the targets for the other attributes. In 2009, the habitat in the Blackwater system failed both targets (Conservation Services, 2009; NPWS, 2010). The Environmental Protection Agency (EPA) recorded Q5 or Q4-5 in all sites sampled in 2015. KerryLIFE has monitored macroinvertebrates at 20 locations. See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Blackwater system
Substratum quality: filamentous algae (macroalgae); macrophytes (rooted higher plants)	Percentage	Restore substratum quality- filamentous algae: absent or trace (less than 5%); macrophytes: absent or trace (less than 5%)	The Blackwater failed the macroalgal target in 2009, 2011, 2014, and 2016/17, with 100% cover in places including on occasion the Kealduff (Ross, 2009, 2011; Moorkens, 2015, 2017). An increase in algae was first noted in the Blackwater by the EPA in 2003 and significant algal cover has been recorded on each monitoring occasion since 2004 (Ross, 2004, 2006, 2009, 2011; Moorkens, 2015, 2017). The macrophyte target was failed (marginally) in 2009, but passed in 2011, 2014 and 2016/17 (NPWS, 2010; Ross, 2011; Moorkens, 2015, 2017). KerryLIFE also monitored algae and macrophytes. Elevated bacterial and fungal growths have also been recorded indicating increased organic load is a problem (Moorkens, 2015). Sufficient recruitment of juvenile mussels is being prevented by the poor condition of the river substratum. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Blackwater system
Substratum quality: sediment	Occurrence	Restore substratum quality- stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment	The Blackwater failed the target in 2009, 2011 and 2014, but passed in 2016/17 (Ross, 2009, 2011; NPWS, 2010; Moorkens, 2015, 2017). Patchy sand deposition has been recorded since monitoring began, but sedimentation with finer fractions appears to have increased over time (averages of 7%, 29% and 100% silt at the 3 transects monitored in 2011) (Ross, 2004, 2006, 2009, 2011). Severe silt plumes were widespread in 2014, demonstrating infiltration of fine sediments to the substratum (Moorkens, 2015). Sufficient recruitment of juvenile mussels is being prevented by the poor condition of the river substratum. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Blackwater system
Substratum quality: oxygen availability	Redox potential	Restore to no more than 20% decline from water column to 5cm depth in substrate	Differences in redox potential between the water column and the substrate correlate with differences in oxygen levels. Juvenile mussels require full oxygenation while buried in gravel. In suitable habitat, there should be very little loss of redox potential between the water column and underlying gravels. See I.S. EN 16859:2017. The Blackwater failed the redox target in 2009, with an average decline of 22.7% (NPWS, 2010). Four of five monitoring stations passed in 2014; however, silt plumes were widespread in the system (Moorkens, 2015). While results were good overall (average decline 17.4% (averages of 16-19% across sites), 81% of readings passed (63-100% across sites)), there was marked deterioration in redox in the Kealduff from May 2016 to July 2017 (Moorkens, 2017). The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Blackwater system

Hydrological regime: flow variability	Metres per second	Restore appropriate hydrological regime	The availability of suitable freshwater pearl mussel habitat is largely determined by flow (geology is the other key factor). To restore the habitat for the species, flow variability over the annual cycle must be such that 1) high flows can wash fine sediments from the substratum; 2) high flows are not artificially increased so as to cause excessive scour of mussel habitat; 3) low flows do not exacerbate the deposition of fine sediments or growth of algae/macrophytes; 4) low flows do not cause stress to mussels in terms of exposure, water temperatures, food availability or aspects of the reproductive cycle. Groundwater inflow to a river contributes to water-cycling. See Moorkens and Killeen (2014) and I.S. EN 16859:2017 for further information. Velocity data from the Kealduff indicate drainage impacts (Moorkens, 2017). The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Blackwater system
Host fish	Number	Maintain sufficient juvenile salmonids to host glochidial larvae	Salmonid fish are host to the larval stage of the freshwater pearl mussel and essential to completion of the life cycle. 0+ and 1+ fish are typically used, both because of habitat overlaps and the development of immunity with age in fish. Fish presence is sufficient, as higher fish density and biomass is indicative of enriched conditions in mussel rivers. Geist et al. (2006) found that higher densities of host fish coincided with eutrophication, poor substrate quality for mussels and a lack of mussel recruitment, while significantly lower host fish density and biomass were associated with high juvenile mussel numbers. Fish movements must be such that 0+ fish remain in the mussel habitat until their 1+ summer. No fish stocking should occur within the mussel habitat, nor any works that may change the salmonid balance or residency time. In 2009, glochidia were found on salmon, but not trout, in the Blackwater system (Johnston, 2009; NPWS, 2010)
Fringing habitat: Hectares area and condition		Maintain the area and condition of fringing habitats necessary to support the population	Semi-natural and natural riparian habitats, including those along lake fringes, even where they do not form part of a natural floodplain, are an integral part of the structure and functioning of river systems. Open wetlands, such as wet heath and blanket bog, are particularly critical to the hydrological regime of mussel rivers. Fringing habitats assist in the settlement of fine suspended material, protect banks from erosion and contribute to nutrient cycling, as well as contributing to the aquatic food web (e.g. allochthonous matter from poor fens and flushes) and providing habitat (refuge and resources) for life-stages of fish, birds and aquatic invertebrates. Equally, fringing habitats are dependent on rivers/lakes, particularly their water levels, and support wetland communities and species of conservation concern. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Blackwater system

Conservation Objectives for : Blackwater River (Kerry) SAC [002173]

1106 *Salmon Salmo salar*

To restore the favourable conservation condition of Atlantic Salmon (*Salmo salar*) in Blackwater River (Kerry) SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	Percentage of river accessible	100% of river channels down to second order accessible from estuary	Artificial barriers block salmon's upstream migration, thereby limiting species to lower stretches and restricting access to spawning area
Adult spawning fish	Number	Conservation limit (CL) for each system consistently exceeded	A conservation limit (CL) is defined by the North Atlantic Salmon Conservation Organisation (NASCO) as "the spawning stock level that produces long-term average maximum sustainable yield as derived from the adult to adult stock and recruitment relationship". The target is based on the Technical Expert Group on Salmon's (TEGOS) annual model output of CL attainment levels. See Technical Expert Group on Salmon (2019) for further details. Stock estimates are either derived from direct counts of adults (rod catch, fish counter) or indirectly by fry abundance counts. The fish counter on the Blackwater River is used as the source of adult salmon run estimates. The Blackwater is currently below CL, meeting 40% of CL
Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 minutes sampling	Target is threshold value for rivers currently exceeding their conservation limit (CL)
Out-migrating smolt abundance	Number	No significant decline	Smolt abundance can be negatively affected by a number of impacts such as estuarine pollution, predation and sea lice (<i>Lepeophtheirus salmonis</i>)
Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes	Salmon spawn in clean gravels
Water quality	EPA Q value	At least Q4 at all sites sampled by EPA	Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA)

Conservation Objectives for : Blackwater River (Kerry) SAC [002173]

1303 Lesser Horseshoe Bat *Rhinolophus hipposideros*

To maintain the favourable conservation condition of Lesser Horseshoe Bat (*Rhinolophus hipposideros*) in Blackwater River (Kerry) SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population per roost	Number	Minimum number of 193 bats for the summer roost with roost id. 442 (in NPWS database); minimum number of 133 bats for the summer roost with roost id. 642; minimum number of 56 bats for the winter roost (roost id. 442). See map 5	A figure of 100 bats for summer roosts and 50 bats for winter roosts was set as a minimum qualifying standard (MQS) when SACs were being selected for lesser horseshoe bat (<i>Rhinolophus hipposideros</i>). NPWS conduct annual counts at each qualifying roost. Qualified means from the 2011-2015 summer data and from the most recent available five years of winter data (collected 2012-2017) have been calculated whereby the year with the highest maximum count and the year with the lowest maximum count were removed and the mean of the remaining years was calculated. This mean is set as the target figure for each roost in Blackwater River (Kerry) SAC. See the conservation objectives supporting document for lesser horseshoe bat (NPWS, 2018) for further information on this and all attributes and targets
Winter roosts	Condition	No decline	Blackwater River (Kerry) SAC has been selected for lesser horseshoe bat because of the presence of one internationally important winter roost (roost id. 442 in NPWS database). Damage or disturbance to the roost or to the habitat immediately surrounding it will lead to a decline in its condition (Mitchell-Jones et al., 2007)
Summer roosts	Condition	No decline	Blackwater River (Kerry) SAC has been selected for lesser horseshoe bat because of the presence of two internationally important summer roosts (roost id. 442 and roost id. 642 in NPWS database). Damage or disturbance to the roosts or to the habitat immediately surrounding the roosts will lead to a decline in their condition (Kelleher and Marnell, 2006)
Auxiliary roosts	Number and condition	No decline	Lesser horseshoe bat populations will use a variety of roosts during the year besides the main summer maternity and winter hibernation roosts. Such additional roosts within the SAC may be important as night roosts, satellite roosts, etc. Night roosts are also considered an integral part of core foraging areas and require protection (Knight and Jones, 2009). In addition, in response to weather conditions for example, bats may use different seasonal roosts from year to year; this is particularly noticeable in winter. Several other roosts that support lesser horseshoe bats, but at numbers below the MQS figures, are known from Blackwater River (Kerry) SAC. A database of all known lesser horseshoe bat roosts is available on the National Biodiversity Data Centre website. NB further unrecorded roosts may also be present within this SAC
Extent of potential foraging habitat	Hectares	No significant decline within 2.5km of qualifying roosts	Lesser horseshoe bats normally forage in woodlands/scrub within 2.5km of their roosts (Schofield, 2008). See map 5 which shows a 2.5km zone around the above roosts and identifies potential foraging grounds
Linear features	Kilometres	No significant loss within 2.5km of qualifying roosts. See map 5	This species follows commuting routes from its roost to its foraging grounds. Lesser horseshoe bats will not cross open ground. Consequently, linear features such as hedgerows, treelines and stone walls provide vital connectivity for this species within 2.5km around each roost (Schofield, 2008)

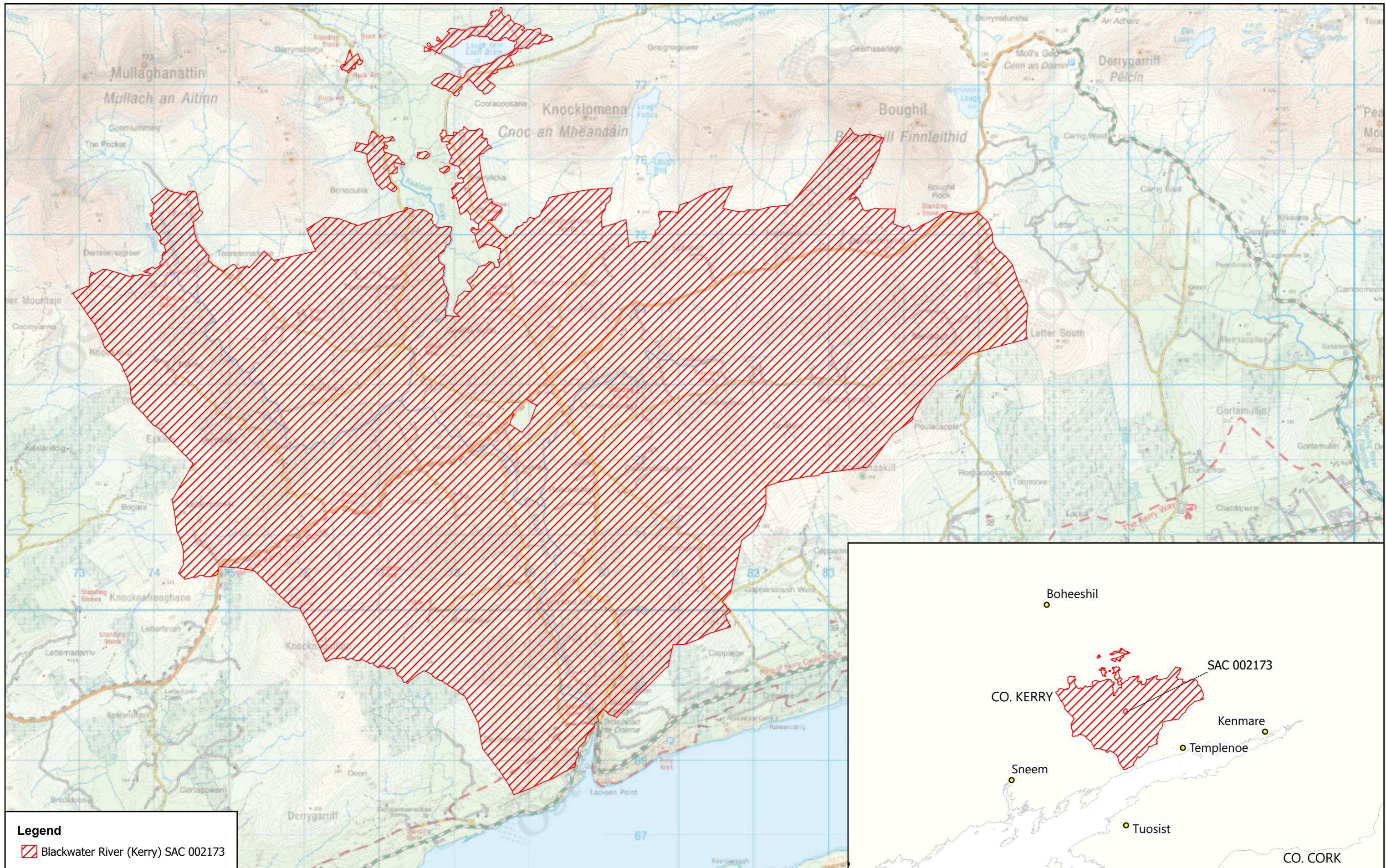
Light pollution	Lux	No significant increase in artificial light intensity adjacent to named roosts or along commuting routes within 2.5km of those roosts. See map 5	Lesser horseshoe bats are very sensitive to light pollution and will avoid brightly lit areas. Inappropriate lighting around roosts may cause abandonment; lighting along commuting routes may cause preferred foraging areas to be abandoned, thus increasing energetic costs for bats (Schofield, 2008)
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Conservation Objectives for : Blackwater River (Kerry) SAC [002173]

1355 *Otter Lutra lutra*

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

Attribute	Measure	Target	Notes
Distribution	Percentage positive survey sites	No significant decline	Measure based on standard otter survey technique. Favourable Conservation Status (FCS) target, based on 1980/81 survey findings, is 88% in SACs. Current range is estimated at 93.6% (Reid et al., 2013)
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 226ha along river banks/lake shoreline/around ponds	No field survey. Areas mapped to include 10m terrestrial buffer, identified as critical for otters (NPWS, 2007), along rivers and around water bodies
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 115km	No field survey. River length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters (Chapman and Chapman, 1982)
Couching sites and holts	Number	No significant decline	Otters need lying up areas throughout their territory where they are secure from disturbance (Kruuk and Moorhouse, 1991; Kruuk, 2006)
Fish biomass available	Kilograms	No significant decline	Broad diet that varies locally and seasonally, but dominated by fish, in particular salmonids, eels and sticklebacks in freshwater (Bailey and Rochford, 2006; Reid et al., 2013)
Barriers to connectivity	Number	No significant increase	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



**MAP 1:
BLACKWATER RIVER (KERRY) SAC
CONSERVATION OBJECTIVES
SAC DESIGNATION**

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

**SITE CODE:
SAC 002173; version 3.0. CO. KERRY**

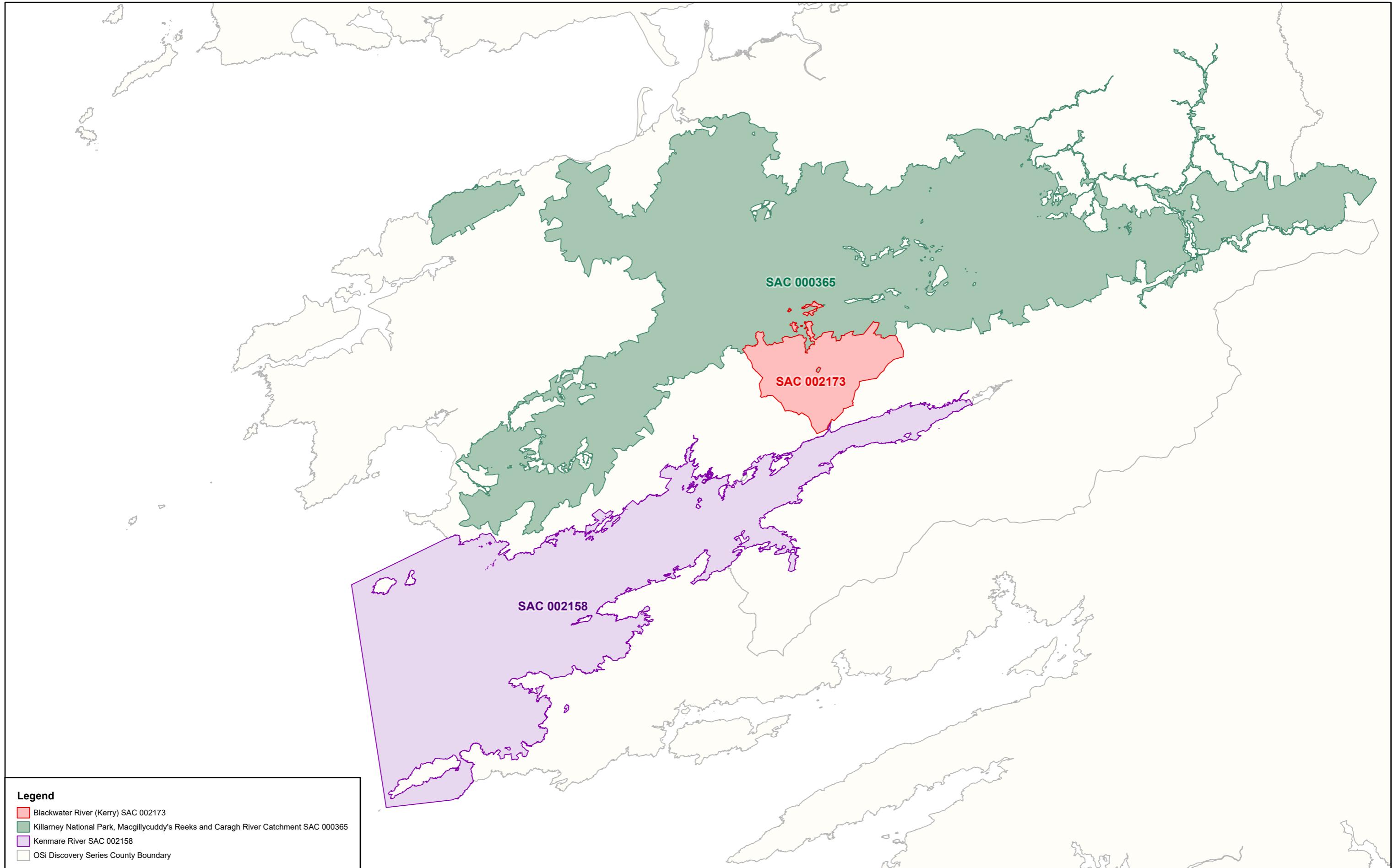
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The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.
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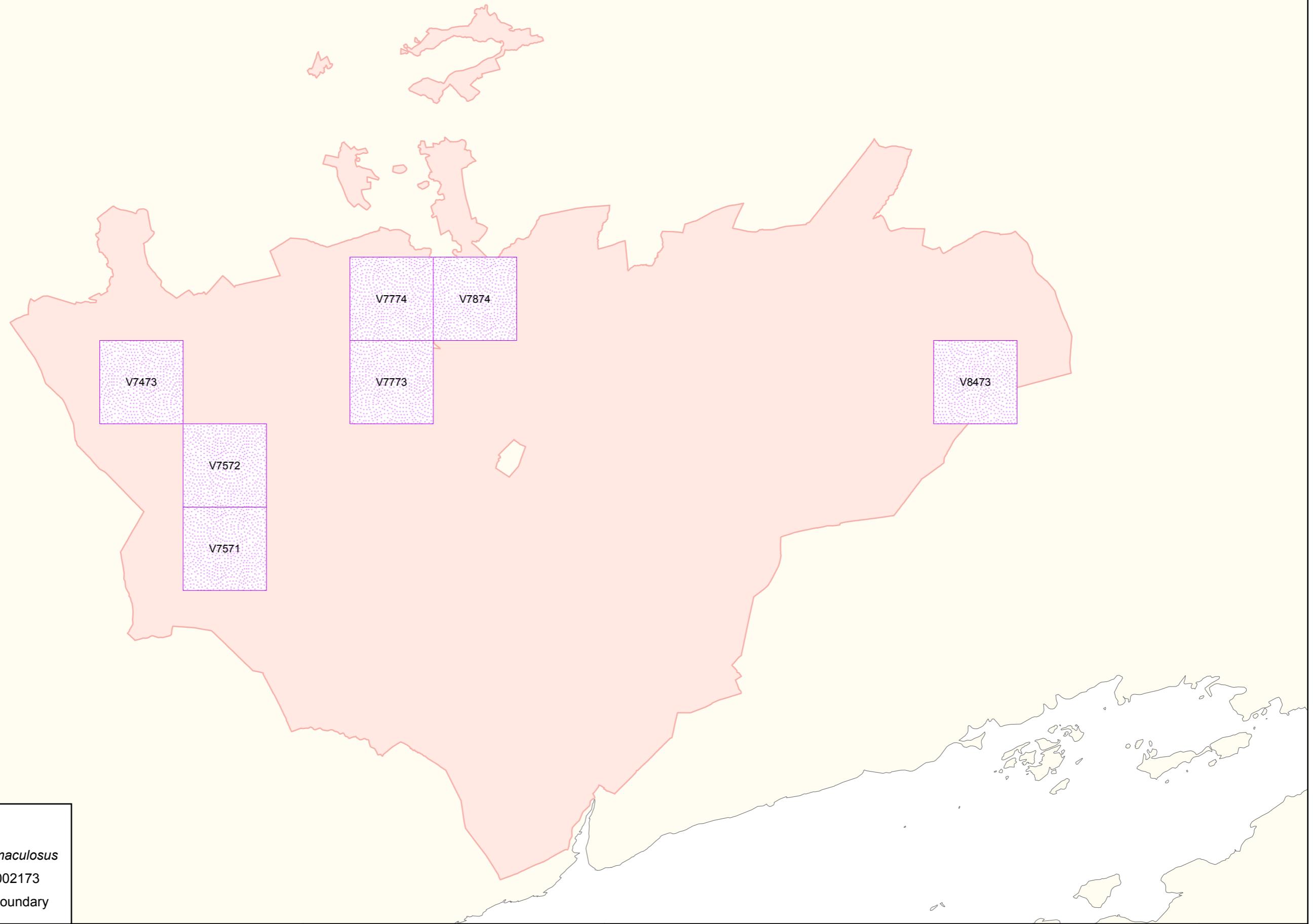
Níl sna teorainneacha ar na léarscáileanna ach nod garshuiomhach ginearálta. Féadfa athbhreithníte a déanamh ar theorainneacha na gceantar comharthaíthe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh OSI-NMA-014. © Suirbhéarachta Ordonáis na hÉireann Rialtas na hÉireann



Map Version 1
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<p>An Roinn Cultúir, Oidhreachtá agus Gaeltachta Department of Culture, Heritage and the Gaeltacht</p>	<p>MAP 2: BLACKWATER RIVER (KERRY) SAC CONSERVATION OBJECTIVES ADJACENT ADJOINING AND OVERLAPPING DESIGNATIONS</p> <p>Map to be read in conjunction with the NPWS Conservation Objectives Document.</p>	<p>SITE CODE: SAC 002173; version 3.0., SAC 002158; version 3.04., SAC 000365; version 3.0. CO. KERRY, CO. CORK</p> <table border="1"> <tr> <td>0</td><td>3.5</td><td>7</td><td>10.5</td><td>14 Kilometers</td></tr> </table>	0	3.5	7	10.5	14 Kilometers	<p>The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Ordnance Survey of Ireland Licence No OSI-NMA-014. © Ordnance Survey of Ireland Government of Ireland</p> <p>Níl sna teorainneacha ar na léarscáileanna ach nod garshuiomhach ginearálta. Feadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaíthe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh OSI-NMA-014. © Suirbhéarachta Ordonáis na hÉireann Rialtas na hÉireann</p>	<p>N Map Version 1 Date: June 2019</p>
0	3.5	7	10.5	14 Kilometers					



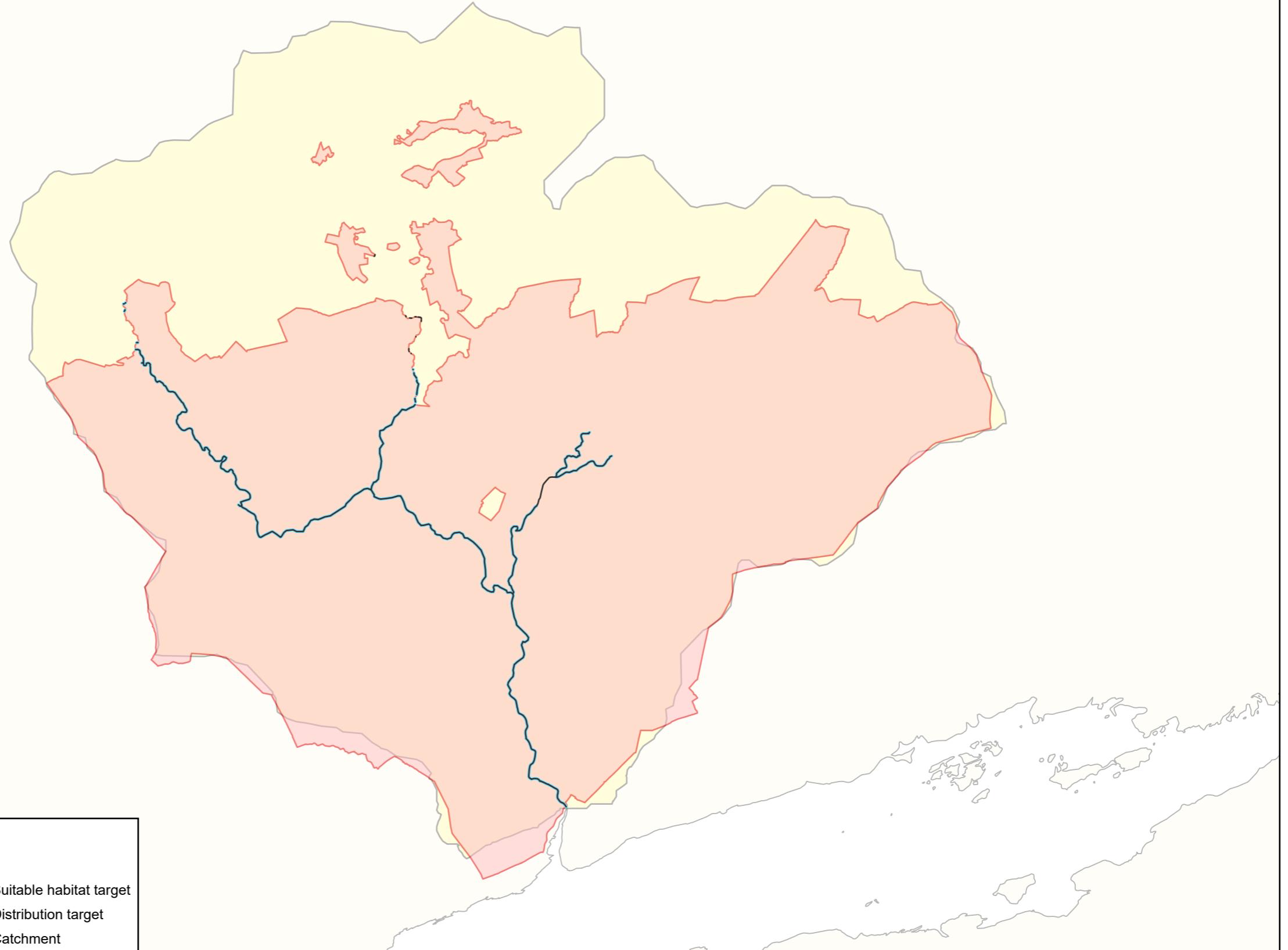
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Oidhreacht agus Gaeltachta
Department of Culture,
Heritage and the Gaeltacht

**MAP 3:
BLACKWATER RIVER (KERRY) SAC
CONSERVATION OBJECTIVES
KERRY SLUG**

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



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Legend

- Blackwater River (Kerry) SAC 002173
- 1029 Freshwater Pearl Mussel - *Margaritifera margaritifera* Suitable habitat target
- 1029 Freshwater Pearl Mussel - *Margaritifera margaritifera* Distribution target
- 1029 Freshwater Pearl Mussel - *Margaritifera margaritifera* Catchment



**MAP 4:
BLACKWATER RIVER (KERRY) SAC
CONSERVATION OBJECTIVES
FRESHWATER PEARL MUSSEL**

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

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0 0.6 1.2 1.8 2.4 3 km

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Nil sna teorainneacha ar na léarscáileanna ach nod garshiomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh OSI-NMA-014. © Suirbhéarachta Ordonáis na hÉireann Ríaltas na hÉireann



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