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Conservation Objectives Series

Bricklieve Mountains and Keishcorran SAC 001656

An Roinn Tithíochta,
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Local Government and Heritage

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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***

001656 Bricklieve Mountains and Keishcorran SAC

1065	Marsh Fritillary *Euphydryas aurinia*
1092	White-clawed Crayfish *Austropotamobius pallipes*
3180	Turloughs*
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
6510	Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*)
8120	Calcareous and calcshist screes of the montane to alpine levels (Thlaspietea rotundifolii)

Supporting documents, relevant reports & publications

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

NPWS Documents

Year :	1992
Title :	Owenmore River Catchment. Proposed Arterial Drainage Environmental Impact Assessment - Botanical and Ornithological Surveys
Author :	Goodwillie, R.N.; Buckley, P.; Douglas, C.
Series :	Unpublished report
Year :	2006
Title :	Conservation Plan for 2006-2011. Bricklieve Mountains and Keishcorran cSAC Site Code 001656 Co. Sligo
Author :	NPWS
Series :	Conservation Plan
Year :	2007
Title :	Grasslands monitoring project 2006
Author :	Dwyer, R.; Crowley, W.; Wilson, F.
Series :	Unpublished report to NPWS
Year :	2007
Title :	Notes of field visit to Lough Gowra, Co. Sligo, 25th September 2007
Author :	Ryan, J.; O Connor, Á.
Series :	Unpublished report by NPWS
Year :	2009
Title :	Monitoring of white-clawed crayfish *Austropotamobius pallipes* in Irish lakes in 2007
Author :	O'Connor, W.; Hayes, G.; O'Keeffe, C.; Lynn, D.
Series :	Irish Wildlife Manuals, No. 37
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 :	Scoping study and pilot survey for a national survey and conservation assessment of upland habitats and vegetation in Ireland
Author :	Perrin, P.M.; O'Hanrahan, B.; Roche, J.R.; Barron, S.J.
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 :	A technical manual for monitoring white-clawed crayfish (*Austropotamobius pallipes*) in Irish lakes
Author :	Reynolds, J.; O'Connor, W.; O'Keeffe, C.; Lynn, D.
Series :	Irish Wildlife Manuals, No.45
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 :	Irish semi-natural grasslands survey 2007-2012
Author :	O'Neill, F.H.; Martin, J.R.; Devaney, F.M.; Perrin, P.M.
Series :	Irish Wildlife Manuals, No. 78
Year :	2013
Title :	National survey of limestone pavement and associated habitats in Ireland
Author :	Wilson, S.; Fernandez, F.
Series :	Irish Wildlife Manuals, No. 73
Year :	2013
Title :	The status of EU protected habitats and species in Ireland. Volume 2. Habitats assessments
Author :	NPWS
Series :	Conservation assessments
Year :	2014
Title :	Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland, Version 2.0
Author :	Perrin, P.M.; Barron, S.J.; Roche, J.R.; O'Hanrahan, B.
Series :	Irish Wildlife Manuals, No. 79
Year :	2015
Title :	Summary of findings from the survey of potential turloughs 2015
Author :	O'Neill, F.H.; Martin, J.R.
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 Lists series, NPWS
Year :	2017
Title :	Conservation objectives supporting document: Turloughs* and Rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation
Author :	O Connor, Á.
Series :	Conservation objectives supporting document
Year :	2018
Title :	The monitoring and assessment of three EU Habitats Directive Annex I grassland habitats
Author :	Martin, J.R.; O'Neill, F.H.; Daly, O.H.
Series :	Irish Wildlife Manuals, No. 102
Year :	2019
Title :	Checklists Protected and Threatened Species in Ireland 2019
Author :	Nelson, B.; Cummins, S.; Fay, L.; Jeffrey, R.; Kelly, S.; Kingston, N.; Lockhart, N.; Marnell, F.; Tierney, D.; Wyse Jackson, M.
Series :	Irish Wildlife Manuals, No. 116
Year :	2021
Title :	Checklists Protected and Threatened Species in Ireland. Version 2.1. 3 December 2021
Author :	Nelson, B.; Cummins, S.; Fay, L.; Jeffrey, R.; Kelly, S.; Kingston, N.; Lockhart, N.; Marnell, F.; Tierney, D.; Wyse Jackson, M.
Series :	Irish Wildlife Manuals, No. 116

Year :	2021
Title :	White-clawed Crayfish *Austropotamobius pallipes* survey in designated SACs in 2017
Author :	Gammell, M.; McFarlane, A.; Brady, D.; O'Brien, J.; Mirimin, L.; Graham, C.; Lally, H.; Minto, C.; O'Connor, I.
Series :	Irish Wildlife Manuals, No. 131

Other References

Year :	2009
Title :	Teagasc EPA soil and subsoils mapping project-final report. Volume II
Author :	Fealy, R. M.; Green, S.; Loftus, M.; Meehan, R.; Radford, T.; Cronin, C.; Bulfin, M.
Series :	Teagasc, Dublin
Year :	2014
Title :	Interim classification, harmonisation and generalisation of county soil maps of Ireland. Irish soil information system final technical report 1
Author :	Jones, R.J.A.; Hannam, J.A.; Palmer, R.C.; Truckell, I.G.; Creamer, R.E.; McDonald, E.
Series :	Report for the EPA prepared by Teagasc and Cranfield University
Year :	2018
Title :	Irish Vegetation Classification: Technical Progress Report No. 4
Author :	Perrin, P.
Series :	Report submitted to National Biodiversity Data Centre

Spatial data sources

Year :	2019
Title :	Turloughs Database 2019
GIS Operations :	Sites identified; clipped to SAC boundary
Used For :	3180 (map 2)
Year :	2013
Title :	Irish Semi-Natural Grassland Survey
GIS Operations :	Dataset clipped to the SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	6210 (map 3)
Year :	2006
Title :	Grassland Monitoring Project 2006
GIS Operations :	Dataset clipped to the SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	6210 (map 3)
Year :	2013
Title :	National Survey of Limestone Pavement and Associated Habitats in Ireland distribution data
GIS Operations :	Dataset clipped to the SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	6210 (map 3)
Year :	2021
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 :	1065, 1092 (maps 4, 5)

3180 Turloughs*

To maintain the favourable conservation condition of Turloughs* in Bricklieve Mountains and Keishcorran 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	Three turloughs are recorded in Bricklieve Mountains and Keishcorran SAC. The most northerly, known as Treanmacmurtagh or Treanscrabbagh, was visited during the 2015 Survey of Potential Turloughs (O'Neill and Martin, 2015; site 460). Another, Lough Gowra, was surveyed by Jim Ryan and Áine O Connor in 2007 (Ryan and O Connor, 2007) and by the Irish Semi-natural Grasslands Survey in 2010 (O'Neill et al., 2013; site 1519). The most southerly turlough lies south of Lough Gowra and is referred to by Goodwillie et al. (1992) as Greenan fen. Lough Gowra is of additional significance for being one of the most elevated turloughs in the country (112m), as well as being close to the northern edge of the range of the habitat (NPWS internal files). See map 2 for the point locations of the three turloughs. See O Connor (2017) for information on all attributes and targets
Habitat distribution	Occurrence	No decline, subject to natural processes	See map 2 for the point locations of the three turloughs recorded in the SAC
Hydrological regime	Various	Maintain appropriate natural hydrological regime necessary to support the natural structure and functioning of the habitat	Hydrological regime is sub-divided into more detailed attributes (groundwater contribution, flood duration, frequency, area and depth, and permanently flooded/wet areas) and targets in O Connor (2017). O'Neill and Martin (2015) visited Treanmacmurtagh turlough and noted that it was dry at the time of the visit (9th September 2015), with a swallow hole visible in the centre. No overland river or stream was noted running in or out, and it appears to fill from groundwater. Ryan and O Connor (2007) noted that Lough Gowra is fed by a surface stream from Lough Labe to the north, and possibly discharges via subterranean and overland routes to Greenan fen to the south. Goodwillie et al. (1992) noted a spring at the highest point of Greenan fen which feeds into a stand of tall wetland vegetation. The water flows westwards into a semi-permanent pool
Soil type	Hectares	Maintain variety, area and extent of soil types necessary to support turlough vegetation and other biota	O'Neill and Martin (2015) described the soil at Treanmacmurtagh turlough as mineral with marl. EPA soil maps classify the substrate here as blanket peat (Fealy et al., 2009) or poorly-drained peat (Jones et al., 2014). Ryan and O Connor (2007) described the soils around the Lough Gowra basin as muddy alluvium. EPA soil maps classify these soils as acidic, deep, well-drained mineral over Devonian sandstone till (Fealy et al., 2009) or moderately well-drained fine loamy drift with limestones (Jones et al., 2014). Just north of Lough Gowra, the soils are basic mineral in character (Fealy et al., 2009; Jones et al., 2014). The substrate at Greenan fen is classed as fen peat by Fealy et al. (2009) and as poorly-drained peat by Jones et al. (2014)
Soil nutrient status: nitrogen and phosphorus	N and P concentration in soil	Maintain nutrient status appropriate to soil types and vegetation communities	See O Connor (2017) for information on all attributes and targets
Physical structure: bare ground	Presence	Maintain sufficient wet bare ground, as appropriate	About halfway up Lough Gowra, Ryan and O Connor (2007) noted that *Ophioglossum vulgatum* and *Viola persicifolia* (listed as Near Threatened in Wyse Jackson et al., 2016) were extremely abundant on bare eroding soils. See O Connor (2017) for information on all attributes and targets

Chemical processes: calcium carbonate deposition and concentration	Calcium carbonate deposition rate/soil concentration	Maintain appropriate calcium carbonate deposition rate and concentration in soil	See O Connor (2017) for information on all attributes and targets
Active peat formation	Flood duration	Maintain active peat formation	Peat formation is noted in the soil maps of Fealy et al. (2009) and Jones et al. (2014) in the region of Treanmacmurtagh turlough and at Greenan fen. Goodwillie et al. (1992) noted that a few willows grow on an island of peat in the centre of the turlough, indicating that peat has been cut from this part of the site
Water quality	Various	Maintain appropriate water quality to support the natural structure and functioning of the habitat	Water quality is sub-divided into more detailed attributes (nutrients, colour, phytoplankton and epiphyton biomass) and targets in O Connor (2017). See also The European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2019. The natural trophic sensitivity of these three turloughs is not documented, but owing to their altitude and surrounding habitats, they are expected to be naturally highly oligotrophic and require ≤10µg/l TP to reach favourable condition. They should also have annual mean <2.5µg/l chlorophyll *a*, maximum ≤8µg/l chlorophyll *a*, and should maintain trace/absent epiphyton as algal mats (<2% cover)
Vegetation composition: area of vegetation communities	Hectares	Maintain area of sensitive and high conservation value vegetation communities/units	O'Neill and Martin (2015) described the vegetation at Treanmacmurtagh turlough as of low conservation value, with a dominant grass-forb community of *Agrostis stolonifera, Ranunculus repens* and *Potentilla anserina*. At Lough Gowra, Ryan and O Connor (2007) made the first record of *Chara vulgaris* var. *papillata* from a turlough, one of the few records of the taxon in Ireland, and described the northern shore of Lough Gowra as very species-rich, with *Rorippa islandica, Viola persicifolia, Ophioglossum vulgatum* and *Persicaria minor* among the species of note recorded. O'Neill et al. (2013) recorded a plot in wet grassland in the north-east shore of Lough Gowra which was assigned to the FE3B *Carex nigra - Potentilla anserina* fen/mire community of the Irish Vegetation Classification system (Perrin, 2018). Goodwillie et al. (1992) described the vegetation at Greenan fen as ranging from forb-rich to sedge-rich communities
Vegetation composition: vegetation zonation	Distribution	Maintain vegetation zonation/mosaic characteristic of the turlough	O'Neill and Martin (2015) noted that vegetation zonation is apparent at the Treanmacmurtagh turlough, with a grass-forb community (*Agrostis stolonifera-Ranunculus repens-Potentilla anserina*) giving way to a *Phalaris arundinacea-Carex* cf. *vesicaria* community, with *Polygonum amphibium* occurring in both communities. Ryan and O Connor (2007) recorded a transect in the south-east shore of Lough Gowra with five zones, from open water with aquatic macrophytes, to a *Potentilla anserina-Polygonum amphibium*-dominated zone, up to a less flooded zone dominated by *Potentilla anserina* and *Carex nigra*, through to a *Molinia caerulea* community and a drier zone with scrub species. At Greenan fen, Goodwillie et al. (1992) noted a progression from an aquatic macrophyte community to a tall-forb community through to a sedge-rush community

Vegetation structure: sward height	Centimetres	Maintain sward heights appropriate to the vegetation unit, and a variety of sward heights across the turlough	While the area has probably been grazed since prehistoric times and so is in equilibrium with the present prevailing land use, this equilibrium needs to be maintained, as a reduction in grazing pressure would result in the spread of scrub vegetation, and overgrazing would lead to poaching and loss in vegetation cover and diversity (NPWS internal files). O'Neill and Martin (2015) recorded heavy poaching by cattle in Treanmacmurtagh turlough. Ryan and O Connor (2007) also noted grazing and poaching in the northern half of the Lough Gowra basin, but the southern and western shores were ungrazed
Typical species	Presence	Maintain typical species within the turlough	Typical species is sub-divided into more detailed attributes (terrestrial, wetland and aquatic plants, invertebrates and birds) and targets in O Connor (2017). Lough Gowra has been described as an excellent quality turlough that supports good populations of several rare or uncommon plant species, including *Viola persicifoli*a (listed as Near Threatened in Wyse Jackson et al., 2016), as well as the charophyte *Chara vulgaris* var. *papillata*, which is the first record from a turlough, and one of the few for the taxon in Ireland (NPWS internal files). At Greenan fen, Goodwillie et al. (1992) noted the presence of Lapwing, a red-listed bird species (Nelson et al., 2019)
Fringing habitats: area	Hectares	Maintain marginal fringing habitats that support turlough vegetation, invertebrate, mammal and/or bird populations	The three turloughs at Bricklieve Mountains and Keishcorran SAC are of high conservation importance for their mosaic of Annex I and other habitats, particularly the transitions and gradations between habitats, e.g. between turloughs, wet and dry grassland, and scrub
Vegetation structure: turlough woodland	Species diversity and woodland structure	Maintain appropriate turlough woodland diversity and structure	A small amount of turlough woodland is recorded in conjunction with these turloughs. Scrub species were noted at Lough Gowra by Ryan and O Connor (2007), although these did not at the time form continuous blocks of woodland. Species recorded included *Salix cinerea* and *Crataegus monogyna*. At Greenan fen, Goodwillie et al. (1992) recorded a small block of *Salix viminalis* and *Salix cinerea* woodland on an island of peat

6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)

To restore the favourable conservation condition of Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) in Bricklieve Mountains and Keishcorran 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	Areas of the habitat have been mapped at Bricklieve Mountains and Keishcorran SAC most recently by the Irish Semi-natural Grassland Survey in 2010 (ISGS; O'Neill et al., 2013; sub-site codes 1517, 1519 and 1561), and also by the National Survey of Limestone Pavement in 2008 (NSLP; Wilson and Fernandez, 2013) and by the Grassland Monitoring Project in 2006 (GMP; Dwyer et al., 2007). These projects have mapped areas of the habitat around much of the periphery of this SAC, mostly in the lower and middle slopes. Overall, the area of the habitat recorded in the SAC is 41.42ha (see map 3); however, it is important to note that further unsurveyed areas of the habitat are likely to be present within the SAC
Habitat distribution	Occurrence	No decline, subject to natural processes	Distribution based on the ISGS (O'Neill et al., 2013), the NSLP (Wilson and Fernandez, 2008) and the GMP (Dwyer et al., 2007). See map 3. As noted above, the habitat is widely distributed in the SAC, being recorded from lower and middles slopes around much of the periphery. It is important to note that further unsurveyed areas of the habitat may be present within the SAC
Vegetation composition: positive indicator species	Number at a representative number of 2m x 2m monitoring stops; within 20m surrounding area of monitoring stops	At least 7 positive indicator species present in monitoring stop or, if 5–6 present in stop, additional species within 20m of stop; this includes at least two 'high quality' positive indicator species present in stop or within 20m of stop	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018), where the lists of positive indicator species, including high quality indicators, are also presented. A small number of additional positive indicators for upland examples of this habitat are also provided (Martin et al., 2018). These documents should be consulted for further details. Two of the three areas (ISGS sites 1517 and 1561) surveyed by the ISGS (O'Neill et al., 2013) had favourable Structure and Functions, indicating a healthy and well-managed habitat, supporting the expected range of species. Some areas of habitat within the SAC may be suffering the effects of fertiliser input or agricultural improvement, with reduced species diversity noted in some areas
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Negative indicator species collectively not more than 20% cover, with cover of an individual species not more than 10%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018), where the list of negative indicator species is presented
Vegetation composition: non-native species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of non-native species not more than 1%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)

Vegetation composition: woody species and bracken	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of woody species (except certain listed species) and bracken (*Pteridium aquilinum*) not more than 5%	Woody species that can occur above 5% cover are juniper (*Juniperus communis*), burnet rose (*Rosa spinosissima*), mountain avens (*Dryas octopetala*) and hoary rock-rose (*Helianthemum oelandicum*). However, cover of these species above 25% may indicate transition to another Annex I habitat such as Alpine and Boreal heaths (4060) or *Juniperus communis* formations (5130). Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018). This SAC also supports significant areas of dry and calcareous heath and, therefore, there are areas where encroachment of heathy species is occurring into calcareous grassland. Gorse (*Ulex europaeus*) is known to be an issue in some areas
Vegetation structure: broadleaf herb:grass ratio	Percentage at a representative number of 2m x 2m monitoring stops	Broadleaf herb component of vegetation between 40% and 90%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018). Broadleaf herb component of vegetation between 30% and 40% may be allowed to pass on expert judgement (Martin et al., 2018)
Vegetation structure: sward height	Percentage at a representative number of 2m x 2m monitoring stops	At least 30% of sward between 5cm and 40cm tall	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Vegetation structure: litter	Percentage cover at a representative number of 2m x 2m monitoring stops	Litter cover not more than 25%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Physical structure: bare soil	Percentage cover at a representative number of 2m x 2m monitoring stops	Not more than 10% bare soil	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Physical structure: grazing or disturbance	Area in local vicinity of a representative number of monitoring stops	Area of the habitat showing signs of serious grazing or disturbance less than 20m²	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)

6510 Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)

To restore the favourable conservation condition of Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis) in Bricklieve Mountains and Keishcorran 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	Lowland hay meadows has not been recently surveyed at Bricklieve Mountains and Keishcorran SAC and thus the total area of habitat in the SAC is currently unknown. It has been noted that the habitat generally occurs in small isolated pockets on valley floors and, in some instances, where drainage is impeded (NPWS internal files). It is suggested that at least four widely dispersed areas across the SAC may support this habitat
Habitat distribution	Occurrence	No decline, subject to natural processes	See the notes for habitat area above
Vegetation composition: positive indicator species	Number at a representative number of 2m x 2m monitoring stops; within 20m surrounding area of monitoring stop	At least 7 positive indicator species present in monitoring stop or, if 5–6 present in stop, additional species within 20m of stop; this includes at least one 'high quality' species present in stop or within 20m of stop	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018), where the lists of positive indicator species, including high quality species, are also presented. One additional indicator for wetter examples of this habitat is proposed in Martin et al. (2018), i.e. sharp-flowered rush (*Juncus acitiflorus*). These documents should be consulted for further details
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Negative indicator species collectively not more than 20% cover, with cover by an individual species not more than 10%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018), where the list of negative indicator species is also presented
Vegetation composition: non-native species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of non-native species not more than 1%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Vegetation composition: woody species and bracken	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of woody species and bracken (*Pteridium aquilinum*) not more than 5%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Vegetation structure: broadleaf herb:grass ratio	Percentage at a representative number of 2m x 2m monitoring stops	Broadleaf herb component of vegetation between 40% and 90%	Attribute and target based on O'Neill et al. (2013). A marginal failure result (35-39%) in the percentage broadleaf herb component may be allowed to pass on expert judgement (Martin et al., 2018)
Vegetation structure: sward height	Percentage at a representative number of 2m x 2m monitoring stops	At least 50% of sward between 10cm and 50cm tall	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Vegetation structure: litter	Percentage cover at a representative number of 2m x 2m monitoring stops	Litter cover not more than 25%	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Physical structure: bare soil	Percentage cover at a representative number of 2m x 2m monitoring stops	Not more than 5% bare soil	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)
Physical structure: disturbance	Area in local vicinity of a representative number of monitoring stops	Area of the habitat showing signs of serious grazing or other disturbance less than 20m²	Attribute and target based on O'Neill et al. (2013) and Martin et al. (2018)

8120 Calcareous and calcshist screes of the montane to alpine levels (Thlaspietea rotundifolii)

To restore the favourable conservation condition of Calcareous and calcshist screes of the montane to alpine levels (Thlaspietea rotundifolii) in Bricklieve Mountains and Keishcorran SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	The total current area of Calcareous and calcshist screes of the montane to alpine levels (Thlaspietea rotundifolii) in Bricklieve Mountains and Keishcorran SAC is unknown. Parts of the habitat in the SAC was surveyed as part of the Scoping Study and Pilot Survey of Upland Habitats in Ireland (Perrin et al., 2009). Calcareous scree is documented to occur on the steep slopes and at the bases of some of the many limestone cliff terraces that run though the SAC. The habitat grades into calcareous rocky slopes and dry heath in places (NPWS, 2006; NPWS internal files)
Habitat distribution	Occurrence	No decline from current distribution, 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 pH and soil 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 in NPWS (2013)
Vegetation composition: positive indicator fern and *Saxifraga* species	Number of species in local vicinity of a representative number of 2m x 2m monitoring stops	Number of ferns and *Saxifraga* indicators at least one	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented. Positive indicator species recorded in the habitat in this SAC include green spleenwort (*Asplenium viride*) (NPWS, 2006)
Vegetation composition: positive indicator species	Number of species in local vicinity of a representative number of monitoring stops	Number of positive indicator species at least three	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented. Positive indicator species recorded in the habitat in this SAC include green spleenwort (*Asplenium viride*). Other species recorded in the habitat in the SAC include mossy saxifrage (*Saxifraga hypnoides*), hoary whitlowgrass (*Draba incana*), Welsh poppy (*Meconopsis cambrica*) and the bryophytes *Fissidens gracilifolius, Neckera crispa* and *Mnium marginatum* var. *marginatum* (NPWS, 2006)
Vegetation composition: grass species and dwarf shrubs	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of dwarf shrubs and grasses, excluding blue moor-grass (*Sesleria caerulea*) collectively less than 20%	Attribute and target based on Perrin et al. (2014). A high cover of grasses or dwarf shrubs in this habitat would indicate that the scree is becoming less exposed and succeeding to another habitat
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Proportion of vegetation composed 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. The negative indicator species common nettle (*Urtica dioica*) was present in one monitoring stop recorded by Perrin et al. (2009), but at less than 1% cover; it was occasional at the edge of another monitoring stop (Perrin et al., 2009)
Vegetation composition: non-native species	Percentage cover at a representative number of 2m x 2m monitoring stops	Proportion of vegetation composed 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: bracken, native trees and scrub	Percentage cover in local vicinity of a representative number of monitoring stops	Total cover of bracken (*Pteridium aquilinum*), native trees and scrub less than 25%	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, and high cover of native trees and shrubs would indicate that the habitat may be succeeding towards scrub or woodland due to lack of grazing. One monitoring stop recorded by Perrin et al. (2009) in the habitat in the SAC was in an ungrazed area that showed signs of encroachment by mosses and hazel (*Corylus avellana*)
Vegetation structure: grazing and browsing	Percentage of leaves/ shoots grazed/browsed at a representative number of 2m x 2m monitoring stops	Live leaves of forbs and shoots of dwarf shrubs showing signs of grazing or browsing collectively less than 50%	Attribute and target based on Perrin et al. (2014)
Physical structure: disturbance	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Ground disturbed by human and animal paths, scree running, vehicles less than 10%	Attribute and target based on Perrin et al. (2014). Disturbance can include hoof marks, wallows, human footprints, vehicle and machinery tracks and also scree running. Scree is subject to naturally recurrent disturbance, but high levels of disturbance may impact on vegetation cover and diversity
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.; see Nelson et al., 2019, 2021)

1065 Marsh Fritillary *Euphydryas aurinia*

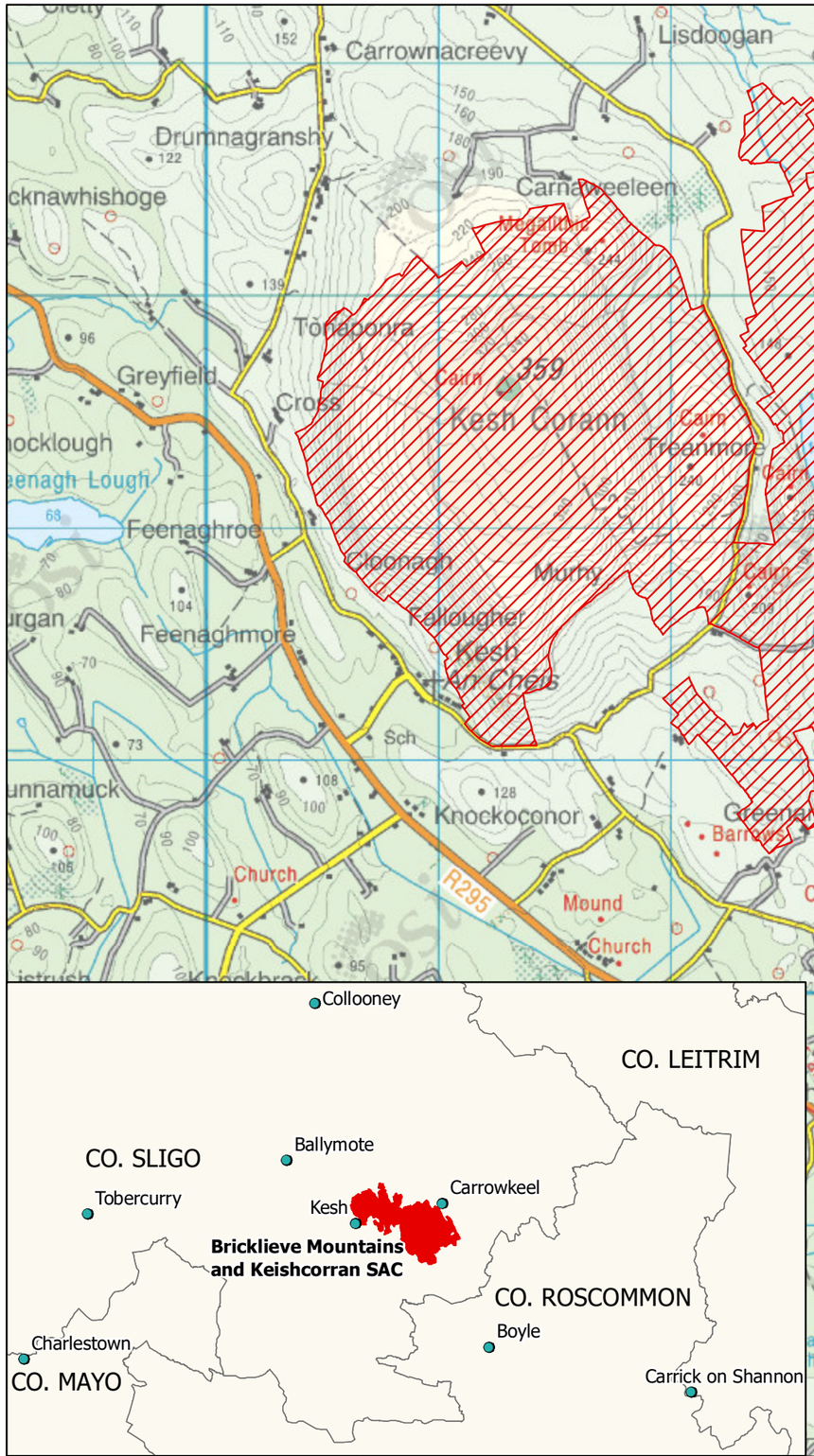
To maintain the favourable conservation condition of Marsh Fritillary (*Euphydryas aurinia*) in Bricklieve Mountains and Keishcorran SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: occupied 1km grid squares	Number	No decline, subject to natural processes	There are confirmed records of marsh fritillary (*Euphydryas aurinia*) from one 1km grid square in Bricklieve Mountains and Keishcorran SAC: G7211. See map 4
Proof of breeding: larval webs	Number at a representative number of sub-sites	Proof of breeding, confirmed by detection of webs	The presence of the larval webs of marsh fritillary (*Euphydryas aurinia*) provides best proof that the habitat is suitable for the species. Proof of breeding should be established at least one year in six
Potential habitat: area	Hectares	Area of potential habitat, stable or increasing, subject to natural processes	Suitable potential habitat for marsh fritillary (*Euphydryas aurinia*) is defined as areas of vegetation where devil's-bit scabious (*Succisa pratensis*) is present, with mean height less than 50cm and with less than 10% cover of scrub more than 1m high. There is no figure available for the area of suitable habitat in the SAC

1092 White-clawed Crayfish *Austropotamobius pallipes*

To maintain the favourable conservation condition of White-clawed Crayfish (*Austropotamobius pallipes*) in Bricklieve Mountains and Keishcorran SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Number of occupied 1km squares	No reduction from baseline. See map 5	Within Bricklieve Mountains and Keishcorran SAC white-clawed crayfish (*Austropotamobius pallipes*) is found in Lough Labe. The species was reported from Lough Labe by both O'Connor et al. (2009) and Gammell et al. (2021). The lake is within a single 1km grid square (G7212) and no other occupied 1km squares are known from this SAC. Habitat for the species is limited, the lake south of Lough Labe, Lough Gowra, is a turlough and, therefore, is not suitable habitat. The species may occur in the stream linking these two waterbodies, but this needs to be confirmed
Population structure: recruitment	Percentage occurrence of juveniles and females with eggs	Juveniles and females with eggs in at least 50% of positive samples taken at appropriate time and methodology	See Reynolds et al. (2010) for further details. Gammell et al. (2021) found a high percentage of juveniles in samples from Lough Labe
Population size	Catch per unit effort	No reduction from baseline of 1.0	The catch per unit effort (CPUE) figures are based on the figures in O'Connor et al. (2009) and Gammell et al. (2021). Both surveys used hand searching, but the value in O'Connor et al. (2009) was less than 1, whereas it was more than 6 in Gammell et al. (2021). A baseline of 1 is set across the range of techniques, but this may be refined with more detailed assessment of the stock. Gammell et al. (2021) gave a population abundance grade of very high
Negative indicator species	Occurrence	No non-indigenous crayfish species	Non-indigenous crayfish species (NICS) are identified as a major direct threat to the white-clawed crayfish and as a disease vector, in particular crayfish plague (*Aphanomyces astaci*), which is fatal to white-clawed crayfish. The possession, import and intentional release of five species of invasive alien crayfish is banned by Statutory Instrument No. 354/2018
Disease	Occurrence	No instances of disease	Crayfish plague, caused by the water-borne mould *Aphanomyces astaci*, is identified as major threat to the species in Ireland. Instances of crayfish plague have occurred in Ireland since 2015 causing local extinctions. There have been no confirmed or suspected outbreaks in this SAC
Water quality	Water chemistry measures	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of the habitat	White-clawed crayfish are not considered very sensitive of water quality but are intolerant of low pH and poorest water quality, and lack of calcareous influence. Baseline levels need to be determined for Lough Labe as it is monitored for water quality by the Environmental Protection Agency (EPA)
Habitat quality: heterogeneity	Occurrence of positive habitat features	No decline from the baseline	White-clawed crayfish need high habitat heterogeneity. Larger crayfish must have stones to hide under, or an earthen bank in which to burrow. Hatchlings shelter in vegetation, gravel and among fine tree roots. Smaller crayfish are typically found among weed and debris in shallow water. Larger juveniles in particular may also be found among cobbles and detritus such as leaf litter. These conditions and habitat features must be available on the whole length of occupied habitat. Gammell et al. (2021) scored the habitat heterogeneity and, following this methodology, the baseline score of 0.45 is set



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Department of Housing, Local Government and Heritage

MAP 1:
BRICKLIEVE MOUNTAINS AND KEISHCORRAN SAC
CONSERVATION OBJECTIVES
SAC DESIGNATION

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

SITE CODE:
SAC 001656; version 3.01
CO. SLIGO

0 0.25 0.5 1 Kilometre

N

Date: December 2021

Treanmacmurtagh (Treanscabbagh)

Lough Gowra

Greenan/Tully

Legend

3180 * Turloughs

Bricklieve Mountains and Keishcorran SAC 001656

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MAP 2:
BRICKLIEVE MOUNTAINS AND KEISHCORRAN SAC
CONSERVATION OBJECTIVES
TURLOUGHS

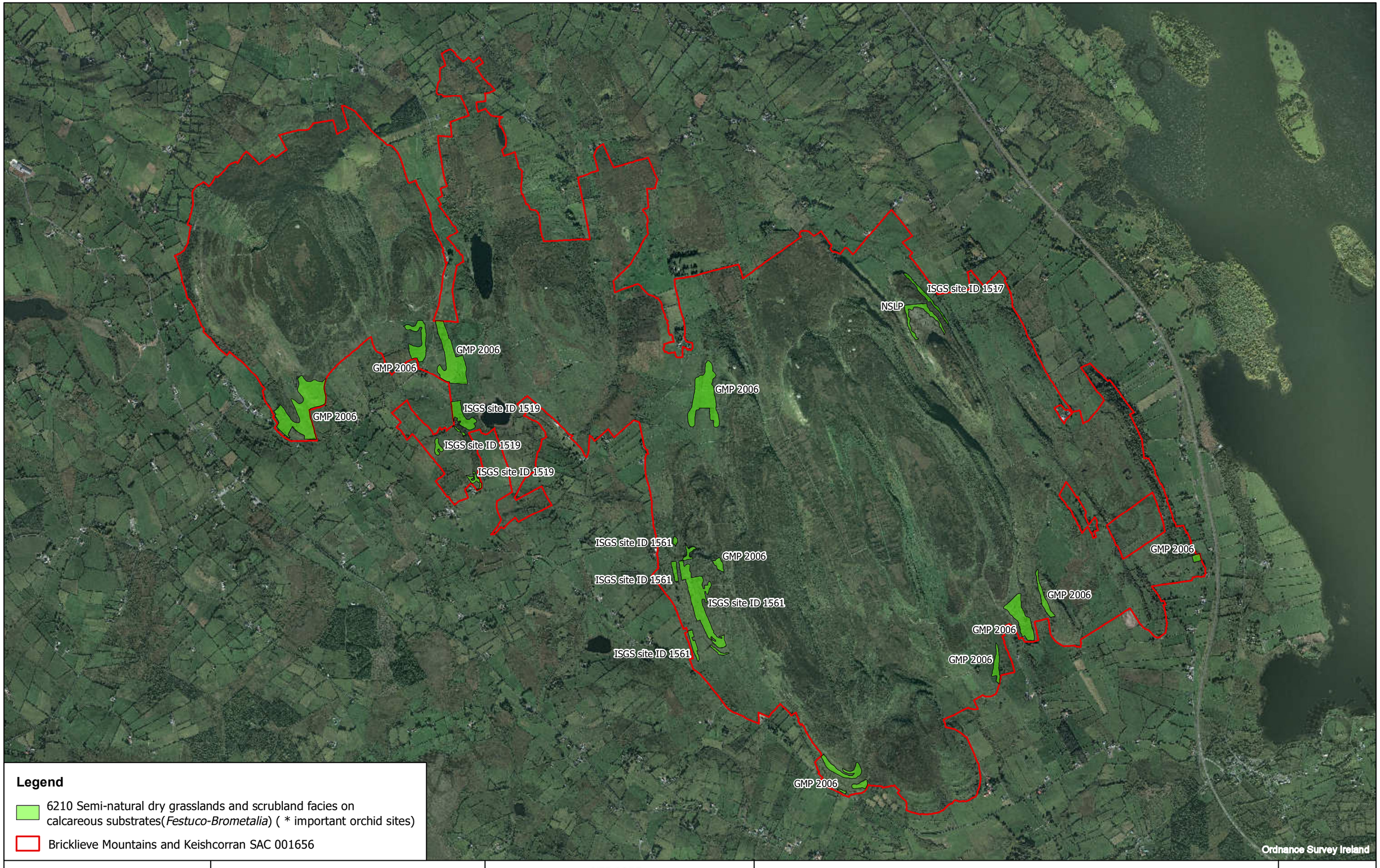
Map to be read in conjunction with the NPWS Conservation Objectives Document

SITE CODE:
SAC 001656; version 3.01
CO. SLIGO

0 0.25 0.5 1 Kilometre

N

Date: December 2021



Legend

6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates(*Festuco-Brometalia*) (* important orchid sites)

Bricklieve Mountains and Keishcorran SAC 001656

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MAP 3:
BRICKLIEVE MOUNTAINS AND KEISHCORRAN SAC
CONSERVATION OBJECTIVES
GRASSLAND HABITATS

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

SITE CODE:
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CO. SLIGO

0 0.25 0.5 1 Kilometre

N

Date: December 2021

Legend

1065 Marsh fritillary *Euphydryas aurinia* 1km grid square

Bricklieve Mountains and Keishcorran SAC 001656

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MAP 4:
BRICKLIEVE MOUNTAINS AND KEISHCORRAN SAC
CONSERVATION OBJECTIVES
MARSH FRITILLARY

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

SITE CODE:
SAC 001656; version 3.01
CO. SLIGO

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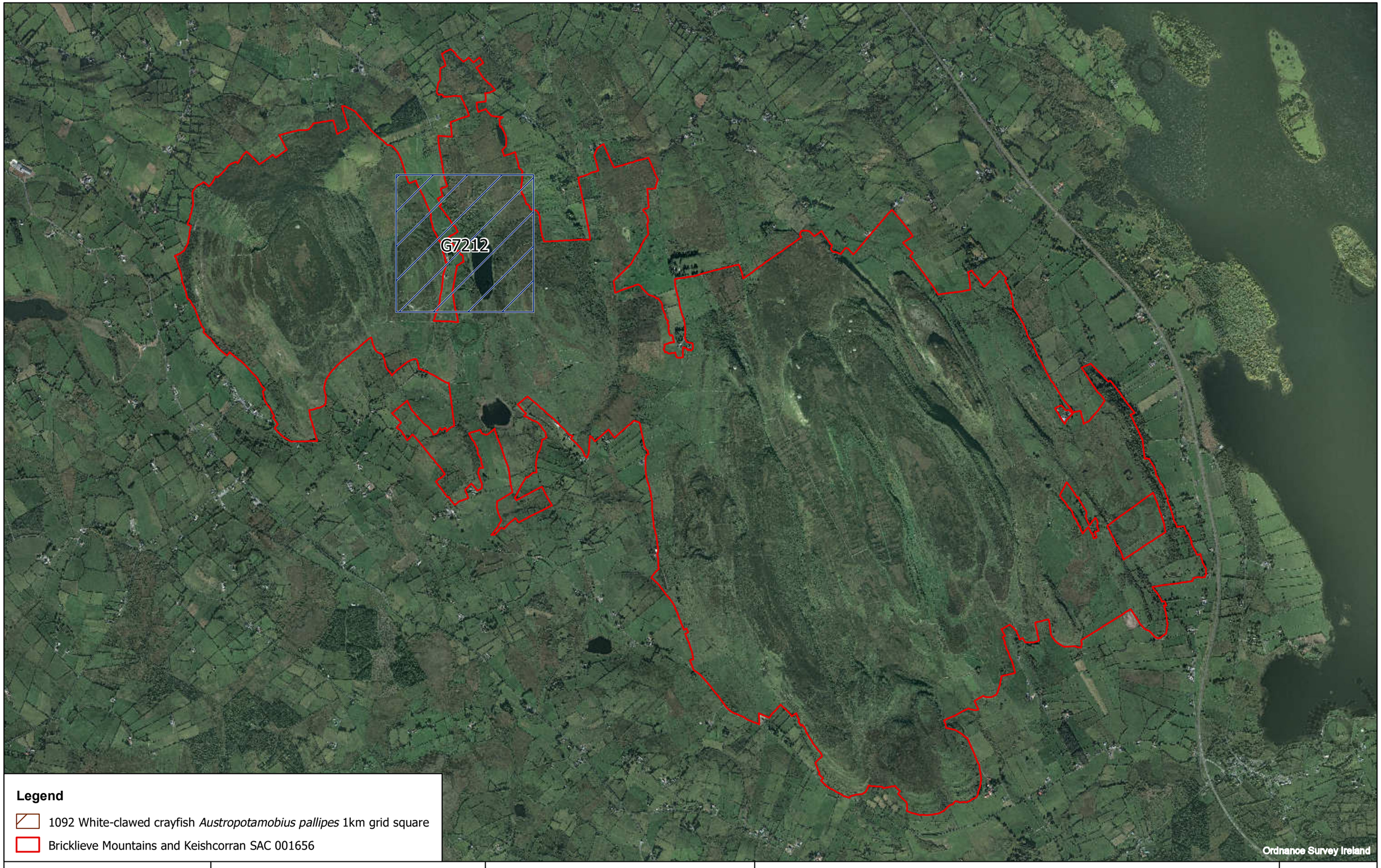
Date: December 2021



Legend

1092 White-clawed crayfish *Austropotamobius pallipes* 1km grid square

Bricklieve Mountains and Keishcorran SAC 001656

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MAP 5:
BRICKLIEVE MOUNTAINS AND KEISHCORRAN SAC
CONSERVATION OBJECTIVES
WHITE-CLAWED CRAYFISH

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

SITE CODE:
SAC 001656; version 3.01
CO. SLIGO

0 0.25 0.5 1 Kilometre

N

Date: December 2021