

National Parks and Wildlife Service

Conservation Objectives Series

Lisduff Fen SAC 002147



An Roinn Cultúir,
Oidhreachta agus Gaeltachta
Department of Culture,
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*

002147 Lisduff Fen SAC

1013 Geyer's Whorl Snail *Vertigo geyeri*

7220 Petrifying springs with tufa formation (Cratoneurion)E

7230 Alkaline fens

Supporting documents, relevant reports & publications

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

NPWS Documents

| | |
|-----------------|--|
| Year : | 2009 |
| Title : | Irish 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 : | 2010 |
| Title : | Red List 4 - Butterflies |
| Author : | Regan, E.C.; Nelson, B.; Aldwell, B.; Bertrand, C.; Bond, K.; Harding, J.; Nash, D.; Nixon, D.; Wilson, C.J. |
| Series : | Red List |
| Year : | 2011 |
| Title : | Monitoring and condition assessment of populations of <i>Vertigo geyeri</i> , <i>Vertigo angustior</i> and <i>Vertigo moulinsiana</i> in Ireland |
| Author : | Moorkens, E.; Killeen, I. |
| Series : | Irish Wildlife Manuals, No. 55 |
| Year : | 2012 |
| Title : | Ireland Red List No. 8: Bryophytes |
| Author : | Lockhart, N.; Hodgetts, N.; Holyoak, D. |
| Series : | Ireland Red Lists series, NPWS |
| Year : | 2013 |
| Title : | Conservation status assessment for petrifying springs |
| Author : | Lyons, M.D.; Kelly, D.L. |
| Series : | Unpublished report to NPWS |
| Year : | 2013 |
| Title : | The status of EU protected habitats and species in Ireland. Volume 2. Habitats assessments |
| Author : | NPWS |
| Series : | Conservation assessments |
| Year : | 2013 |
| Title : | Conservation status assessments for three fen habitat types - 7230, 7210 and 7140 |
| Author : | Kimberley, S. |
| Series : | Unpublished report to NPWS |
| 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 : | 2016 |
| Title : | Monitoring guidelines for the assessment of petrifying springs in Ireland |
| Author : | Lyons, M.D.; Kelly, D.L. |
| Series : | Irish Wildlife Manuals, No. 94 |
| Year : | 2016 |
| Title : | Ireland Red List No. 10: Vascular Plants |
| Author : | Wyse Jackson, M.; FitzPatrick, Ú.; Cole, E.; Jebb, M.; McFerran, D.; Sheehy Skeffington, M.; Wright, M. |
| Series : | Ireland Red List Series, NPWS |

Year : in prep.
Title : Monitoring of sites and habitat for three Annex II species of whorl snail (*Vertigo*). Volume 1: Final report
Author : Long, M.P.; Brophy, J.T.
Series : Irish Wildlife Manuals, No. 104

Other References

Year : 2004
Title : Common Standards Monitoring guidance for lowland wetland habitats
Author : JNCC
Series : Joint Nature Conservation Committee, Peterborough

Year : 2010
Title : Water Quality in Ireland 2007-2009
Author : McGarrigle, M.; Lucey, J.; Ó Cinnéide, M.
Series : Environmental Protection Agency, Wexford

Year : 2011
Title : Review and revision of empirical critical loads and dose-response relationships. Proceedings of an expert workshop, Noordwijkerhout, 23-25 June 2010
Author : Bobbink, R.; Hettelingh, J.P.
Series : RIVM report 680359002, Coordination Centre for Effects, National Institute for Public Health and the Environment (RIVM)

Year : 2015
Title : The flora and conservation status of petrifying springs in Ireland
Author : Lyons, M.D.
Series : Unpublished Ph.D. Thesis, Trinity College Dublin

Spatial data sources

| | |
|-------------------------|--|
| Year : | 2016 |
| Title : | point file associated with Lyons (2015) |
| GIS Operations : | Dataset created from spatial references; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising |
| Used For : | 7220 (map 2) |
| <hr/> | |
| Year : | 2018 |
| 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 : | 1013 (map 3) |
| <hr/> | |

Conservation Objectives for : Lisduff Fen SAC [002147]

7220 Petrifying springs with tufa formation (Cratoneurion)

To restore the favourable conservation condition of Petrifying springs with tufa formation (Cratoneurion)* in Lisduff Fen SAC, which is defined by the following list of attributes and targets:

| Attribute | Measure | Target | Notes |
|--|---------------------------|---|---|
| Habitat area | Square metres | Area stable or increasing, subject to natural processes | In Lisduff Fen SAC, Petrifying springs with tufa formation (Cratoneurion)* occur in calcareous seepages within the Annex I habitat Alkaline fens (habitat code 7230) and in association with a calcareous stream that flows into the southern end of the SAC (NPWS internal files). An area of 500m ² (0.05ha) of the habitat was recorded by Lyons (2015) in the sub-site Lisduff Fen (site ID: PS078) (see map 2) which was described by Lyons (2015) as an extensive fen with localised tufa-forming seepages with paludal tufa. The area figure is a minimum estimate of the habitat in the SAC. It is important to note that further unsurveyed areas may be present within the SAC |
| Habitat distribution | Occurrence | No decline, subject to natural processes. See map 2 for point location | Point distribution is based on Lyons (2015). Note that further unsurveyed areas may be present within the SAC. Lyons and Kelly (2016) describe eight plant communities of Irish petrifying springs based on relevé data. The habitat in the Lisduff Fen sub-site (PS078) falls mainly into the <i>Schoenus nigricans</i> springs group, with the <i>Carex lepidocarpa</i> small sedge springs group also present (Lyons, 2015). Further information on the vegetation communities associated with the habitat is presented in Lyons and Kelly (2016) |
| Hydrological regime: height of water table; water flow | Metres; metres per second | Maintain appropriate hydrological regimes | Petrifying springs rely on permanent irrigation, usually from upwelling groundwater sources or seepage sources (Lyons and Kelly, 2013). Water flow should not be altered anthropogenically. See Lyons and Kelly (2016) for further details |
| Water quality - nitrate level | mg/l | No increase from baseline nitrate level and less than 10mg/l | Target based on data from McGarrigle et al. (2010). See Lyons and Kelly (2016) for further details |
| Water quality - phosphate level | µg/l | No increase from baseline phosphate level and less than 15µg/l | Based on data from Lyons (2015). See Lyons and Kelly (2016) for further details. A high phosphate level (59µg/l) was recorded at the Lisduff Fen sub-site (PS078) by Lyons (2015) |
| Vegetation composition: positive indicator species | Number per spring | At least three positive/high quality indicator species as listed in Lyons and Kelly (2016) and no loss from baseline number | Based on Lyons and Kelly (2016), where the lists of positive and high quality indicator species are presented. Positive indicator species recorded in the habitat in the Lisduff Fen sub-site (PS078) by Lyons (2015) include long-stalked yellow-sedge (<i>Carex lepidocarpa</i>), carnation sedge (<i>C. panicea</i>), dioecious sedge (<i>C. dioica</i>), broad-leaved cottongrass (<i>Eriophorum latifolium</i>), black bog-rush (<i>Schoenus nigricans</i>), common butterwort (<i>Pinguicula vulgaris</i>), the stonewort <i>Chara vulgaris</i> and the bryophytes <i>Aneura pinguis</i> , <i>Campylium stellatum</i> , <i>Fissidens adianthoides</i> , <i>Palustriella commutata</i> , <i>P. falcata</i> , <i>Philonotis calcarea</i> , <i>Scorpidium cossonii</i> and <i>S. scorpioides</i> |

| | | | |
|--|---------------------|--|--|
| Vegetation composition: negative indicator species | Cover (DAFOR scale) | Potentially negative indicator species should not be Dominant or Abundant; invasive species should be absent | Based on Lyons and Kelly (2016), where the lists of potentially negative herbaceous, bryophyte (and alga) and woody species are presented. See Lyons and Kelly (2016) also for details on potentially invasive species, including sycamore (<i>Acer pseudoplatanus</i>) which is invasive in non-wooded springs and a negative indicator species in wooded springs. If two or more potentially negative bryophyte species are present, and if at least two are Frequent, or at least one is Abundant, then the habitat fails for this attribute. See Lyons and Kelly (2016) for further details. The potentially negative bryophyte species <i>Cratoneuron filicinum</i> and the potentially negative woody species grey willow (<i>Salix cinerea</i>) were recorded in the Lisduff Fen sub-site (PS078), but neither species was Dominant or Abundant (Lyons, 2015) |
| Vegetation structure: sward height | Centimetres | Field layer height between 10cm and 50cm (except for bryophyte-dominated ground <10cm) | See Lyons and Kelly (2016) for further details |
| Physical structure: trampling/dung | Cover (DAFOR scale) | Cover should not be Dominant or Abundant | See Lyons and Kelly (2016) for further details |

Conservation Objectives for : Lisduff Fen SAC [002147]

7230 Alkaline fens

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

| Attribute | Measure | Target | Notes |
|--|--|--|--|
| Habitat area | Hectares | Area stable or increasing, subject to natural processes | Alkaline fen has not been mapped in detail for Lisduff Fen SAC and thus the total current area of the qualifying habitat in the SAC is unknown. The majority of the SAC comprises very wet alkaline fen. The fen vegetation grades into vegetation more typical of raised bog in the north central section, and scrub woodland occurs in the north-east area of the SAC. On the western side, the fen merges into wet grassland which is improved to varying degrees (NPWS internal files). Petrifying springs with tufa formation (Cratoneurion) (habitat code 7220*) occur within calcareous seepages in the habitat in the SAC. See also the conservation objective for habitat 7220 in this volume |
| 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 in NPWS (2013). See also Bobbink and Hettelingh (2011) |
| Ecosystem function: peat formation | Percentage cover of peat-forming vegetation and water table levels | Maintain active peat formation, where appropriate | In order for peat to form, water levels need to be slightly below or above the soil surface for c.90% of the time |
| Ecosystem function: hydrology - groundwater levels | Water levels (centimetres); duration of levels; hydraulic gradients | Maintain, or where necessary restore, appropriate natural hydrological regimes necessary to support the natural structure and functioning of the habitat | Fen habitats require high groundwater levels (i.e. water levels at or above the ground surface) for a large proportion of the calendar year (i.e. duration of mean groundwater level). Fen groundwater levels are controlled by regional groundwater levels in the contributing catchment area (which sustain the hydraulic gradients of the fen groundwater table). Regional abstraction of groundwater may affect fen groundwater levels |
| Ecosystem function: hydrology - surface water flow | Drain density and form | Maintain, or where necessary restore, as close as possible to natural or semi-natural drainage conditions | Drainage, either within or surrounding the fen habitat, can result in the drawdown of the alkaline fen groundwater table. The depth, geometry and density of drainage (hydromorphology) will indicate the scale and impact on fen hydrology. Drainage can result in loss of characteristic species and transition to drier habitats |
| Ecosystem function: water quality | Water chemistry measures | Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of the habitat | Fens receive natural levels of nutrients (e.g. iron, magnesium and calcium) from water sources. However, they are generally poor in nitrogen and phosphorus, with the latter tending to be the limiting nutrient under natural conditions. Water supply should also be relatively calcium-rich. In this SAC, a calcareous stream flows into the fen from the south. Calcareous seepages also occur within the habitat (NPWS internal files) |
| Community diversity | Abundance of variety of vegetation communities | Maintain variety of vegetation communities, subject to natural processes | The entire diversity of alkaline fen vegetation communities present in the SAC is currently unknown. Information on the vegetation communities associated with alkaline fens in the uplands is presented in Perrin et al. (2014) |

| | | | |
|---|--|--|---|
| Vegetation composition: brown mosses | Percentage cover at a representative number of 2m x 2m monitoring stops | Maintain adequate cover of typical brown moss species | Typical brown moss species include <i>Bryum pseudotriquetrum</i> , <i>Calliergonella cuspidata</i> , <i>Calliergon giganteum</i> , <i>Campylium stellatum</i> , <i>Cratoneuron filicinum</i> , <i>Ctenidium molluscum</i> , <i>Fissidens adianthoides</i> , <i>Palustriella commutata</i> , <i>Scorpidium cossonii</i> , <i>S. revolvens</i> and <i>S. scorpioides</i> . In this SAC, brown mosses including <i>Calliergonella cuspidata</i> , <i>Campylium stellatum</i> and <i>Scorpidium revolvens</i> have been recorded in the habitat (Moorkens and Killeen, 2011; NPWS internal files) |
| Vegetation composition: typical vascular plants | Percentage cover at a representative number of 2m x 2m monitoring stops | Maintain adequate cover of typical vascular plant species | For lists of typical plant species see the Article 17 conservation status assessment for alkaline fens (NPWS, 2013) and the fen habitats supporting document (Kimberley, 2013). See also Perrin et al. (2014) and JNCC (2004). Typical species recorded in the habitat in the SAC include black bog-rush (<i>Schoenus nigricans</i>), slender sedge (<i>Carex demissa</i>), long-stalked yellow-sedge (<i>C. lepidocarpa</i>), few-flowered spike-rush (<i>Eleocharis quinqueflora</i>), blunt-flowered rush (<i>Juncus subnodulosus</i>), marsh pennywort (<i>Hydrocotyle vulgaris</i>), water mint (<i>Mentha aquatica</i>), lesser spearwort (<i>Ranunculus flammula</i>), meadow thistle (<i>Cirsium dissectum</i>) and grass-of-parnassus (<i>Parnassia palustris</i>) (Moorkens and Killeen, 2011; NPWS internal files) |
| Vegetation composition: native negative indicator species | Percentage cover at a representative number of 2m x 2m monitoring stops | Cover of native negative indicator species at insignificant levels | Negative indicators include species not characteristic of the habitat and species indicative of undesirable activities such as overgrazing, undergrazing, nutrient enrichment, agricultural improvement or impacts on hydrology. Native negative indicators may include graminoids such as reed canary-grass (<i>Phalaris arundinacea</i>) and reed sweet-grass (<i>Glyceria maxima</i>), tall herbs such as great willowherb (<i>Epilobium hirsutum</i>), bracken (<i>Pteridium aquilinum</i>), bramble (<i>Rubus fruticosus</i>) and common nettle (<i>Urtica dioica</i>), and bryophytes such as <i>Brachythecium rutabulum</i> and <i>Kindbergia praelonga</i> |
| 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 10% | Attribute and target based on Perrin et al. (2014). Scrub and trees will tend to invade if fen conditions become drier |
| Vegetation composition: soft rush and common reed cover | Percentage cover in local vicinity of a representative number of monitoring stops | Total cover of soft rush (<i>Juncus effusus</i>) and common reed (<i>Phragmites australis</i>) less than 10% | Attribute and target based on Perrin et al. (2014) |
| Vegetation structure: litter | Percentage cover in local vicinity of a representative number of monitoring stops | Total cover of litter not more than 25% | Attribute and target based on JNCC (2004). More than 25% litter cover may indicate insufficient removal of biomass by grazing and/or undesirable water table levels |
| Physical structure: disturbed bare ground | Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops | Cover of disturbed bare ground not more than 10% | Attribute and target based on Perrin et al. (2014). While grazing may be appropriate in this habitat, excessive areas of disturbed bare ground may develop due to unsuitable grazing regimes. Disturbance can include hoof marks, wallows, human footprints, vehicle and machinery tracks. Excessive disturbance can result in loss of characteristic species and presage erosion for peatlands |
| Physical structure: tufa formations | Percentage cover in local vicinity of a representative number of monitoring stops | Disturbed proportion of vegetation cover where tufa is present is less than 1% | Attribute and target based on Perrin et al. (2014) |

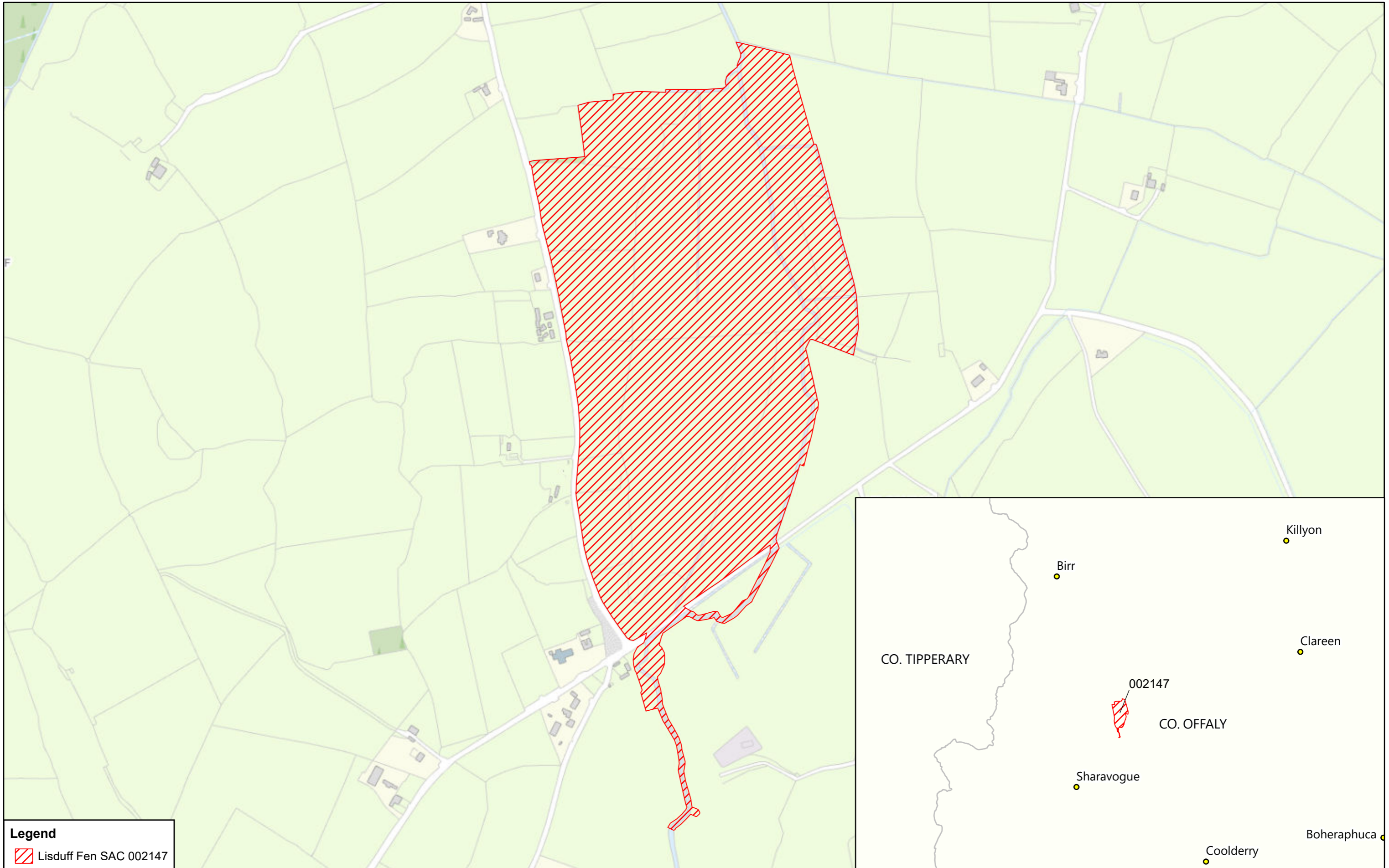
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|-------------------------------------|--------------------------------|--|--|
| Indicators of local distinctiveness | Occurrence and population size | No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat; maintain features of local distinctiveness, subject to natural processes | 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.). Calcareous springs with tufa deposits occur in association with the alkaline fen in the SAC. Red Listed molluscs recorded from fen habitat in the SAC include the Endangered <i>Vertigo moulinsiana</i> and the Vulnerable species <i>Vertigo geyeri</i> (listed on Annex II), <i>Vertigo antivertigo</i> and <i>Vallonia pulchella</i> , as well as the Near Threatened <i>Vertigo substriata</i> (Byrne et al., 2009; Moorkens and Killeen, 2011). A breeding population of the Vulnerable and Annex II listed marsh fritillary (<i>Euphydryas aurinia</i>) (Regan et al., 2010) was recorded in the SAC in 2016 (Long and Brophy, in prep.). See the conservation objectives for priority habitat Petrifying springs with tufa formation (Cratoneurion) and for Geyer's whorl snail (<i>Vertigo geyeri</i>) in this volume |
|-------------------------------------|--------------------------------|--|--|

Conservation Objectives for : Lisduff Fen SAC [002147]


1013 Geyer's Whorl Snail *Vertigo geyeri*

To restore the favourable conservation condition of Geyer's Whorl Snail in Lisduff Fen SAC, which is defined by the following list of attributes and targets:

| Attribute | Measure | Target | Notes |
|--|--|---|--|
| Distribution | Number of occupied 1km squares | No decline, subject to natural processes. There is one known site for this species in the SAC within N0800 | The majority of records of Geyer's whorl snail (<i>Vertigo geyeri</i>) in Lisduff Fen SAC come from the 1km grid square N0800 (see site code VgCAM20 in Moorkens and Killeen, 2011 and in Long and Brophy, in prep.). There is a 1990 record from S0899, but the habitat in this section even at that time was marginal and the species has not been reported from there since. See map 3 which shows both N0800 and S0899. The species was not recorded within the known site (VgCAM20) in the SAC during a 2016 survey, but the reasons for this are unclear (Long and Brophy, in prep.) |
| Occurrence in suitable habitat | Presence in a representative number of samples | No decline, subject to natural processes | The species should be present in a representative number of samples taken from locations that have suitable habitat following the methodology in Moorkens and Killeen (2011) and Long and Brophy (in prep.) |
| Habitat area | Hectares | Area of suitable habitat stable or increasing, subject to natural processes; no less than 2ha of at least suboptimal habitat | The habitat for Geyer's whorl snail in the surveyed site (site code VgCAM20) in Lisduff Fen SAC is found along the spring line on the western margin of the southern part of the site. Habitat for the species at this site is defined in Moorkens and Killeen (2011) and Long and Brophy (in prep.). The target is that there should be at least 2ha of habitat in at least suboptimal condition (Moorkens and Killeen, 2011). In 2016, there was 2.8ha of suitable habitat (Long and Brophy, in prep.) |
| Habitat quality: vegetation structure and height | Assessment in a representative number of samples | No decline, subject to natural processes | Optimal and suboptimal habitat for Geyer's whorl snail in the surveyed site (VgCAM20) is defined by Moorkens and Killeen (2011) and is given in Long and Brophy (in prep.). The habitat is maintained by grazing over at least part of the site. Habitat should be open flushed fen grassland with sedge/moss lawns 5-20cm tall containing a high diversity, with species such as <i>Carex viridula</i> , <i>Parnassia palustris</i> , <i>Equisetum palustre</i> , <i>Juncus articulatus</i> and the mosses <i>Scorpidium revolvens</i> and <i>Campyllum stellatum</i> and with scattered tussocks of <i>Schoenus nigricans</i> no greater than 80cm tall. The quality of the habitat should be assessed following the methodology and definitions in Moorkens and Killeen (2011) and Long and Brophy (in prep.) |
| Habitat quality: soil wetness | Percentage of a representative number of sample points | No decline, subject to natural processes; at least 50% of a representative number of sample points in areas of optimal habitat should be classified as optimal wetness; at least 25% in areas of suboptimal habitat | This attribute should be assessed following the methodology and definitions in Moorkens and Killeen (2011) and Long and Brophy (in prep.). Over the site as a whole, soil wetness should be suitable for the species in 50% of sample points within optimal habitat and in 25% of sample points in suboptimal habitat |



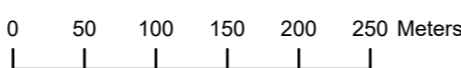
Legend
 Lisduff Fen SAC 002147

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**MAP 1:
 LISDUFF FEN SAC
 CONSERVATION OBJECTIVES
 SAC DESIGNATION**
 Map to be read in conjunction with the NPWS Conservation Objectives Document.

**SITE CODE:
 SAC 002147; version 3. CO.OFFALY**

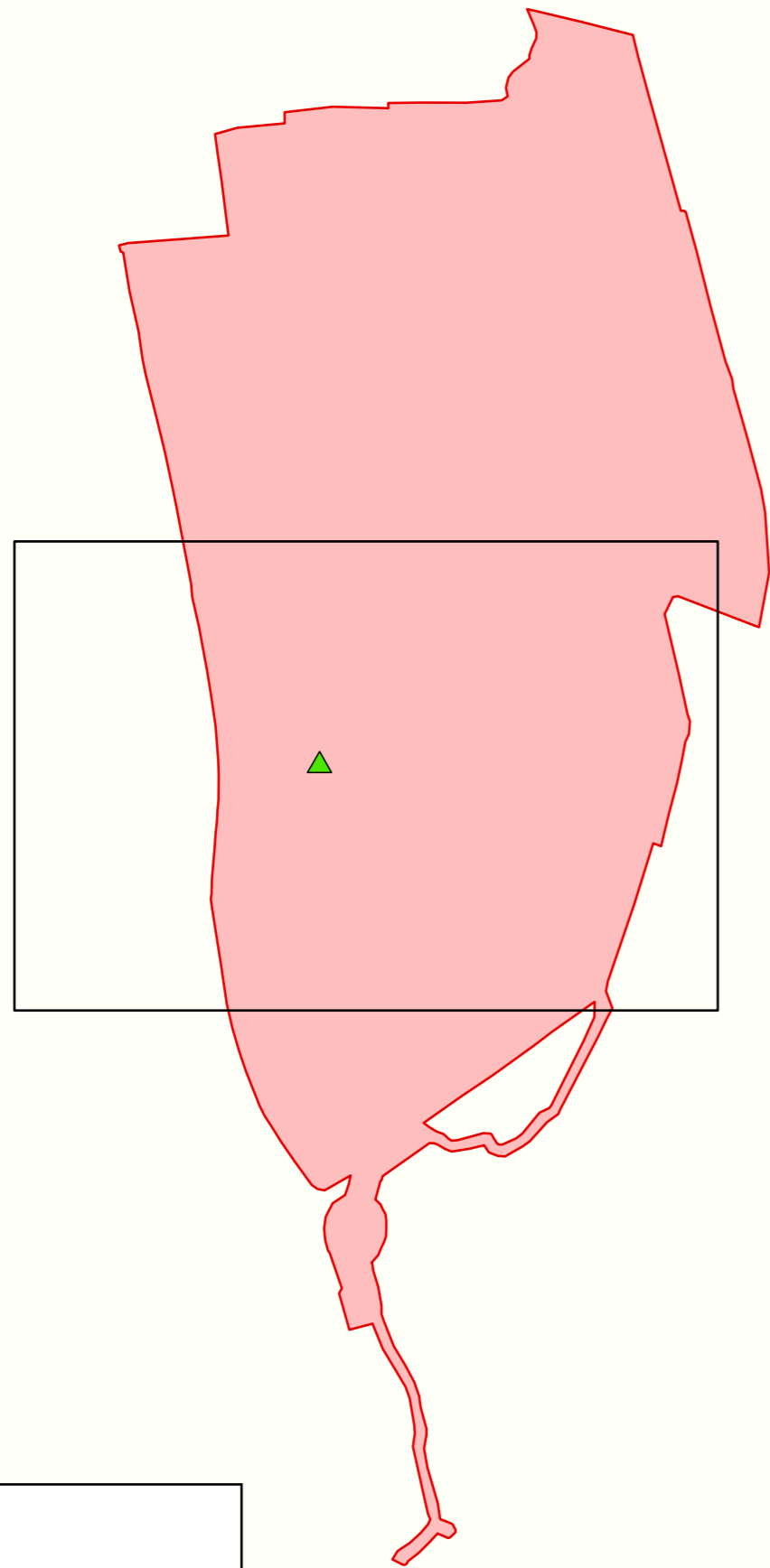
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Map Version 1
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Legend

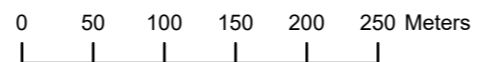
- Lisduff Fen SAC 002147
- OSi Discovery Series County Boundary
- ▲ 7220 Petrifying springs with tufa formation (*Cratoneurion*)

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**MAP 2:
LISDUFF FEN SAC
CONSERVATION OBJECTIVES
PETRIFYING SPRINGS**

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

**SITE CODE:
SAC 002147; version 3. CO.OFFALY**

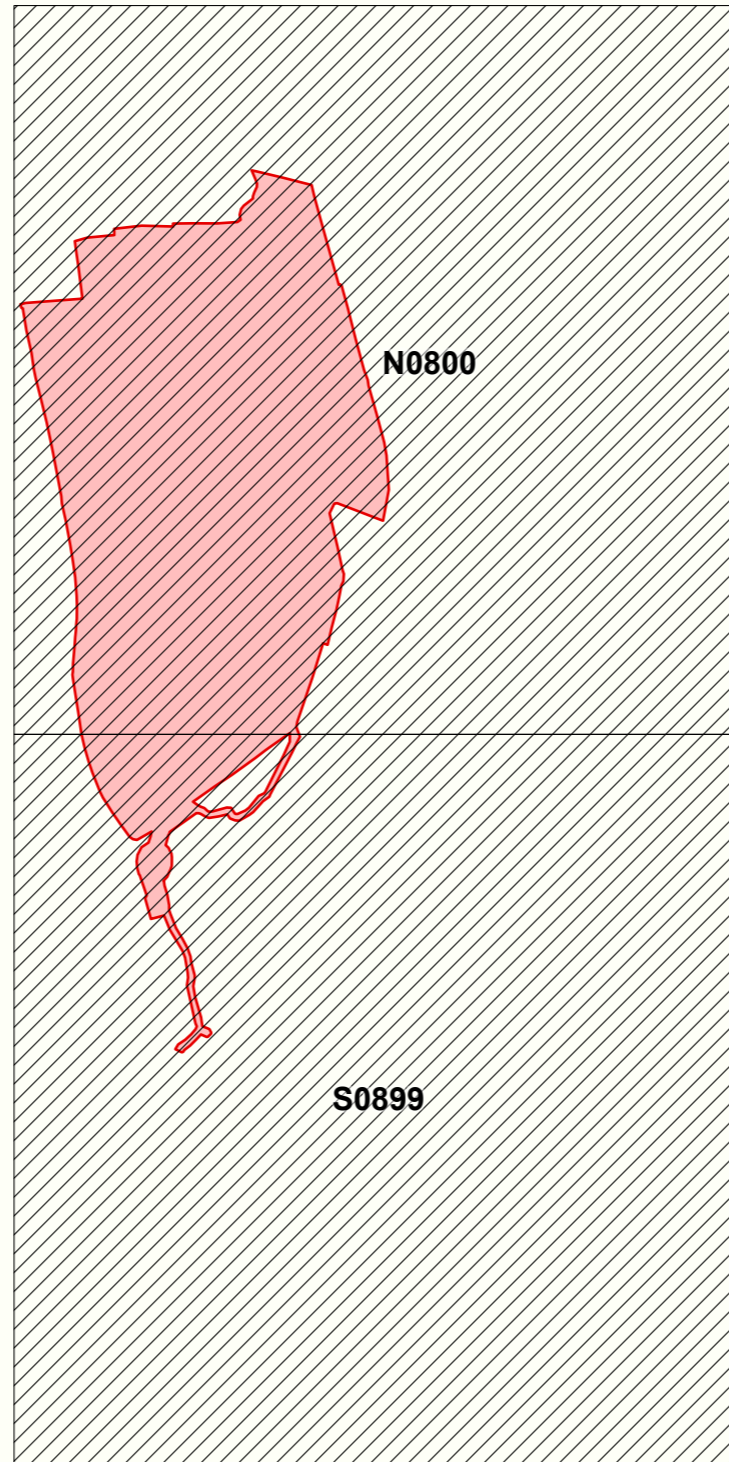


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**Map Version 1
Date: June 2018**



Legend

- Lisduff Fen SAC 002147
- OSi Discovery Series County Boundary

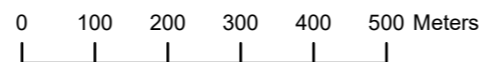


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Department of Culture,
Heritage and the Gaeltacht

**MAP 3:
LISDUFF FEN SAC
CONSERVATION OBJECTIVES
GEYER'S WHORL SNAIL**

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

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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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**Map Version 1
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