

NPWS

Gweedore Bay and Islands SAC  
(site code:1141)

**Conservation objectives supporting document-  
Coastal lagoons**

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## 1. Introduction

### 1.1 Gweedore Bay and Islands SAC

Gweedore Bay and Islands SAC is selected for eleven coastal and one marine habitat listed on Annex I of the Habitats Directive.

“Coastal lagoons” (habitat code 1150) is a priority habitat in Annex I of the Habitats Directive. A coastal lagoon is a lake or pond that is fully or partially separated from the sea by a permeable barrier that can be entirely natural such as shingle, or can be an artificial embankment. Salinity varies depending on such factors such as freshwater inputs and barrier permeability. Lagoons support unique assemblages of flora and fauna, particularly invertebrates. In Ireland, coastal lagoons are considered to be in bad conservation status due to issues such as drainage and water pollution (NPWS, 2013).

Two lagoons are listed for this SAC (Oliver, 2007). The table below gives the conservation status assessment of these lagoons as outlined in that report. See map in Appendix 1 and Appendix 2 for accounts of the site (from Oliver, 2007). Note that there may be additional, as yet unsurveyed lagoons within this SAC.

| Code <sup>1</sup> | Name         | County  | Conservation Assessment |
|-------------------|--------------|---------|-------------------------|
| IL082             | Kincas Lough | Donegal | Unfavourable-Inadequate |
| IL083             | Moorlagh     | Donegal | Favourable              |

<sup>1</sup> Codes are those used in Oliver, 2007.

### 1.2 Conservation objectives

A site-specific conservation objective aims to define the favourable conservation condition of a habitat or species at site level. The maintenance of habitats and species within sites at favourable condition will contribute to the maintenance of favourable conservation status of those habitats and species at a national level.

Conservation objectives are defined using attributes and targets that are based on parameters as set out in the Habitats Directive for defining favourable status, namely area, range, and structure and functions.

Provisional reference conditions for Irish lagoons are proposed by Roden and Oliver (2013). Reference conditions aim to define ecological status prior to human impacts (i.e. “natural” conditions). The targets for the water quality attributes given below are based on reference values given by Roden and Oliver (2013).

Attributes and targets may change/become more refined as further information becomes available.

## 2. Area

The target for habitat area is- stable or increasing, subject to natural processes. Favourable reference area for the mapped lagoons is 10.0 ha- see table below.

| Code <sup>1</sup> | Name         | Area (Ha) <sup>2</sup> |
|-------------------|--------------|------------------------|
| IL082             | Kincas Lough | 3.2                    |
| IL083             | Moorlagh     | 6.9                    |
|                   | <b>Total</b> | <b>10.0</b>            |

<sup>1</sup> Codes are those used in Oliver, 2007.

<sup>2</sup> Areas are calculated from spatial data derived from Oliver (2007).

## 3. Range

The known distribution of lagoon habitat in Gweedore Bay and Islands SAC is shown in Appendix 1.

The target for the habitat distribution attribute is- no decline, subject to natural processes.

## 4. Structure and functions

Structure and functions relates to the physical components of a habitat (“structure”) and the ecological processes that drive it (“functions”). For lagoons these include attributes such as salinity, hydrology and various water quality attributes.

### 4.1 Salinity regime

Lagoons can vary considerably in salinity both within and between sites depending on the volume and timing of inflowing and outflowing fresh and seawater. Salinity is probably the most important variable in the classification of lagoon types (Roden and Oliver, 2013).

The target for the salinity regime attribute is- median annual salinity and temporal variation within natural range.

Seawater enters Kincas Lough from the west on most tides and it also receives large volumes of freshwater from Lough Mullaghderg to the north. Salinity below 1m depth is measured at 32-33psu with surface salinities of between 5-10psu and 7-13psu. Moorlagh has an artificial barrier formed by a causeway and road bridge, with 3 culverted channels each with a wooden sluice. Seawater enters from the north on most tides with large streams entering from the south. Salinity varies considerably, measuring up to 30psu at 0.75m depth while surface salinities measure 7-10psu on the surface of the main body of the lagoon, but 0.5-2psu at its southern end.

Using information from Oliver (2007), the following table gives the salinity class for each lagoon listed. See Roden and Oliver (2013) for further information on salinity classes and Appendix 2 for individual lagoon reports.

| Code  | Name         | Salinity                |
|-------|--------------|-------------------------|
| IL082 | Kincas Lough | Euhaline to oligohaline |
| IL083 | Moorlagh     | Euhaline to oligohaline |

## 4.2 Hydrological regime

Fluctuations in water depth are a natural feature of lagoon hydrology. However, if water levels fluctuate beyond their natural values due to issues such as drainage, the condition of the habitat can deteriorate.

The target for hydrological regime is- annual water level fluctuations and minima within natural ranges.

The two lagoons identified within Gweedore Bay and Islands SAC can be classified as relatively shallow, with Kincas Lough having a water depth of 5m and Moirlagh has a depth of <1m. Thus even small changes in water depth can cause significant losses in habitat area.

Further information is required to investigate historic fluctuations to enable more specific targets to be set. See Appendix 2 for individual site reports.

## 4.3 Barrier: connectivity between lagoon and sea

The morphology of the barrier between a lagoon and sea determines how it functions ecologically. Changes to the barrier can be due to natural processes such as storms, but they can also be modified through human intervention. Active management is sometimes necessary, particularly if the lagoon is artificial.

The target for the attribute barriers- connectivity between lagoon and sea is- appropriate hydrological connections between lagoons and sea, including where necessary, appropriate management.

The two lagoons listed for the site have a rock/peat barrier type, which is summarised in the following table (after Oliver, 2007). See also site accounts in Appendix 2.

| Code  | Name         | Barrier Type |
|-------|--------------|--------------|
| IL082 | Kincas Lough | Rock/peat    |
| IL083 | Moirlagh     | Rock/peat    |

## 4.4 Water quality- Chlorophyll a

This attribute indicates the level of phytoplankton in the water column. Roden and Oliver (2013) make the assumption that, for shallow lagoons in “natural” condition, primary productivity is dominated by the benthos rather than the plankton. Phytoplankton tends to increase in density in response to increasing nutrient levels. Excessive shading from phytoplankton can reduce submergent macrophyte colonisation of the littoral zone of lagoons.

The target for the attribute water quality- Chlorophyll a is- annual median chlorophyll a within natural ranges and less than 5µg/L. Target based on Roden and Oliver (2013).

## 4.5 Water quality- Molybdate reactive phosphorus (MRP)

The target for the attribute water quality- Molybdate Reactive Phosphorus (MRP) is: annual median MRP within natural ranges and less than 0.1mg/L. The target is based on Roden and Oliver (2013).

This limit is required to ensure that excessive shading from phytoplankton does not reduce submergent colonisation of the littoral zone.

#### **4.6 Water quality- Dissolved inorganic nitrogen (DIN)**

The target for the attribute water quality- Dissolved Inorganic Nitrogen (DIN) is: annual median DIN within natural ranges and less than 0.15mg/L. The target is based on Roden and Oliver (2013).

As for phosphorus, the limit for set nitrogen is to ensure that excessive shading from phytoplankton does not reduce submergent colonisation.

#### **4.7 Depth of macrophyte colonisation**

Both of the surveyed lagoons within Gweedore Bay and Islands SAC have been identified as relatively shallow, thus, it is expected that macrophytes extend down to their full depths.

The target for the attribute depth of macrophyte colonisation is- macrophyte colonisation to maximum depth of lagoons.

#### **4.8 Typical plant species**

As lagoon specialist species do not easily recolonise, their presence is one of the indicators of long term continuity of quality.

The target for the attribute typical plant species is- maintain number and extent of listed lagoonal specialists, subject to natural variation.

The plant species recorded in each lagoon is summarised in Oliver (2007). Species considered to be lagoonal specialists include *Ruppia cirrhosa*, *Ruppia* sp. and *Chaetomorpha linum*. See Appendix 2 for individual site reports.

#### **4.9 Typical animal species**

Some invertebrate species are regarded as lagoonal specialists and their presence can indicate long term quality. As species found within each lagoon can vary considerably, depending on other attributes such as salinity, the target is based on site-specific species lists.

The target for the attribute typical animal species is- maintain listed lagoon specialists, subject to natural variation

A total of 27 faunal species were recorded in Kincas Lough and 29 in Moorlagh. The species considered lagoonal specialists recorded in both lagoons are the isopod *Jaera nordmanni* and the decapod *Palaemonetes varians*. In Kincas Lough lagoonal specialists include the hydroid *Cordylophora caspia*, the bivalve *Cerastoderma glaucum* and the bryozoan *Conopeum seurati* are also recorded. The lagoonal specialists in Moorlagh are the isopod *Lekanesphaera hookeri*, the gastropod *Hydrobia ventrosa* and the rare isopod *Jaera ischiosetosa*. The species recorded per site are summarised in Oliver (2007). See Appendix 2 for site reports.

#### **4.10 Negative indicator species**

Negative indicator species include non-native alien species as well as those that are not typical of the habitat. For example, accelerated encroachment by reed beds can be caused by low salinity, shallow water and elevated nutrient levels.

The target for the attribute negative indicator species is: negative indicator species absent or under control.

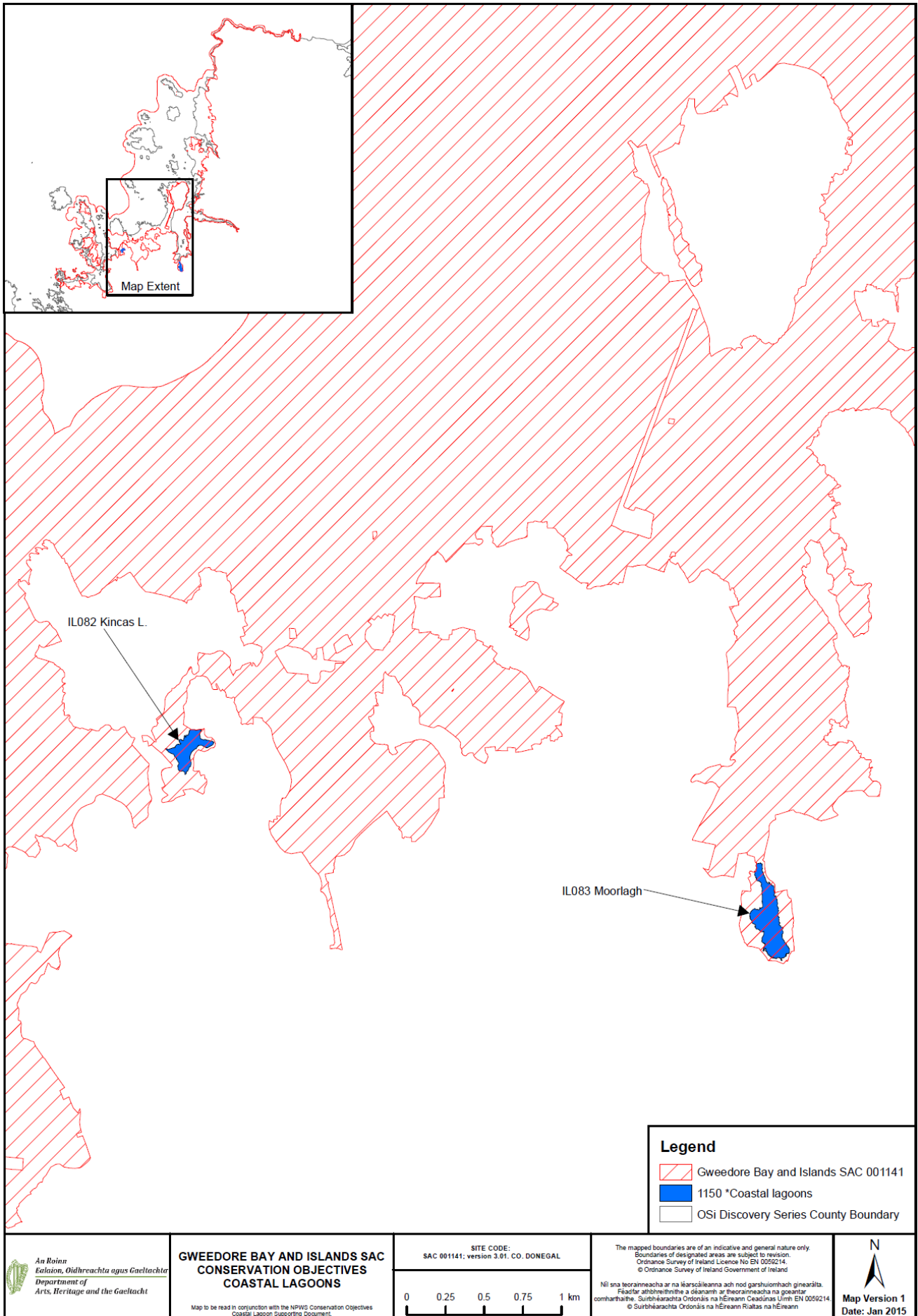
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Roden, C.M. and Oliver, G. (2013) Monitoring and assessment of Irish lagoons for the purpose of the EU Water framework Directive. Unpublished report to the Environmental Protection Agency.

NPWS (2013) The status of EU protected habitats and species in Ireland. Unpublished report, NPWS. Department of Arts, Heritage and the Gaeltacht, Dublin.

Oliver, G. (2007) Inventory of Irish coastal lagoons (version 2). Unpublished report to the National Parks and Wildlife Service.

# Appendix 1 Lagoon distribution map





## Appendix 2 Site reports

The following are site accounts from Oliver (2007)

| <b>Code<sup>1</sup></b> | <b>Name</b>  |
|-------------------------|--------------|
| IL082                   | Kincas Lough |
| IL083                   | Moorlagh     |

<sup>1</sup> Codes are those used in Oliver, 2007.



**Conservation Designation:** Gweedore Bay and Islands SAC 001141, pNHA 001141

**General description:**

Kincas Lough is a small (6ha), relatively shallow (5m) **rock/peat lagoon**, lying opposite Cruit Island, approximately 6 kms west of Annagary, Co Donegal. According to local information, the channel from Lough Mullaghderg was deepened in order to relieve flooding. As a result, this raised water levels in Kincas Lough and the tidal inlet was deepened in order to lower these water levels. Seawater enters from the west on most tides but the lakes also receive large volumes of freshwater from small streams and the channel which drains from Lough Mullaghderg to the north. Surface salinity varied from 5-10psu on 19/6/96 and 7.4 - 13.1psu in September 1998 but measured 32-33psu below 1m depth.

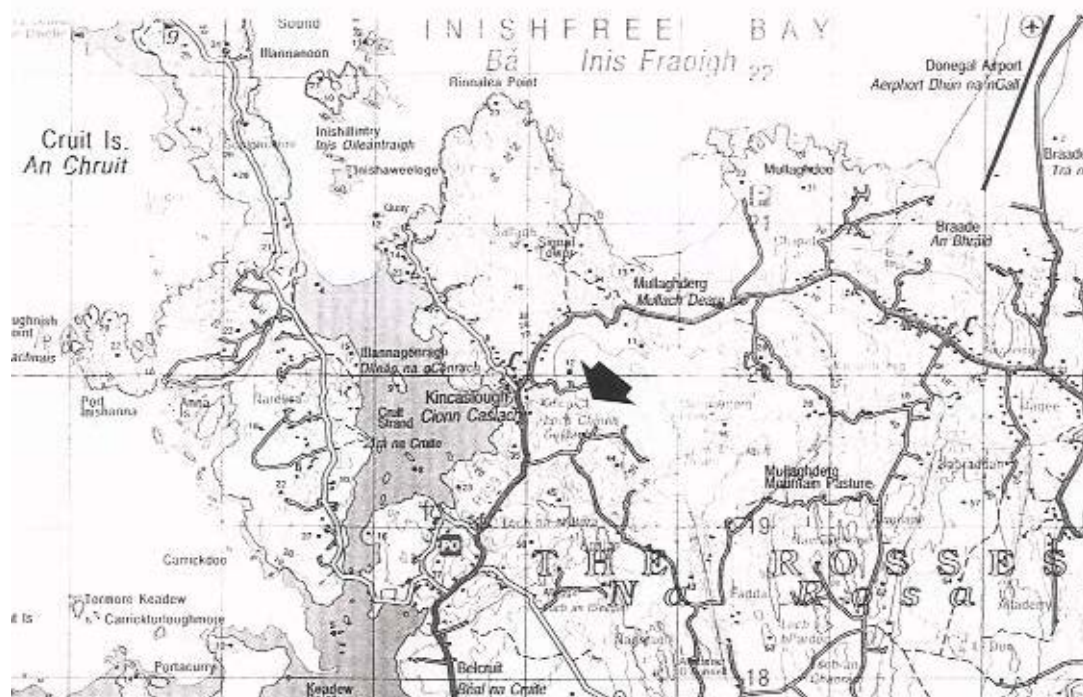


Figure 82.1 Location of map of Kincas Lough, Co. Donegal.

Kincas Lough was surveyed in 1998 for vegetation (Roden 1999), aquatic fauna (Oliver 1999) and ecotonal coleoptera (Good 1998, Good & Butler 2000). Results of these surveys are summarised by Healy (1999a,b; 2003).

Stations used for faunal sampling are not necessarily the same as those used for vegetation or ecotonal coleoptera.

## Flora

The vegetation of Kincas Lough was surveyed in 1998 by C. Roden (Roden 1999). The following is based on the report by Roden, following his survey on 29/6/98 and 9/9/98.

Kincas Lough is a stratified lagoon with a variety of vegetation types. The sides of the lagoon are rocky with mud on the lagoon floor. In shallow water (50cm) stands of *Chara aspera* occur on gravel. Stands of *Ruppia cirrhosa* occur at 1m depth with *Cladophora vagabunda*. Below 1-2m pure stands of often very dense *Chaetomorpha linum* occur. Two of these species are lagoonal specialists.

*Chaetomorpha linum*. There is some doubt about the taxonomic status of the unattached lagoonal form of this species, and it was recorded by Hatch and Healy (1998) as *C. mediterranea*. It is a common, characteristic alga of semi-isolated Irish lagoons, recorded at 49 of the 87 (56.3%) lagoons surveyed.

*Ruppia* spp. are the most characteristic aquatic plant taxa of Irish coastal lagoons. The species are hard to distinguish when not flowering, and remain uncertain at some sites, but *Ruppia* of one species or the other (*R. maritima*, *R. maritima* var *brevirostris*, *R. cirrhosa*) was found at 62 of the 87 lagoons (71.3%) surveyed, and is one of the most useful indicators of coastal lagoon status. *Ruppia maritima* appears to be the more common of the species and was found at 41 of the lagoons surveyed (47%). *Ruppia cirrhosa* is believed to tolerate higher salinities than the former species and to be less common, but neither of these statements is clearly supported in Irish lagoons and the two species were often found growing together. *R. cirrhosa* was only identified at 23 lagoons (26%), but species was not determined at 12 sites.

Below 3-4m no plants were found due to lack of light. Patches of a white growth, possibly *Beggiatoa* were noted, perhaps indicating anoxic conditions. Several large stands of *Phragmites australis* were recorded growing on the margins. While it was not possible to adequately survey the marginal vegetation, one stand of *Blysmus rufus* was noted. The phytoplankton of the lagoon was dominated by freshwater species and detritus probably washed into the lagoon from Mullaghderg.

The aquatic flora of the lagoon includes two lagoonal specialists, but otherwise is poor, probably resulting from eutrophication, algal blooms and anoxic conditions at depth. One stand of *Blysmus rufus* was noted on the margin of the lagoon, but based on aquatic flora, the lagoon is rated as of **low conservation value**.

## Fauna

Four stations were selected for faunal sampling in Kincas Lough on 7-8/9/98 (Oliver 1999, Figure 82.2, Table 82.1). A total of 27 taxa were recorded in 1998, of which 23 were identified to species (Table 82.2). Two of these species are listed as lagoonal specialists in Britain and two others proposed as lagoonal specialists in Ireland. Empty shells of another specialist (*Cerastoderma glaucum*) were also found, suggesting that live specimens may occur on other occasions. The hydrobiids were identified as *Potamopyrgus antipodarum* and *Hydrobia ulvae* although some live specimens showed pigmentation of the tentacles similar to that described for *H. neglecta*. However, all preserved specimens were identified as one of the former two species.

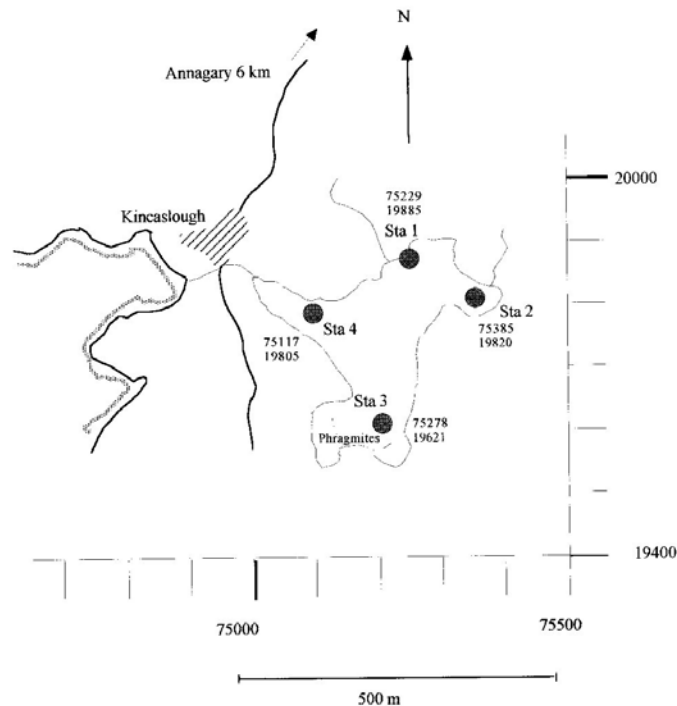


Figure 82.2 Sampling stations used at Kincas Lough.

Table 82.1 Positions of faunal sampling stations in Kincas Lough, 7-8/9/98 with salinity, depth of water and type of substratum.

|                          | Sta 1                       | Sta 2                                     | Sta 3                           | Sta 4                        |
|--------------------------|-----------------------------|---|---------------------------------|------------------------------|
| GPS position             | B 75229<br>19885            | B 75385<br>19820                          | B 75278<br>19621                | B 75117<br>19805             |
| Salinity(psu) at surface | 7.4-8.6                     | 9.1                                       | 12.2                            | 11.4                         |
| Salinity(psu) at depth   | 29                          | 29  | 30.9                            | 27.5                         |
| Depth(cm)                | 0-100                       | 20-100                                    | 30-100                          | 20-100                       |
| Substratum               | Rocks,<br>stones,<br>gravel | Rocks,<br>gravel,<br>sand,<br>anoxic silt | Anoxic<br>organic<br>silt, clay | <i>Phragmites</i><br>"scraw" |

***Cordylophora caspia***. Hydroid recorded at four lagoons in Donegal (Kincas L., Inch L., Durnesh L., Blanket Nook), on the North Slob, Co. Wexford, Rostellan, Co. Cork, Muckinish, Co. Clare and an unsurveyed site (Rinmore) in Co. Galway and previously at Lady's Island L. (Healy *et al.* 1982). According to Arndt (1984), the species "appears to be an excellent bio-indicator for eutrophic brackish water in the horohaline zone". Proposed as a lagoonal specialist for Ireland by Oliver and Healy (1998).

***Jaera nordmanni***. Isopod crustacean recorded at 24 of the 87 lagoons surveyed (27.6%) and may occur at others where it was not recorded due to the fact that only adult males are easily identified. This species may occur in freshwater, as in L. Errol, Cape Clear, Co. Cork. Described in England (Barnes 1994, Hayward and Ryland 1995) as occurring in streams flowing down the shoreline, on south and west coasts only. All records in Ireland are from West Cork to Donegal. Proposed as a lagoonal specialist for Ireland by Oliver and Healy (1998).

***Palaemonetes varians*** Decapod crustacean listed as a lagoonal specialist in the U.K. by Barnes (1989) and Bamber (1997), but apparently is no longer regarded as

such. Although found in estuaries, this species appears to be far more characteristic of lagoons in Ireland, found in 64 of the 87 lagoons surveyed (73.6%) and may require a lagoonal environment for reproduction. Therefore, it remains on the proposed list of lagoonal specialists for Ireland.

***Cerastoderma glaucum*** Bivalve mollusc. A common lagoonal specialist found at 30 of the 87 lagoons (34.5%) surveyed.

***Conopeum seurati*** Bryozoan recorded at 49 of the 87 lagoons surveyed (56.3%), but is not listed in a recent review of Irish marine Bryozoa (Wyse Jackson 1991). Either the species is under-recorded or is truly a lagoonal specialist.

*Agabus sturmii* is characteristic of eutrophic or mesotrophic waters.

Table 82.2 Aquatic fauna recorded at stations in Kincas Lough, The Rosses, Co. Donegal. 1998. L.T. = light trap; F = Fyke net; + = present, o = occasional, c = common, a = abundant. Species in bold text are lagoonal specialists.

| Taxa  | Sampling Stations |        |   |        |       |        |      |        |
|---|-------------------|--------|---|--------|-------|--------|------|--------|
|   | 1                 | L.T. 1 | 2 | L.T. 2 | 3     | L.T. 3 | 4    | L.T. 4 |
| <b>Cnidaria</b>                                 |                   |        |   |        |       |        |      |        |
| <i>Astropecten irregularis</i>                  |                   |        |   |        | +     |        |      |        |
| <b><i>Cordylophora caspia</i></b>               | +                 |        |   |        |       |        |      |        |
| <b>Nemertea</b>                                 |                   |        |   |        |       |        |      |        |
| <b>Annellida</b>                                |                   |        |   |        |       |        |      |        |
| <i>Fabricia stellaris</i>                       |                   |        |   | 1      |       |        |      |        |
| <b>Crustacea</b>                                |                   |        |   |        |       |        |      |        |
| Ostracoda                                       |                   |        |   | c      |       |        |      |        |
| Isopoda <b><i>Jaera nordmanni</i></b>           | c                 |        | + |        | o     |        |      |        |
| Mysidacea <i>Neomysis integer</i>               | 0                 |        | o |        | o     |        | o    | 1      |
| Amphipoda                                       | +                 | 2      | + | 3      |       |        | +    |        |
| <i>Gammarus duebeni</i>                         | 19                | 2      | 4 | 2      | 6     |        | 34   |        |
| Decapoda <i>Carcinus maenas</i>                 |                   |        |   |        |       |        | F=15 |        |
| <i>Crangon crangon</i>                          | +                 | 1      | + |        |       |        |      | 5      |
| <b><i>Palaemonetes varians</i></b>              | o                 |        | o |        |       |        |      |        |
| <b>Acarina</b>                                  |                   |        |   |        |       |        |      |        |
| indet.  |                   |        |   | 4      |       |        |      |        |
| <b>Insecta</b>                                  |                   |        |   |        |       |        |      |        |
| Odonata <i>Ischnura elegans</i>                 |                   |        |   |        | 2     |        | +    |        |
| Trichoptera Limnephilidae indet.                |                   |        |   |        | cases |        | +    |        |
| Coleoptera                                      |                   |        |   |        | +     |        | +    |        |
| <i>Agabus sturmii</i>                           |                   |        |   |        | 1     |        |      |        |
| <i>A. bipustulatus</i>                          |                   |        |   |        | 1     |        |      |        |
| <i>Colymbetes fuscus</i>                        |                   |        |   |        | 1     |        |      |        |
| <i>Gyrinus caspius</i>                          |                   |        | 1 |        |       |        |      |        |
| Diptera Chironomidae indet.                     |                   |        | + | 2      | +     | 5      | +    |        |
| <b>Mollusca</b>                                 |                   |        |   |        |       |        |      |        |
| Prosobranchia <i>Hydrobiidae</i>                | o                 |        | c | 10     | a     | 35     | a    |        |
| <i>Hydrobia ulvae</i>                           |                   |        |   |        | a     |        | a    |        |
| <i>Potamopyrgus antipodarum</i>                 | o                 |        | c |        |       |        |      |        |
| <i>Skeneopsis planorbis</i>                     | +                 |        |   |        |       |        |      |        |
| Bivalvia ( <b><i>Cerastoderma glaucum</i></b> ) | shells            |        |   |        |       |        |      |        |
| <b>Bryozoa</b>                                  |                   |        |   |        |       |        |      |        |
| <b><i>Conopeum seurati</i></b>                  |                   |        | + |        |       |        |      |        |
| <b>Pisces</b>                                   |                   |        |   |        |       |        |      |        |
| <i>Anguilla anguilla</i>                        |                   |        |   |        |       |        | F=21 |        |
| <i>Pomatoschistus microps</i>                   | +                 | 6      | + | 52     | +     | 3      | +    | 9      |
| <i>Gasterosteus aculeatus</i>                   | o                 | 1      | + | 2      | +     |        |      |        |
| <i>Pleuronectes flesus</i>                      | +                 |        |   |        |       |        | F=2  |        |

The aquatic fauna of Kincas Lough is not rich, and is largely composed of marine species which can easily enter or leave the lagoon with tidal water. However, at least four of the species are lagoonal specialists, and if the anoxic conditions improved

the lagoon may be considerably more interesting. Based on aquatic fauna, the site is rated as of **moderate conservation value**.

### Ecotonal coleoptera

Thirteen species of carabid and twenty species of staphylinid were recorded at Kincas Lough in 1998 (Good 1999, Good & Butler 1999), none of which are indicator species. Based on shoreline coleoptera, the site is rated as of **no conservation value**.

### Summary

Kincas Lough is a small **rock/peat lagoon**, a type of lagoon similar to the Scottish “obs”, which are characteristic of parts of the west coast of Ireland, especially in Connemara, but relatively rare in European terms. The lagoon is situated in an area of scenic interest but the lagoon is not a particularly good example of its type. The aquatic flora of the lagoon includes two lagoonal specialists (*C. linum*, *R. cirrhosa*), but otherwise is poor, probably resulting from eutrophication, algal blooms and anoxic conditions at depth. One stand of *Blysmus rufus* was noted on the margin of the lagoon, but based on aquatic flora, the lagoon is rated as of low conservation value. The aquatic fauna is not rich and is dominated by euryhaline and marine/polyhaline species, most of which are highly mobile and able to enter and leave the lagoon freely and at least two of the species appear to indicate eutrophic conditions. However, at least four of the species are lagoonal specialists and if the anoxic conditions improved, the lagoon may be considerably more interesting. Overall conservation value is rated as moderate.

**Overall Conservation Value = Moderate**

### Conservation Status Assessment (from Oliver 2007)

|                     |   |
|---------------------|---|
| Impacts             | Eutrophication in small lagoon both naturally and due to effluents from upstream caravan park. Ind/commercial activities. Caravans. |
| Conservation Status | <b>Unfavourable-Inadequate</b>  |

### Further Information

Listed as a lagoon by Healy *et al.* 1997. Surveyed in 1998 for vegetation (Roden 1999), aquatic fauna (Oliver 1999) and ecotonal coleoptera (Good 1998, Good & Butler 2000). Results of these surveys are summarised by Healy (1999a,b; 2003). Included in a biological classification of Irish coastal lagoons (Oliver 2005) and in the Conservation Status Assessment (Oliver 2007).

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4.83

Moorlagh, County Donegal O.S. B 790 187

O.S. Discovery Sheet 1



**Conservation Designation:** Gweedore Bay and Islands SAC 001141, pNHA 001141

**General description:**

Moorlagh is a moderate sized (9.5ha), shallow (<1m) **rock/peat lagoon**, with an artificial barrier formed by a causeway and road bridge, with 3 culverted channels each with a wooden sluice, 0.5 km south of Annagary, Co. Donegal. Seawater enters from the north on most tides but large streams enter from the south. Salinity probably varies considerably and in August 1998 measured 7.3 - 9.7psu on the surface of the main body of the lagoon, and up to 30.1psu at 0.75m depth but 0.5 - 2psu at the southern end of the lagoon.

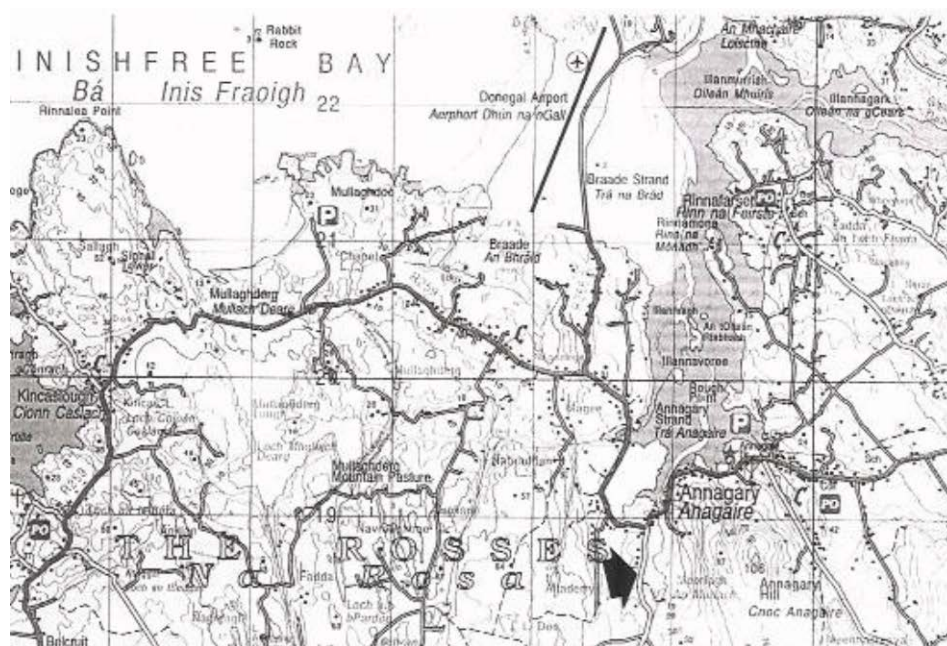


Figure 83.1 Location map of Moorlagh.



Moorlagh was surveyed in 1998 for vegetation (Roden 1999), aquatic fauna (Oliver 1999) and ecotonal coleoptera (Good 1998, Good & Butler 2000). Results of these surveys are summarised by Healy (1999a,b; 2003).

Stations used for faunal sampling are not necessarily the same as those used for vegetation or ecotonal coleoptera.

### Flora

The vegetation of Moorlagh was surveyed in 1998 by C. Roden (Roden 1999). The following is based on the report by Roden, following his survey on 26/7/98 and 10/9/98.

The benthic flora is a very uniform mixture of *Ruppia* sp. which could not be identified to species as no fruiting plants were found, and drift *Cladophora*, identified tentatively as *C. vagabunda*. Rocks were covered with some macroalgae, mainly *Fucus ceranoides* and *Enteromorpha*. Marginal vegetation included *Juncus maritimus*, *Festuca rubra* and the *Juncus gerardii* association.

Moorlagh appears to have no distinctive floristic or vegetational features of note, other than the extensive beds of *Ruppia* sp. and based on aquatic flora is rated as of **low conservation value**.

### Fauna

Five stations were selected for faunal sampling in Moorlagh on 9-11/9/98 (Oliver 1999, Figure 83.2, Table 83.1).

A total of 29 faunal taxa were recorded in 1998 (Table 83.2). Three of these species are listed as lagoonal specialists in Britain and one other is a proposed lagoonal specialist in Ireland. Two other species were recorded when visited briefly in 1996, including one (*Jaera ischiosetosa*), which is an apparently rare species in Ireland.

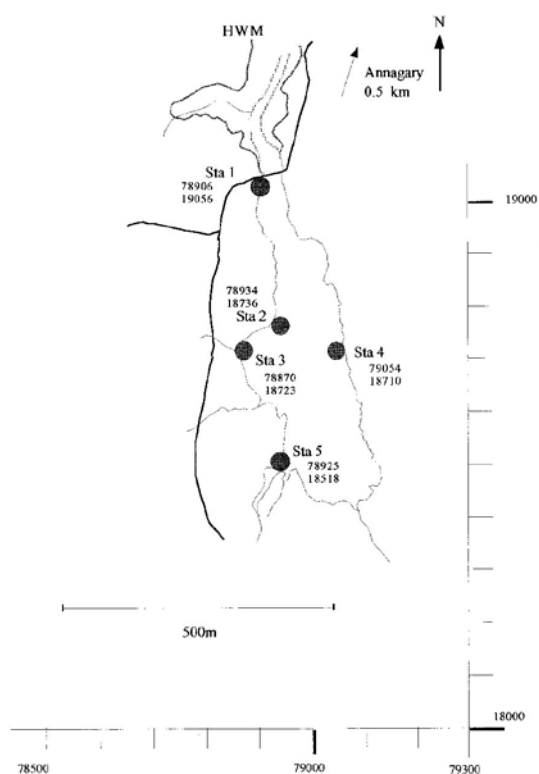


Figure 83.2 Sampling stations used at Moorlagh.

Table 83.1 Positions of faunal sampling stations in Moorlagh, 9-11/9/98 with salinity, depth of water and type of substratum. (salinity varies with tidal conditions and depth)

|               | Sta 1                                       | Sta 2                           | Sta 3                                      | Sta 4                 | Sta 5            |
|---------------|---|---------------------------------|--|-----------------------|------------------|
| GPS position  | B 78906<br>19056                            | B 78934<br>18736                | B 78870<br>18723                           | B 79054<br>18710      | B 78925<br>18518 |
| Salinity(psu) | 9-17  | 7.3-8.5                         | 9.7-18.5                                   | 6.8-7.8               | 0.5-29           |
| Depth(cm)     | 0-50  | 0-75                            | 0-75                                       | 0-30                  | 0-100            |
| Substratum    | Rocks,<br>gravel,<br>peaty sand<br>and silt | Rocks,<br>gravel,<br>sandy silt | Rocks,<br>peaty silt,<br>clay,<br>"scraw". | Gravel,<br>peaty silt | Peaty silt       |

Table 83.2 Aquatic fauna recorded at stations in Moorlagh, Co. Donegal 9-11/9/98. L.T. = light trap; F = Fyke net; + = present, o = occasional, c = common, a = abundant. ( ) = previous record from 1996. Species in bold text are lagoonal specialists or apparently rare species.

| Taxa             | Sampling Stations                 |        |     |        |   |     |   |        |     |       |
|------------------|-----------------------------------|--------|-----|--------|---|-----|---|--------|-----|-------|
|                  | 1                                 | L.T. 1 | 2   | L.T. 2 | 3 | mid | 4 | L.T. 4 | 5   | L.T.5 |
| <b>Nemertea</b>  | <i>Tetrastemma melanocephalum</i> |        |     |        |   |     |   |        |     |       |
|                  |                                   | +      |     |        |   |     |   |        |     |       |
| <b>Crustacea</b> |                                   |        |     |        |   |     |   |        |     |       |
| Isopoda          | <i>Jaera ischiosetosa</i>         |        |     |        |   |     |   |        |     |       |
|                  | (+)                               |        |     |        |   |     |   |        |     |       |
|                  | <i>J. nordmanni</i>               |        |     |        |   |     |   |        |     |       |
|                  | c                                 |        | 2   |        |   |     |   |        |     |       |
|                  | <i>Lekanesphaera hookeri</i>      |        |     |        |   |     |   |        |     |       |
|                  | a                                 | 120    | +   | 60     | + |     | + | 12     | +   | 5     |
| Mysidacea        | <i>Neomysis integer</i>           |        |     |        |   |     |   |        |     |       |
|                  | c                                 | 5      | +   | 5      | + | +   | + | 15     |     | 5     |
|                  | <i>Praunus flexuosus</i>          |        |     |        |   |     |   |        |     |       |
|                  | c                                 |        |     |        |   |     |   |        |     |       |
| Amphipoda        |                                   |        |     |        |   |     |   |        |     |       |
|                  | +                                 |        |     |        | + |     |   |        | +   | 5     |
|                  | <i>Gammarus zaddachi</i>          |        |     |        |   |     |   |        |     |       |
|                  | 20                                |        | 1   |        | 6 | 2   | 3 |        | 2   | 5     |
|                  | <i>Melita palmata</i>             |        |     |        |   |     |   |        |     |       |
|                  |                                   |        | 2   |        |   | 1   |   |        |     | 1     |
| Decapoda         | <i>Carcinus maenas</i>            |        |     |        |   |     |   |        |     |       |
|                  | +                                 |        |     |        |   |     |   |        | F=1 |       |
|                  | <i>Crangon crangon</i>            |        |     |        |   |     |   |        |     |       |
|                  | c                                 | 20     | +   |        |   |     |   |        |     |       |
|                  | <i>Palaemonetes varians</i>       |        |     |        |   |     |   |        |     |       |
|                  | c                                 |        | +   | 2      | + | +   | + |        | +   |       |
| <b>Insecta</b>   |                                   |        |     |        |   |     |   |        |     |       |
| Odonata          | Aeshnidae indet.                  |        |     |        |   |     |   |        |     |       |
|                  |                                   |        | +   |        |   |     |   |        |     |       |
|                  | <i>Ischnura elegans</i>           |        |     |        |   |     |   |        |     |       |
|                  |                                   |        |     |        | o |     |   |        | o   |       |
| Heteroptera      | <i>Gerris lacustris</i>           |        |     |        |   |     |   |        |     |       |
|                  |                                   |        |     |        |   |     |   |        | c   |       |
|                  | <i>Hydrometra stagnorum</i>       |        |     |        |   |     |   |        |     |       |
|                  |                                   |        |     |        |   |     | o |        |     |       |
| Coleoptera       |                                   |        |     |        |   |     |   |        |     |       |
|                  | <i>Gyrinus substriatus</i>        |        |     |        |   |     |   |        |     |       |
|                  |                                   |        |     |        |   |     |   |        | 1   |       |
|                  | <i>Haliplus fulvus</i>            |        |     |        |   |     |   |        |     |       |
|                  |                                   |        |     |        |   |     |   |        | 2   |       |
|                  | <i>H. lineolatus</i>              |        |     |        |   |     |   |        |     |       |
|                  |                                   |        |     |        |   |     |   |        | 5   |       |
|                  | <i>H. rufficollis</i>             |        |     |        |   |     |   |        |     |       |
|                  |                                   |        |     |        |   |     |   |        | 2   |       |
|                  | <i>Helophorus flavipes</i>        |        |     |        |   |     |   |        |     |       |
|                  |                                   |        |     |        | 1 |     |   |        |     |       |
| Diptera          | Chironomidae indet.               |        |     |        |   |     |   |        |     |       |
|                  | +                                 |        |     |        |   |     |   |        | +   |       |
| <b>Mollusca</b>  |                                   |        |     |        |   |     |   |        |     |       |
| Prosobranchia    | Hydrobidae indet.                 |        |     |        |   |     |   |        |     |       |
|                  | +                                 |        | +   | +      | + | +   | + |        | +   | a     |
|                  | <i>Hydrobia ulvae</i>             |        |     |        |   |     |   |        |     |       |
|                  | +                                 |        |     | 2      |   |     |   |        |     |       |
|                  | <i>H. ventrosa</i>                |        |     |        |   |     |   |        |     |       |
|                  |                                   |        |     |        |   | +   |   |        |     |       |
|                  | <i>Potamopyrgus antipodarum</i>   |        |     |        |   |     |   |        |     |       |
|                  |                                   |        | c   |        |   |     | c |        | c   |       |
|                  | <i>Skeneopsis planorbis</i>       |        |     |        |   |     |   |        |     |       |
|                  | +                                 |        |     | +      |   |     |   |        |     |       |
| Bivalvia         | <i>Mya arenaria</i>               |        |     |        |   |     |   |        |     |       |
|                  | o                                 |        |     |        |   |     |   |        |     |       |
| <b>Pisces</b>    |                                   |        |     |        |   |     |   |        |     |       |
|                  | <i>Anguilla anguilla</i>          |        |     |        |   |     |   |        |     |       |
|                  | +                                 | 1      | F=2 |        |   |     |   |        | F=5 |       |
|                  | <i>Gasterosteus aculeatus</i>     |        |     |        |   |     |   |        |     |       |
|                  | (+)                               |        |     |        |   |     |   |        |     |       |
|                  | <i>Pleuronectes flesus</i>        |        |     |        |   |     |   |        |     |       |
|                  |                                   |        |     |        |   |     |   |        | F=7 |       |
|                  | <i>Pomatoschistus microps</i>     |        |     |        |   |     |   |        |     |       |
|                  | +                                 |        | +   |        |   |     |   |        |     |       |
|                  | <i>Salmo trutta</i>               |        |     |        |   |     |   |        |     |       |
|                  |                                   |        | F=2 |        |   |     |   |        | F=1 |       |

*Jaera nordmanni*. Isopod crustacean recorded at 24 of the 87 lagoons surveyed (27.6%) and may occur at others where it was not recorded due to the fact that only adult males are easily identified. This species may occur in freshwater, as in L. Errol, Cape Clear, Co. Cork. Described in England (Barnes 1994, Hayward and Ryland 1995) as occurring in streams flowing down the shoreline, on south and west coasts only. All records in Ireland are from West Cork to Donegal. Proposed as a lagoonal specialist for Ireland by Oliver and Healy (1998).

*Lekanesphaera hookeri* is a common lagoonal isopod crustacean, found at 37 of the 87 lagoons surveyed (42.5%).

*Palaemonetes varians* Decapod crustacean listed as a lagoonal specialist in the U.K. by Barnes (1989) and Bamber (1997), but apparently is no longer regarded as such. Although found in estuaries, this species appears to be far more characteristic of lagoons in Ireland, found in 64 of the 87 lagoons surveyed (73.6%) and may require a lagoonal environment for reproduction. Therefore, it remains on the proposed list of lagoonal specialists for Ireland.

*Hydrobia ventrosa*. Gastropod mollusc commonly found in brackish lagoons and ditches and generally not on the open coast. Recorded at 18 of the 87 (20.7%) lagoons surveyed up to 2006.

*Jaera ischioetosa* Isopod crustacean recorded at 12 sites from West Cork to Donegal. The only previous record appears to be for L. Hyne. Co. Cork (Goss Custard *et al.* 1979).

The aquatic fauna is generally poor and dominated largely by euryhaline and marine/polyhaline species most of which are highly mobile and able to enter and leave fresh or seawater freely. The Coleopteran species may easily have been washed into the lagoon as a result of high rainfall and freshwater discharge from the streams.

Four species are lagoonal specialists, but only one species (*J. ischioetosa*) is considered to be rare and none are particularly abundant. The lagoon is very shallow and undoubtedly undergoes extreme variations in salinity and could be described as what Hartog (1974) refers to as a “shock system”, which could explain the paucity of resident species. Based on aquatic fauna, the site is rated as of **moderate conservation value**.

#### Ecotonal coleoptera

Eight species of carabid and eighteen species of staphylinid were recorded at Moorlagh in 1998 (Good 1999, Good & Butler 1999), none of which are indicator species. Based on shoreline coleoptera, the site is rated as of **no conservation value**.

#### Summary

Moorlagh is moderate sized **rock/peat lagoon**, a type of lagoon similar to the Scottish “obs”, which are characteristic of parts of the west coast of Ireland, especially in Connemara, but relatively rare in European terms. This lagoon is not a particularly good example of a rock/peat lagoon, as it undergoes extreme variations in salinity and is what Hartog (1974) refers to as a “shock system”, which could explain the paucity of resident species. The lagoon appears to have no distinctive floristic or vegetational features of note, other than the extensive beds of *Ruppia* sp. and based on aquatic flora is rated as of low conservation value. The aquatic fauna is generally poor, but four species are lagoonal specialists, and one species (*J. ischioetosa*) appears to be rare in Ireland. Overall conservation value is rated as moderate.

**Overall Conservation Value = Moderate**

| <b>Conservation Status Assessment</b> (from Oliver 2007) |   |
|--|---|
| Impacts  | "Shock lagoon" but no significant impacts. Leisure fishing. |
| Conservation Status                                      | Favourable  |

### Further Information

Listed as a lagoon by Healy *et al.* 1997. Surveyed in 1998 for vegetation (Roden 1999), aquatic fauna (Oliver 1999) and ecotonal coleoptera (Good 1998, Good & Butler 2000). Results of these surveys are summarised by Healy (1999a,b; 2003). Included in a biological classification of Irish coastal lagoons (Oliver 2005) and in the Conservation Status Assessment (Oliver 2007).

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