

NPWS

Tory Island Coast SAC
(site code: 2259)

**Conservation objectives supporting document-
Coastal lagoons**

Version 1
2015

Contents

1. Introduction	1
1.1 Tory Island Coast SAC.....	1
1.2 Conservation objectives	1
2. Area.....	2
3. Range	2
4. Structure and functions	2
4.1 Salinity regime	2
4.2 Hydrological regime	2
4.3 Barrier: connectivity between lagoon and sea	3
4.4 Water quality- Chlorophyll a	3
4.5 Water quality- Molybdate reactive phosphorus (MRP).....	3
4.6 Water quality- Dissolved inorganic nitrogen (DIN).....	3
4.7 Depth of macrophyte colonisation	3
4.8 Typical plant species	4
4.9 Typical animal species.....	4
4.10 Negative indicator species	4
5. References.....	5
Appendix 1 Lagoon distribution map	6
Appendix 2 Site report.....	7

1. Introduction

1.1 Tory Island Coast SAC

Tory Island is a remote, rocky island lying some 11km to the north of Bloody Foreland in Co. Donegal. The island is approximately 4km long by 1km wide, and consists in the main of igneous granite, with a few dolerite intrusions. The extreme eastern section, however, is made up of more erosion-resistant Ards Quartzite and high, dramatic coastal cliffs occur here.

The SAC is selected for several coastal marine habitats 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).

A single lagoon is listed for this SAC (Oliver, 2007). The table below gives the conservation status assessment of this lagoon as outlined in that report. See map in Appendix 1 and Appendix 2 for accounts of each site (from Oliver, 2007).

Code ¹	Name	County	Conservation Assessment
IL084	Loch Ó Dheas	Donegal	Unfavourable inadequate

¹ 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 lagoon is 3.2ha- see table below.

Code ¹	Name	Area (Ha) ²
IL084	Loch Ó Dheas	3.2
	Total	3.2

¹ Code is that used in Oliver, 2007.

² Areas is calculated from spatial data derived from Oliver (2007).

3. Range

The known distribution of lagoon habitat in Tory Island 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.

The salinity within the lagoon is generally low, measuring less than 1 psu to 1.psu (Oliver (2007)).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
IL084	Loch Ó Dheas	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.

Loch Ó Dheas lagoon identified within Tory Island Coast SAC can be classified as shallow (1.5m), 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 the site report.

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.

Loch Ó Dheas is a natural sedimentary lagoon with a cobble barrier (Oliver, 2007); see also site account in Appendix 2.

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 set for nitrogen is to ensure that excessive shading from phytoplankton does not reduce submergent colonisation.

4.7 Depth of macrophyte colonisation

As Loch Ó Dheas has been identified as shallow, it is expected that macrophytes extend down to its full depth (1.5m).

The target for the attribute depth of macrophyte colonisation is: macrophyte colonisation to maximum depth of the lagoon.

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 the lagoon is summarised in Oliver (2007); of these, only *Ruppia cirrhosa* is considered to be a lagoonal specialist. See Appendix 2 for individual site report.

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

The species recorded Loch Ó Dheas is summarised in Oliver (2007). No lagoonal specialists were recorded in this lagoon. See Appendix 2 for site report.

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 reedbeds 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.

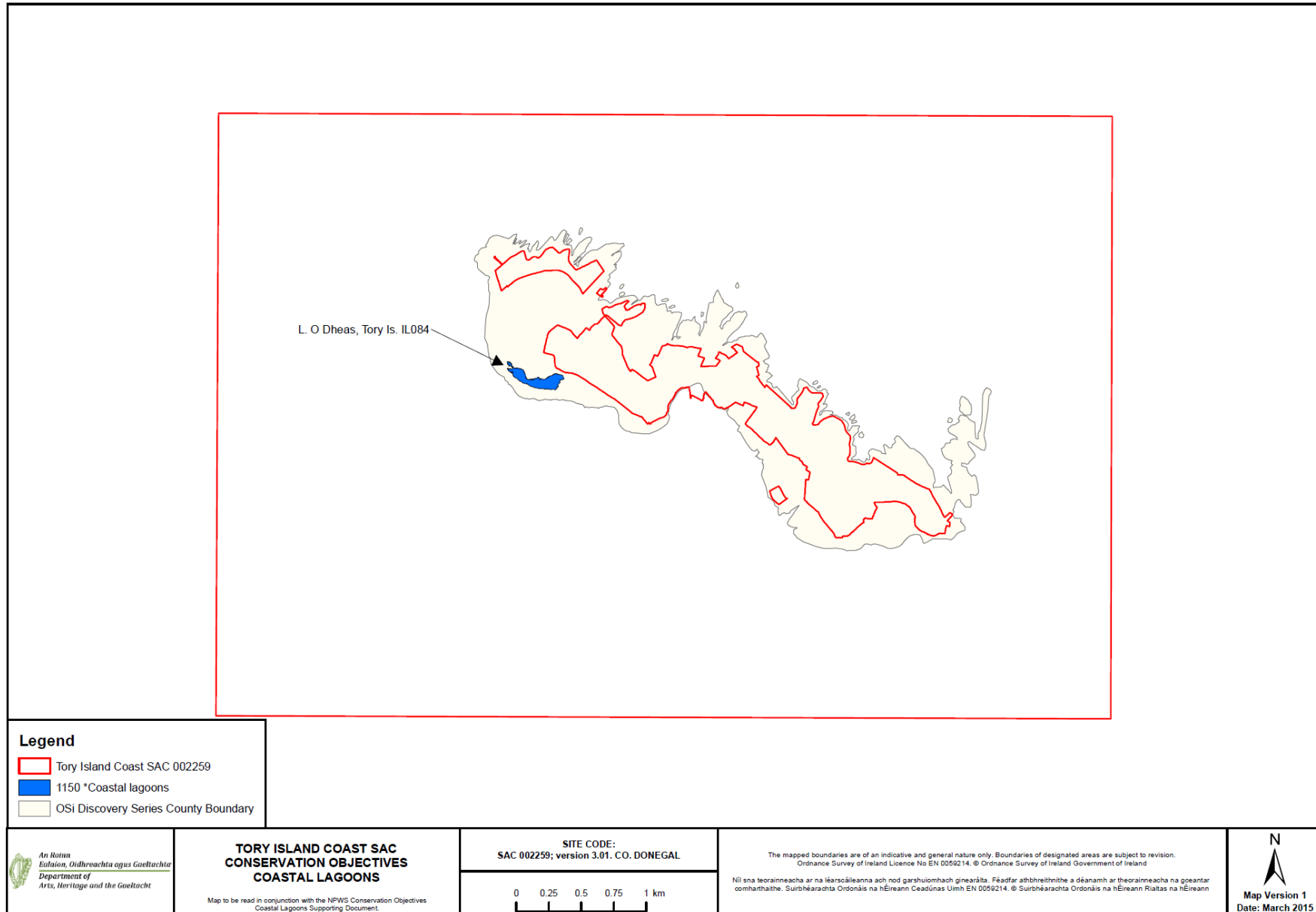
5. References

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 report

The following are site accounts from Oliver (2007)

Code¹	Name
IL084	Loch Ó Dheas

¹ Code is that used in Oliver, 2007

4.84

Loch Ó Dheas, Tory Island, County Donegal O.S. B 844 464
O.S. Discovery Sheet 1



Conservation Designation: Tory Island SAC 002259, SPA 004073, pNHA 000193

General description:

A small (3ha), shallow (1.5m) **natural sedimentary lagoon** with a **cobble barrier**, situated 1km west of the pier at West Town on Tory Island, Co. Donegal. Salinity is generally low and apparently is used as a source of drinking water, and measured less than 1psu on 26-27/10/05 and 1.2psu on 12/8/06.

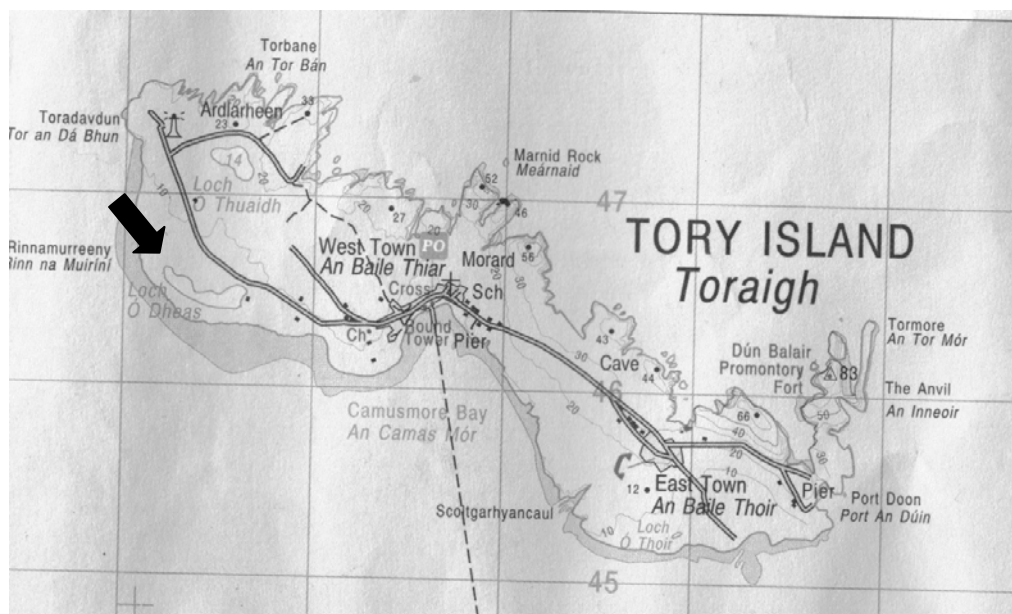


Figure 84.1 Location map of Loch Ó Dheas, Tory Island.

Loch Ó Dheas was surveyed on 26-27/10/05 and 12/8/06 for aquatic fauna and flora. Four stations were selected for sampling at this time (Figure 84.2, Table 84.1)

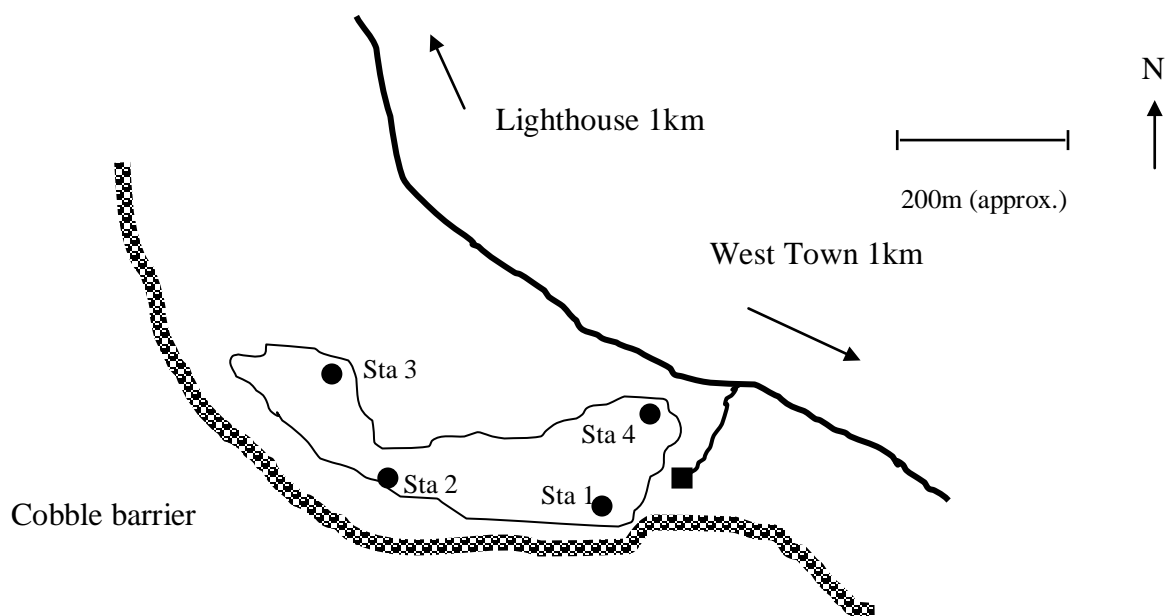


Figure 84.2 Sampling stations used at Loch Ó Dheas, Tory Island 26-27/10/05

Flora

The aquatic vegetation of Loch Ó Dheas at the time of sampling in 2005 (26-27/10/05) was remarkably poor (Table 84.1). In August 2006, the vegetation was slightly more abundant with percentage cover of *Ruppia cirrhosa* up to 25% and a few plants of *Ranunculus baudotii* were recorded, but the lagoon consists largely of bare granite rocks and sand, smothered at times with the filamentous alga, *Cladophora* sp.

Table 84.1 Positions of sampling stations in Loch Ó Dheas, 26-27/10/05, with salinity, temperature and depth of water, type of substratum and percentage cover of vegetation and bare ground. Species in bold text are lagoonal specialists.

	Station 1	Station 2	Station 3	Station 4
GPS Position	B 84587	B 84377	B 84348	B 84640
Salinity(psu)	46403	46442	46561	46513
Temperature	0.6	0.6	0.6	0.5
Depth(cm)	12.1	13.2	14.1	14.1
Substratum	0-100	0-100	0-70	0-50
	Granite boulders, sand	Granite boulders, sand	Granite boulders, sand	Granite boulders, sand
Percentage cover:				
Algae				
Chlorophyta	<i>Cladophora</i> sp.	10	10	20
Angiosperms				
	<i>Littorella</i> sp.	+	+	10
	<i>Myriophyllum spicatum</i>	5	5	
	<i>Ruppia cirrhosa</i>	5	5	
Bare ground				
Rock/pebbles	70	70	40	40
Sand	20	20	50	50

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. *Ruppia cirrhosa* was only identified at 23 lagoons (26%), but species was not determined at 12 sites.

Based on aquatic flora the site is rated as of **low conservation value**.

Fauna

The aquatic fauna recorded in Loch Ó Dheas on 26-27/10/05 is poor, with a total of only 17 faunal taxa, most of which are freshwater insects. None of the species are lagoonal specialists and only the mollusc, *Potamopyrgus antipodarum*, the corixid *Sigara dorsalis* and unidentified Mayfly (Ephemeroptera) were abundant at some stations. When visited in August 2006, the fauna was very similar, except that two additional species (*Lymnaea peregra*, *Ischnura elegans*) were recorded in low numbers.

The aquatic fauna is poor, with a low number of generally freshwater taxa recorded. None of the species recorded are lagoonal specialists and none are of particular interest. Based on aquatic fauna, the site is rated as of **low conservation value**.

Table 84.2 Aquatic fauna recorded at sampling stations in Loch Ó Dheas, 26-27/10/05
a = abundant, c = common, o = occasional, r = rare.

			Sta 1	Sta 2	Sta 3	Sta 4
Nematoda		Nematoda indet.			r	
Annelida	Hirudinea	Hirudinea indet.			c	r
		Naididae indet.			o	o
Crustacea	Amphipoda	<i>Gammarus duebeni</i>	o	o	c	r
Acarina		Hydracarina indet.	o		o	
Insecta	Ephemeroptera	Ephemeroptera indet.	c	c	c	a
	Trichoptera	Trichoptera indet.			o	c
	Heteroptera	<i>Corixa</i> sp.				o
		<i>Sigara dorsalis</i>	c	c	o	c
		<i>Sigara scotti</i>	o	o		o
	Coleoptera	<i>Haliplus</i> sp.	o	c		
		<i>Hygrotus</i> sp.	o	o		o
		sp. 3		o		
	Diptera	Chironomidae indet.	o	o	r	o
Mollusca	Gastropoda	<i>Potamopyrgus antipodarum</i>	a	c	a	a
Bryozoa		<i>Plumatella repens</i>	c	o	o	o
Pisces		<i>Gasterosteus aculeatus</i>	c	c	o	o

Summary

Loch Ó Dheas is a small, shallow **natural sedimentary lagoon** with a **cobble** barrier. Geomorphologically it is a good example of its type, but salinity is very low and the Loch could easily be regarded as a freshwater lake, rather than lagoon. In August 2006, the vegetation was slightly more abundant than in October 2005, with percentage cover of *Ruppia cirrhosa* up to 25% and a few plants of *Ranunculus baudotii*, but the lagoon consists largely of bare granite rocks and sand, smothered at times with the filamentous alga, *Cladophora* sp. The aquatic fauna is similarly poor, with a low number of generally freshwater taxa recorded. None of the species recorded are lagoonal specialists and none are of particular interest. Although geomorphologically it is an interesting sedimentary lagoon with an impressive cobble barrier, overall conservation value is rated as low.

Overall Conservation Value = Low

Conservation Status Assessment (from Oliver 2007)

Impacts	Poaching by cattle. Eutrophication from surrounding farmland, roosting waterfowl and dwelling houses in very shallow lagoon. Dumping.
Conservation Status	Unfavourable-Inadequate

Further Information

Listed as a lagoon by Healy *et al.* 1997, Healy 2003 and Oliver 2005 and included in the Conservation Status Assessment (Oliver 2007).

References:

- Healy, B. 2003. Coastal Lagoons. In: *Wetlands of Ireland*. R. Otte (ed). Chapter 4. University College Dublin Press. Dublin. 44-78.
- Healy, B., Oliver, G.A., Hatch, P. & Good, J.A. 1997. *Coastal lagoons in the Republic of Ireland. Vol. 3. Inventory of lagoons and saline lakes*. Report to the National Parks and Wildlife Service, Dublin.
- Oliver, G.A. 2005. *Seasonal changes and Biological Classification of Irish Coastal Lagoons*. PhD Thesis. U.C.D., Dublin. Available on www.irishlagoons.com
- Oliver, G.A. 2007. *Conservation status report: Coastal Lagoons (1150)*. Unpublished report to the National Parks and Wildlife Service, Dublin.