NPWS

Lower River Shannon SAC
(site code 2165)

Conservation objectives supporting document-
Lagoons

Version 1
May 2012

Contents

1. Introduction

1.1 Lower River Shannon SAC

Lower River Shannon Special Area of Conservation (site code 002165) is a large site that encompasses the lower reaches of the River Shannon extending from just south of Lough Derg at its eastern end to a line drawn from Loop Head to Kerry Head at the west. The Mulkear and Maine rivers are included in the site as well as the lower portions of others, such as the Fergus and Maigue.

The site is selected for 14 habitats listed in Annex I of the Habitats Directive and seven species in Annex II.

"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, 2008).

Four lagoons are listed for this SAC (Oliver, 2007). The table below gives the conservation status assessment of each 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
IL031	Quayfield and Poulaweala Loughs	Limerick	Unfavourable inadequate
IL032	Shannon Airport Lagoon	Clare	Unfavourable- bad
IL033	Scattery Lagoon	Clare	Unfavourable- inadequate
IL034	Cloonconeen Pool	Clare	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 (2010). 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 (1010).

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 33.4ha- see table below.

Code[1]	Name	Area (Ha) [2]
IL031	Quayfield and Poulaweala Loughs	2.5
IL032	Shannon Airport Lagoon	24.2[3]
IL033	Scattery Lagoon	2.8
IL034	Cloonconeen Pool	3.9
	Total	**33.4**

[1] Codes are those used in Oliver, 2007.

[2] Areas are calculated from spatial data derived from Oliver (2007).

[3] Please note that the area for this lagoon is incorrect in the account given in Oliver (2007).

3. Range

The known distribution of lagoon habitat in the Lower River Shannon SAC is shown in Appendix 1. There may be other lagoons in the site that have not yet been mapped by NPWS.

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, 2010).

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

The lagoons in the SAC vary from oligohaline (0.5-5 practical salinity units (psu)) to euhaline (30-4-psu). Using information from Oliver (2007), the following table gives the salinity class for each lagoon listed. See Roden and Oliver (2010) for further information on salinity classes and Appendix 2 for individual lagoon reports.

Code	Name	Salinity
IL031	Quayfield and Poulaweala Loughs	Oligohaline/polyhaline
IL032	Shannon Airport Lagoon	Oligohaline
IL033	Scattery Lagoon	Euhaline
IL034	Cloonconeen Pool	Euhaline

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.

All the lagoons identified within the Lower River Shannon SAC can be classified as shallow, thus even small changes in water depth can cause significant losses in habitat area. Shannon Airport Lagoon has a sluiced inlet. 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 four lagoons listed for the site have varying barrier types, which is summarised in the following table (after Oliver, 2007). See also site accounts in Appendix 2.

Code	Name	Barrier Type
IL031	Quayfield and Poulaweala Loughs	Karst
IL032	Shannon Airport Lagoon	Embankment (artificial)
IL033	Scattery Lagoon	Cobble/shingle
IL034	Cloonconeen Pool	Cobble

4.4 Water quality- Chlorophyll a

This attribute indicates the level of phytoplankton in the water column. Roden and Oliver (2010) 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 (2010).

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 (2010).

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 (2010).

A 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

All of the lagoons within the Lower River Shannon SAC have been identified as 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 *Chaetomorpha linum* in Quayfield and Scattery; *Ruppia* spp. in Quayfield and Cloonconeen; *Chara* spp. in Shannon. 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

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 reedbeds can be caused by low salinity, shallow water and elevated nutrient levels.

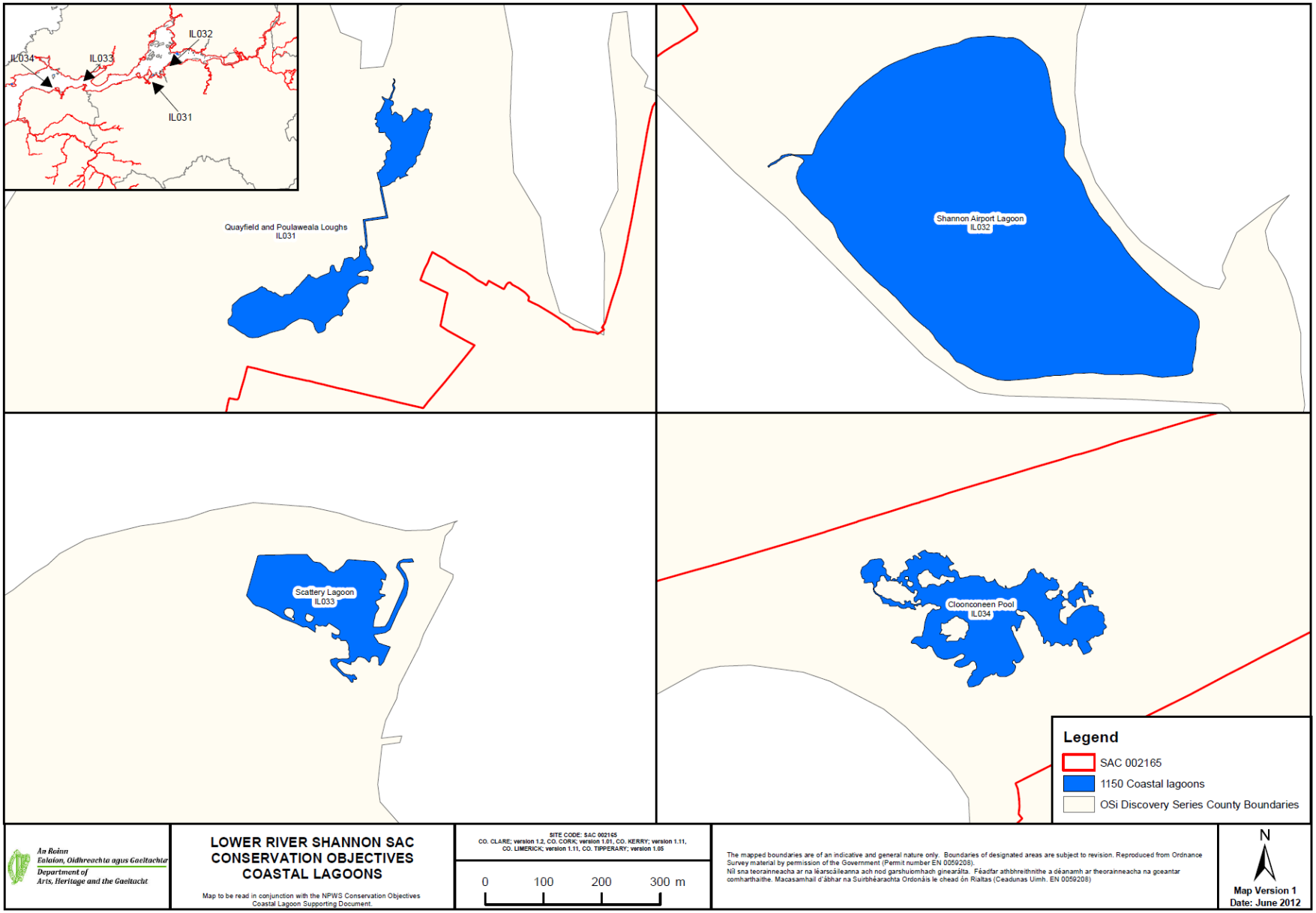
The target for the attribute negative indicator species is: negative indicator species absent or under control.

5. References

Roden, C.M. and Oliver, G. (2010) Monitoring and assessment of Irish lagoons for the purpose of the EU Water framework Directive. Unpublished report to the Environmental Protection Agency.

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)

Code[1]	Name
IL031	Quayfield and Poulaweala Loughs
IL032	Shannon Airport Lagoon
IL033	Scattery Lagoon
IL034	Cloonconeen Pool

[1] Codes are those used in Oliver, 2007.

4.31 Quayfield and Poulaweala Loughs, County Limerick

O.S. R 297 527 O.S. Discovery Sheet 64

Conservation Designation: Lower River Shannon SAC 002165, pNHA 000435

General description:

Two small (2ha), shallow (<1m) **karst lagoons**, situated **on** the south shore of the Shannon estuary 5km northwest of Askeaton, Co. Limerick. The two lagoons are connected intermittently depending on water levels by a small channel. Seawater enters Quayfield Lough through limestone grykes, and salinity in this lagoon measured 28psu at the time of sampling (27/9/03). Seawater occasionally then flows into the Poulaweala Lough, but this is now almost a freshwater lake.

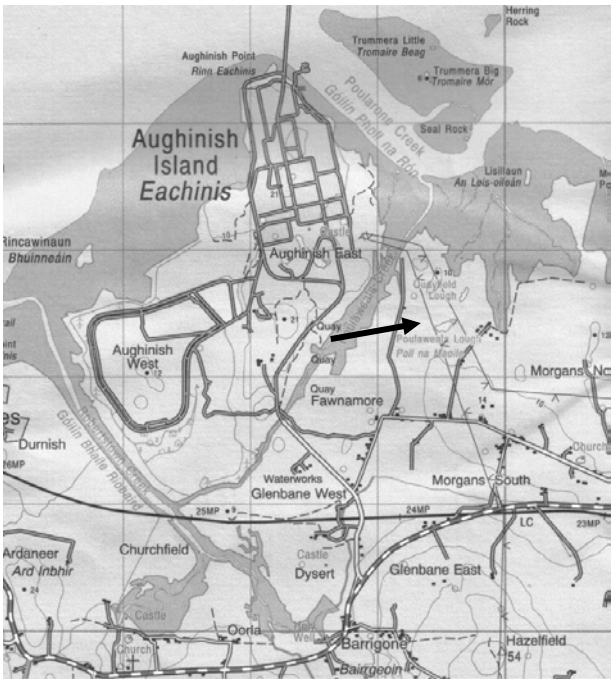


Figure 31.1 Location map of Quayfield and Poulaweala Loughs.

Quayfield and Poulaweala Loughs were surveyed in 2003 as part of a PhD study (Oliver 2005) and used in a biological classification of Irish coastal lagoons. Three stations were selected for the sampling of aquatic fauna and flora (Figure 31.2, Table 31.1)

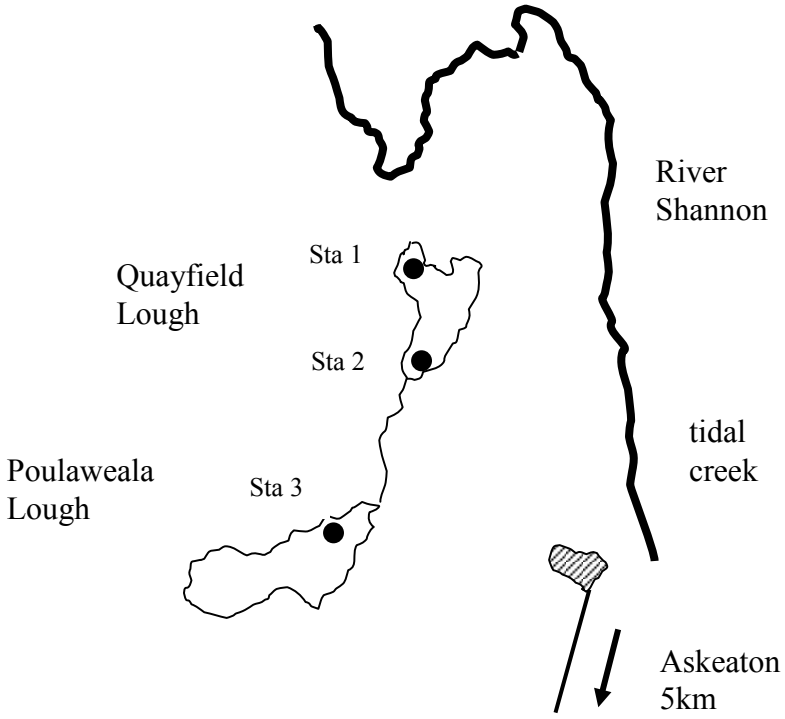


Figure 31.2 Sampling stations used at Quayfield and Poulaweala Loughs on 13/7 and 27/9/03.

Flora

A total of 13 floral taxa were recorded at Quayfield and Poulaweala Loughs on 13/7 and 27/9/03 (Table 31.1). Two of these taxa are regarded as lagoonal specialists. None of the other species are particularly rare or unusual.

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. The *Ruppia* at this site was not specifically identified as no flowering plants were found but is assumed to be *Ruppia maritima* which appears to be the more common of the species and was found at 41 of the lagoons surveyed (47%).

The southern part of Poulaweala Lough is largely dominated by *Cladium mariscus* but this species was not present in the areas sampled.

The lagoon habitat is small but largely dominated by two lagoonal specialists and based on aquatic vegetation, as a lagoon the site is regarded as of **moderate conservation value**.

Table 31.1 Positions of sampling stations in Quayfield and Poulaweala Loughs on 13/7 and 27/9/03 with salinity, temperature and depth of water, type of substratum and percent cover of vegetation, bare ground and rotting vegetation. Species in bold text are lagoonal specialists.

Taxa		Sampling Stations		
		Sta 1	Sta 2	Sta 3
GPS position		R 29624 53383	R 29639 53216	R 29471 53111
Salinity (psu)		28.8	28.6	1.9
Temperature		15.9	22.1	13.5
Depth (m)		0-30	0-30	0-20
Substratum		soft mud, occ. stones	soft mud, occ. stones	soft organic mud, occ. stones
Percentage cover:				
BARE - mineral		97	5	5
BARE - rotting vegetation			1	
ALGAE				
Chlorophyta	***Chaetomorpha linum***	2	2	
	Cladophora sp.	1	5	
	Enteromorpha sp.	1	1	
	Ulva lactuca	1	1	
Phaeophyta	*Fucus vesiculosus*	1		
Rhodophyta	*Hildenbrandia*	1		
	Chondrus crispus	1		
Charophyta	*Chara polycarpa*			1
Angiosperms	*Potamogeton pectinatus*			2
	***Ruppia* sp.**	1	3	
	Schoenoplectus lacustris			5
	Scirpus maritimus		5	45
	Spartina sp.	1		

Fauna

A total of 31 faunal taxa were recorded in Quayfield and Poulaweala Loughs (Table 31.2), largely due to the salinity range of the two loughs and the relatively high number of insects in the lower salinity Poulaweala. However, six of the species recorded in Quayfield Lough are lagoonal specialists.

Idotea chelipes is a common, lagoonal, isopod crustacean, often found in association with the lagoonal form of *Chaetomorpha linum.* Found at 23 of the 87 (26.4%) lagoons surveyed, mostly at relatively high salinity.

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.

Sigara stagnalis Hemipteran insect (water-boatman). A common lagoonal specialist found at 36 of the 87 (41.4%) lagoons surveyed.

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.

Table 31.2 Aquatic fauna recorded at sampling stations in Quayfield and Poulaweala Loughs on 13/7 and 27/9/03. Species in bold text are lagoonal specialists.

		Sta 1				Sta 2				Sta 3			
		SW	Sed	L.T.	**Ab**	SW	Sed	L.T.	**Ab**	SW	Sed	L.T.	**Ab**
Annelida													
Polychaeta	*Arenicola* agg				**o**				**o**				
	Nereis diversicolor	0.3			**c**	1.5	6.0		**c**				
Crustacea													
Cirripedia	*Elminius modestus*				**o**								
Isopoda	***Idotea chelipes***	0.3		12.0	**o**	7.5		4.0	**c**				
	Lekanesphaera hookeri	16.7		11.0	**a**	2.0		44.0	**a**				
Amphipoda	indet	1.0		5.0	**o**	0.5			**r**				
	Melita palmata	2.7		5.0	**c**								
	Crangon crangon			1.0	**r**								
	Palaemonetes varians	2.0		8.0	**o**	7.0		6.0	**c**	37.3		5.0	**c**
Insecta													
Odonata	*Ischnura elegans*												**o**
Heteroptera	Corixidae					1.5			**o**	9.7		12.0	**o**
	Corixa sp.											1.0	**r**
	Gerris odontogaster									1.3			**o**
	Gerris sp.									1.3			**o**
	Hesperocorixa linnaei									0.3		1.0	**r**
	? Notonecta viridis												**r**
	S. dorsalis									0.7			**o**
	S. distincta									0.3			**r**
	Sigara stagnalis								**o**	4.7		1.0	**o**
Coleoptera										7.3		4.0	**c**
	Gyrinus caspius									4.0		2.0	**c**
	Helophorus sp.									0.3			**r**
	Hydaticus seminiger									0.3			**r**
	Hygrotus inaequalis									1.0			**o**
	Noterus clavicornis									1.7		2.0	**o**
	Rhantus frontalis												**r**
Diptera	Chironomidae	0.3			**r**		3.0		**o**	3.7	1.7		**o**
Mollusca													
Prosobranchia	*Hydrobia ulvae*	46.0		6.0	**c**	35.0			**c**				
	H. ventrosa	8.3			**o**	1.0			**o**				
	Littorina littorea				**r**								
	L. saxatilis				**o**								
	Potamopyrgus antipodarum									2.7		1.0	**o**
Pulmonata	*Lymnaea peregra*												**o**
Bivalvia	***Cerastoderma glaucum***				**r**				**o**				
	Mytilus edulis				**o**								
Bryozoa	***Conopeum seurati***				**r**				**o**				
Pisces	*Gasterosteus aculeatus*					0.5			**r**	2.3		4.0	**o**
	Mugilidae				**o**								
	Pomatoschistus microps	0.3		18.0	**c**	1.5		2.0	**c**				

The two loughs are both small and Poulaweala is closer to a freshwater lake than a lagoon, but Quayfield Lough is largely dominated by lagoonal specialist species, and based on this fauna, as a lagoon it is regarded as of **moderate conservation value**.

Summary

Poulaweala and Quayfield Loughs are both small and Poulaweala is closer to a freshwater lake than a lagoon, but Quayfield Lough is largely dominated by lagoonal specialist species, with 2 floral and 6 faunal lagoonal specialist species. It is also a **karst lagoon**, with connection to the sea through underground fissures, which is an unusual lagoon type in Europe. Therefore, despite its small size, as a lagoon it is regarded as of **moderate conservation value**. Poulaweala Lough is included as, although it is at present closer to a freshwater lake, it appears to be silting up and the possibility of dredging part of the lake, thus recreating more brackish conditions, might be considered.

Overall Conservation Value = Moderate

Conservation Status Assessment (from Oliver 2007)	
Impacts	Natural eutrophication in small, shallow lagoons. Poulaweala becoming drier and "choked" by emergents. Silting up.
Conservation Status	Unfavourable-Inadequate

Further Information

Listed as a lagoon by Healy *et al.* 1997, and Healy 2003. Surveyed in 2003 as part of a PhD study (Oliver 2005) and used in a biological classification of Irish coastal lagoons and in the Conservation Status Assessment (Oliver 2007).

References:

Bamber, R.N. 1997. Assessment of saline lagoons within Special Areas of Conservation. *English Nature Research Reports* No. 235.

Barnes, R.S.K. 1989. Coastal lagoons of Britain: an overview and conservation appraisal. *Biological Conservation* **49:** 295–313.

Hatch, P. & Healy, B. 1998. Aquatic vegetation of Irish coastal lagoons. *Bulletin of the Irish Biogeographical Society*. **21:** 2-21.

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.

Wyse Jackson, P.N. 1991. Distribution of Irish marine Bryozoa, together with biographical notes relating to the chief researchers in the group. *Bulletin of the Irish Biogeographical Society.* **14:** 129-18.

4.32	**Shannon Airport Lagoon, County Clare** O.S. R 350 620 O.S. Discovery Sheet 58

Conservation Designation: Lower River Shannon SAC 002165,
SPA 004077, pNHA 002048

General description:

Situated only a few hundred metres southwest of Shannon Airport. A small (2ha) **artificial lagoon** with a sluiced inlet, formed behind a coastal embankment. There has been considerable debate and controversy in relation to this lagoon, and the possible safety threat of waterbirds colliding with aircraft. When visited briefly in 1996, salinity measured 13psu and water depth was approximately 1m, but when sampled in 2002, a large part of the lagoon was dry and salinity measured 0psu.

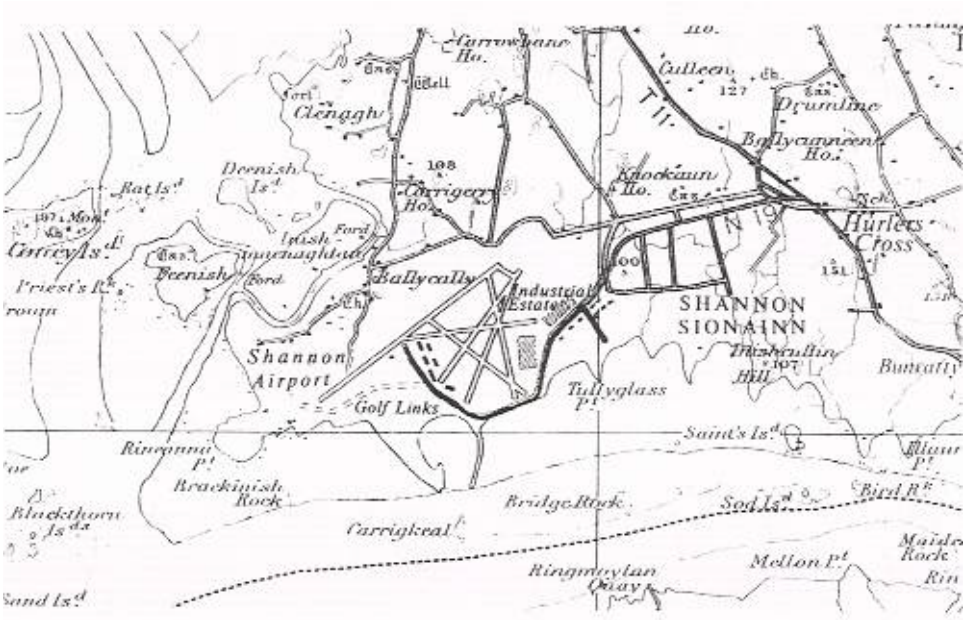


Figure 32.1 Location map of Shannon Airport Lagoon.

Shannon Airport lagoon was visited briefly in 1996 and surveyed in 2002 as part of a PhD study (Oliver 2005) and used in a biological classification of Irish coastal lagoons. As part of this study, an additional vegetation survey was carried out by C. Roden in 2003 (Roden 2004). Four stations were selected for the sampling of aquatic fauna and flora (Figure 32.2, Table 32.1.)

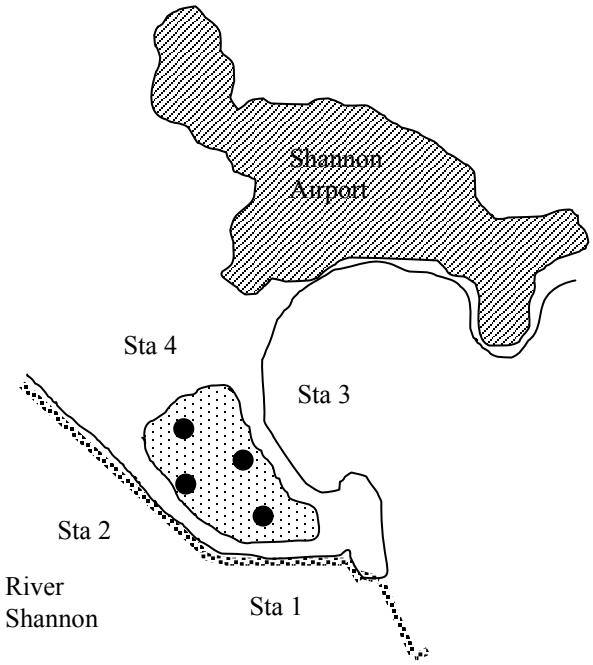


Figure 32.2 Sampling stations used at Shannon Airport lagoon from 22-23/8/02.

Flora

In 1996 two rare charophytes (*Chara canescens, Chara connivens*) were reported at this site by Healy *et al*. 1997. Both of these two species are rare and both are regarded as lagoonal specialists.

In 2002 only 9 floral taxa were recorded in the lagoon (Table 32.1), but one of these species may have been the rare charophyte, *C. ?connivens* which is a lagoonal specialist. None of the other species are of particular note.

When visited in 2003 water covering the muddy bottom was only a few centimetres deep and the only charophytes recorded appeared to be *Chara aspera* (Roden 2004).

Chara ?connivens. During the lagoon surveys by C. Roden (1999, 2004) a spineless *Chara* species was collected from the North Slobs but it lacked any reproductive organs and its identity could not be established. An attempt to collect fertile material in September 2003 had to be abandoned as a dense algal bloom reduced visibility to a few cm. The identity of the form should be investigated as soon as possible. Similarly this "vague" record from Shannon airport lagoon is unlikely to be verified if water levels are maintained at such low levels.

Chara canescens was recorded in **eight lagoons** during the surveys - North Slob, Lady's Island L., and Tacumshin L., Co. Wexford, L. Gill, Co. Kerry, L. Murree, Co. Clare, Tanrego, Co. Sligo and Durnesh L. and Inch L., Co. Donegal (Hatch & Healy, 1998; Roden, 1999; Roden 2004). It was also recorded at Shannon Lagoon in 1996 (Hatch and Healy 1998), but not refound at that site in 2003 (Roden 2004). This species is listed in the Red Data Book for Britain and Ireland (Stewart and Church 1992). Although recorded from several European countries it is believed to be declining. It is believed to be extinct in Holland, and there are only a few records from the U.K. since 1960. These Irish locations are very important in European terms, and it is especially encouraging to have found new sites.

Table 32.1 Percentage cover of vegetation and bare ground in Shannon Airport lagoon on 22-23/8/02, with salinity, depth of water and type of substratum.

Sampling dates		Station 1 22-23/8/02	Station 2 22-23/8/02	Station 3 22-23/8/02	Station 4 22-23/8/02
Salinity(psu)		0	0	0	0
Depth(cm)		15-25	0-30	30	10
Substratum		soft mud	very soft mud	sand	sand
Percentage cover:					
Chlorophyta	*Cladophora* sp.	60	30	10	
	Enteromorpha sp.	2	2	5	
Charophyta	*Chara polyacantha*	2	2	2	2
	***Chara* sp 2 (?*connivens*)**	0	1	1	1
Angiosperms	*Myriophyllum spicatum*	5	2	2	2
	Phragmites australis	10	5	5	
	Potamogeton pectinatus	70	10	10	2
	Scirpus maritimus	10	5	5	
	Zannichellia palustris	5	2	2	2
Bare ground		20	60	70	90

Unfortunately, no more information is available concerning the possibility of either of these rare species being present in the Shannon Airport lagoon and if they ever did occur in the past, they would be unlikely to survive if water levels in the lagoon are not increased.

Based on aquatic vegetation, as a lagoon conservation value of the lagoon must therefore be regarded as **low, but potentially high conservation value.**

Fauna

The lagoon fauna was poor in 2002, with only 13 taxa recorded, and only 9 of these identified to species (Table 32.2). Of the limited fauna, none are particularly abundant apart from Ostracoda. Species such as *Neomysis integer, Lekanesphaera hookeri*, corixids and the two of the fish species (*G. aculeatus, P. microps*) are often found in very high numbers in lagoons but were found only in relatively low numbers at this particular site. Two species are lagoonal specialists, but both are relatively common in lagoonal habitats in Ireland.

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

Sigara stagnalis Hemipteran insect (water-boatman). A common lagoonal specialist found at 36 of the 87 (41.4%) lagoons surveyed.

The 10-spined Stickleback, ***Pungitius pungitius*** has only previously been recorded in two other lagoons, both in Wexford (Lady's Island Lake and Tacumshin). In Shannon Airport lagoon in 2002 it was quite common, outnumbering *G. aculeatus* but is described in the Irish Red Data Book (Whilde 1993) as "a near threatened species needing to be closely monitored".

Table 32.2 Faunal taxa recorded at stations in Shannon Airport lagoon 22-23/8/02.
SW = mean of 3x 30 second sweeps, Sed = mean of 3 x 0.005m^2 diameter sediment cores, L.T. = Light trap, **Ab** = overall abundance of all sampling methods, including visual searches. r = rare, o = occasional, c = common, a = abundant . Species in bold text are lagoonal specialists or otherwise notable species.

		Sta 1				Sta 2				Sta 3		
		SW	Sed	L.T.	**Ab**	SW	Sed	L.T.	**Ab**	SW	L.T.	**Ab**
Annelida	*Tubifex* sp.		2.7		c		1.7		c			
Crustacea	Ostracoda			7	a			45	c			
Mysidacea	*Neomysis integer*	1.0		2	o			1	r	1.3	42	o
	Lekanesphaera hookeri	1.3		22	o	3.3			o	3.3	11	o
Amphipoda	indet									2.0	1	o
	Gammarus zaddachi	0.3		13	o	0.3			r	2.0	1	o
Heteroptera	Corixidae	49.3		12	c	126.7		18	c	14.3	31	c
	Gerris sp.								o			
	Sigara lateralis	6.0			o	6.7		1	o	6.7		o
	Sigara stagnalis	35.0		12	c	1.0		15	c	9.0	31	c
Diptera	Chironomidae		8.0		c		16.3		c			
Mollusca	*Potamopyrgus antipodarum*	0.3			r	4.3			o			
Pisces	*Gasterosteus aculeatus*	2.0		12	c	0.7			o	0.7	2	o
	Pomatoschistus microps									2.3	2	o
	Pungitius pungitius	0.3		6	o	1.0		1	o	0.3	25	o

Based on this aquatic fauna, the site is regarded as of **low conservation value** as a lagoon.

Summary

Shannon Airport lagoon is a small artificial lagoon. The flora, at least in 1996 and 2002, was potentially extremely interesting with possibly 2 very rare charophytes (***C. canescens*** and ***C. ?connivens***), both of which are lagoonal specialists. Unfortunately both of these have still to be confirmed and when the site was visited by a botanist in 2003 neither of these charophyte species were found. Two faunal species are lagoonal specialists, but neither is particularly rare. Generally, the fauna of the site is poor and does not appear at this stage to include any rare or threatened species, except possibly *Pungitius pungitius*. Shannon Airport lagoon may have been of greater conservation value in the past, but as a result of recent drainage, conservation value is considered to be low.

Overall Conservation Value = Low

Conservation Status Assessment (from Oliver 2007)	
Impacts	Eutrophication from airport effluents. Deliberate drainage to discourage waterfowl which pose potential threat to safety of aircraft. Ind/commercial activities. Modification of hydrology.
Conservation Status	Unfavourable-BAD

Further Information

Visited briefly in 1996. Listed as a lagoon by Healy *et al.* 1997, and Healy 2003. Surveyed in 2002/2003 as part of a PhD study, with an additional vegetation survey in 2003 (Roden 2004) and used in a biological classification of Irish coastal lagoons (Oliver 2005) and in the Conservation Status Assessment (Oliver 2007).

References:

Hatch, P. 1996. *A survey of the vegetation of Irish coastal lagoons.1996.* Unpubl. Report to NPWS. Dublin.

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4.33	**Scattery Lagoon, County Clare** O.S. Q 974 527 O.S. Discovery Sheet 63

Conservation Designation: Scattery Island SAC 002165, pNHA 001911

General description:

Situated on Scattery Island in the River Shannon, 2.5km southwest of Kilrush, Co. Clare. A small (10ha), shallow, "estuarine" natural **sedimentary lagoon** with a cobble/shingle barrier. A relatively large natural inlet allows most tides to enter through the barrier, and salinity is generally high, ranging from 29-32psu at the time of sampling (18-21/9/03).

Figure 33.1 Location map of Scattery Lagoon.

Scattery Lagoon was surveyed in 2003 as part of a PhD study (Oliver 2005) and used in a biological classification of Irish coastal lagoons. At this time, the vegetation was surveyed by C. Roden (Roden 2004). Four stations were selected for the sampling of aquatic fauna and flora (Figure 32.2, Table 31.1)

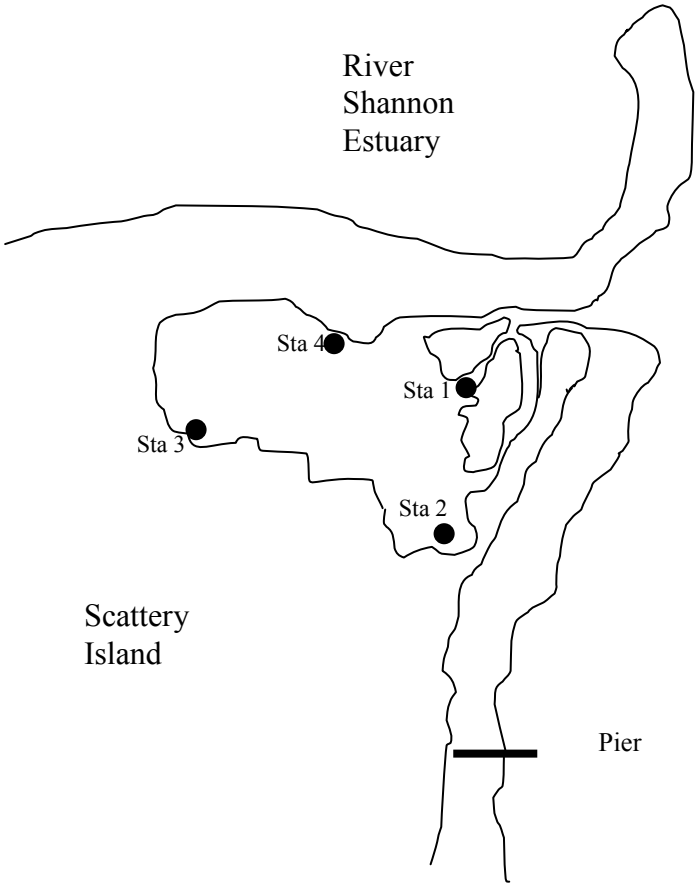

Figure 33.2 Sampling stations used at Scattery lagoon from18-21/9/03.

Flora

A total of 22 floral taxa were recorded at Scattery Island lagoon of which 10 were identified to species (Table 33.1). Most of these are common marine algae but much of the lagoon, which is not bare mud, is dominated by one species, *Chaetomorpha linum*, which is regarded as lagoonal specialist:

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.

None of the plants recorded in Scattery lagoon are rare, and being an "estuarine type" lagoon much of the bed of the lagoon consists of bare mud. However, the large cover of *C. linum* makes it typivally lagoonal. Based on aquatic vegetation the site is therefore regarded as of **moderate conservation value** as a lagoon.

Table 33.1 Percentage cover of vegetation and bare ground in Scattery Island lagoon on 18-21/8/02 with salinity, depth of water, and type of substratum. Species in bold text are lagoonal specialists.

		Station 1	Station 2	Station 3	Station 4
Salinity(psu0		29	30	32	32
Depth(cm)		0-50	0-50	0-50	0-50
Substratum		stones, gravel	soft mud, cobbles on shoreline	soft mud	gravel and mud
Percentage cover:					
Chlorophyta	***Chaetomorpha linum***	1	20	20	50
	Cladophora sp.	5	20	20	5
	Codium sp.	2	2		2
	Dictyota dichotoma	5			
	Enteromorpha sp.	2	5	5	1
	Ulva sp.	5	1		
Chrysophyta	*Vaucheria* sp.	1		1	1
Phaeophyta	*Ascophyllum nodosum*			1	
	Fucus serratus	20	10	2	2
	Fucus spiralis	2	2	2	
	Fucus vesiculosus	30	1	2	
	Pelvetia canaliculata	1		2	
Rhodophyta	*Ceramium sp.*	2			
	Chondrus crispus	5			2
	Corallina sp.	2			
	Gracilaria verrucosa	1	5	5	2
	Laurencia hybrida	1			
	Lithothamnion sp.	2			
	Plocamium cartilaginum	1	1		
	Polysiphonia sp.	5	10		
Angiosperms	*Spartina* sp.	1	1	1	
Bare ground		5	20	40	35

Fauna

Scattery Island lagoon is relatively rich in fauna, with a total of 48 taxa recorded, of which 45 were identified to species (Table 33.2). Most of these taxa are relatively common marine animals, but four species are regarded as lagoonal specialists, and one (*J. forsmani*) appears to be rare:

Idotea chelipes is a common, lagoonal, isopod crustacean, often found in association with the lagoonal form of *Chaetomorpha linum.* Found at 23 of the 87 (26.4%) lagoons surveyed, mostly at relatively high salinity.

Jaera forsmani was recorded at Raffeen and Kilmore L. (Co. Cork), Drongawn L. (Kerry), Aibhnín, L. Fhada and L. Fhada upper pools (Connemara). The only previous record for this, probably under-recorded species was for L. Hyne, Co. Cork in De Grave and Holmes (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.

Table 33.2 Faunal taxa recorded at stations in Scattery lagoon 18-21/8/02.
SW = mean of 3x 30 second sweeps, Sed = mean of 3 x 0.005m^2 diameter sediment cores, L.T. = Light trap, **Ab** = overall abundance of all sampling methods, including visual searches. r = rare, o = occasional, c = common, a = abundant. Species in bold text are lagoonal specialists or otherwise notable species.

		Sta 1			**Sta 2**				**Sta 3**				**Sta 4**			
		SW	Sed	**Ab**	SW	Sed	L.T.	**Ab**	SW	Sed	L.T.	**Ab**	SW	Sed	L.T.	**Ab**
Porifera	*Halichondria panicea*			c												
Cnidaria	*?Anthopleura*			o				o								
	Laomedia angulata			o				o				o				
Nemertea	*Lineus ruber*			o				o			1	r				
Annelida	*Arenicola marina*			o				o				c				
	Capitella capitata			o				o				o				c
	Janua pagenstecheri			o				o				o				
	Scoloplos armiger		2.3	o		8.3		c		2.3		o		1.7		c
	Spirorbis spirorbis			o				o				o				c
	Tubificoides benedii			c	24.7			c								c
	Heterochaeta costata			o				o								r
	Tubifex indet			c				c		2.3		o		8.0		c
Crustacea																
Mysidacea	*Praunus flexuosus*				38.7		5	c	0.3		27	o	16.7		2	c
Isopoda	***Idotea chelipes***	8.0		o	34.3		12	c					64.7		46	c
	Idotea baltica							o								
	Jaera forsmani			o												
Amphipoda	indet	19.7		c	4.0	0.3	3	o					4.3		1	c
	Apherusa jurinei	0.3		r	0.3			r					0.3			r
	Corophium volutator				0.7		1	o		17.7		c				
	Gammarus locusta	12.0		c	2.7			c				o	4.0		1	c
	Melita palmata	3.3		c												
Decapoda	*Carcinus maenas*	1.3		c	0.3			c				c				c
	Crangon crangon											o				c
	Palaemonetes varians	1.3		o	5.7		1	o								
Insecta	Chironomidae	3.3	2.3	o	1.0	16.7		c	2.7			o		46.3		c
Mollusca	*Akera bullata*			c		0.7		c				c		0.3		c
	Cerastoderma glaucum			o				o				o				c
	Gibbula umbilicalis	0.7		c				c								
	Hydrobia ulvae	24.3		c	67.7			c	17.0			c	1.0			c
	Lepidochitona cinerea			o												
	Littorina obtusata	6.7		c								o				c
	Littorina littorea	2.7		o												
	Littorina saxatilis			o												c
	Macoma baltica		0.7	o										0.3		r
	Mytilus edulis			r								r				
	Patella vulgata			o												
	Rissoa membranacea	0.3		r												
	Tapes decussata		0.3	o												
Bryozoa	*Alcyonidium gelatinosum*			c												
	Bowerbankia gracilis			o				o				o				
	Conopeum seurati							o								
	Electra pilosa			o												
	Kirchenpaueri pinnata							o								
Pisces	*Atherina presbyter*								0.3		1	o				
	Gasterosteus aculeatus				0.7			o								
	Mugilidae							o				c				
	Pleuronectes flesus							o								
	Pollachius pollachius							r								
	Pomatoschistus microps			o				o				c				

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.

The aquatic fauna of Scattery lagoon is relatively rich and comprised largely of common marine species, reflecting the high salinity of the site and combination of both hard and soft substrates. There is however an important lagoonal element with four lagoonal specialist species and one apparently rare crustacean (*J. forsmani*). Based on this fauna, the site is regarded as of **moderate conservation value** as a lagoon.

Summary

Scattery Island lagoon is small and is potentially vulnerable to storm damage, but it is an interesting natural **sedimentary lagoon**, with a cobble/shingle barrier. The lagoon is **"estuarine"** in nature with much of the bed of the lagoon consisting of bare mud, but dominated in places by the lagoonal specialist alga ***Chaetomorpha linum***. The fauna is mostly marine but with a relatively large number of taxa (48) four of which are lagoonal specialist species and one other (*J. forsmani*) is an apparently rare species. Overall, conservation value as a coastal lagoon is rated as high, due to the barrier and the fact that the biota is largely dominated by *Chaetomorpha* with *Idotea chelipes* and *Cerastoderma glaucum*.

Overall Conservation Value = High

Conservation Status Assessment (from Oliver 2007)	
Impacts	Natural damage to cobble barrier may destroy lagoon habitat. Erosion.
Conservation Status	Unfavourable-Inadequate

Further Information

Listed as a lagoon by Healy *et al.* 1997, and Healy 2003. Surveyed in 2002 as part of a PhD study (Oliver 2005, Roden 2004), and used in a biological classification of Irish coastal lagoons and in the Conservation Status Assessment (Oliver 2007). Otherwise, no further information available.

References:

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Bamber, R.N. 1997. Assessment of saline lagoons within Special Areas of Conservation. *English Nature Research Reports* No. 235.

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Roden, C. 2004. *Report on the sub littoral flora and vegetation of nine coastal lagoons.*. Dúchas, Dublin.

Wyse Jackson, P.N. 1991. Distribution of Irish marine Bryozoa, together with biographical notes relating to the chief researchers in the group. *Bulletin of the Irish Biogeographical Society.* **14:** 129-18.

4.34 **Cloonconeen Pool, County Clare** O.S. Q 836 497
O.S. Discovery Sheet 63

Conservation Designation: Lower River Shannon SAC 002165

General description:

This pool lies on the Shannon estuary, just west of Kilcredaun Point, 2 km southwest of Carrigaholt. Small (7ha) natural **sedimentary lagoon** with a cobble barrier in an area of partially cut peat bog which has become flooded by seawater. Salinity was high at the time of sampling (9-10/8/96) and ranged from 32-34psu in the main pool but is probably less for much of the time. There is a drowned forest of pine, some 4,000 years old on the beach which Mitchell (1990) describes as the finest example of "submerged forest' that he knows. Further offshore is another barrier of rock, which possibly represents the position of a former complete barrier, enclosing a larger lagoon. The lagoon and cobble barrier, together with the drowned forest, is of great geomorphological interest.

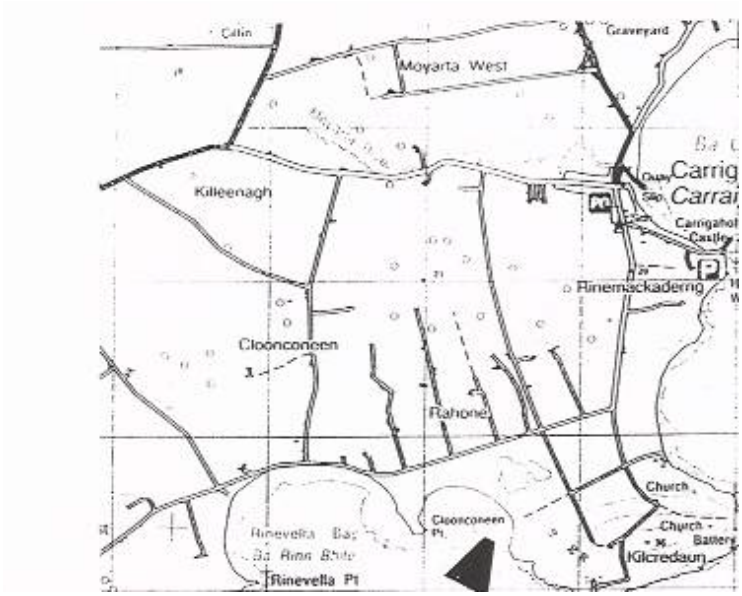

Figure 34.1 Location map of Cloonconeen Pool.

Cloonconeen Pool was surveyed in 1996 for vegetation (Hatch 1996, Hatch & Healy 1998), aquatic fauna (Healy & Oliver 1996, Oliver & Healy 1998) and ecotonal coleoptera (Good 1996, Good & Butler 1998). Results of these surveys are summarised by Healy *et al*. (1997a,b,c), Healy & Oliver (1998) and Healy (1999, 2003).

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

Flora

Vegetation was surveyed by P. Hatch in 1996 (Hatch 1996, Hatch & Healy 1998).

Ruppia maritima was the only aquatic higher plant species. It is more or less sparse but frequent around most shores and forms fairly dense beds in the south eastern bay. It has a wide distribution, but is absent from the vicinity of the inflow channel.

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.

Marginal communities and species show some diversity. *Scirpus maritimus* and *Juncus maritimus* are the dominant species around most shores, typically associated with a sparse understorey of salt tolerant species and grading to *Juncus gerardii - Festuca rubra* saltmarsh. *Puccinellia maritima* saltmarsh occurs at the western end, including one stand on the barrier shore with an open *Phragmites* cover. *Spartina anglica* is locally dominant on the north western shore and there is one small area of open *Salicornia* cover on a muddy shore in the same area.

Extensive stands of *Phragmites* and *Spartina* lie to the west of the site, associated with the inflow channel which joins the lagoon at its western end.

Fauna

Four stations were selected for faunal sampling in 1996 (Figure 34.2, Table 34.1).

Table 34.1 Positions of sampling stations in Cloonconeen Pool, 9-10/8/96, with salinity, depth of water and type of substratum

	Sta A	Sta B	Sta C	Sta D
GPS position	Q 8362 4966	Q 8351 4976	Q 8382 4974	Q 8373 4981
Salinity(psu)	34	30	32	32
Depth(cm)	0-100	0-40	0-50	0-50
Substratum	Cobbles, gravel, coarse sand	Sand, silt, unconsolidated peat	Fine silt, soft unconsolidated peat	soft unconsolidated peat

A total of only 14 taxa were recorded in Cloonconeen, of which 13 are identified to species (Table 34.2), but seven of these species are lagoonal specialists, (Lady's Island had only 8 lagoonal specialists and is 100 times larger!), and one beetle found in abundance (*E. bicolor*) is relatively rare nationally.

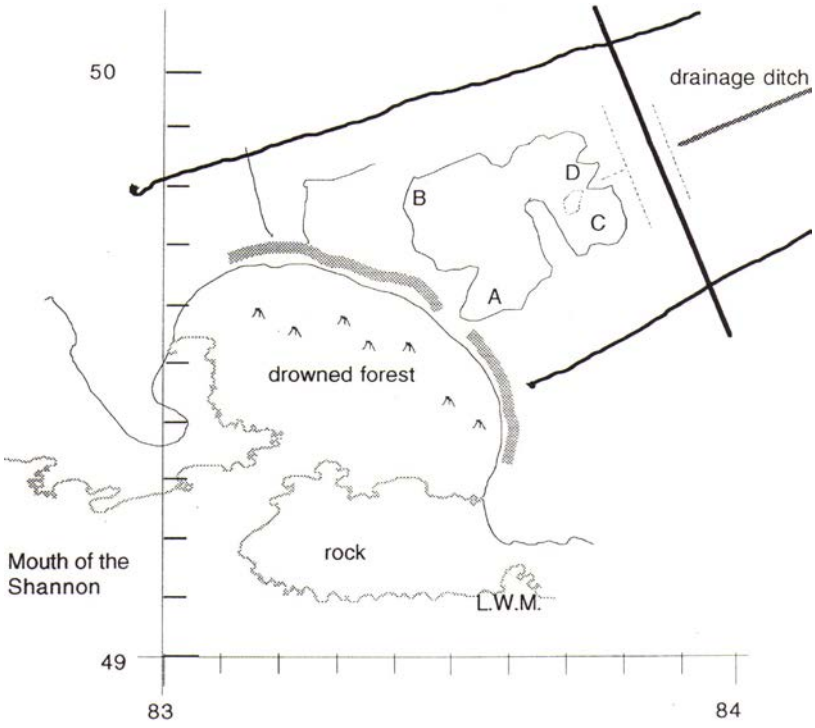

Figure 33.2 Sampling stations used at Cloonconeen Pool.

Table 34.2 Aquatic fauna recorded at stations in Cloonconeen Pool, 9-10/8/96
L.T. = Light Trap + = present; r = rare, c = common, o = occasional; a = abundant; F = fyke net.
Species in bold text are lagoonal specialists.

Taxa		Sampling Stations							
		A	L.T.A	B	L.T.B	C	L.T.C	D	L.T.D
Crustacea									
Isopoda	***Lekanesphaera hookeri***	a	50	a	50	a	150	a	120
	Jaera ?nordmanni	+							
Amphipoda	*Gammarus locusta*	+						+	
Decapoda	*Carcinus maenas*	+		+					
	Palaemonetes varians	a	55	a	200	a	110	a	56
Insecta									
Hemiptera	Corixidae	a	150	o	2	a	50	a	40
	Sigara stagnalis	a	a	+	+	a	+	a	+
Coleoptera	***Enochrus bicolor***	+		+		+		+	
Diptera	Chironomidae	+				+		+	
Mollusca									
Prosobranchia	Hydrobiidae	a				c		+	
	Hydrobia ulvae	10							
	Hydrobia ventrosa	1				+			
Bivalvia	***Cerastoderma glaucum***	a		shells		c		a	
Teleostei	*Anguilla anguilla*	F,						F,	
	Gasterosteus aculeatus	a	24	a	43	a	56	c	16

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.

Sigara stagnalis Hemipteran insect (water-boatman). A common lagoonal specialist found at 36 of the 87 (41.4%) lagoons surveyed.

Enochrus bicolor Water-beetle recorded at 12 lagoons of the 87 surveyed, from the southern half of the country from Co. Wicklow to Connemara including the Aran Islands. There are only two recent records from N. Ireland (Nelson *et al.* 1998).

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.

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

The *Jaera* were not identified specifically as only females were found, but were thought to be ***Jaera nordmanni***, which was proposed as a lagoonal specialist for Ireland by Oliver and Healy (1998). This is an 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.

The fauna of Cloonconeen is poor, with only 14 taxa recorded, reflecting the small size of the pool, the absence of emergent vegetation and hard surfaces, and a soft sediment that may be unsuitable to most species. However, a high proportion of these (50%) are lagoonal specialists and one is a relatively rare species. Therefore, based on aquatic invertebrates, Cloonconeen is regarded as of **high conservation value**.

Ecotonal coleoptera

A total of five carabid and five staphylinid beetles were recorded at Cloonconeen (Good & Butler 1998), of which two species are indicator species (*Bembidion aeneum, Brundinia meridionalis*). The presence of two indicator species indicates well-developed habitat and the site is described as of **significant conservation value.**

Summary
Cloonconeen Pool is a small natural sedimentary lagoon with a cobble barrier superimposed on peat. The biota of the pool is poor with relatively few species but a large proportion of lagoonal specialists (7 faunal, 1 floral) and a relatively rare beetle found in abundance. The pool and shoreline are worthy of conservation for their unusual geomorphology, the presence of the drowned forest, the pool with its typical lagoonal fauna and the presence of a rare species of beetle, found in abundance. Overall it is rated as of high conservation value.

Overall Conservation Value = High

Conservation Status Assessment (from Oliver 2007)	
Impacts	Natural damage to cobble barrier may destroy lagoon habitat. Erosion.
Conservation Status	Unfavourable-Inadequate

Further Information

Cloonconeen Pool was surveyed in 1996 for vegetation (Hatch 1996, Hatch & Healy 1998), aquatic fauna (Healy & Oliver 1996, Oliver & Healy 1998) and ecotonal coleoptera (Good 1996, Good & Butler 1998). Results of these surveys are summarised by Healy *et al*. (1997a,b,c), Healy & Oliver (1998), and Healy (1999, 2003). Included in a biological classification of Irish coastal lagoons (Oliver 2005) and in the Conservation Status Assessment (Oliver 2007).

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