

NPWS

Kilkeran Lake and Castlefreke Dunes SAC
(site code: 001061)

**Conservation objectives supporting document-
Coastal lagoons**

Version 1
December 2016

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Please note that this document should be read in conjunction with the following report: NPWS (2016) Conservation Objectives: Kilkeran Lake and Castlefreke Dunes SAC 001061. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

1. Introduction

1.1 Kilkeran Lake and Castlefreke Dunes SAC

Kilkeran Lake and Castlefreke Dunes SAC is situated approximately 6km south-east of Rosscarbery in Co. Cork. It is a coastal SAC in which well-developed sand dunes have impounded a natural sedimentary lagoon.

This SAC is selected for four coastal habitats listed on Annex I of the EU Habitats Directive, including coastal lagoons.

“Coastal lagoons” (habitat code 1150) is a priority Annex I habitat. 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 that 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, Kilkeran Lake, is listed for this SAC by Oliver (2007). The table below gives the conservation status assessment of this lagoon as outlined in that report. See the map in Appendix 1 and see Appendix 2 for the account of the site (from Oliver, 2007).

Code ¹	Name	County	Conservation Assessment
IL019	Kilkeran Lake	Cork	Unfavourable - Bad

¹ Code is that 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 favourable reference area for the mapped lagoon is 20.3ha, see table below.

Code ¹	Name	Area (ha) ²
IL019	Kilkeran Lake	20.3
	Total	20.3

¹ Code is that used in Oliver, 2007.

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

The target for habitat area is: stable or increasing, subject to natural processes.

3. Range

The known distribution of the lagoon habitat in Kilkeran Lake and Castlefreke Dunes 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).

A channel, some 400m long, leads from the lagoon to the sea. This is blocked for most of the year by a barrier of coarse sand, at the south-eastern end of the Castlefreke sand dune system. This barrier is occasionally breached artificially, but also naturally, when water levels rise. The main freshwater input is via a stream that enters the northern end of the lagoon. Salinity is generally low, measuring around 1-2 psu (practical salinity units). Using information from Oliver (2007), the salinity class for this lagoon is given in the table below. See Roden and Oliver (2013) for further information on salinity classes and Appendix 2 for the lagoon report.

Code ¹	Name	Salinity
IL019	Kilkeran Lake	Oligohaline

¹ Code is that used in Oliver, 2007.

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

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.

Kilkeran Lake, located within Kilkeran Lake and Castlefreke Dunes SAC, can be classified as shallow, 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.

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

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.

Kilkeran Lake is a natural sedimentary lagoon behind a sand dune barrier which is periodically breached, either naturally or artificially (after Oliver, 2007). See also the site report in Appendix 2.

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

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 5 µg/L. The target is 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 0.1 mg/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 0.15 mg/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

Kilkeran Lake been identified as shallow, thus, it is expected that macrophytes would extend down to its full depth.

The target for the attribute depth of macrophyte colonisation is: macrophyte colonisation to maximum depth of 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 plant species recorded in Kilkeran Lake is summarised in Oliver (2007). One species, *Ruppia maritima*, is considered to be a lagoonal specialist. See Appendix 2 for the site report.

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

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 species recorded in this site are summarised in Oliver (2007) and include four lagoonal specialists. The amphipod *Allomelita pellucida* is considered rare, as is the hemipteran *Notonecta viridis*; the remaining two, the hemipteran insect *Sigara stagnalis* and the decapod *Palaemonetes varians*, are common. See Appendix 2 for the site report.

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

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.

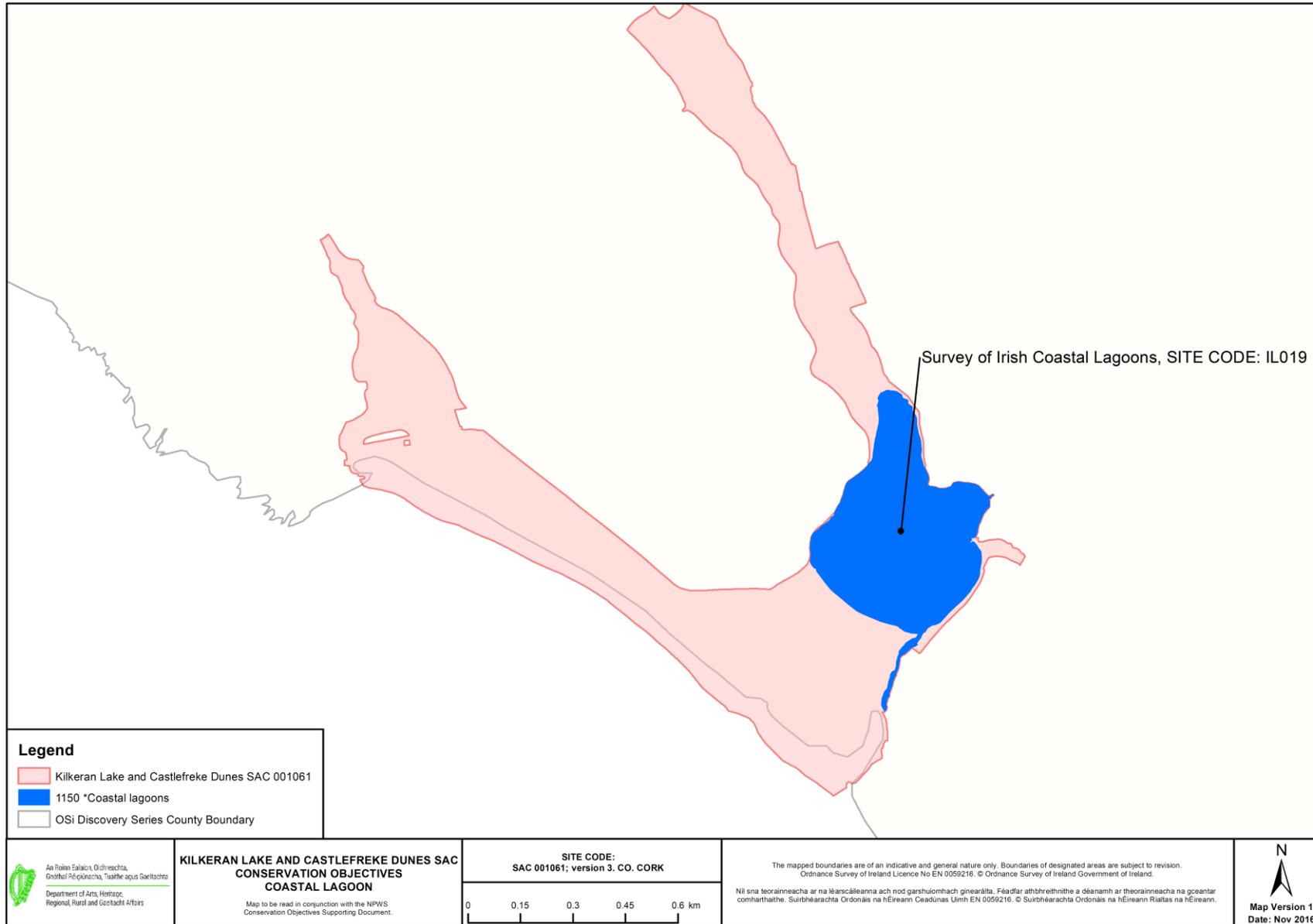
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Oliver, G. (2007) Inventory of Irish coastal lagoons (version 2). Unpublished report to the National Parks and Wildlife Service.

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.

Appendix 1 Distribution map of Coastal lagoons within Kilkieran Lake and Castlefreke Dunes SAC



Appendix 2 Site report

The following is the site account from Oliver (2007)

Code¹	Name
IL019	Kilkeran Lake

¹ Code is that used in Oliver, 2007.

4.19 **Kilkeran Lake County Cork O.S. W 338 344**
O.S. Discovery Sheet 89



Conservation Designation: Kilkeran Lake and Castleflecke Dunes
 SAC 001061, pNHA 001061

General description:

Kilkeran Lake is a small (16ha), shallow (<3m) natural lagoon, lying behind sand hills on the south coast of Co. Cork, about 5 km east of the town of Rosscarbery and 2 km north of Galley Head. A channel leads from the lagoon 400 m to the shoreline where the water of the lake is impounded for most of the year by a short, coarse sand barrier, which the County Council periodically breach, but that also opens naturally, when water levels rise. The barrier closes again naturally, generally within a few weeks. Salinity is generally low, and measured 1-2psu when sampled in 1996. The lake has suffered from extreme eutrophication, and the once thriving trout fishery has now gone.

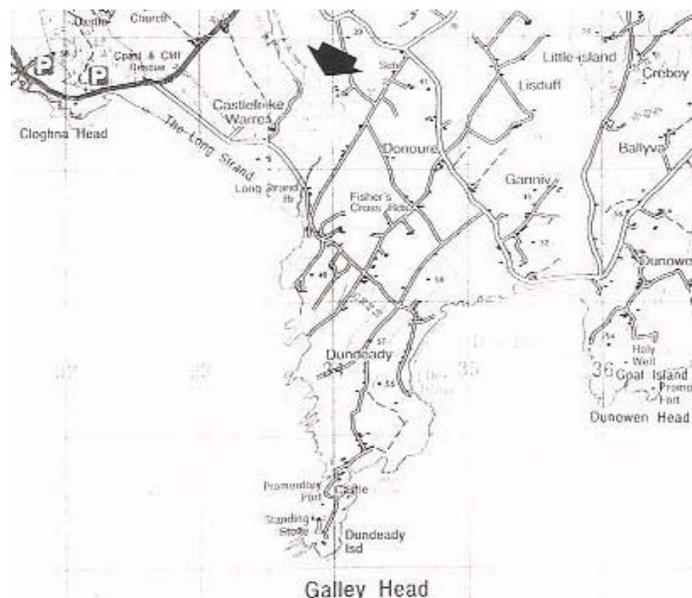


Fig 19.1 Location of map of Kilkeran Lake

Kilkeran Lake 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

The vegetation of Kilkeran Lake was surveyed by P. Hatch in 1996 (Hatch 1996, Hatch and Healy 1998) and the following is based on his survey.

Potamogeton pectinatus is abundant, occurring in extensive, dense beds to 5-15 metres out from most of the eastern and western shores and covering the entire water surface of the eastern bay. *Ruppia maritima* occurs here but was found by grapnel survey near the mouth of the outlet channel only. Its abundance and distribution is unknown. A small amount of *Chara aspera* var. *aspera* was found at the same location. Its abundance and distribution are also unknown. *Polygonum amphibium* is occasional along the western shore. Marginal vegetation comprises a narrow fringing strip of *Scirpus maritimus*, *Schoenoplectus* and *Phragmites*, each locally dominant along the eastern and western shores, with a broader band of *Phragmites* along the southern shore and an extensive *Phragmites* bed associated with the freshwater inflows in the north.

A total of 9 floral taxa were recorded in 1996, of which one species (*R. maritima*) is regarded as a lagoonal specialist.

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.

Hatch (1996) described the vegetation of Kilkeran as a species-poor example of mildly brackish conditions and regarded it as “potentially valuable” as a full survey of aquatics was not possible. No further information is available but the lagoon is regarded as of **low conservation value** based on aquatic flora.

Fauna

The fauna of the lake was surveyed by P. Galvin in 1991 (Galvin 1992) and by Oliver and Healy in 1996 (Oliver 1996, Oliver and Healy 1998).

A total of 29 faunal taxa were recorded in 1996, of which 27 were identified to species (Table 19.2). Four species are lagoonal specialists and three appear to be rare species.

Allomelita pellucida. Amphipod crustacean recorded at Kilcoole, Co. Wicklow, six sites in Cork (Cuskinny, L. Beg, Kilkeran, Lissagriffin, Farranamanagh, Reenydonegan), and recently in the River Lee (Cott *et al.* 2007), and in Furnace L., Co. Mayo. There are also 2 unconfirmed records for Ballyvodock (Co Cork) and Muckinish (Co. Clare). The only previous records are for L. Hyne and Glengarriff in Co. Cork and Furnace L. (Costello *et al.* 1989). 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.

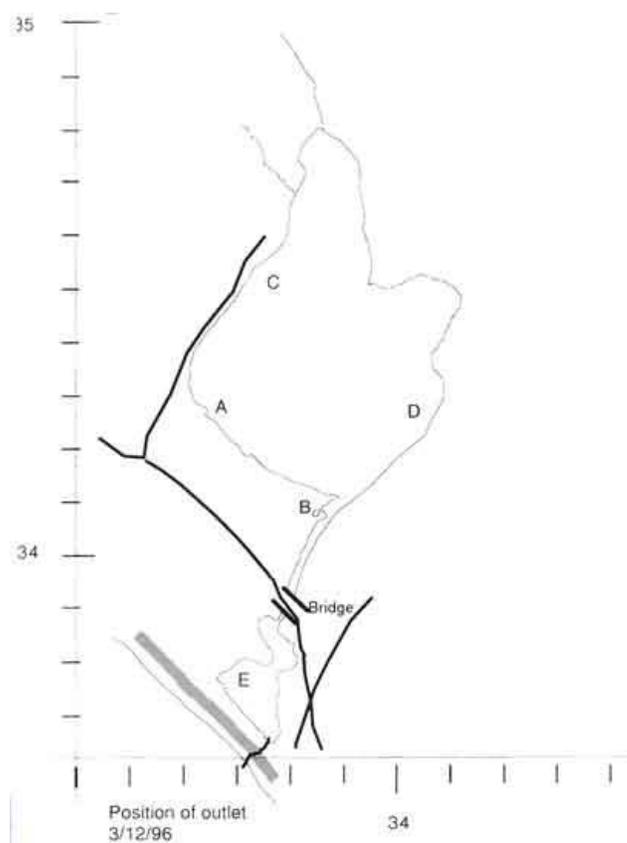


Figure 19.2 Sampling stations used at Kilkeran Lake.

Table 19.1 Positions, salinity, depth of water and type of substratum of sampling stations in Kilkeran Lake 25-27/7/96

	Sampling stations				
	Sta A	Sta B	Sta C	Sta D	Sta E
GPS position	W 3360 3426	W 3389 3404	W 3379 3454	W 3407 3425	W 3374 3356
Salinity(psu)	1.00	2.00	2.00	1-2.00	2.00
Depth of water(cm)	0-100	0-200	15-100	15-100	0-100
Substratum	Gravel, sand and mud, with occasional stones	Sand, soft organic mud	Stones with patches of sand and silty mud	Shaley stone, soft organic mud	Sand and gravel

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

Notonecta viridis Hemipteran insect (back-swimmer) recorded on the east coast at Kilcoole, on the south coast at North Slob, Lady's Island L., Tacumshin L., Ballyteige, Clogheen/White's Marsh and Kilkeran L. and also on the west coast at Reenydonegan, Co. Cork and L. Donnell, Co. Clare. A rare brackish water species in Ireland. According to Southwood and Leston (1959), it was recorded only for Wexford and North Kerry. Recorded previously in Lady's Island L (Healy *et al.* 1982) in Lady's

Island L. and the North Slob by Galvin (1992) and from the Dingle Peninsula by McCarthy and Walton (1980). *N. viridis* is found at inland sites in the U.K. but appears to be largely restricted to lagoons in Ireland, and was proposed as a lagoonal specialist for Ireland by Oliver and Healy (1998).

Table 19.2 Aquatic Fauna Recorded at Kilkeran Lake, Co. Cork. June & July 1996. () = records from July; L.T. = light-trap; + = present; o = occasional; c = common; a = abundant; * = recorded by Galvin in 1991. Species in bold text are lagoonal specialists or rare species.

	Stations									
	A	L.T.A	B	L.T.B.	C	L.T.C	D	L.T.D	E	
Crustacea										
Mysidacea <i>Neomysis integer</i>	c	c100	a	>100	a	c750	o	33		+
Amphipoda <i>Allomelita pellucida</i>			+							
<i>Gammarus duebeni</i>			+		+		+			
Decapoda <i>Palaemonetes varians</i>	c	5	a	59	o	4	c			+
Insecta										
Ephemeroptera <i>Cloeon dipterum</i>			+					+		
Odonata <i>Ischnura elegans</i>	(+)									
Diptera Chironomidae indet.	a	3	c		c		c	1		c
Hemiptera Corixidae	a	1500	a	1000	c	250	c	150		c
<i>Corixa panzeri</i>	+	1	+	+	+					
<i>Sigara concinna</i>	+	a	+	+	+	+	+	+		+
<i>S. dorsalis</i>		2			+		+			+
<i>S. stagnalis</i>			1							
<i>Notonecta glaucum</i>					+					
<i>N. viridis</i>					+					
<i>Hydrometra gracilentia</i>										
<i>H. stagnorum</i>					+					
Coleoptera (incl. larvae)	a	a			+		+			
<i>Anacaena lutescens</i>					+					
<i>Cercyon marinus</i>					+					
<i>Gyrinus caspius</i>					+					
<i>Helophorus brevipalpis</i>	+									
<i>Hydroporus angustatus</i>										
<i>H. palustris</i>	+									
Mollusca										
Prosobranchia <i>Potamopyrgus antipodarum</i>	+		+		c		+			?
Bryozoa <i>Plumatella repens</i>	+				+					
? <i>Fredericella sultana</i>			+							
Teleostei										
<i>Anguilla anguilla</i>	+		+		+		+			
<i>Gasterosteus aculeatus</i>	+	2	a	2	a	1	+			+
<i>Pomatoschistus microps</i>			+	2						
<i>Platichthys flesus</i>	+		+				+			

Hydrometra gracilentia was identified from specimens collected by Galvin (1992) and verified by M. Speight. This is a first record for Ireland and was not found at any other site, however the specimen was mislaid and despite subsequent searches, no others were found.

Both *Neomysis integer* and corixids were more abundant in this lake than at any other site sampled during the survey. This is the only site at which the beetles *Anacaena lutescens* and *Cercyon marinus* were recorded but details of their distribution in Ireland are not known at present. Galvin (1992) recorded 44 species of aquatic fauna in 1991,

including the rare lagoonal bryozoan *Victorella pavid*a which may have been misidentified. In 1996 another bryozoan species, *Fredericella sultana*, was recorded but not verified.

The lake is regarded as of high conservation value. Surveys to date indicate that the fauna comprises some rare species which also deserve protection.

Ecotonal Coleoptera

Eight species of Carabidae and seventeen species of Staphylinidae were recorded in 1996 (Good & Butler 1996, 1998). Three species were regarded as indicator species (*Blethia multipunctata*, *Gabius keysianus*, *Philonthus fumarius*) and the site was rated as of **average conservation interest**.

Summary

Kilkeran Lake is a **natural sedimentary lagoon** lying within an area of relatively unspoilt sand dunes and, although small (c.16 ha.) is probably the best example in the southwest of Ireland of a lagoon with a sand/gravel barrier. The lagoon suffers from eutrophication, but for such a relatively small lake, the aquatic fauna appears to be diverse and includes several rare or interesting species. In conclusion, based on Geomorphology and Aquatic invertebrates, the lagoon is of **high conservation value**.

Overall Conservation Value = High

Conservation Status Assessment (from Oliver 2007)

Impacts	Extreme eutrophication at times due to agricultural activities resulting in algal blooms and fishkills. Relieved by almost annual breaching. Modification of hydrology. Leisure fishing, Accumulation of organic material.
Conservation Status	Unfavourable-BAD

Further Information

A water quality and phytoplankton survey was carried out on behalf of the NPWS in 1993-94. Aquatic fauna was surveyed by Galvin (1992). 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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