Sampling Fish for the Water Framework Directive

Lakes 2013

Glenade Lough

Iascach Intíre Éireann
Inland Fisheries Ireland

Water Framework Directive Fish Stock Survey of Glenade Lough,
August 2013

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Cover photo: Netting survey on Glen Lough © Inland Fisheries Ireland

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1.1 Introduction

Glenade Lough is situated at the top of the Bonet catchment in Co. Leitrim, in a valley between the Arroo and Benbulben Mountain ranges, approximately 9km north-west of Manorhamilton (Plate 1.1, Fig. 1.1). The lake has a surface area of 73.3ha, a mean depth <4m and a maximum depth of 11.5m (NWIRBD, *pers.comm*). It is categorised as typology class 6 (as designated by the EPA for the Water Framework Directive), i.e. shallow (<4m), greater than 50ha and moderately alkaline (20-100mg/l CaCO3).

Glenade Lough has been designated as a Special Area of Conservation (NPWS, 1999). The underlying geology of the lough is composed of carboniferous limestone and shales. The lake is naturally eutrophic, a habitat listed on Annex I of the E.U. Habitats Directive. The water is clear, well aerated and relatively nutrient poor, and the shoreline is generally stony or sandy (NPWS, 1999). There is a diverse range of pondweeds present in the lake, which include *Potamogeton praelongus, P. pusillus, P. lucens* and *P. natans* (NPWS, 1999). Glenade Lough is home to a large population of the white-clawed crayfish (*Austropotamobius pallipes*), a species listed on Annex II of the E.U. Habitats Directive. The lake is also home to the plant species quillwort (*Isoetes lacustris*) and slender naiad (*Najas flexilis*), a species listed on Annex II of the E.U. Habitats Directive (NPWS, 1999). Surrounding the lake are areas of deciduous woodland which includes species such as hazel (*Corylus avellana*), ash (*Fraxinus excelsior*), alder (*Alnus glutinosa*) oak (*Quercus petraea*), beech (*Fagus sylvatica*), rhododendron (*Rhododendron ponticum*) and sycamore (*Acer pseudoplatanus)* (NPWS, 1999).

Glenade Lough was previously surveyed in 2007 and 2010 as part of the Water Framework Directive surveillance monitoring programme (Kelly and Connor, 2007 and Kelly *et al*., 2011). During the 2010 survey, perch were found to be the dominant species present in the lake. Pike, roach and eels were also captured during the survey.

Plate 1.1. Glenade Lough
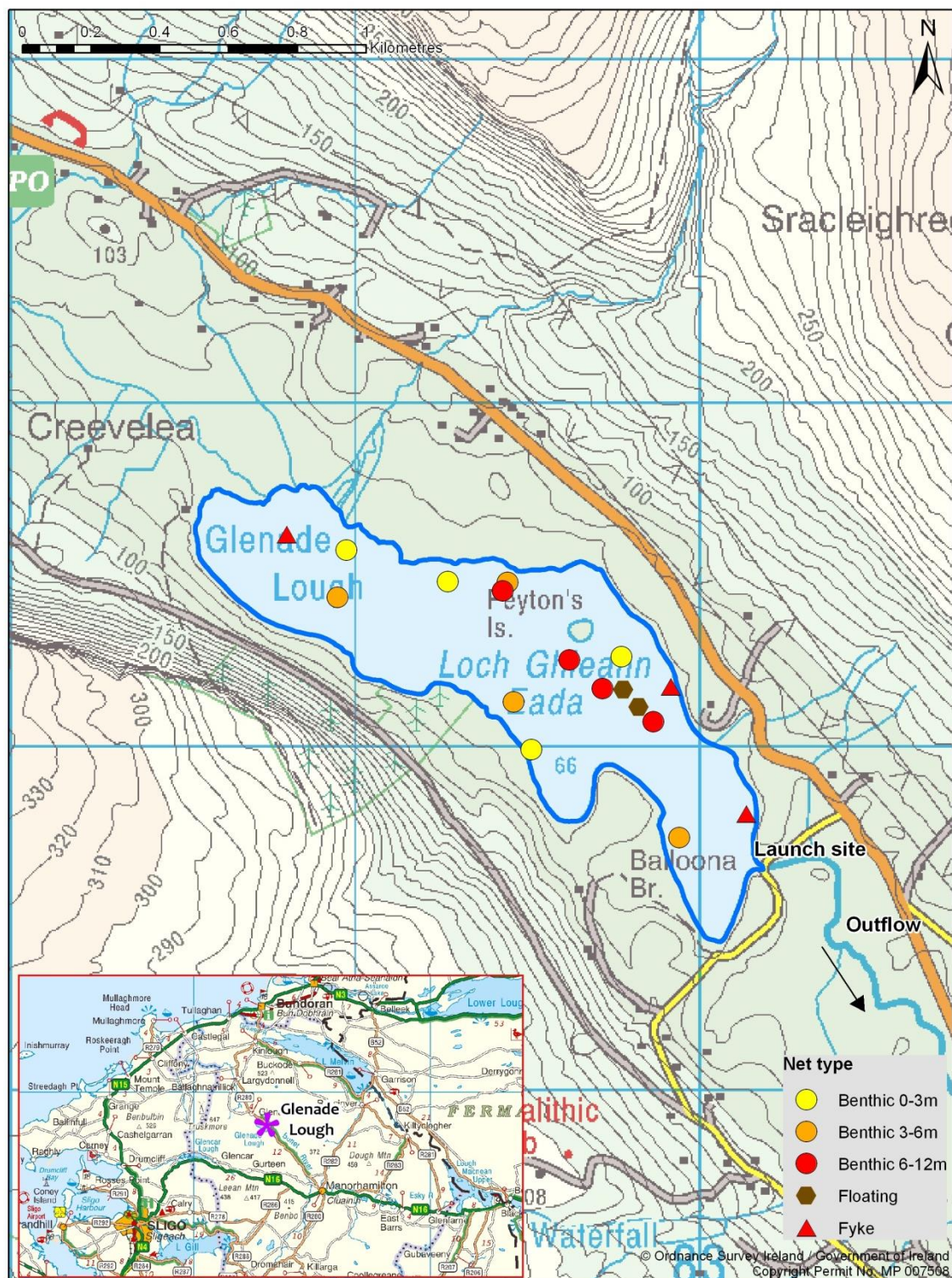
Fig. 1.1. Location map of Glenade Lough showing net locations and depths of each net (outflow is indicated on map)

1.2 Methods

Glenade Lough was surveyed over two nights from the 26th to the 28th of August 2013. A total of three sets of Dutch fyke nets, 12 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (4 @ 0-2.9m, 4 @ 3-5.9m and 4 @ 6-11.9m) and one floating benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill net were deployed in the lake (16 sites). Nets were deployed in the same locations as were randomly selected in the previous survey. A handheld GPS was used to locate the precise location of each net. The angle of each gill net in relation to the shoreline was randomised.

All fish were measured and weighed on site and scales were removed from all roach. Live fish were returned to the water whenever possible (i.e. when the likelihood of their survival was considered to be good). Samples of fish were retained for further analysis.

1.3 Results

1.3.1 Species Richness

A total of four fish species were recorded in Glenade Lough in August 2013, with 911 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Roach was the most abundant fish species recorded, followed by perch. During the previous surveys in 2010 and 2007 the same species composition was recorded.

Table 1.1. Number of each fish species captured by each gear type during the survey on Glenade Lough, August 2013

Scientific name	Common name	Number of fish captured			
		Benthic mono multimesh gill nets	Surface mono multimesh gill nets	Fyke nets	Total
Rutilus rutilus	Roach	431	36	2	469
Perca fluviatilis	Perch	435	1	3	439
Esox lucius	Pike	2	0	0	2
Anguilla anguilla	European eel	0	0	1	1

1.3.2 Fish abundance

Fish abundance (mean CPUE) and biomass (mean BPUE) were calculated as the mean number/weight of fish caught per metre of net. For all fish species except eel, CPUE/BPUE is based on all nets, whereas eel CPUE/BPUE is based on fyke nets only. Mean CPUE and BPUE for all fish species captured in the 2010 and 2013 surveys are summarised in Table 1.2. Mean CPUE and BPUE for all species is illustrated in Figure 1.2 and 1.3.

Roach was the dominant species both in terms of abundance (CPUE) in terms of biomass (BPUE).

The mean roach CPUE was significantly higher in 2013 than in 2010 and 2007 (Mann-Whitney, $P<0.05$) and the mean roach BPUE fluctuated slightly over the three sampling years (Table 1.2; Figs 1.2 and 1.3).

The mean perch CPUE and BPUE was similar in 2013 and 2007 and was lower in 2010, however, only the mean perch BPUE was significantly higher in 2013 than in 2010 (Mann-Whitney, $P<0.05$) (Table 1.2; Figs 1.2 and 1.3).
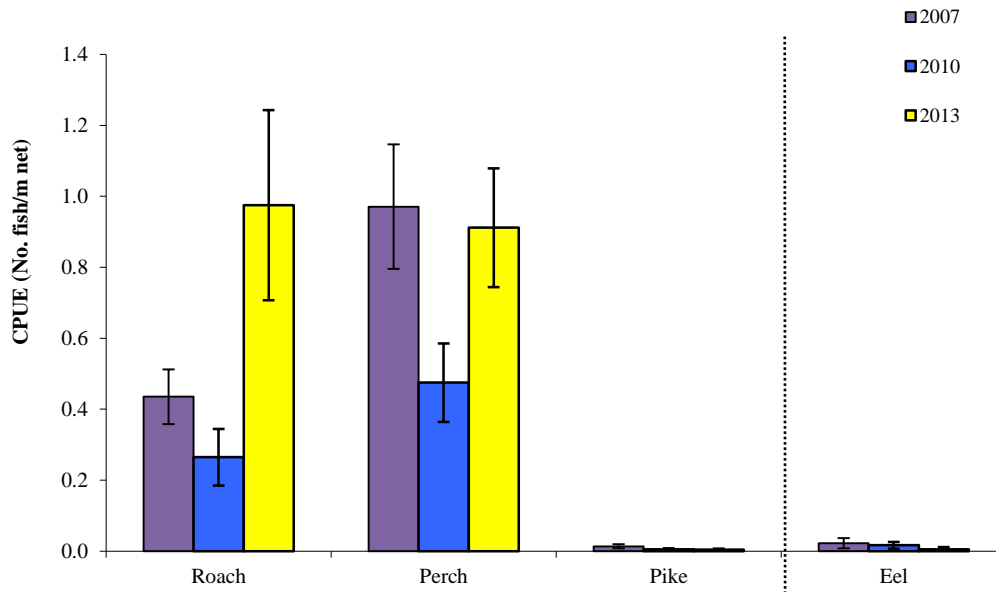
Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured in Glenade Lough, 2007, 2010 and 2013

| Scientific name	Common name	2007	2010	2013
		Mean CPUE		
Rutilus rutilus	Roach	0.435 (0.077)	0.264 (0.079)	0.975 (0.268)
Perca fluviatilis	Perch	0.971 (0.175)	0.475 (0.111)	0.911 (0.167)
Esox lucius	Pike	0.014 (0.006)	0.005 (0.003)	0.004 (0.003)
Anguilla anguilla	European eel*	0.022 (0.015)	0.016 (0.009)	0.006 (0.006)
		Mean BPUE		
Rutilus rutilus	Roach	55.576 (12.078)	38.647 (10.079)	51.642 (10.262)
Perca fluviatilis	Perch	33.756 (7.772)	13.792 (2.921)	27.065 (5.105)
Esox lucius	Pike	24.454 (10.491)	12.122 (8.291)	6.252 (6.203)
Anguilla anguilla	European eel*	5.205 (2.692)	4.172 (2.120)	2.311 (2.311)

Note: On the rare occasion where biomass data was unavailable for an individual fish, this was determined from a length/weight regression for that species.

*Eel CPUE and BPUE based on fyke nets only

Fig. 1.2. Mean (±S.E.) CPUE on Glenade Lough for all fish species captured (Eel CPUE based on fyke nets only), 2007, 2010 and 2013
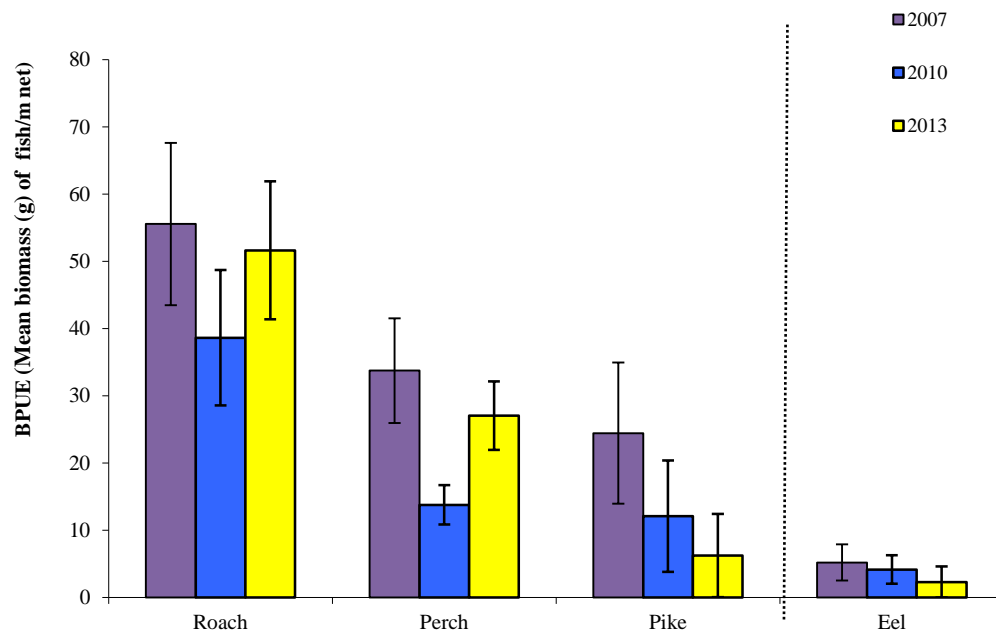
**Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Lough Bane (Eel BPUE based on fyke nets only), 2007, 2010 and 2013**

1.3.3 Length frequency distributions and growth

Roach captured during the 2013 survey ranged in length from 6.4cm to 28.5cm (mean = 12.6cm) (Fig.1.4) with eight age classes present, ranging from 1+ to 8+, with a mean L1 of 3.7cm (Table 1.3). The dominant age class was 1+ (Fig 1.4). Roach captured during the 2010 and 2007 surveys had a similar length and age range to 2013. The dominant age class was 2+ and 4+ in 2007 and 2010 respectively (Fig. 1.4).

Perch captured during the 2013 survey ranged in length from 4.0cm to 23.1cm (mean = 11.8cm) (Fig. 1.5) with ten age classes present, ranging from 0+ to 9+, with a mean L1 of 5.2cm (Table 1.4). The dominant age class was 3+ (Fig 1.5). Perch captured during the 2010 and 2007 surveys had a similar length and age range (Fig. 1.5). The dominant age class was 2+ and 4+ in 2007 and 2010 respectively (Fig 1.5).

Two pike captured during the 2013 survey ranged in length from 15.1cm to 73.0cm and a single eel captured measured 62.0cm.
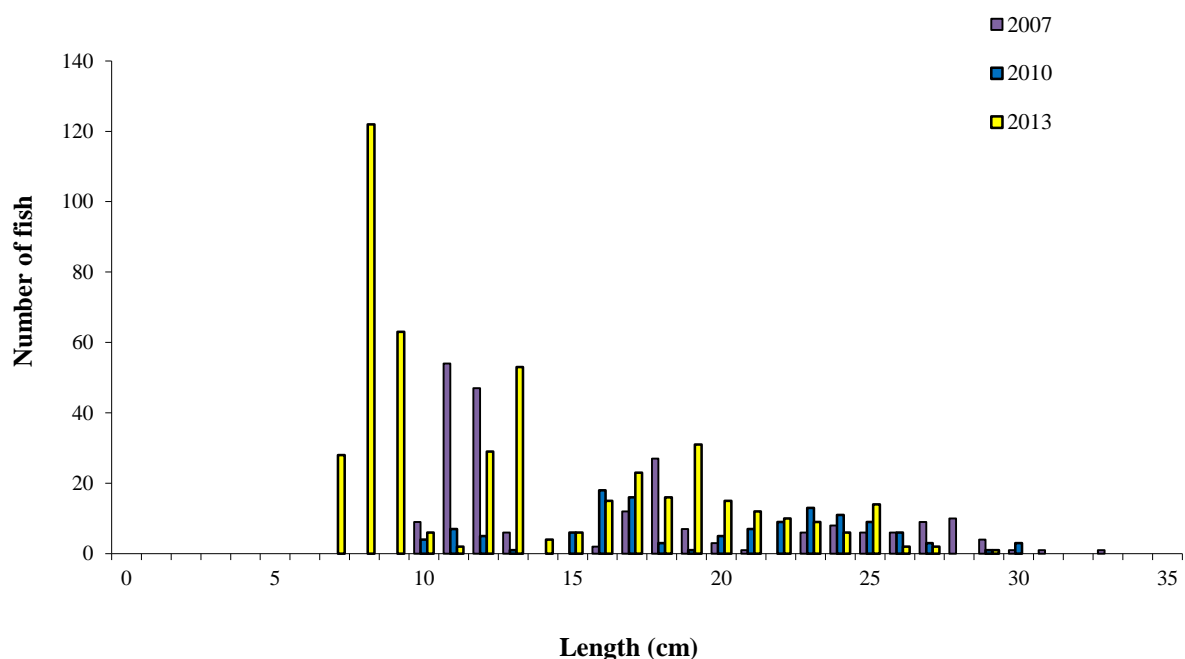
Fig. 1.4. Length frequency of roach captured on Glenade Lough, 2007, 2010 and 2013
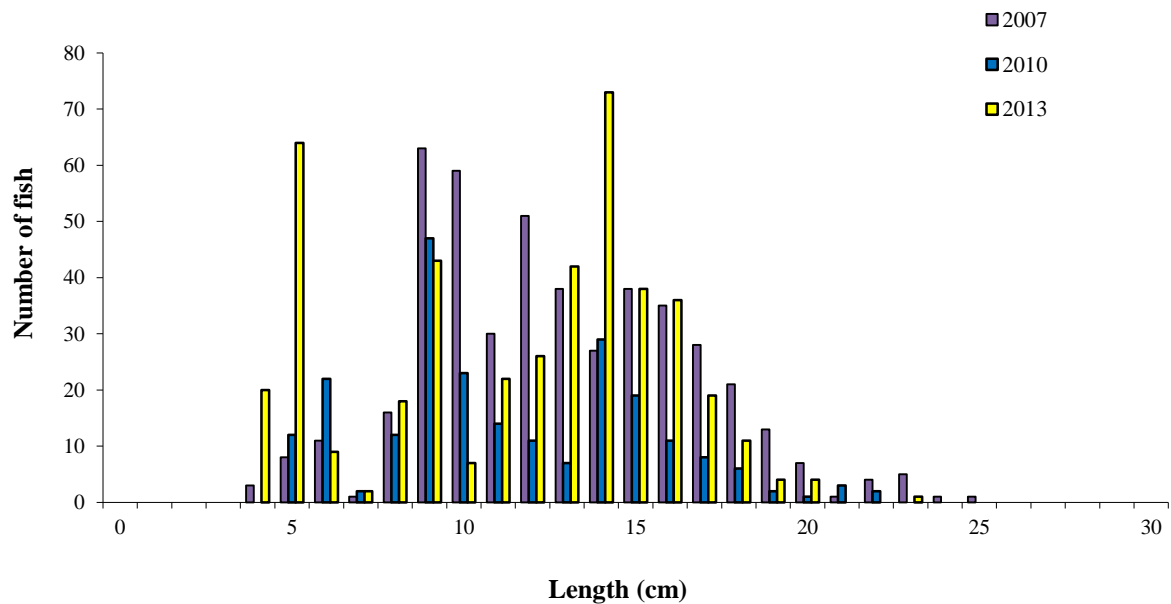
Fig. 1.5. Length frequency of perch captured on Glenade Lough, 2007, 2010 and 2013

Table 1.3. Mean (±SE) roach length (cm) at age for Glenade Lough, August 2013

	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8
Mean	3.7 (0.1)	7.9 (0.1)	13.6 (0.2)	17.8 (0.3)	21.3 (0.3)	23.5 (0.5)	25.1 (0.6)	26.7
N	133	106	88	73	47	7	2	1
Range	1.6-7.0	3.7-13.9	6.3-18.4	12.2-24.7	17.0-27.6	21.2-25.7	24.5-25.6	26.7-26.7

Table 1.4. Mean (±SE) perch length (cm) at age for Glenade Lough, August 2013

	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8	L_9
Mean	5.2 (0.1)	8.6 (0.1)	11.6 (0.2)	14.1 (0.2)	15.9 (0.2)	17.3 (0.4)	18.8 (0.6)	20.3 (0.8)	22.8
N	71	58	42	31	23	12	6	3	1
Range	4.1-7.9	6.3-11.2	8.9-15.2	11.2-17.8	13.5-17.6	14.9-19.7	16.5-20.9	19.3-21.7	22.8-22.8

1.4 Summary

Roach was the dominant species both in terms of abundance (CPUE) and biomass (BPUE) during the 2013 survey.

The mean roach CPUE was significantly higher in 2013 than in 2010 and 2007. The mean roach BPUE fluctuated slightly over the three sampling years. Roach ranged in age from 1+ to 8+, indicating reproductive success in eight of the previous nine years; however, no 0+ fish were recorded. The dominant age class was 1+.

The mean perch CPUE and BPUE was similar in 2013 and 2007 and was lower in 2010, however, only the mean perch BPUE was significantly higher in 2013 than in 2010. Perch ranged in age from 0+ to 9+ indicating reproductive success in the previous ten years. The dominant age class was 3+.

Classification and assigning lakes with an ecological status is a critical part of the WFD monitoring programme. It allows River Basin District managers to identify and prioritise lakes that currently fall short of the minimum "Good Ecological Status" that is required by 2015 if Ireland is not to incur penalties.

A multimetric fish ecological classification tool (Fish in Lakes – 'FIL') was developed for the island of Ireland (Ecoregion 17) using IFI and Agri-Food and Biosciences Institute Northern Ireland (AFBINI) data generated during the NSSHARE Fish in Lakes project (Kelly *et al.*, 2008). This tool was further developed during 2010 (FIL2) in order to make it fully WFD compliant, including producing EQR values for each lake and associated confidence in classification (Kelly *et al*., 2012). Using the FIL2 classification tool, Glenade Lough has been assigned an ecological status of Poor based on the fish populations present in 2013. The ecological status assigned to the lake based on the 2010 survey data was Moderate and was Bad in 2007.

In the 2010 to 2012 surveillance monitoring reporting period, the EPA assigned Glenade Lough an overall draft ecological status of Moderate, based on all monitored physico-chemical and biological elements, including fish.

1.5 References

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