



Sampling Fish for the Water Framework Directive

Lakes 2010

Glenade Lough



Iascach Intíre Éireann
Inland Fisheries Ireland

ACKNOWLEDGEMENTS

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1.1 Introduction

Glenade Lough (Plate 1.1, Fig. 1.1) is situated at the top of the Bonet catchment in Co. Leitrim, in a valley between the Arroo and Benbulbin Mountain ranges, approximately 9km north-west of Manorhamilton. The lake has a surface area of 73.3ha, a mean depth <4m and a maximum depth of 11.5m (NWRFB, *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 as part of the Water Framework Directive surveillance monitoring programme (Kelly and Connor, 2007). During this survey, perch and roach were found to be the dominant species present in the lake. Pike and eels were also captured during the survey.



Plate 1.1. Glenade Lough

Glenade Lough, Leitrim

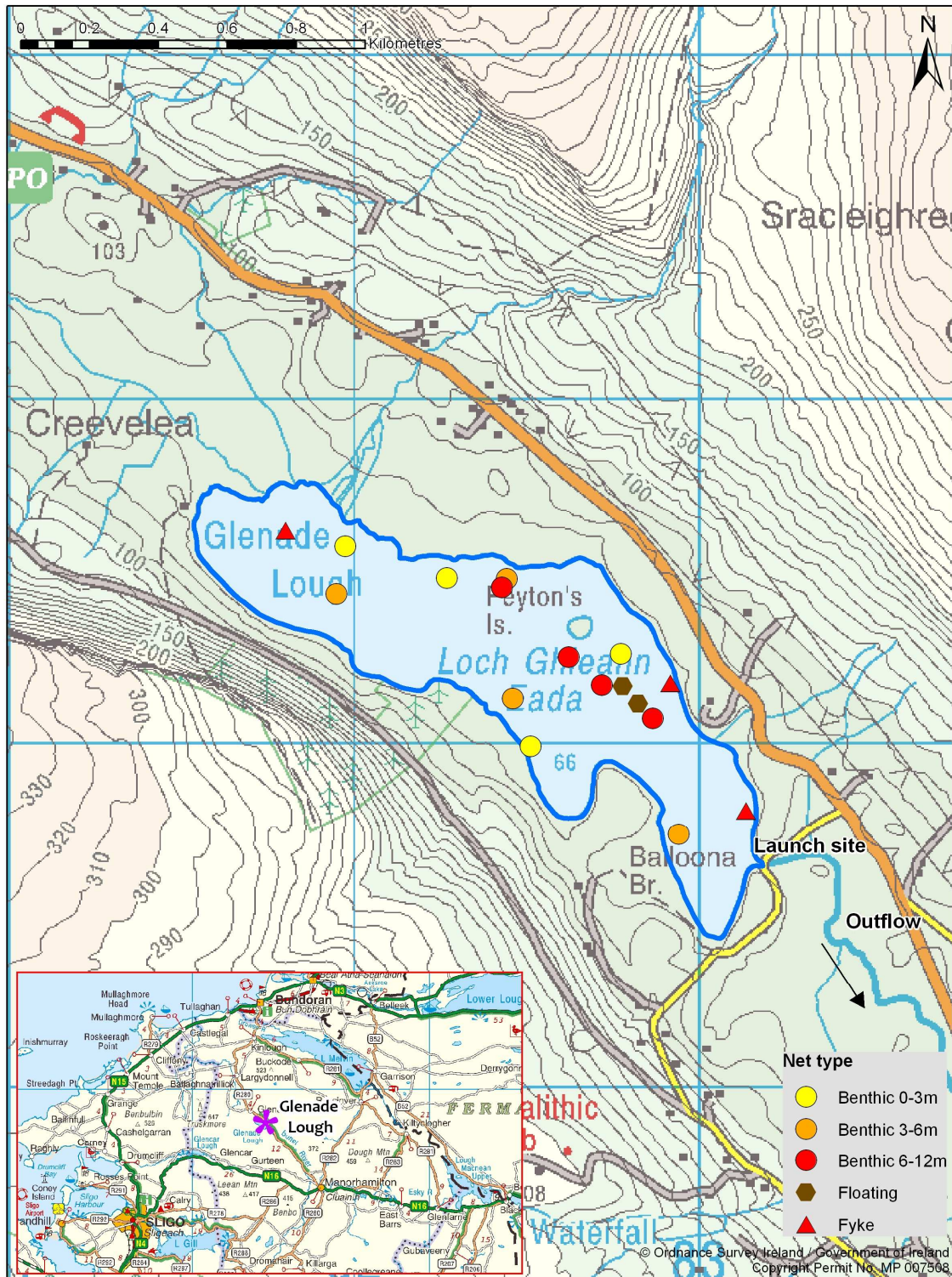


Fig. 1.1. Location map of Glenade Lough showing net locations and depths of each net (outflow is indicated on map)

1.2 Methods

Glenade Lough was surveyed over two nights from the 13th to the 16th of September 2010. 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 September 2010, with 365 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Perch was the most abundant fish species recorded, followed by roach. During the previous survey in 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, September 2010

Scientific name	Common name	Number of fish captured			Total
		Benthic mono multimesh gill nets	Surface mono multimesh gill nets	Fyke nets	
<i>Perca fluviatilis</i>	Perch	225	0	6	231
<i>Rutilus rutilus</i>	Roach	125	1	2	128
<i>Anguilla anguilla</i>	European eel	0	0	3	3
<i>Esox lucius</i>	Pike	2	0	1	3

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 2007 and 2010 are summarised in Table 1.2. Mean CPUE is illustrated in Figure 1.2.

The mean perch CPUE was significantly lower in 2010 than in 2007 (t- test, $t_{26.7} = 2.390$, $p < 0.05$). The difference in the mean perch CPUE between Glenade Lough and Lough Lattone, a similar lake type, was assessed and although the mean CPUE for Glenade Lough was lower (Fig. 1.3) this was not statistically significant.

The mean roach CPUE was lower in 2010 than in 2007; however, this was not statistically significant. The differences in the mean roach CPUE between Glenade Lough and four other similar lakes were assessed with no statistically significant differences being found (Fig. 1.4).

Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured in Glenade Lough, 2007 and 2010

Scientific name	Common name	2007	2010
Mean CPUE			
<i>Perca fluviatilis</i>	Perch	0.971 (0.175)	0.475 (0.111)
<i>Esox lucius</i>	Pike	0.014 (0.006)	0.005 (0.003)
<i>Rutilus rutilus</i>	Roach	0.435 (0.077)	0.264 (0.079)
<i>Anguilla anguilla</i>	European eel	0.022 (0.015)	0.016 (0.009)
Mean BPUE			
<i>Perca fluviatilis</i>	Perch	33.756 (7.772)	13.792 (2.921)
<i>Esox lucius</i>	Pike	24.454 (10.491)	12.122 (8.291)
<i>Rutilus rutilus</i>	Roach	55.576 (12.078)	38.647 (10.079)
<i>Anguilla anguilla</i>	European eel	5.205 (2.692)	4.172 (2.120)

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

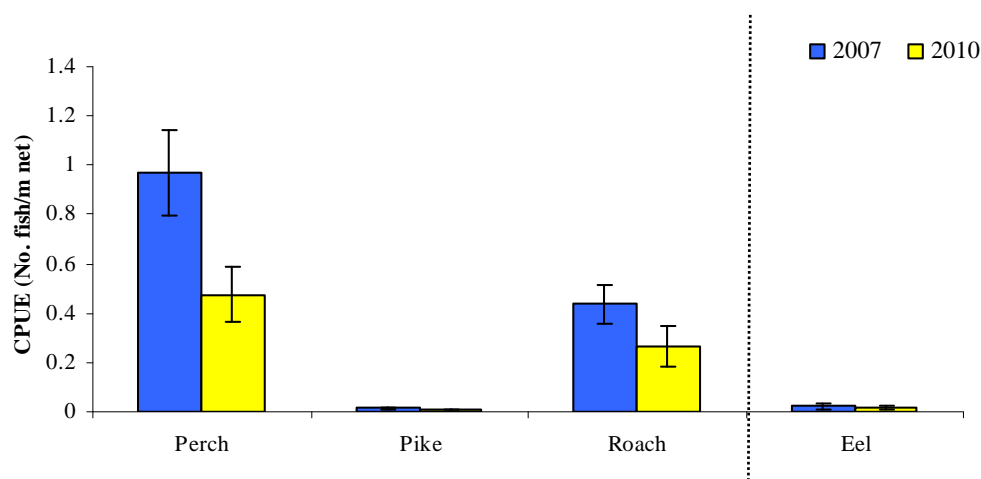


Fig. 1.2. Mean (\pm S.E.) CPUE on Glenade Lough for all fish species captured (Eel CPUE based on fyke nets only), 2007 and 2009

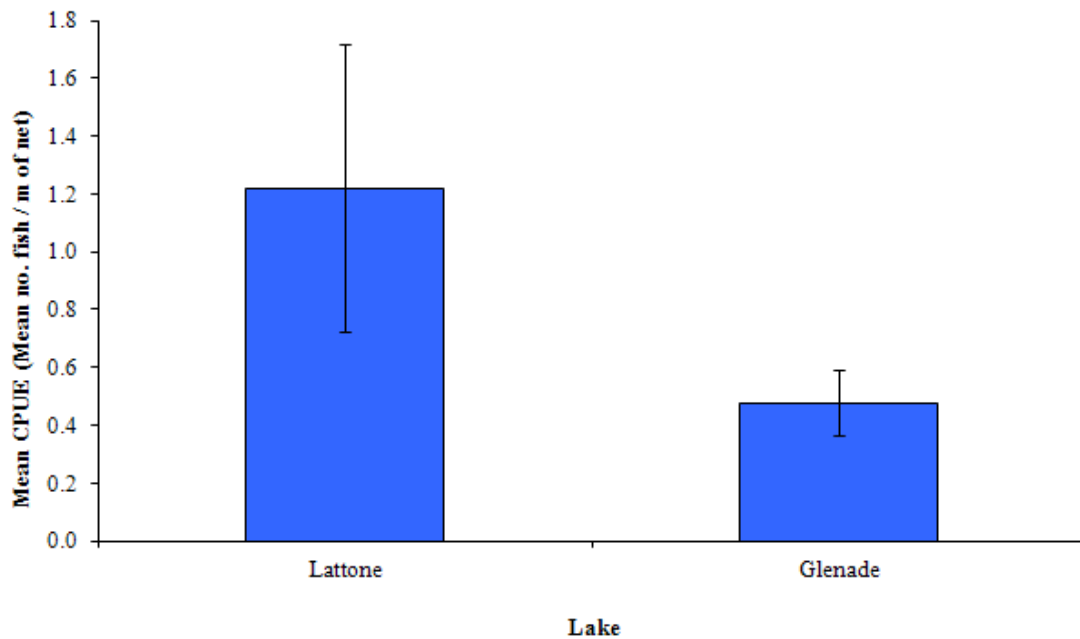


Fig. 1.3. Mean (\pm S.E.) perch CPUE in two lakes surveyed during 2010

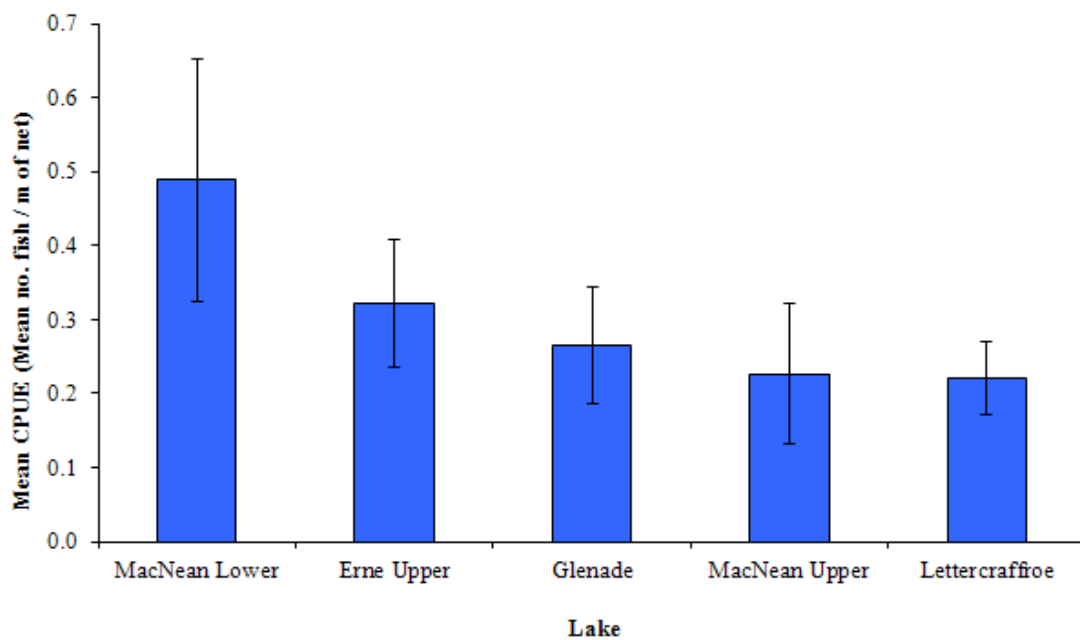


Fig. 1.4. Mean (\pm S.E.) roach CPUE in five lakes surveyed during 2010

1.3.3 Length frequency distributions

Perch captured during the 2010 survey ranged in length from 5.0cm to 22.0cm (mean = 11.6cm) (Fig. 1.5). Perch captured during the 2007 survey had lengths ranging from 4.7cm to 25.0cm (Fig. 1.5). Roach captured during the 2010 survey ranged in length from 9.5cm to 29.8cm (mean = 19.1cm) (Fig.1.6). Roach captured during the 2007 survey had a length range of 10.3 to 33.3cm (Fig.1.6). Eels captured during the 2010 survey ranged in length from 47.0m to 56.0cm and pike ranged in length from 18.0cm to 82.0cm.

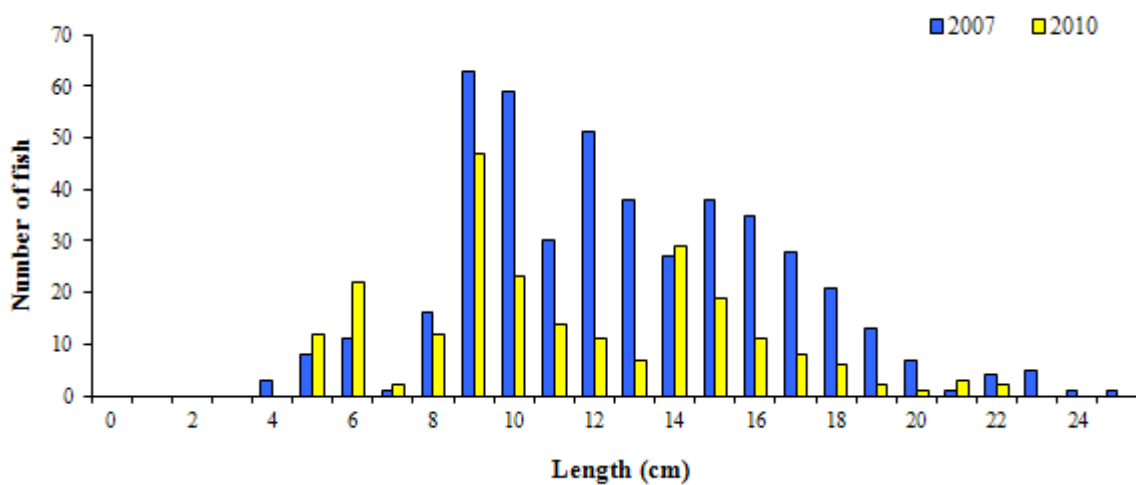


Fig. 1.5. Length frequency of perch captured on Glenade Lough

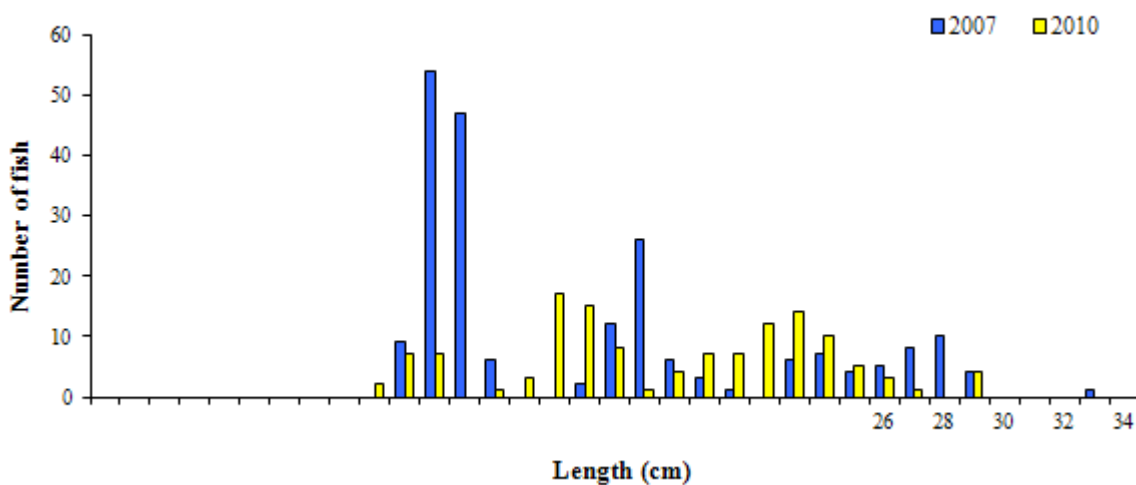


Fig. 1.6. Length frequency of roach captured on Glenade Lough

1.3.4 Fish age and growth

Eight age classes of perch were present, ranging from 0+ to 7+, with a mean L1 of 5.7cm (Table 1.3). In the 2007 survey, perch ranged from 0+ to 8+ with a mean L1 of 8.4cm.

Six age classes of roach were present, ranging from 1+ to 6+, with a mean L1 of 3.6cm (Table 1.4). Similar growth patterns were seen during the 2007 survey, with roach ages also ranging from 1+ to 6+, with a mean L1 of 3.6cm.

Two age classes of pike were present, ranging from 0+ to 5+.

Table 1.3. Mean (\pm SE) perch length (cm) at age for Glenade Lough, September 2010

	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇
Mean	4.8 (0.1)	9.2 (0.2)	12.2 (0.2)	14.6 (0.3)	15.6 (0.3)	17.3 (0.5)	18.9 (0.7)
N	65	53	43	35	19	11	5
Range	3.4-6.8	6.0-11.9	9.0-16.2	11.5-19.2	12.7-18.1	14.3-19.2	16.6-21.0

Table 1.4. Mean (\pm SE) roach length (cm) at age for Glenade Lough, September 2010

	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆
Mean	3.7 (0.1)	10.2 (0.1)	16.8 (0.2)	21.4 (0.3)	25.3 (0.4)	28.7 (0.4)
N	92	83	54	44	13	3
Range	2.7-5.1	6.8-11.9	12.5-20.1	16.3-25.2	21.7-27.9	29.5-29.5

1.4 Summary

Perch was the dominant species in terms of abundance (CPUE) and roach was the dominant species in terms of biomass (BPUE).

The mean perch CPUE was significantly lower in 2010 than in 2007. The mean perch CPUE in Glenade Lough was relatively low when compared to Lough Lattone, the other similar lake type surveyed; however, this was not statistically significant. Perch ranged in age from 0+ to 7+ indicating reproductive success in the previous seven years.

The mean roach CPUE in Glenade Lough was comparable to other lakes surveyed during 2010. Roach ranged in age from 1+ to 6+, indicating reproductive success in six of the previous seven years; however, no 0+ fish were recorded.

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. Using the FIL2 classification tool, Glenade Lough has been assigned an ecological status of Moderate based on the fish populations present. This is an improvement on the previous status classification as the lake was assigned a status of Poor/bad in 2007.

In the 2007 to 2009 surveillance monitoring reporting period, the EPA assigned Glenade Lough an overall ecological status of Moderate, based on all monitored physico-chemical and biological elements, including fish. This status classification will be revised at the end of 2012.

1.5 References

- Kelly, F. and Connor, L. (2007) *WFD Surveillance Monitoring - Fish in Lakes 2007*. Central Fisheries Board report.
- Kelly, F.L., Harrison, A., Connor, L., Allen, M., Rosell, R. and Champ, T. (2008) *FISH IN LAKES Task 6.9: Classification tool for Fish in Lakes. FINAL REPORT*. Central Fisheries Board, NSSHARE project.
- NPWS (1999) *Site synopsis: Glenade Lough. Site code: 001919*. Site Synopsis report, National Parks and Wildlife Service.

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