



Sampling Fish for the Water Framework Directive

Lakes 2010

Glencar Lough



Iascach Intíre Éireann
Inland Fisheries Ireland

ACKNOWLEDGEMENTS

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1.1 Introduction

Glencar Lough is situated in the Drumcliff catchment in Co. Sligo, approximately 7km north-east of Sligo town (Plate 1.1, Fig. 1.1). It is 3.2km in length and 0.8km wide, with Glencar waterfall located in the north-east corner (Fig. 1.1). Glencar Lough forms part of the Benbulbin, Gleniff and Glencar Special Area of Conservation. The lake and the waterfall are of particular botanical interest within the SAC site (NPWS, 2003). The lake has a surface area of 114.7ha, a mean depth > 4m and a maximum depth of 19m. The lake is categorised as typology class 12 (as designated by the EPA for the Water Framework Directive), i.e. deep (>4m), greater than 50ha and high alkalinity (>100mg/l CaCO₃).

The lake holds a small stock of brown trout and gets a good run of sea trout and salmon (O' Reilly, 2007). Sea trout average 0.7kg in weight. The largest brown trout taken in recent years weighed 2.9kg and the largest salmon was 10kg (O' Reilly, 2007).

Glencar Lough was previously surveyed in 2007 as part of the Water Framework Directive surveillance monitoring programme (Kelly and Connor, 2007). During this survey, brown trout and three-spined stickleback were found to be the dominant species present in the lake. Sea trout, salmon, flounder, minnow and eels were also captured during the survey.

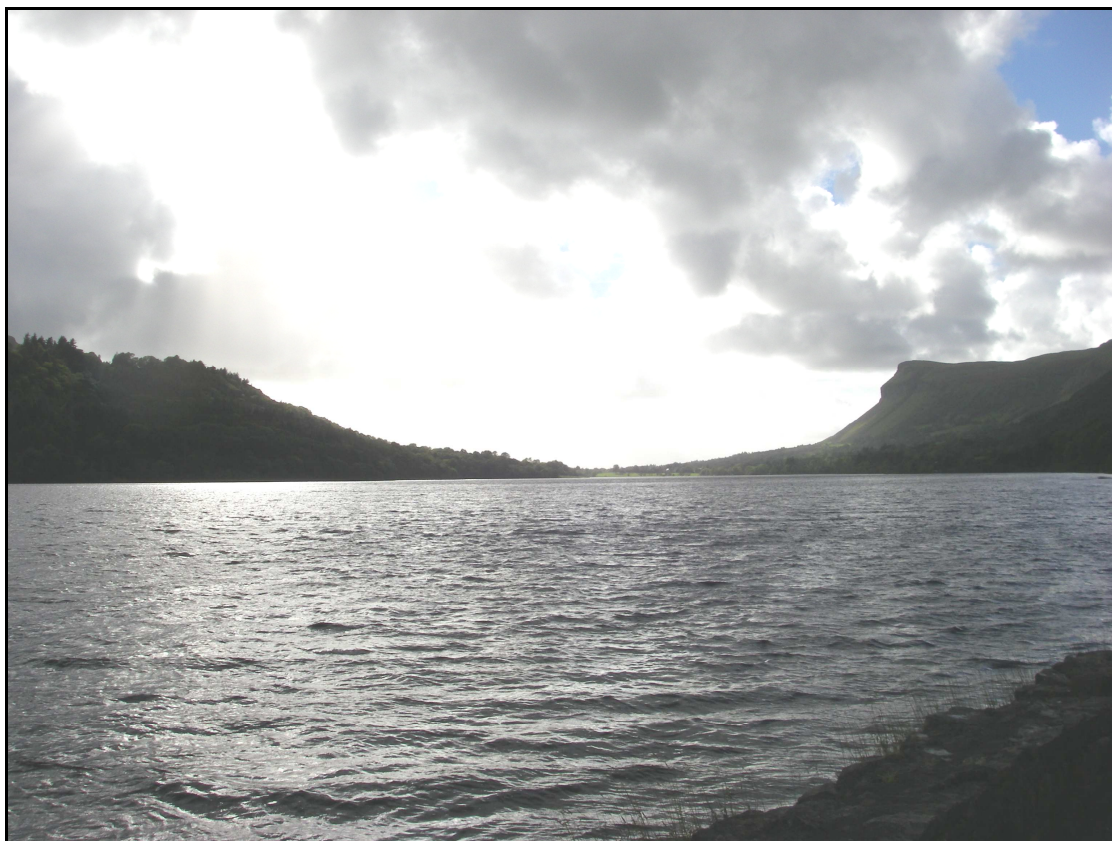


Plate 1.1. Glencar Lough

Glencar Lough, Sligo/Leitrim

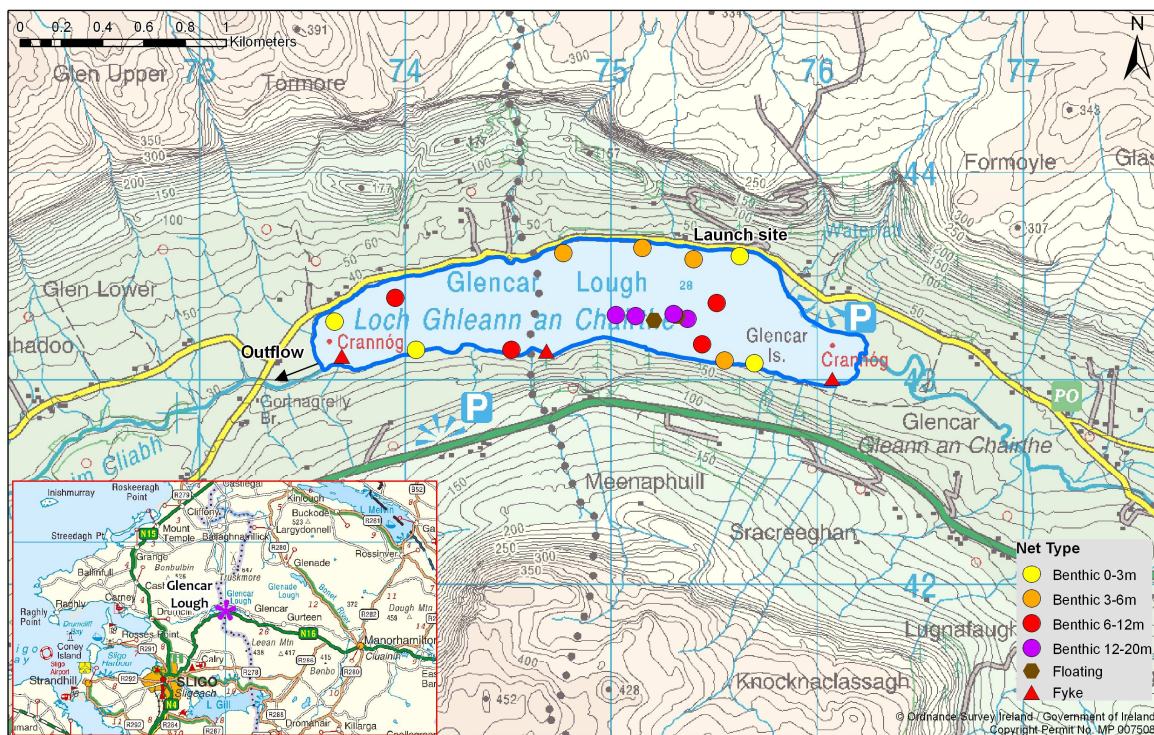


Fig. 1.1. Location map of Glencar Lough showing net locations and depths of each net (outflow is indicated on map)

1.2 Methods

Glencar Lough was surveyed over two nights from the 13th to the 16th of September 2010. A total of three sets of Dutch fyke nets, 16 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (4 @ 0-2.9m, 4 @ 3-5.9m, 4 @ 6-11.9m and 4 @ 12-19.9m) and two floating monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets were deployed in the lake (21 sites). Nets were deployed in the same locations as were randomly selected in the previous survey. A handheld GPS was used to mark 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 brown trout, sea trout and salmon. 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 six fish species (sea trout are included as a separate ‘variety’ of trout) were recorded in Glencar Lough in September 2010, with 128 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Brown trout was the most abundant fish species recorded, followed by three-spined stickleback and sea trout. 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 Glencar 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>Salmo trutta</i>	Brown trout	83	1	0	84
<i>Salmo trutta</i>	Sea trout	5	0	0	5
<i>Salmo salar</i>	Salmon	1	0	1	2
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	22	1	0	23
<i>Platichthys flesus</i>	Flounder	2	0	2	4
<i>Phoxinus phoxinus</i>	Minnow	1	0	1	2
<i>Anguilla anguilla</i>	European eel	0	0	8	8

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 also illustrated in Figure 1.2.

Although the mean brown trout CPUE was lower in 2010 than in 2007, this was not statistically significant. The differences in the mean brown trout CPUE between Glencar Lough and two other similar lakes were assessed and found to be statistically significant (Kruskal-Wallis, $P < 0.001$) (Fig. 1.3). Independent-Samples Mann-Whitney U tests between each lake showed that Glencar Lough had a significantly higher mean brown trout CPUE than Beltra Lough ($z = -3.305$, $P < 0.001$) and Lough Rea ($P < 0.001$ $z = -3.687$).

Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured in Glencar Lough, 2007 and 2009

Scientific name	Common name	2007	2010
Mean CPUE			
<i>Salmo trutta</i>	Brown trout	0.291 (0.085)	0.133 (0.035)
<i>Salmo trutta</i>	Sea trout	0.006 (0.002)	0.008 (0.004)
<i>Salmo salar</i>	Salmon	0.003 (0.002)	0.002 (0.001)
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	0.220 (0.107)	0.037 (0.013)
<i>Platichthys flesus</i>	Flounder	0.008 (0.003)	0.005 (0.003)
<i>Phoxinus phoxinus</i>	Minnow	0.030 (0.024)	0.002 (0.001)
<i>Anguilla anguilla</i>	European eel	0.024 (0.015)	0.044 (0.022)
Mean BPUE			
<i>Salmo trutta</i>	Brown trout	16.571 (3.329)	11.616 (2.868)
<i>Salmo trutta</i>	Sea trout	2.350 (1.117)	2.847 (1.759)
<i>Salmo salar</i>	Salmon	4.353 (3.301)	6.142 (4.510)
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	0.882 (0.430)	0.046 (0.015)
<i>Platichthys flesus</i>	Flounder	1.779 (0.910)	2.357 (1.471)
<i>Phoxinus phoxinus</i>	Minnow	0.151 (0.118)	0.014 (0.010)
<i>Anguilla anguilla</i>	European eel	4.667 (2.963)	4.711 (2.442)

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

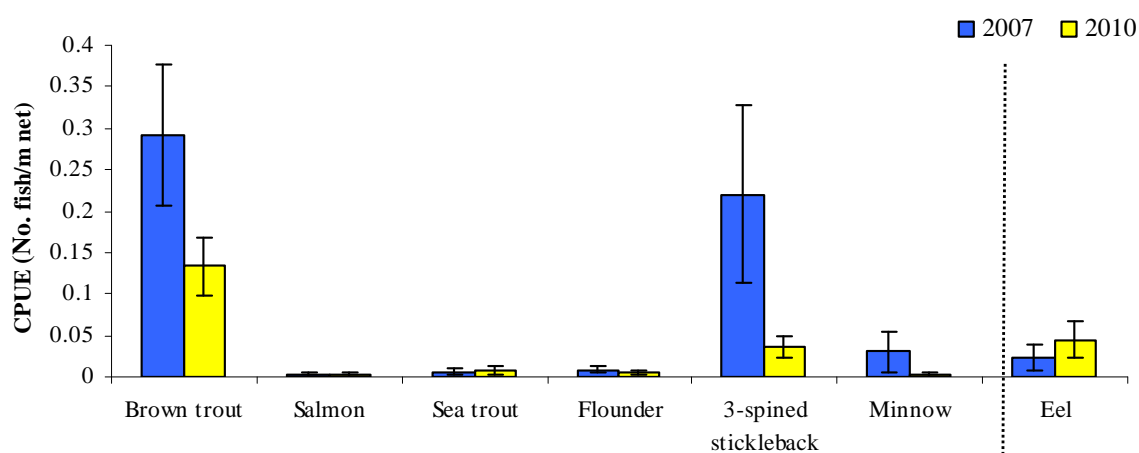


Fig. 1.2. Mean (\pm S.E.) CPUE in Glencar Lough (Eel CPUE based on fyke nets only)

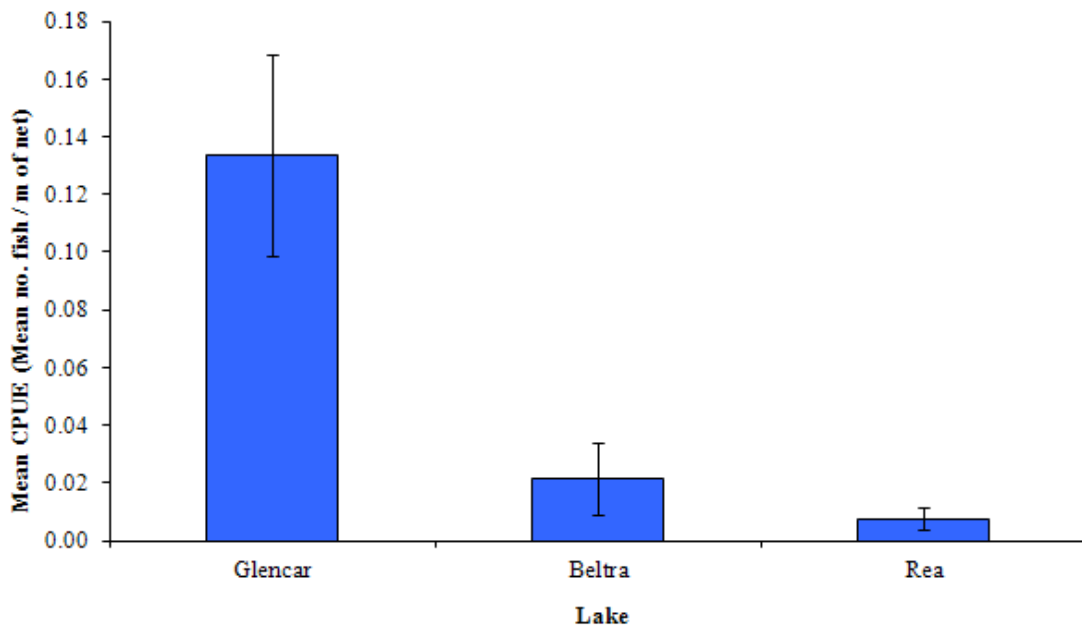


Fig. 1.3. Mean (\pm S.E.) brown trout CPUE in four lakes surveyed during 2010

1.3.3 Length frequency distributions

Brown trout captured during the 2010 survey ranged in length from 7.5cm to 33.0cm (mean = 18.6cm) (Fig. 1.4). Brown trout captured during the 2007 survey had lengths ranging from 11.0cm to 32.5cm (Fig. 1.4). Sea trout captured during the 2010 survey ranged in length from 26.8cm to 48.5cm (mean = 31.9cm) (Fig.1.5). Sea trout captured during the 2007 survey had a length range of 28.4cm to 34.7cm (Fig.1.5). Three-spined stickleback captured during the 2010 survey ranged in length from 3.0cm to 5.5cm, flounder ranged in length from 22.0cm to 36.8cm, minnow ranged in length from 6.0cm to 8.0cm, eels ranged in length from 31.7cm to 44.0cm and salmon ranged in length from 49.5cm to 50.0cm.

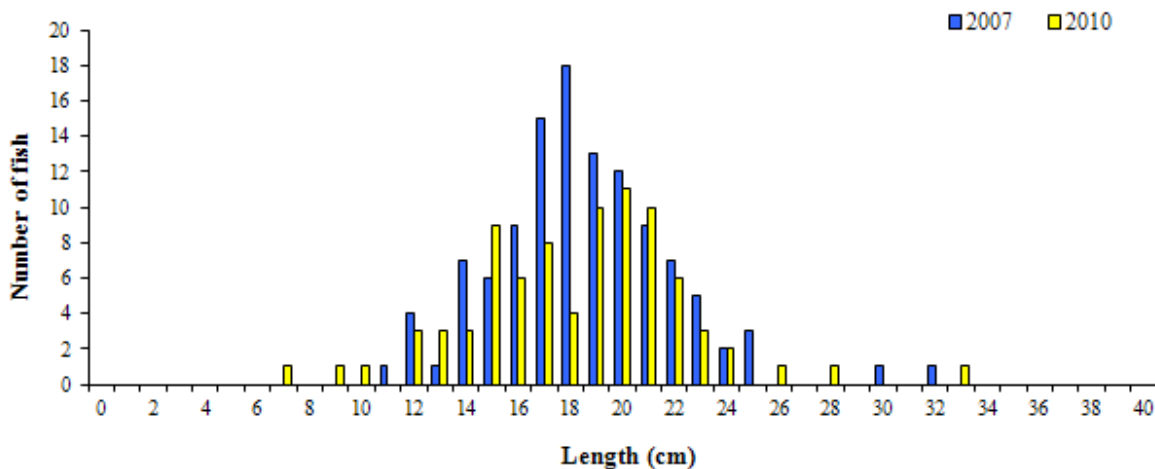


Fig. 1.4. Length frequency of brown trout captured on Glencar Lough

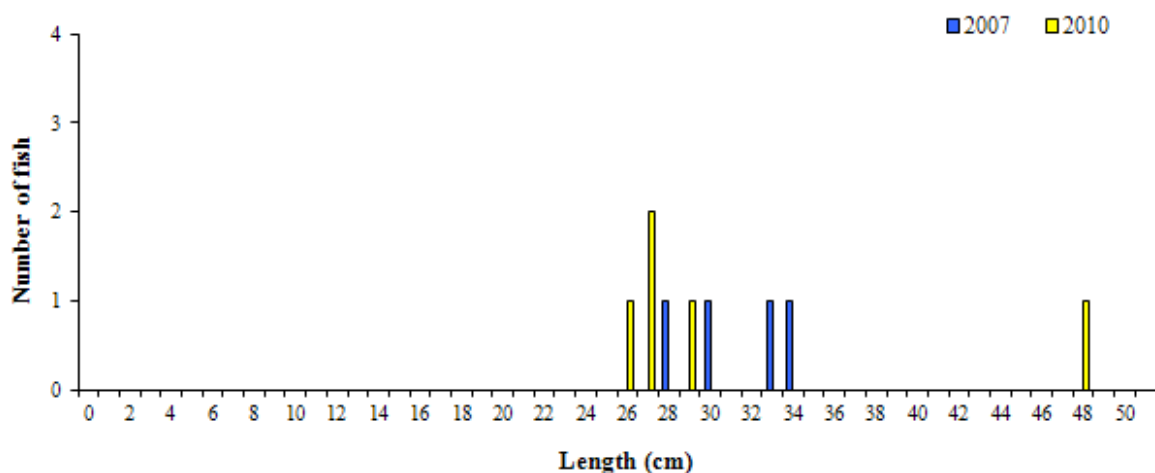


Fig. 1.5. Length frequency of sea trout captured on Glencar Lough

1.3.4 Fish age and growth

Five age classes of brown trout were present, ranging from 0+ to 4+, with a mean L1 of 6.1cm (Table 1.3). Similar growth patterns were observed during the 2007 survey, with brown trout ages ranging from 1+ to 3+, with a mean L1 of 6.1cm. Brown trout L4 was 25.6cm indicating a slow rate of growth for brown trout in this lake according to the classification scheme of Kennedy and Fitzmaurice (1971).

Sea trout captured were aged 2.0+, 2.2+ and 4.0+, with a mean L1 of 7.0cm. Adult salmon captured were aged 1.1+ and 1.1+1SM, with a mean L1 of 5.7cm.

Table 1.3. Mean (\pm SE) brown trout length (cm) at age for Glencar Lough, September 2010

	L ₁	L ₂	L ₃	L ₄
Mean	6.1 (0.2)	14.4 (0.3)	22.2 (1.0)	25.6
N	55	36	9	1
Range	4.4-9.8	10.1-17.8	18.5-29.2	25.6-25.6

1.4 Summary

Brown trout was the dominant species in terms of both abundance (CPUE) and biomass (BPUE).

The mean brown trout CPUE in Glencar Lough was significantly higher than Beltra Lough, Lough Rea and Lough Ree. Although the mean brown trout CPUE was lower in 2010 than in 2007, this was not statistically significant. Brown trout ranged in age from 0+ to 4+, indicating reproductive success in each of the previous five years. Length at age analyses revealed that brown trout in the lake exhibit a slow rate of growth according to the classification scheme of Kennedy and Fitzmaurice (1971).

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, Glencar Lough has been assigned an ecological status of High for both 2007 and 2010 based on the fish populations present.

In the 2007 to 2009 surveillance monitoring reporting period, the EPA assigned Glencar Lough an overall ecological status of Good, 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

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