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Sampling Fish for the Water Framework Directive

Lakes 2011

Lough Barra

Iascach Intíre Éireann
Inland Fisheries Ireland

Water Framework Directive Fish Stock Survey of Lough Barra, August 2011

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1.1 Introduction

Lough Barra is situated in the upper part of the Gweebarra River catchment close to the south-western perimeter of Glenveagh National Park in Co. Donegal. The lake is situated at an altitude of 88.6m above sea level. It has a surface area of 63ha, a mean depth of 4.4m and a maximum depth of 11.6m (Fig. 1.1). The lake is categorised as typology class 4 (as designated by the EPA for the Water Framework Directive), i.e. deep (>4m), greater than 50ha and low alkalinity (<20mg/l CaCO3). The lake has been classed as 2a (i.e. expected to meet good status by 2015) in the WFD Characterisation report (EPA, 2005).

The geology of the area is predominantly granite, felsite and other intrusive rocks rich in silica. Lough Barra Bog SPA is situated immediately to the south-west of the lake (Fig. 1.1) and part of the bog is a nature reserve (NPWS, 2005). Lough Barra itself forms part of the Cloghernagore Bog and Glenveagh National Park Special Area of Conservation. This is a particularly large SAC located in north-west Donegal. It contains many different habitats ranging from exposed rock and scree mountains to blanket bogs, lakes and rivers.

According to O' Reilly (1998), the brown trout in the lake are small and an occasional salmon and sea trout reach the lake. The lake was previously surveyed in August 2005 and 2008 by the Central Fisheries Board and the Northern Regional Fisheries Board as part of the NS Share "Fish in Lakes" project (Kelly *et al*., 2007) and as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al*., 2009). . Brown trout, salmon and eels were recorded in both surveys.

Plate1.1. Lough Barra looking north-east towards the River Barra (inflow) (Photo courtesy of IFI and No. 3 Operational Wing, Irish Air Corps [Aer Chór na hÉireann])

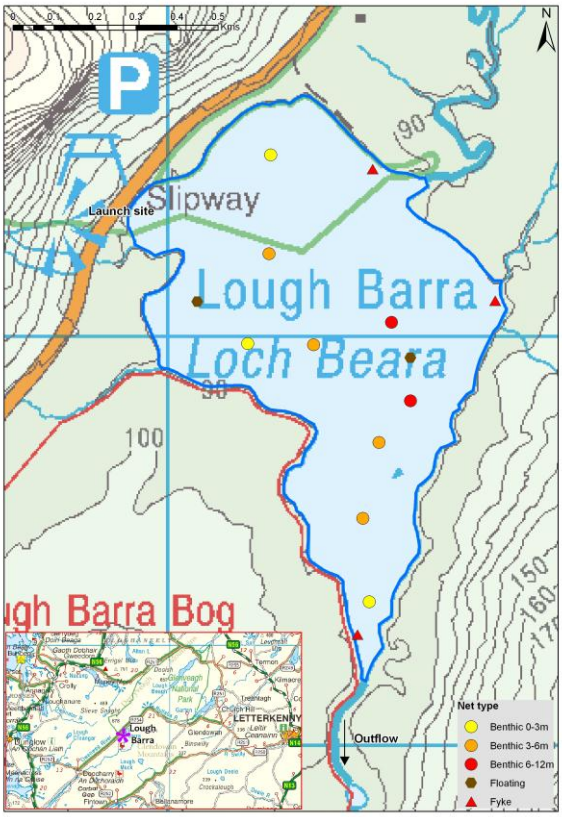

Fig 1.1. Location map of Lough Barra showing locations and depths of each net (outflow is indicated on map)

1.2 Methods

Lough Barra was surveyed over one night on the 10th of August 2011. A total of three sets of Dutch fyke nets, nine benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (3 @ 0-2.9m, 4 @ 3-5.9m and 2 @ 6-11.9m) and two floating monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets were deployed in the lake (14 sites). Nets were deployed in the same locations as were randomly selected in the previous survey in 2008. 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 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 three fish species were recorded on Lough Barra in August 2011, with 216 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 eels and salmon. A similar species composition was recorded during the previous survey in 2008.

Table 1.1. Number of each fish species captured by each gear type during the survey on Lough Barra, August 2011

Scientific name	Common name	Number of fish captured			
		Benthic mono multimesh gill nets	Surface mono multimesh gill nets	Fyke nets	Total
Salmo trutta	Brown trout	124	6	21	151
Salmo salar	Salmon	4	0	2	6
Anguilla anguilla	European eel	1	0	58	59

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 2008 and 2011 are summarised in Table 1.2. Mean CPUE and BPUE for all fish species is illustrated in Figures 1.2 and 1.3.

Although the mean brown trout CPUE appeared lower in 2011 than in 2008, this difference was not statistically significant. The differences in the mean brown trout CPUE between Lough Barra and four similar lakes was assessed, with no overall significant differences being found (Fig. 1.4).

Although the mean brown trout BPUE also appeared slightly lower in 2011 than in 2008, this difference was not statistically significant. The differences in the mean brown trout BPUE between Lough Barra and four similar lakes was assessed, with no overall significant differences being found (Fig. 1.5). However, Independent-Samples Mann-Whitney U tests between each lake showed that Lough Barra had a significantly lower mean brown trout BPUE than Lough Acoose ($z = -2.205$, $P<0.05$).

Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Lough Barra, 2008 and 2011

Scientific name	Common name	2008	2011
		Mean CPUE	
Salmo trutta	Brown trout	0.469 (0.110)	0.334 (0.121)
Salmo salar	Salmon	0.012 (0.005)	0.012 (0.005)
Anguilla anguilla	European eel	0.033 (0.009)	0.322 (0.194)
		Mean BPUE	
Salmo trutta	Brown trout	22.911 (5.391)	18.721 (6.732)
Salmo salar	Salmon	3.1 (2.977)	0.267 (0.128)
Anguilla anguilla	European eel	3.038 (1.464)	38.711 (19.421)

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

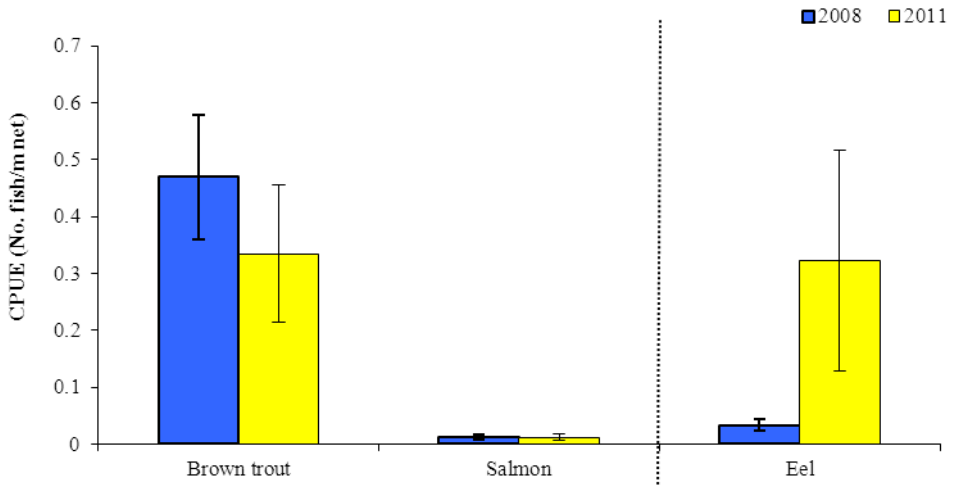

Fig. 1.2. Mean (±S.E.) CPUE for all fish species captured in Lough Barra (Eel CPUE based on fyke nets only), 2008 and 2011

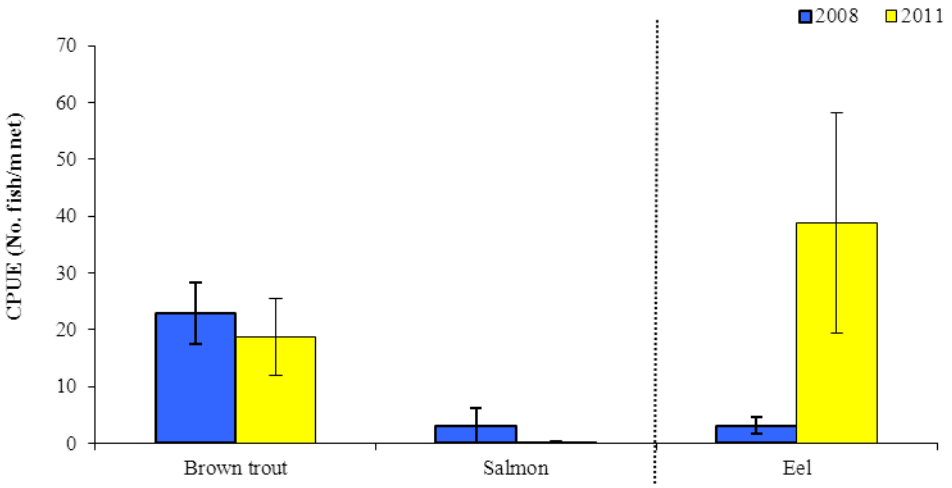

Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Lough Barra (Eel CPUE based on fyke nets only), 2008 and 2011

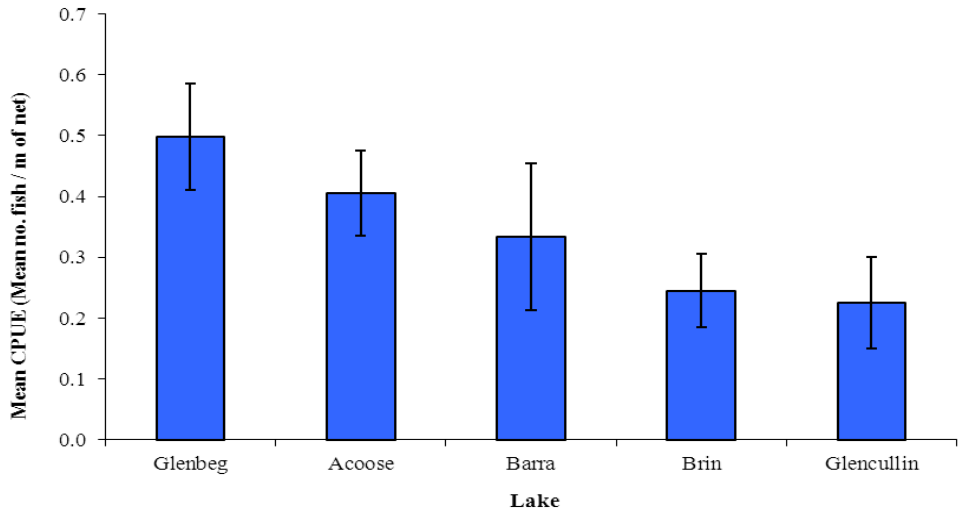

Fig. 1.4. Mean (±S.E.) brown trout CPUE in five lakes surveyed during 2011

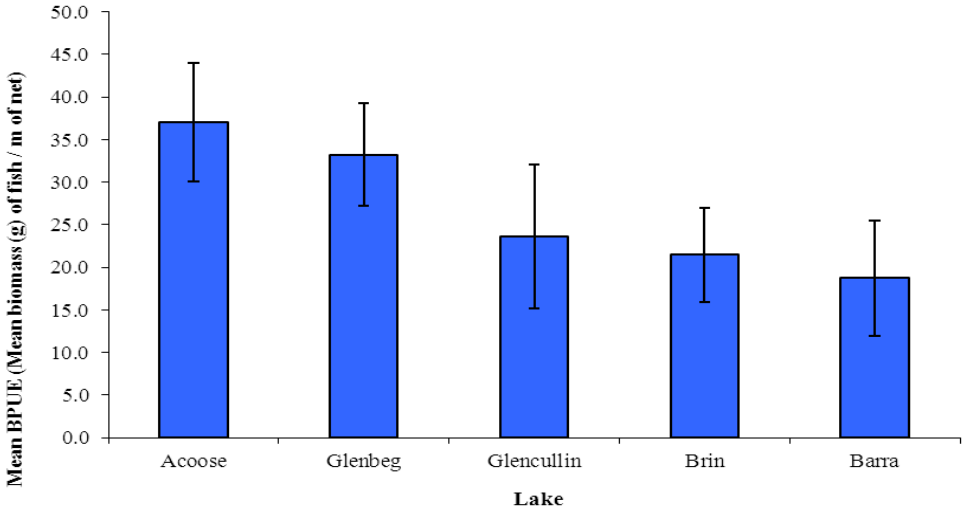

Fig. 1.5. Mean (±S.E.) brown trout BPUE in five lakes surveyed during 2011

1.3.3 Length frequency distributions

Brown trout captured during the 2011 survey ranged in length from 11.2cm to 21.4cm (mean = 16.5cm) (Fig. 1.6). Brown trout captured during the 2008 survey ranged in length from 6.6cm to 26.5cm (Fig. 1.6).

Eels captured during the 2011 survey ranged in length from 30.0cm to 65.5cm (mean = 38.8cm). Eels captured during the 2008 survey had lengths ranging from 29.2cm to 46.6cm.

Salmon captured during the 2011 survey ranged in length from 11.4cm to 13.6cm.

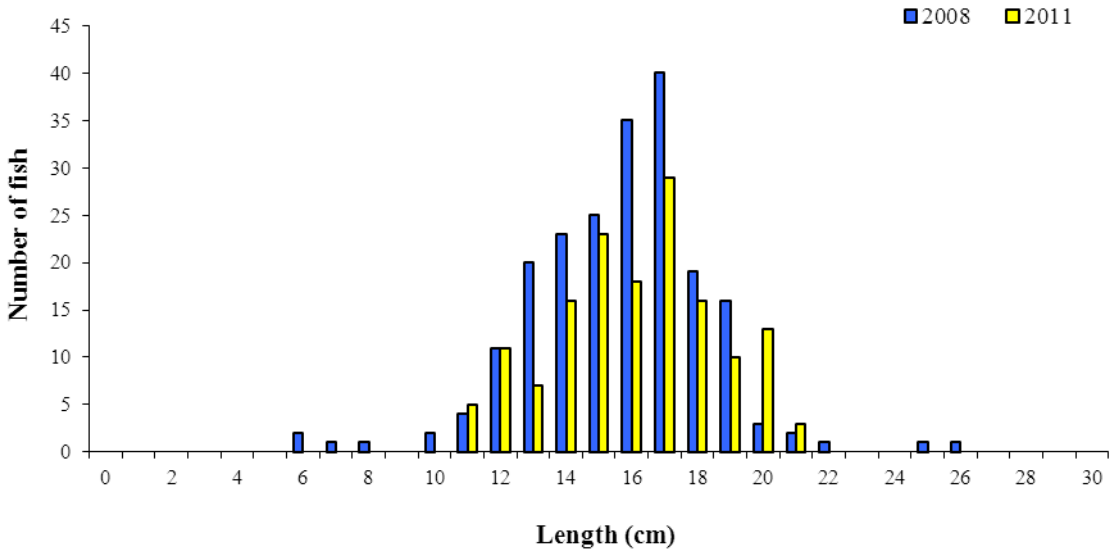

Fig. 1.6. Length frequency of brown trout captured on Lough Barra, 2008 and 2011

1.3.4 Fish age and growth

Three age classes of brown trout were present, ranging from 1+ to 3+, with a mean L1 of 5.4cm (Table 1.3). In the 2008 survey, brown trout ranged from 0+ to 5+ with a mean L1 of 5.6cm.

The juvenile salmon captured were all aged at 1+.

Table 1.3. Mean (±SE) brown trout length (cm) at age for Lough Barra, August 2011

	L_1	L_2	L_3
Mean	5.4 (0.2)	12.3 (0.4)	15.9 (0.5)
N	46	36	13
Range	2.9-8.4	7.1-17.6	13.1-19.6

1.4 Summary

Brown trout was the dominant species in terms of abundance (CPUE) and biomass (BPUE) captured in the survey gill nets.

Although the mean brown trout CPUE and BPUE in Lough Barra was slightly lower in 2011 than in the 2008 survey this difference was not statistically significant. The mean brown trout CPUE in Lough Barra was similar to the other lakes assessed during 2011, with no statistically significant differences being found between lakes. However, the mean brown trout BPUE in Lough Barra was significantly lower than Lough Acoose, another similar lake surveyed. Brown trout ranged in age from 1+ to 3+, indicating reproductive success in the previous three years.

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, Lough Barra has been assigned an ecological status of High based on the fish populations present in 2011. The ecological status assigned to the lake based on the 2008 survey data was Good.

In the 2007 to 2009 surveillance monitoring reporting period, the EPA assigned Lough Barra 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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