Sampling Fish for the Water Framework Directive

Lakes 2014

Lough Fern

IASCACH INTÍRE ÉIREANN
INLAND FISHERIES IRELAND

Water Framework Directive Fish Stock Survey of Lough Fern, August 2014

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

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1.1 Introduction

Lough Fern is located in the Leannan (Lennon) catchment, two kilometres south of Milford and ten kilometres north of Letterkenny, in Co. Donegal (Fig. 1.1). The lake is situated at an altitude of 18.7m above sea level. It has a surface area of 181ha, a mean depth of 2m and a maximum depth of 3m. The lake 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 $CaCO_3$). The lake has been classed as 2a (i.e. expected to meet good status by 2015 pending further investigation) in the WFD Characterisation report (EPA, 2005). The geology of the area is predominantly schist and gneiss. It is a soft water lake that has been classified as mesotrophic (NPWS, 2005).

Lough Fern is located within the Leannan River Special Area of Conservation. The river has been designated as a SAC as it is home to a number of species listed on Annex II of the EU Habitats Directive. These species include the freshwater pearl mussel and Atlantic salmon.

Lough Fern was one of the great spring salmon lakes until its stocks were hit by ulcerative dermal necrosis (UDN) in the 1970s (O' Reilly, 2007). Since then, however, signs of recovery are slowly emerging and salmon from the River Leannan have been reported to average 4kg, with the largest weighing in at 15kg. The lake holds a good stock of brown trout (O' Reilly, 2007). The lake was previously surveyed in September 2005 by Inland Fisheries Ireland (previously the Central Fisheries Board and the Northern Regional Fisheries Board) as part of the NS Share "Fish in Lakes" project (Kelly *et al*., 2007). Brown trout, salmon and eels were recorded in this survey. The lake was also surveyed in 2008 and 2011 as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al*., 2009 and Kelly *et al*., 2012a). During the 2011 survey, brown trout were found to be the dominant species present in the lake. Three-spined stickleback, salmon and eels were also captured during the survey.

This report summarises the results of the 2014 fish stock survey carried out on the lake, as part of the Water Framework Directive surveillance monitoring programme.

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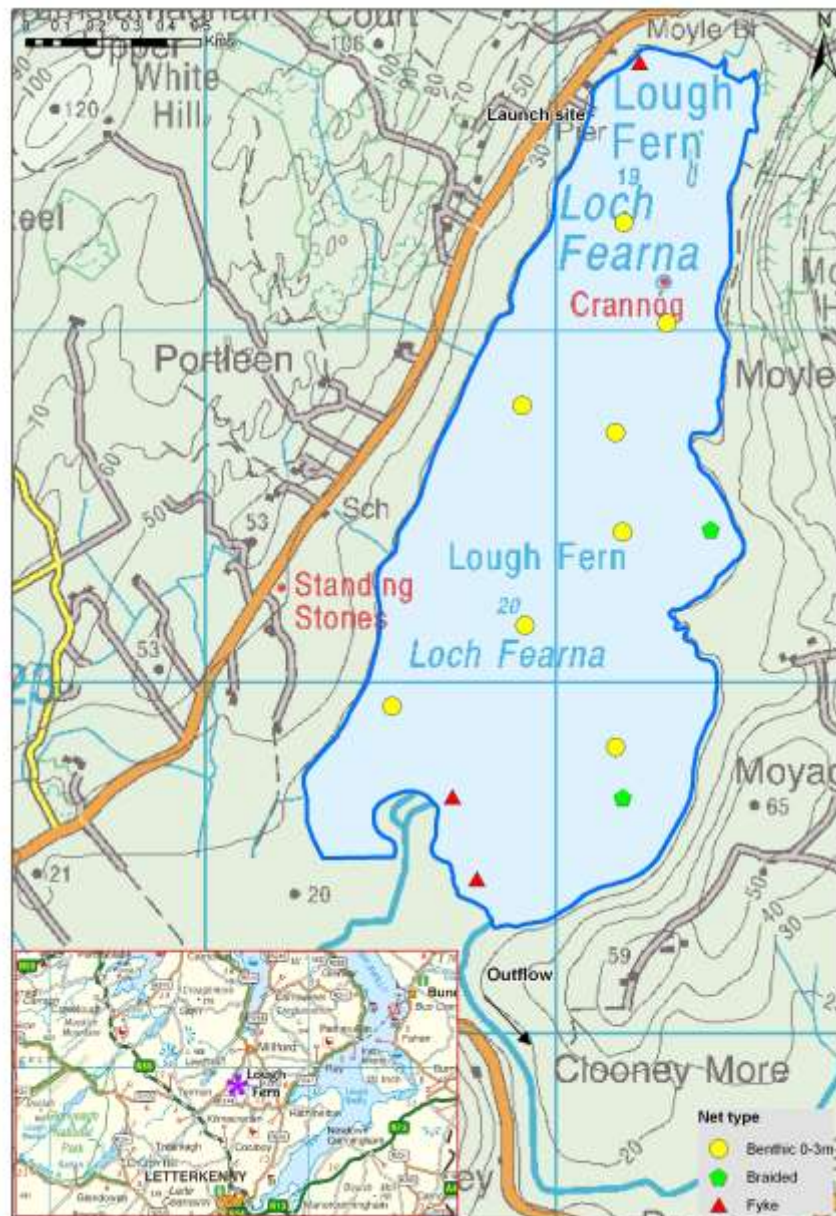
Fig. 1.1 Location map of Lough Fern showing locations and depths of each net (outflow is indicated on map)

1.2 Methods

Lough Fern was surveyed over two nights between the 12th to the 14th of August 2014. A total of three sets of Dutch fyke nets and eight benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (8 @ 0-2.9m) were deployed in the lake (11 sites). The netting effort was supplemented using two benthic braided survey gill nets (62.5mm mesh knot to knot) at two additional

sites. Nets were deployed in the same locations as were randomly selected in the previous surveys in 2008 and 2011. 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 apart from perch 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 five fish species were recorded on Lough Fern in August 2014, with 237 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, eels, salmon and perch. During the previous surveys in 2008 and 2011 the same species composition was recorded with the exception of perch, which were only recorded during the 2014 survey.

Table 1.1. Number of each fish species captured by each gear type during the survey on Lough Fern, August 2014

Scientific name	Common name	Number of fish captured			
		Benthic mono multimesh gill nets	Benthic braided gill nets	Fyke nets	Total
Salmo trutta	Brown trout	154	0	10	164
Gasterosteus aculeatus	3-spined stickleback	37	0	3	40
Perca fluviatilis	Perch	3	0	0	3
Salmo salar	Salmon	3	1	0	4
Anguilla anguilla	European eel	0	0	26	26

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 2008, 2011 and 2014 surveys are summarised in Table 1.2. Mean CPUE and BPUE for all species is illustrated in Figures 1.2 and 1.3.

Brown trout was the dominant species in terms of abundance (CPUE) and biomass (BPUE). Although the mean brown trout CPUE and BPUE fluctuated slightly over the three sampling years, these differences were not statistically significant (Table 1.2; Fig 1.2 and 1.3).

Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Lough Fern, 2008, 2011 and 2014

| Scientific name	Common name	2008	2011	2014
		Mean CPUE		
Salmo trutta	Brown trout	0.346 (0.728)	0.436 (0.095)	0.407 (0.120)
Gasterosteus aculeatus	3-spined stickleback	0.0321 (0.014)	0.163 (0.068)	0.098 (0.032)
Perca fluviatilis	Perch	-	-	0.008 (0.006)
Salmo salar	Salmon	0.002 (0.002)	0.008 (0.004)	0.011 (0.006)
Anguilla anguilla	European eel	0.166 (0.034)	0.075 (0.025)	0.125 (0.057)
		Mean BPUE		
Salmo trutta	Brown trout	58.887 (12.032)	64.033 (15.118)	35.836 (9.341)
Gasterosteus aculeatus	3-spined stickleback	0.128 (0.586)	0.218 (0.091)	0.073 (0.025)
Perca fluviatilis	Perch			1.185 (0.803)
Salmo salar	Salmon	5.564 (5.564)	23.051 (15.631)	5.320 (5.056)
Anguilla anguilla	European eel	17.811 (3.766)	5.691 (1.641)	10.614 (4.899)

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
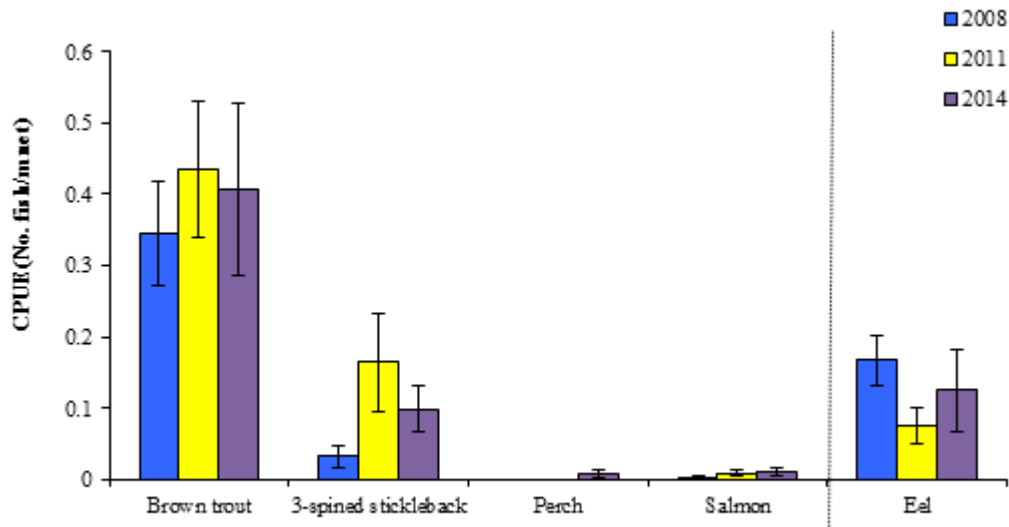
Fig. 1.2. Mean (±S.E.) CPUE for all fish species captured in Lough Fern (Eel CPUE based on fyke nets only), 2008, 2011 and 2014
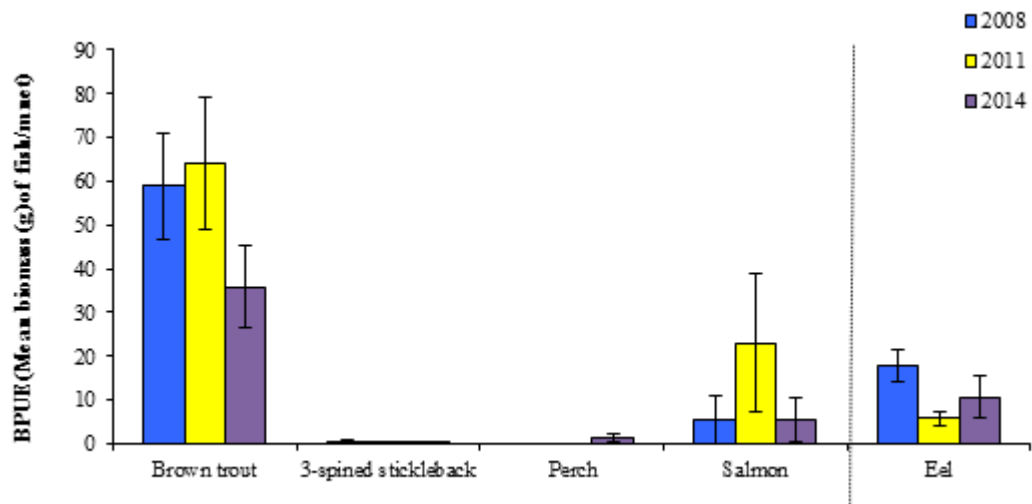
Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Lough Fern (Eel BPUE based on fyke nets only), 2008, 2011 and 2014

1.3.3 Length frequency distributions and growth

Brown trout captured during the 2014 survey ranged in length from 5.4cm to 33.9cm (mean = 18.5cm) (Fig. 1.4). Five age classes were present, ranging from 0+ to 4+, with a mean L1 of 6.6cm (Table 1.3). The dominant age class was 2+ (Fig. 1.4). Brown trout captured during the 2008 and 2011 surveys had similar length and age ranges, with some smaller fish being captured in 2008 and 2014 and some larger fish captured in 2011 (Fig. 1.4).

Three perch were recorded in 2014 only and ranged in length from 17.8cm to 21.7cm and were aged at 1+.

Three-spined stickleback captured during the 2014 survey ranged in length from 3.5cm to 5.6cm and eels ranged from 29.8cm to 47.6cm. All salmon captured were aged from 1+ to 2.1+ and ranged in length from 13.4cm to 56.5cm.
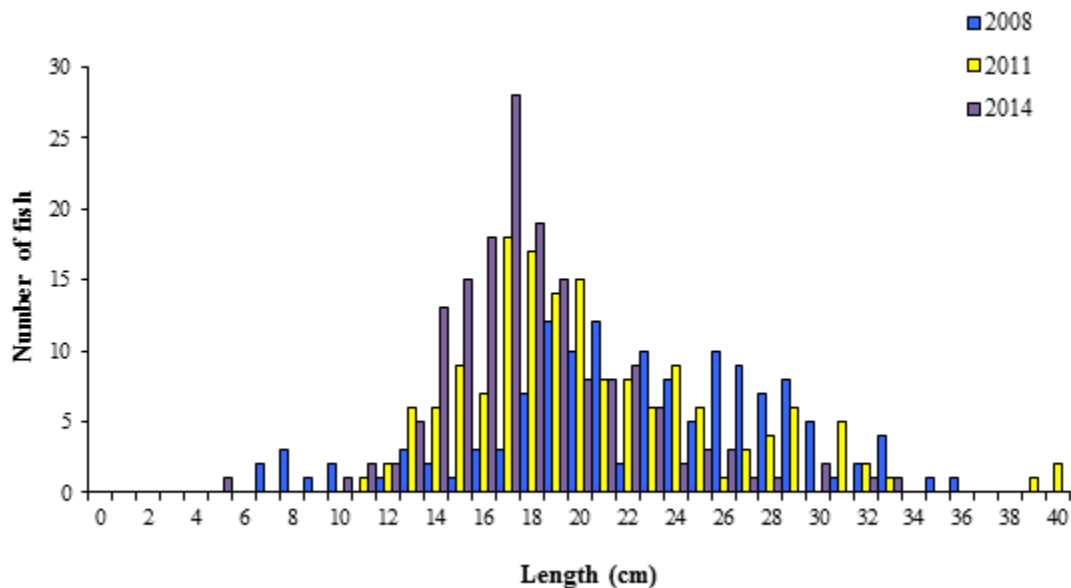

Fig. 1.4. Length frequency of brown trout captured on Lough Fern, 2008, 2011 and 2014

Table 1.3. Mean (±SE) brown trout length (cm) at age for Lough Fern, August 2014

	L_1	L_2	L_3	L_4
Mean	6.6	15.6	22.6	27.7
N	51	30	7	1
Range	4.0-9.2	9.5-21.9	17.6-27.3	27.7-27.7

1.4 Summary

Brown trout was the dominant species in terms of abundance (CPUE) and biomass (BPUE) captured in the survey gill nets during the 2014 survey.

The mean brown trout CPUE and BPUE fluctuated slightly over the three sampling occasions; however, these differences were not statistically significant. Brown trout ranged in age from 0+ to 4+, indicating reproductive success in each of the previous five years. The dominant age class was 2+.

Perch were recorded for the first time in the 2014 survey and were aged at 1+. The source of these is unknown and further investigation will be undertaken.

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*., 2012b). Using the FIL2 classification tool, Lough Fern has been assigned an ecological status of Poor in 2005, Moderate in 2008 and Good for both 2011 and 2014 based on the fish populations present.

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

1.5 References

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