Lough Fern

Sampling Fish for the Water Framework Directive - Lakes 2008

The Central and Regional Fisheries Boards

ACKNOWLEDGEMENTS

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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, mean depth of 2m and 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 now holds a good stock of brown trout (O'Reilly, 2007). The lake was previously surveyed in September 2005 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). Brown trout, salmon and eels were recorded in this survey.

Plate 1. Lough Fern, looking south

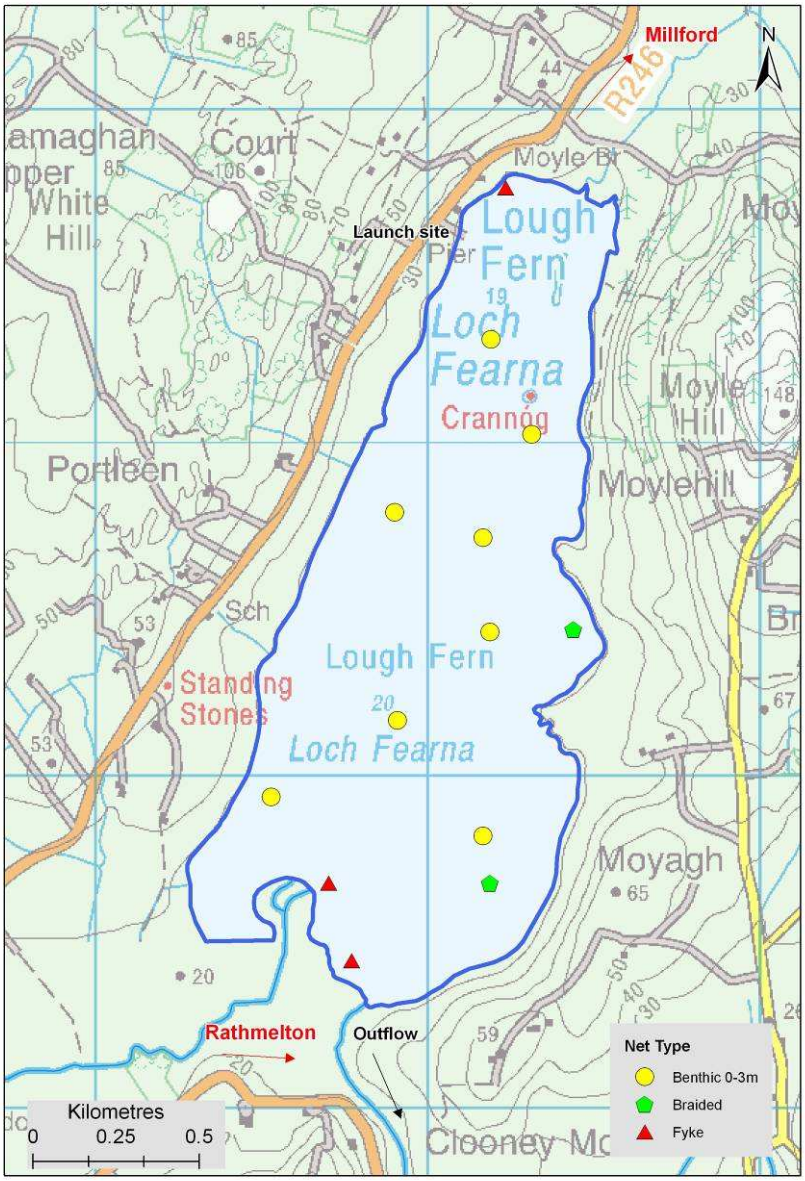

Fig. 1.1. Location map of Lough Fern showing locations and depths of each net (outflow is indicated on map)

1.2 Methods

The lake was surveyed over one night between the 17th and 18th of September 2008. A total of three sets of Dutch fyke nets and eight benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) survey gill nets (8 @ 0-2.9m) were deployed randomly in the lake (11 sites) (Fig. 1.1). The fyke and monofilament gill netting effort is identical to that carried out in 2005 however; the netting effort was supplemented in 2008 with two benthic braided (62.5mm mesh knot to knot) survey gill nets at two additional sites. Nets were deployed in similar locations as were randomly selected in the previous 2005 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 and scales were removed from brown trout and salmon on site. 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 returned to the laboratory for further analysis.

1.3 Results

1.3.1 *Species richness*

A total of four fish species were recorded on Lough Fern in September 2008. The number of each species captured by each gear type is shown in Table 1.1. A total of 181 fish were captured during the survey. Brown trout were the most common fish species encountered in the benthic gill nets and fyke nets. One adult salmon was captured in a braided gill net. In the 2005 survey, brown trout were also found to be the dominant species, again followed by eels, a single salmon was captured and no 3-spined stickleback were recorded (Kelly *et al.*, 2007).

Table 1.1. List of fish species recorded (including numbers captured) during the survey on Lough Fern, September 2008

Scientific name	Common name	Number of fish captured			
		Benthic mono multimesh gill nets	Benthic braided gill nets	Fyke nets	Total
Salmo trutta	Brown trout	128	5	4	137
Gasterosteus aculeatus	3-spined stickleback	12	0	1	13
Salmo salar	Salmon	0	1	0	1
Anguilla anguilla	Eel	0	0	30	30

1.3.2 *Fish abundance*

Fish abundance (mean CPUE) and biomass (mean BPUE) was 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 are summarised in Table 1.2. Mean CPUE is illustrated in Figure 1.2. For comparative purposes, 2005 data is also displayed. Compared with the 2005 results, brown trout had a lower CPUE in 2008, however this was not statistically significant. Eels had a higher CPUE in 2008 compared to 2005, however, again this was not statistically significant.

Table 1.2. Mean CPUE and Mean BPUE on Lough Fern

Year	2005	2008
	Mean CPUE (mean no. of fish per m of net)	
Brown trout	0.476 (0.0810)	0.346 (0.0729)
Salmon	0.002 (0.0015)	0.003 (0.0026)
3-spined stickleback	-	0.032 (0.0147)
Eel	0.083 (0.0000)	0.167 (0.0347)
	Mean BPUE (mean weight (g) of fish/m of net)*	
Brown trout	83.222 (15.1381)	58.887 (12.0325)
Salmon	4.545 (4.5454)	5.564 (5.5641)
3-spined stickleback	-	0.128 (0.0587)
Eel	9.036 (9.0355)	17.811 (3.7666)

- On the rare occasion where biomass data was unavailable for an individual fish, this was determined from a length/weight regression for that species. Standard error is displayed in brackets.
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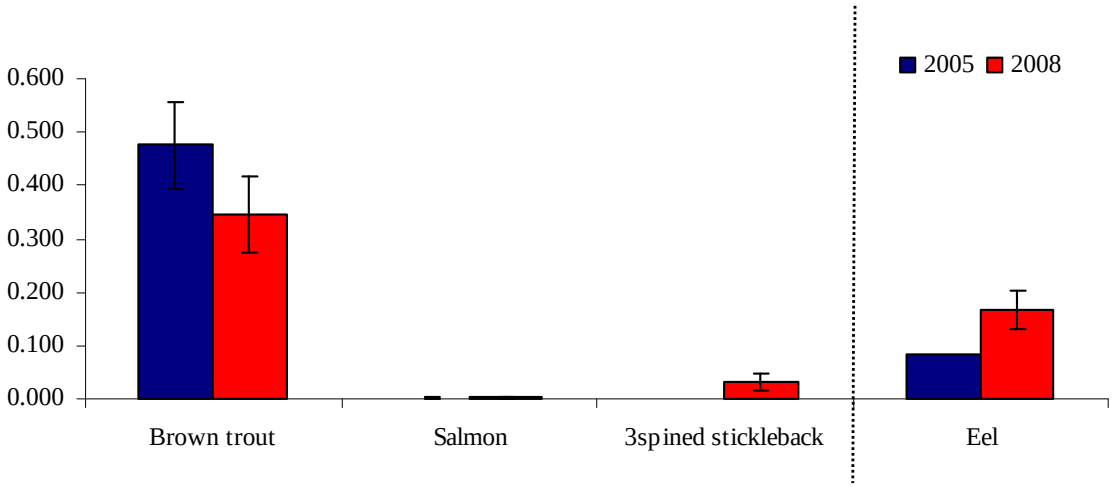

Fig. 1.2. Mean (±S.E.) CPUE on Lough Fern (Eel CPUE based on fyke nets only)

1.3.3 *Length frequency distributions*

Brown trout ranged in length from 7.5cm to 36.5cm (mean = 22.9cm) (Fig. 1.3). In 2005, brown trout ranged in length from 12.2cm to 36.81cm (Fig. 1.3). Eels ranged in length from 30.0cm to 49.0cm during the current survey. Similar lengths were also recorded for eels in the 2005 survey. 3-spined sticklebacks ranged in length from 3.0cm to 5.5cm. A single salmon measuring 61.0cm in length was also captured in 2008.

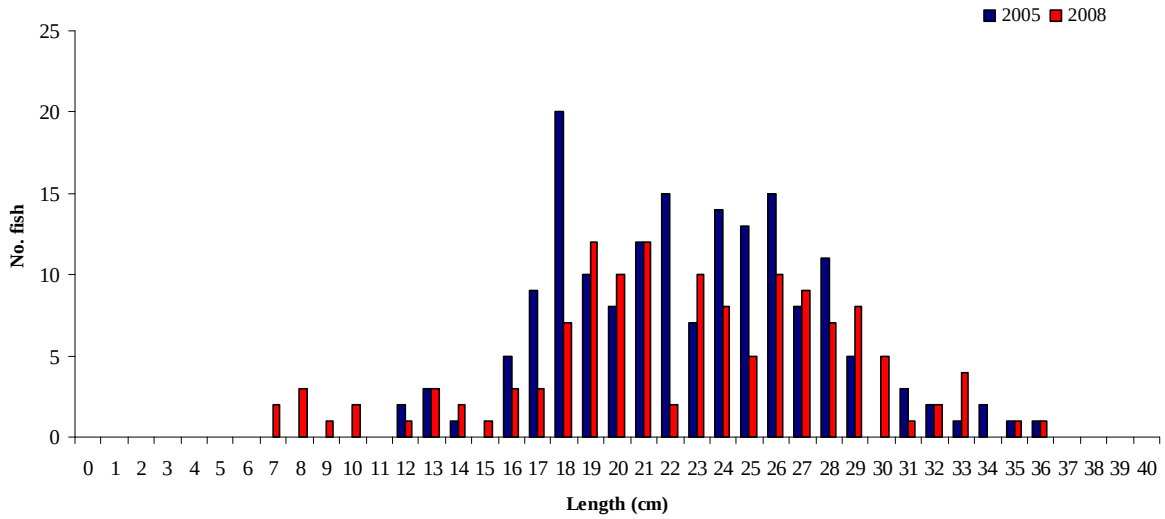

Fig. 1.3. Length frequency of brown trout captured on Lough Fern

1.3.4 *Fish age and growth*

Brown trout ranged in age from 0+ to 4+. Mean brown trout L1 was 7.9cm. Mean brown trout L4 was 30.8cm, indicating that the growth of brown trout in Lough Fern is fast based on a classification developed by Kennedy and Fitzmaurice (1971) (Table 1.3). Brown trout in the 2005 survey ranged in age from 1+ to 5+, and the mean L1 was 6.7cm. Brown trout aged 2+ accounted for the largest proportion of the populations captured in the gill nets (37.3%), followed by 1+ (31.3%), 3+ (18.0%), 0+ (9.6%)and 4+ (3.6%). The single salmon caught in 2008 was aged 3+.

Table 1.3. Mean brown (±S.E.) trout length at age for Lough Fern, September 2008

	L_1	L_2	L_3	L_4
Mean	7.9 (0.187)	17.9 (0.462)	25 (0.609)	30.8 (1.334)
N	74	48	17	3
Range	4.3-11.7	13.3-23	20.7-30	29.2-33.5

1.4 Summary

Survey results and data analysis reveal the brown trout are the dominant species in Lough Fern, followed by eel. Sticklebacks were also recorded, along with one adult salmon. The mean CPUE was the second highest recorded for moderate alkalinity lakes (Kelly *et al*., 2009). The CPUE was high when compared with other moderate alkalinity lakes surveyed at the time.

Eel CPUE was the second highest amongst all moderate alkalinity lakes surveyed during 2008. The CPUE for eels has increased since 2005.

Kennedy and Fitzmaurice (1971) related growth rates to alkalinity and classified the growth of lake trout generally into four different categories. This description was applied to trout from Lough Fern and therefore trout were classified as fast growing. Little change has been observed in the growth of brown trout since 2005. However, in 2005, the results showed that the brown trout in Lough Fern were relatively slow growing, this is due to the fact that mean brown trout L4 in 2005 was 28.8cm, therefore just putting it into the slower category. Brown trout growth was average in comparison with the other moderate alkalinity lakes surveyed during 2008, e.g. Lough Melvin and Lough Gill.

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 new WFD multimetric fish classification tool has been developed for the island of Ireland (Ecoregion 17) using Agri-Food and Biosciences Institute Northern Ireland (AFBINI) and CFB data (Kelly *et al*., 2008). Using this tool and expert opinion, Lough Fern has been assigned a draft classification of good. In 2005, the lake was also classified as good, therefore the ecological status has been maintained during the previous three years. The EPA has assigned good status to Lough Fern in an interim draft classification. This was based on physico-chemical parameters and biotic elements, such as macroinvertebrates and macrophytes.

1.5 References

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