



Sampling Fish for the Water Framework Directive

Lakes 2010

Lettercraffroe Lough



Iascach Intíre Éireann
Inland Fisheries Ireland

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1.1 Introduction

Lettercraffroe Lough is located 6km south-west of Oughterard on a tributary of the Owenriff River which flows through the town and into Lough Corrib (Plate 1.1, Fig. 1.1). It has a surface area of 82ha, a mean depth of 2.86m and a maximum depth of 17.9m (WRFB, 2006). The lake is categorised as typology class 2 (as designated by the EPA for the purposes of the Water Framework Directive), i.e. shallow (<4m), greater than 50ha and low alkalinity (<20mg/l CaCO₃). Lettercraffroe Lough is an excellent example of the Annex 1 habitat, lowland oligotrophic lake. It holds a very large stock of brown trout, ranging in size from 0.23kg to 0.34kg (O' Reilly, 2007).

Lettercraffroe Lough is situated within the Connemara Bog Complex, a large site that encompasses a wide range of habitats, including extensive tracts of blanket bog, heath, woodland, lakes, rivers and streams. The Connemara Bog Complex is underlain by various Galway granites, with small areas along the northern boundary made up of schist and gneiss (NPWS, 2005). Atlantic salmon occurs in many of the rivers within the complex and Arctic char, a species listed in the Irish Red Data Book as vulnerable (King *et al.*, 2011), also occur in a number of lakes within the SAC including Ballynahinch Lake, Glenicmurrin Lough and Lough Shindilla (NPWS, 2005).

The main perceived threats within the complex are peat cutting, overgrazing and afforestation. Forestry affects habitat uniformity, lake and river catchments, nesting and feeding habitats for animals, and landscape integrity (NPWS, 2005). A tree felling plan was due to take place during 2010, along the streams and in areas surrounding the lake. However, due to issues regarding pearl mussels in the catchment, this plan has had to be revisited and a new forestry management plan is under development (Coillte, 2010). It is hoped that this plan will include the development of riparian zones. Conifers will be felled and they will not be replaced in areas along the streams or between the access road and the lake. It is hoped that these efforts will lead to the creation of an extensive buffer zone surrounding Lettercraffroe Lough.

The western and southern shores of the lake are heavily forested and there have previously been problems with phosphorous loading in the lake, which reached critical levels in the summer of 2004 (FIE, 2010). Water samples have since indicated that phosphorus levels are decreasing in the lake (Coillte, *pers. comm.*).

Lettercraffroe Lough was previously surveyed in 2007 as part of the WFD surveillance monitoring programme (Kelly and Connor, 2007). During this survey roach and brown trout were found to be the dominant species present in the lake. Three-spined stickleback and eels were also recorded.



Plate 1.1. Lettercraffroe Lough



Plate 1.2. Clear felling on the shore of Lettercraffroe Lough

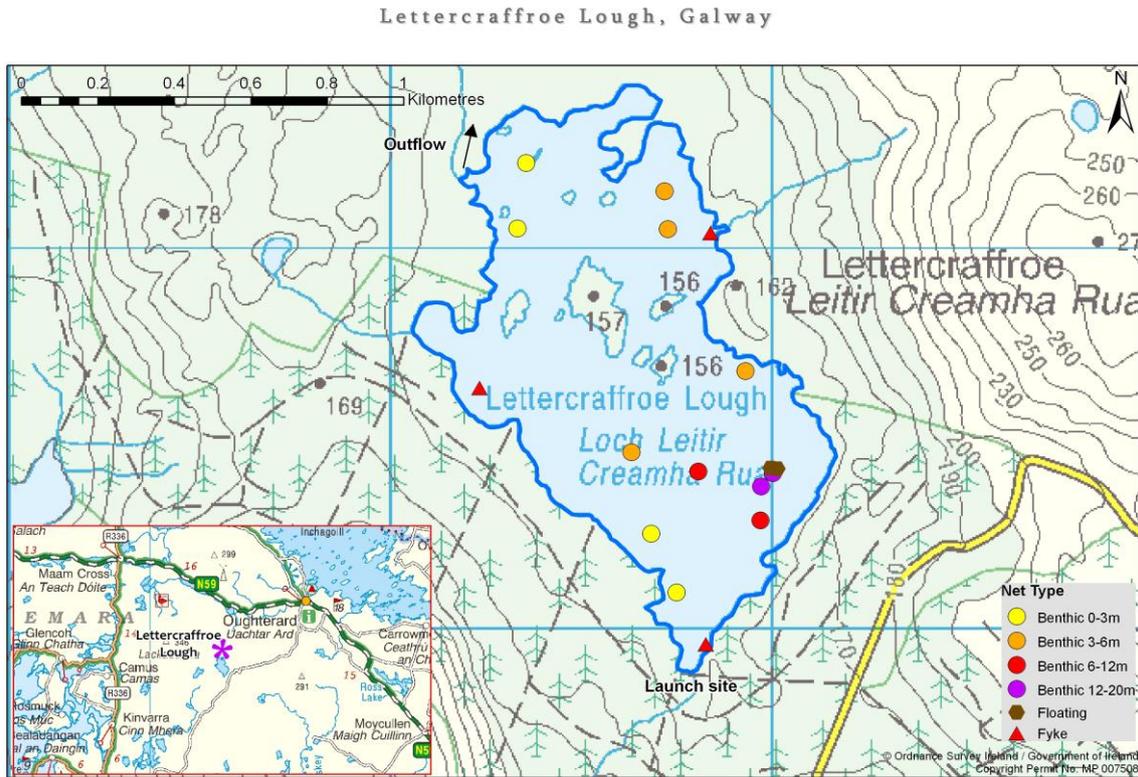


Fig. 1.1. Location map of Lettercraffroe Lough showing net locations and depths of each net (outflow is indicated on map)

1.2 Methods

Lettercraffroe Lough was surveyed over two nights from the 20th to the 22nd 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, 2 @ 6-11.9m and 2 @ 12-19.9m) and two floating monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets were deployed randomly in the lake (17 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 and brown trout. 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 on Lettercraffroe Lough in September 2010, with 160 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Roach was the most abundant fish species recorded, followed by brown 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 Lettercraffroe Lough, September 2010

Scientific name	Common name	Number of fish captured			
		Benthic mono multimesh gill nets	Surface mono multimesh gill nets	Fyke nets	Total
<i>Rutilus rutilus</i>	Roach	112	0	0	112
<i>Salmo trutta</i>	Brown trout	32	1	0	33
<i>Anguilla anguilla</i>	European eel	0	0	10	10
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	2	1	2	5

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 recorded during the 2007 and 2010 surveys are summarised in Table 1.2. Mean CPUE is illustrated in Figure 1.2.

Although the mean brown trout CPUE was lower in 2010 than in 2007, this difference was not statistically significant. The differences in the mean brown trout CPUE between Lettercraffroe Lough and two other similar lakes were assessed, with no significant differences being found (Fig. 1.3).

The differences in the mean roach CPUE between Lettercraffroe Lough and four other similar lakes were assessed, with no overall significant difference being found (Kruskal-Wallis) (Fig. 1.4). However, Independent-Samples Mann-Whitney U tests between each lake showed that Lettercraffroe Lough had a significantly lower mean roach CPUE than Lough MacNea Lower ($z = -1.992$, $P < 0.05$).

Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species recorded on Lettercraffroe Lough, 2007 and 2010

Scientific name	Common name	2007	2010
Mean CPUE			
<i>Salmo trutta</i>	Brown trout	0.104 (0.032)	0.064 (0.020)
<i>Rutilus rutilus</i>	Roach	0.215 (0.064)	0.219 (0.049)
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	0.004 (0.002)	0.008 (0.004)
<i>Anguilla anguilla</i>	European eel	0.004 (0.003)	0.055 (0.033)
Mean BPUE			
<i>Salmo trutta</i>	Brown trout	20.383 (6.838)	11.833 (4.192)
<i>Rutilus rutilus</i>	Roach	18.100 (4.846)	33.925 (7.243)
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	0.016 (0.010)	0.011 (0.006)
<i>Anguilla anguilla</i>	European eel	1.730 (1.356)	31.861 (17.870)

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

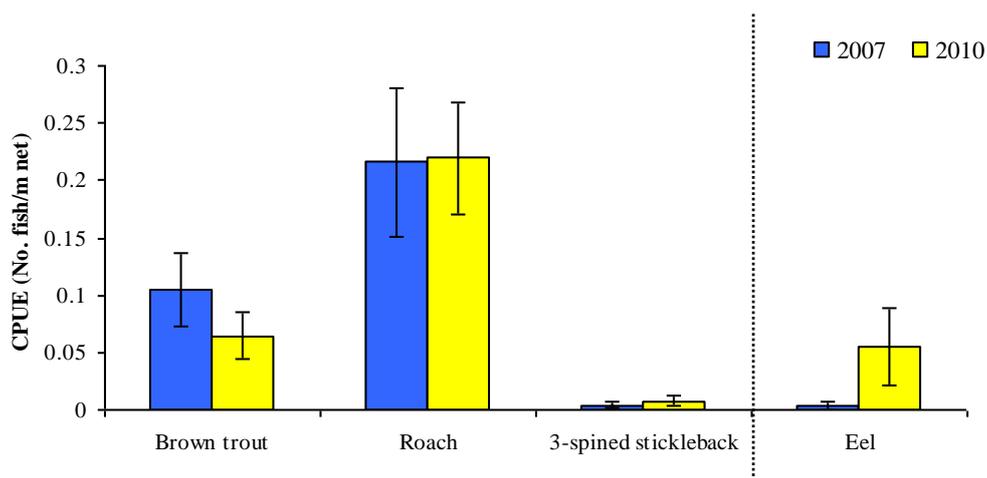


Fig. 1.2. Mean (\pm S.E.) CPUE on Lettercraffroe Lough (Eel CPUE based on fyke nets only)

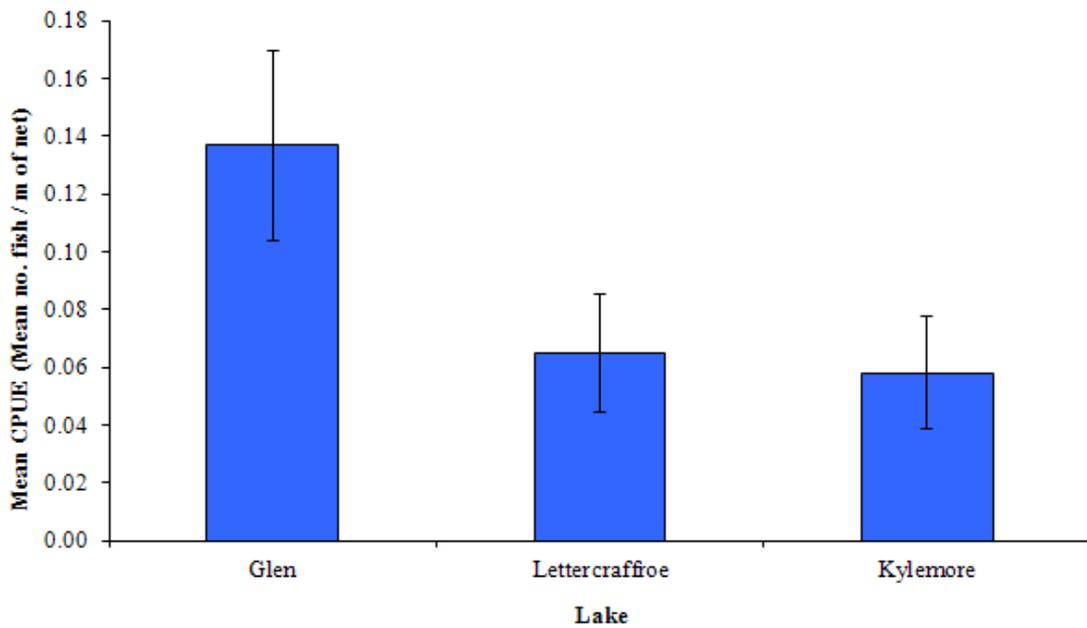


Fig. 1.3. Mean (\pm S.E.) brown trout CPUE in three lakes surveyed during 2010

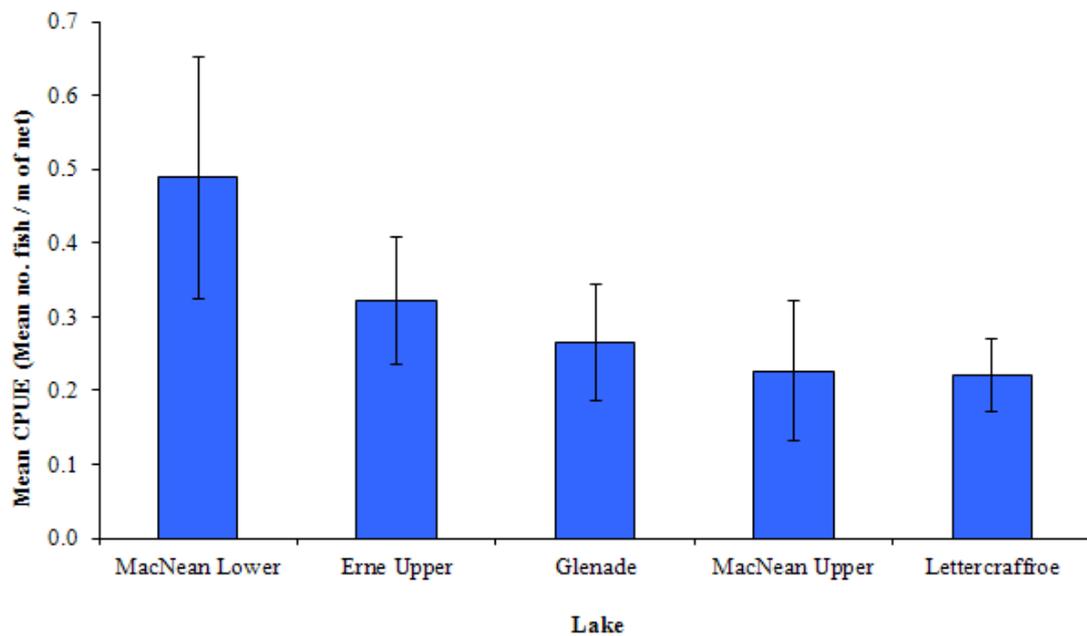


Fig. 1.4. Mean (\pm S.E.) roach CPUE in five lakes surveyed during 2010

1.3.3 Length frequency distributions

Brown trout captured during the 2010 survey ranged in length from 14.9cm to 41.0cm (mean = 23.9cm) (Fig. 1.5). Brown trout captured during the 2007 survey ranged in length from 9.6cm to

35.8cm (Fig. 1.5). Roach captured during the 2010 survey ranged in length from 8.5cm to 28.4cm (mean = 19.2cm) (Fig. 1.6). Roach captured during the 2007 survey ranged in length from 11.4cm to 30.0cm (Fig.1.6). Eels captured during the 2010 survey ranged in length from 44.0cm to 76.8cm and three-spined stickleback ranged in length from 3.0cm to 5.5cm.

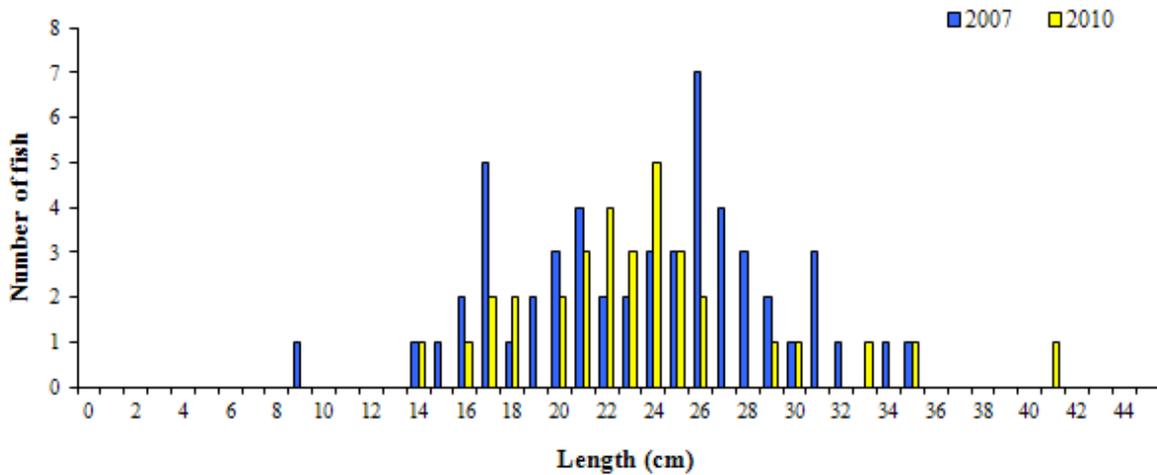


Fig. 1.5. Length frequency of brown trout captured on Lettercraffroe Lough

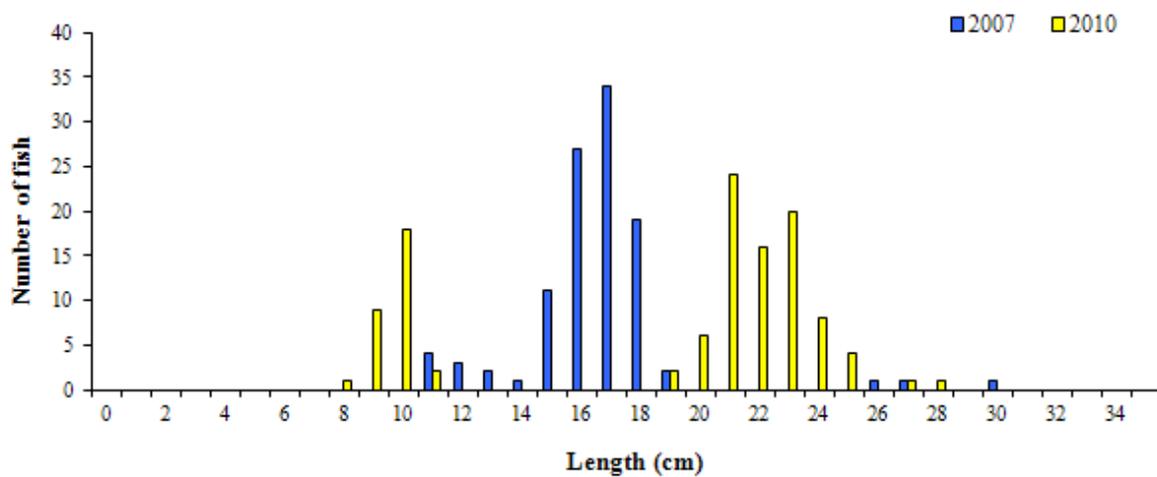


Fig. 1.6. Length frequency of roach captured on Lettercraffroe Lough

1.3.4 Fish age and growth

Five age classes of brown trout were present, ranging from 1+ to 5+, with a mean L1 of 8.2cm (Table 1.3). In the 2007 survey, brown trout ranged from 0+ to 6+ with a mean L1 of 7.6cm. Mean brown trout L4 was 31.3cm (Table 1.3) indicating a fast rate of growth for brown trout in this lake according to the classification scheme of Kennedy and Fitzmaurice (1971).

Three age classes of roach were present, ranging from 1+ to 5+, with a mean L1 of 2.8cm (Table 1.4). In the 2007 survey, roach ranged from 1+ to 7+ with a mean L1 of 2.6cm. .

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

	L ₁	L ₂	L ₃	L ₄	L ₅
Mean	8.2 (0.2)	17.7 (0.4)	23.8 (0.8)	31.3 (2.7)	31.7 (0.8)
N	33	27	8	3	2
Range	6.5-11.0	12.5-23.7	20.5-27.9	28.2-36.8	30.9-32.5

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

	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇	L ₈	L ₉
Mean	2.8 (0.1)	9.1 (0.2)	15.5 (0.3)	19.4 (0.3)	22.1 (0.3)	23.1	24.7	25.7	27.0
N	48	34	34	34	29	1	1	1	1
Range	2.1- 4.1	6.9- 10.9	12.1- 18.4	16.2- 23.1	19.5- 25.4	23.1- 23.1	24.7- 24.7	25.7- 25.7	27.0- 27.0

1.4 Summary

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

The mean brown trout CPUE in Lettercraffroe Lough was not significantly different from the two other similar lakes surveyed. Brown trout ranged in age from 1+ to 5+, indicating reproductive success in five of the previous six years, with no 0+ fish being recorded. Length at age analyses revealed that brown trout in the lake exhibit a fast rate of growth according to the classification scheme of Kennedy and Fitzmaurice (1971).

The mean roach CPUE in Lettercraffroe Lough was relatively low when compared to the other four similar lakes surveyed. However, only Lough MacNea Lower exhibited a statistically significant higher mean CPUE. Three age classes of roach were present, 1+, 4+ and 5+. Two age classes were missing, i.e. 2+ and 3+, indicating that there may have been a reproductive failure in the roach population in 2007 and 2008.

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, combined with expert opinion on non-native/alien species, Lettercraffroe Lough has been assigned an ecological status of Good based on the fish populations present. The ecological status assigned to the lake based on the 2007 survey data was Good.

In the 2007 to 2009 surveillance monitoring reporting period, the EPA assigned Lettercraffroe 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.

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