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Sampling Fish for the Water Framework Directive

Lakes 2013

Lettercraffroe Lough

Iascach Intíre Éireann
Inland Fisheries Ireland

Water Framework Directive Fish Stock Survey of Lettercraffroe Lough, September 2013

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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 a lowland oligotrophic lake, an Annex 1 habitat,. 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 SAC 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).

The main perceived threats within the SAC 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 phosphorus 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 and 2010 as part of the WFD surveillance monitoring programme (Kelly and Connor, 2007 and Kelly *et al.*, 2011). During the 2010 survey roach were found to be the dominant species present in the lake. Brown trout, three-spined stickleback and eels were also recorded.

Plate 1.1. Lettercraffroe Lough

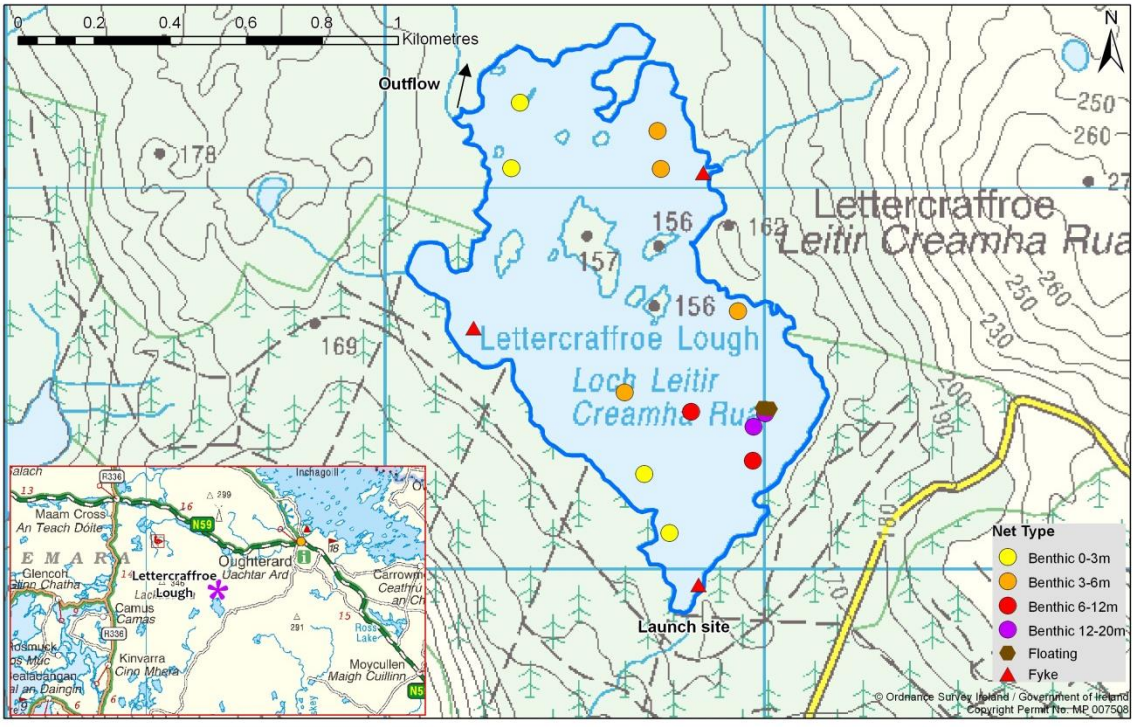

Fig. 1.1. Location map of Lettercraffroe Lough showing net locations and depths of each net (outflow is indicated on map)

1.2 Methods

Lettercraffroe Lough was surveyed over two nights from the 2nd to the 4th of September 2013. 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 2013, with 187 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 surveys in 2010 and 2007 the same species composition was recorded with the exception of eels, which were not recorded in the current survey.

Table 1.1. Number of each fish species captured by each gear type during the survey on Lettercraffroe Lough, September 2013

Scientific name	Common name	Number of fish captured			
		Benthic mono multimesh gill nets	Surface mono multimesh gill nets	Fyke nets	Total
Rutilus rutilus	Roach	134	2	0	136
Salmo trutta	Brown trout	44	1	3	48
Gasterosteus aculeatus	Three-spined stickleback	2	0	1	3

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 2010 and 2013 surveys are summarised in Table 1.2. Mean CPUE and BPUE for all species captured in 2010 and 2013 is illustrated in Figure 1.2 and 1.3.

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

The mean roach CPUE and BPUE was higher in 2013 than in 2010 and 2007 however, these differences were not statistically significant (Table 1.2; Fig 1.2 and 1.3).

Although the mean brown trout CPUE varied slightly over the three sampling occasions these differences were not statistically significant (Table 1.2; Fig 1.2 and 1.3). The mean brown trout BPUE decreased from 2007 to 2013, however, 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 recorded on Lettercraffroe Lough, 2007, 2010 and 2013

Scientific name	Common name	2007	2010	2013
			Mean CPUE	
Rutilus rutilus	Roach	0.215 (0.064)	0.219 (0.049)	0.267 (0.051)
Salmo trutta	Brown trout	0.104 (0.032)	0.064 (0.020)	0.091 (0.024)
Gasterosteus aculeatus	Three-spined stickleback	0.004 (0.002)	0.008 (0.004)	0.005 (0.003)
Anguilla anguilla	European eel*	0.004 (0.003)	0.055 (0.033)	-
			Mean BPUE	
Rutilus rutilus	Roach	18.100 (4.846)	33.925 (7.243)	34.687 (7.193)
Salmo trutta	Brown trout	20.383 (6.838)	11.833 (4.192)	6.888 (2.192)
Gasterosteus aculeatus	Three-spined stickleback	0.016 (0.010)	0.011 (0.006)	0.013 (0.007)
Anguilla anguilla	European eel*	1.730 (1.356)	31.861 (17.870)	-

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

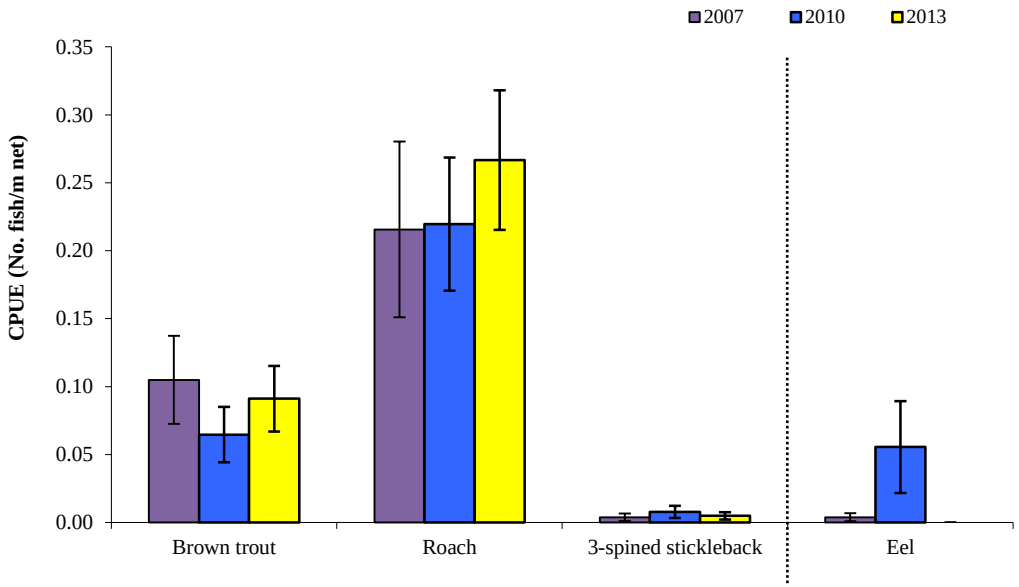

Fig. 1.2. Mean (±S.E.) CPUE for all fish species captured in Lettercraffroe Lough (Eel CPUE based on fyke nets only), 2007, 2010 and 2013

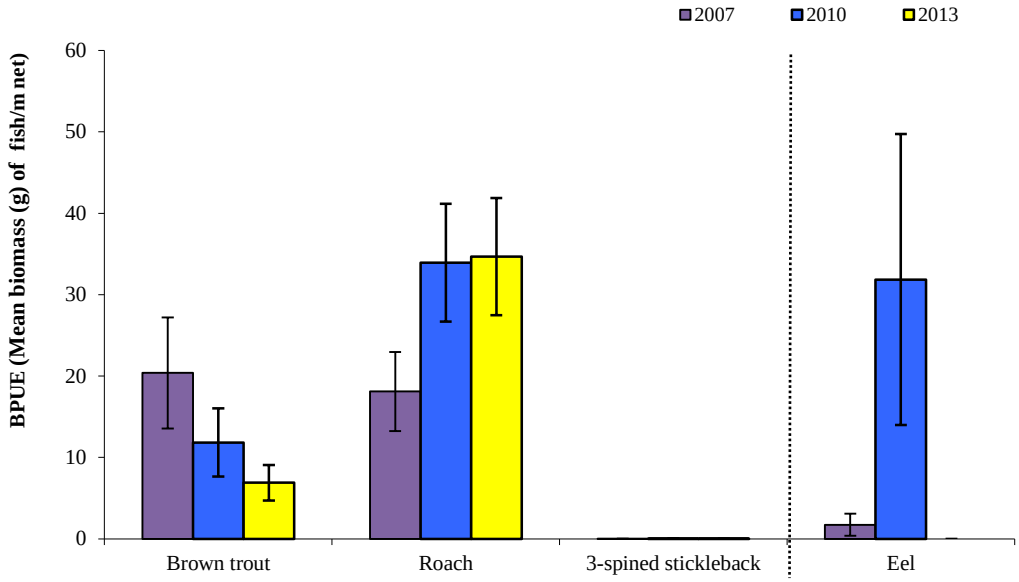

Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Lettercaraffroe Lough (Eel BPUE based on fyke nets only), 2007, 2010 and 2013

1.3.3 Length frequency distributions and growth

Roach captured during the 2013 survey ranged in length from 9.0cm to 29.1cm (mean = 19.1cm) (Fig. 1.4) with nine age classes present, ranging from 1+ to 9+, with a mean L1 of 2.2cm (Table 1.3). The dominant age class was 3+ (Fig. 1.4). Roach captured during the 2010 and 2007 survey had a similar length range (Fig.1.4) however roach had a narrower age range 2010 and 2007, ranging from 1+ to 5+ and 1+ to 7+ respectively. The dominant age class in 2007 and 2013 was similar and an older age class was dominant in 2010 (Fig. 1.4).

Brown trout captured during the 2013 survey ranged in length from 13.0cm to 30.5cm (mean = 17.3 cm) (Fig. 1.5) with four age classes present, ranging from 1+ to 4+, with a mean L1 of 8.5cm (Table 1.4). The dominant age class was 1+ (Fig. 1.5). Mean brown trout L4 was 25.7cm (Table 1.4) indicating a slow rate of growth for brown trout in this lake according to the classification scheme of Kennedy and Fitzmaurice (1971). Brown trout captured during the 2010 survey ranged in length from 14.9cm to 41.0cm (Fig. 1.5) with five age classes present (1+ to 5+) and had a fast rate of growth. Brown trout captured during the 2007 survey ranged in length from 9.6cm to 35.8cm (Fig. 1.5), ranged in age from 0+ to 6+ and exhibited a slow rate of growth. The dominant age class in 2007 and 2010 was similar and was older than the dominant age class in 2013 (Fig. 1.5).

Three-spined stickleback had similar length ranges in all years.

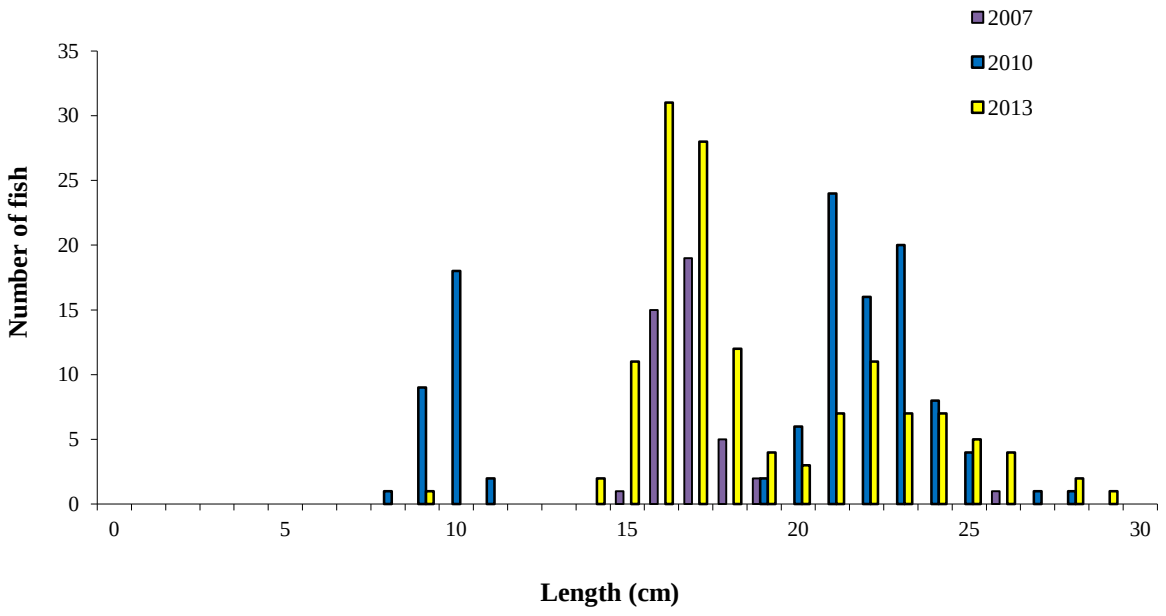

Fig. 1.4. Length frequency of roach captured on Lettercraffroe Lough, 2007, 2010 and 2013

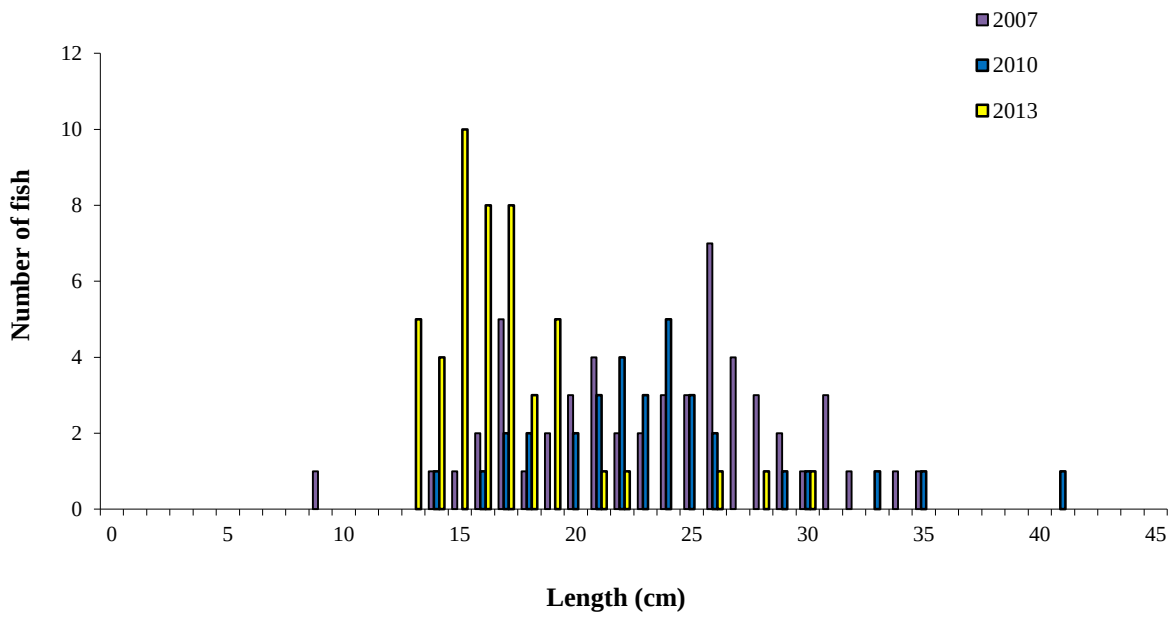

Fig. 1.5. Length frequency of brown trout captured on Lettercraffroe Lough, 2007, 2010 and 2013

Table 1.3. Mean (±SE) roach length (cm) at age for Lettercraffroe Lough, September 2013

	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8	L_9
Mean	2.2 (0.1)	7.4 (0.2)	13.5 (0.2)	17.3 (0.2)	20.0 (0.3)	22.1 (0.2)	23.9 (0.3)	24.9 (0.6)	25.9 (0.5)
N	80	79	78	59	41	38	16	5	2
Range	1.2-6.0	4.4-12.4	7.8-18.1	13.0-21.9	13.3-24.3	20.2-26.0	22.0-26.1	23.8-27.3	25.4-26.4

Table 1.4. Mean (±SE) brown trout length (cm) at age for Lettercraffroe Lough, September 2013

	L_1	L_2	L_3	L_4
Mean	8.5 (0.3)	13.7 (0.8)	19.5 (2.0)	25.7 (1.9)
N	45	14	4	3
Range	5.4-12.2	9.0-19.1	14.4-23.3	22.0-28.4

1.4 Summary

Roach was the dominant species in terms of both abundance (CPUE) and biomass (BPUE) during the 2013 survey.

The mean roach CPUE and BPUE was higher in 2013 than in 2010 and 2007 however, these differences were not statistically significant. Nine age classes of roach were present ranging from 1+ to 9+ indicating reproductive success in nine of the previous ten years. The dominant age class was 3+.

Although the mean brown trout CPUE varied slightly over the three sampling occasions these differences were not statistically significant. The mean brown trout BPUE decreased from 2007 to 2013, however, these differences were also not statistically significant. Brown trout ranged in age from 1+ to 4+, indicating reproductive success in four of the previous five years, with no 0+ fish being recorded. The dominant age class was 1+. 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 (Kelly *et al*., 2012). Using the FIL2 classification tool, Lettercraffroe Lough has been assigned an ecological status of Good for 2007, 2010 and 2013 based on the fish populations present.

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

1.5 References

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