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Sampling Fish for the Water Framework Directive

Lakes 2011

Lough Egish

Iascach Intíre Éireann
Inland Fisheries Ireland

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

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1.1 Introduction

Lough Egish (Plate 1.1 and Fig 1.1) is located in the Erne catchment, approximately eight kilometres south of Castleblaney in Co. Monaghan. The lake is situated at an altitude of 160.8m above sea level. It has a surface area of 117ha, a mean depth of 3.3m and a maximum depth of 10m. The lake is categorised as typology class 10 (as designated by the EPA for the Water Framework Directive), i.e. shallow (<4m), greater than 50ha and high alkalinity (>100mg/l $CaCO_3$). The geology of the area is predominantly Silurian Quartzite.

The lake has been classed as 1a (i.e. at risk of failing to meet good status by 2015) in the WFD Characterisation report (EPA, 2005). The lake was classified as strongly eutrophic by the Environmental Protection Agency in 2002 (McGarrigle *et al*., 2002). Lough Egish was previously used as the main water supply for Castleblaney, however this supply was upgraded and water is no longer extracted from the lake. Lakeland Dairies Drying Plant also extracted their process and cooling water from the lake prior to 2008.

A fish stock survey on Lough Egish was carried out in 2006 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). This survey recorded perch, roach, eels and pike. Zebra mussels are also present in this lake. Historical records of char exist for Lough Egish (Went 1945; Went, 1971); however, none have been captured in recent years. A subsequent survey was undertaken on the lake in 2008 as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al*., 2009). During this survey, perch and roach were found to be the dominant species present in the lake. Pike and eels were also captured during the survey.

This report summarises the results of the 2011 fish stock survey carried out on the lake, as part of the Water Framework Directive surveillance monitoring programme.

Plate 1.1. Lough Egish looking northeast across the lake towards Lakeland Dairies Drying Plant

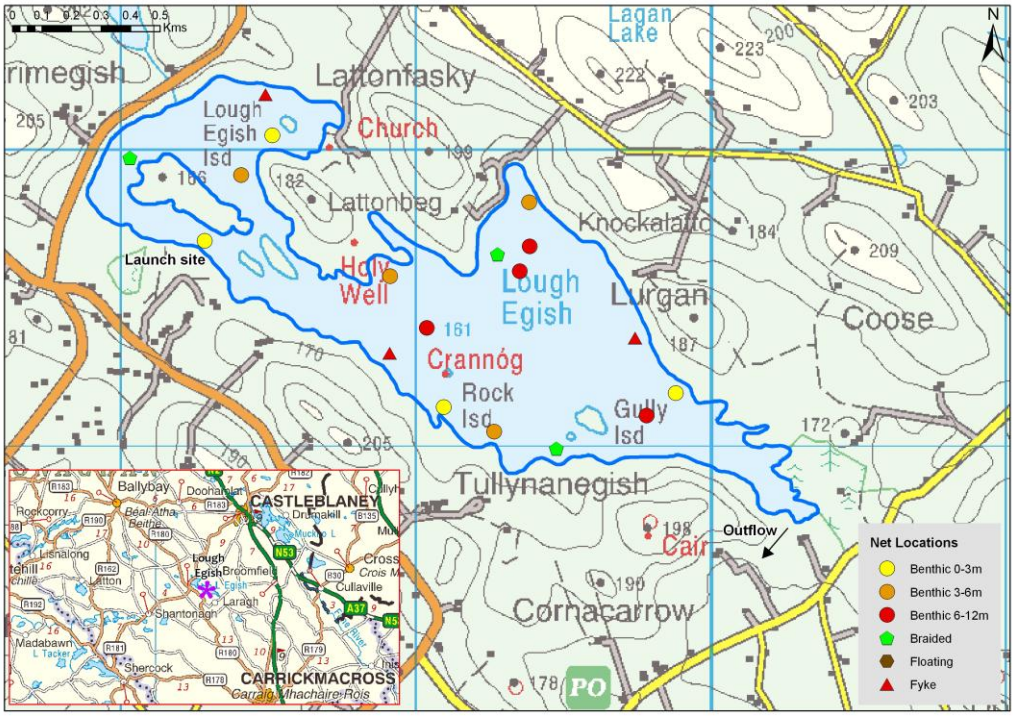

Fig. 1.1. Location map of Lough Egish showing locations and depths of each net (outflow is indicated on map)

1.2 Methods

Lough Egish was surveyed over two nights between the 29th and the 31st of August 2011. A total of three sets of Dutch fyke nets and 12 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (4 @ 0-2.9m, 4 @ 3-5.9m and 4 @ 6-11.9m) were deployed in the lake (15 sites). The netting effort was supplemented using three benthic braided survey gill nets (62.5mm mesh knot to knot) at three additional 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 apart from perch were measured and weighed on site and scales were removed from all roach, roach x bream hybrids and pike. 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 and one type of hybrid were recorded on Lough Egish in August 2011, with 1705 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Perch was the most abundant fish species recorded, followed by roach. Eels, roach x bream hybrids and pike were also recorded. During the previous survey in 2008 the same species composition was recorded with the exception of roach x bream hybrids, which were not present during the 2008 survey but were captured in the current survey.

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

Scientific name	Common name	Number of fish captured			
		Benthic mono multimesh gill nets	Benthic braided gill nets	Fyke nets	Total
Perca fluviatilis	Perch	1202	0	7	1209
Rutilus rutilus	Roach	488	0	1	489
Esox lucius	Pike	4	1	0	5
Rutilus rutilus x Abramis brama	Roach x bream hybrid	1	0	0	1
Anguilla anguilla	European eel	0	0	1	1

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 perch and roach CPUE was higher in 2011 than in 2008, these differences were not statistically significant.

The differences in the mean perch CPUE between Lough Egish and five other similar lakes was assessed, and found to be statistically significant (Kruskal-Wallis, $P<0.05$) (Fig. 1.4). Independent-Samples Mann-Whitney U tests between each lake showed that Lough Egish had a significantly higher mean perch CPUE than Upper and Lower Lough Corrib ($z = -3.701$ $P<0.05$ and $z = -3.408$ $P<0.05$).

The differences in the mean roach CPUE between Lough Egish and five other similar lakes was assessed, and found to be statistically significant (Kruskal-Wallis, $P<0.05$) (Fig. 1.5). Independent-Samples Mann-Whitney U tests between each lake showed that Lough Egish had a significantly higher mean roach CPUE than Upper and Lower Lough Corrib, Lough Sheelin and Lough O'Flynn ($z = -2.740$ $P<0.05$, $z = -2.177$ $P<0.05$, $z = -2.213$ $P<0.05$ and $z = -3.221$ $P<0.05$).

Although the mean perch BPUE was lower and roach BPUE was higher in 2011 than in 2008, these differences were also not statistically significant.

The differences in the mean perch BPUE between Lough Egish and five other similar lakes was assessed, and found to be statistically significant (Kruskal-Wallis, $P<0.05$) (Fig. 1.6). Independent-Samples Mann-

Whitney U tests between each lake showed that Lough Egish had a significantly higher mean perch BPUE than Upper and Lower Lough Corrib ($z = -3.465$ $P<0.05$ and $z = -3.190$ $P<0.05$).

The differences in the mean roach BPUE between Lough Egish and five other similar lakes was assessed, and found to be statistically significant (Kruskal-Wallis, $P<0.05$) (Fig. 1.7). Independent-Samples Mann-Whitney U tests between each lake showed that Lough Egish had a significantly higher mean roach BPUE than Upper Lough Corrib, Lough Sheelin, Lower Lough Corrib and Lough O'Flynn ($z = -2.907$ $P<0.05$; $z = -2.457$ $P<0.05$; $z = -2.881$ $P<0.05$ and $z = -3.413$ $P<0.05$).

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

Scientific name	Common name	2008	2011
		Mean CPUE	
Perca fluviatilis	Perch	0.788 (0.232)	2.232 (0.689)
Rutilus rutilus	Roach	0.354 (0.104)	0.904 (0.301)
Esox lucius	Pike	0.013 (0.008)	0.009 (0.004)
Rutilus rutilus x Abramis brama	Roach x bream hybrid	-	0.002 (0.002)
Anguilla anguilla	European eel	0.005 (0.005)	0.005 (0.005)
		Mean BPUE	
Perca fluviatilis	Perch	48.68 (14.631)	35.738 (9.457)
Rutilus rutilus	Roach	53.5 (13.463)	76.823 (20.951)
Esox lucius	Pike	33.115 (23.045)	11.379 (6.352)
Rutilus rutilus x Abramis brama	Roach x bream hybrid	-	0.891 (0.891)
Anguilla anguilla	European eel	2.644 (2.644)	2.516 (2.516)

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

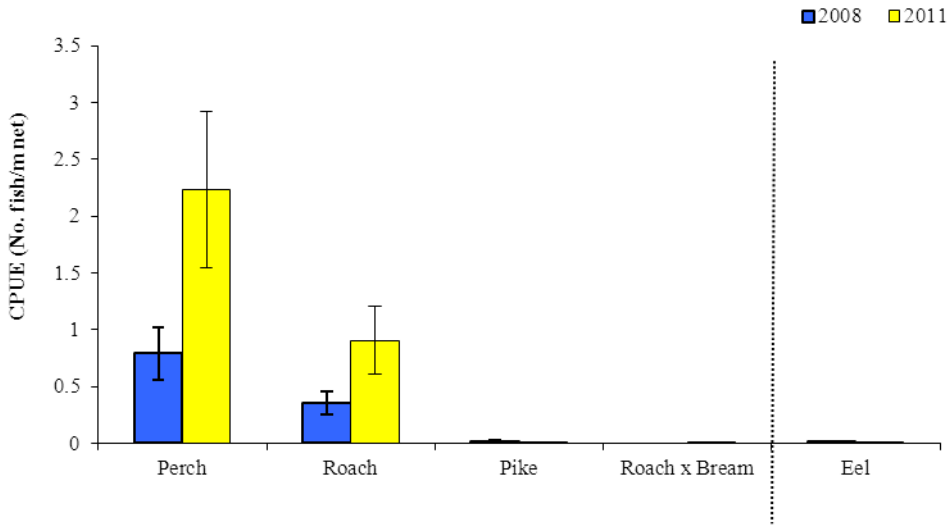

Fig. 1.2. Mean (±S.E.) CPUE for all fish species captured in Lough Egish (Eel CPUE based on fyke nets only), 2008 and 2011

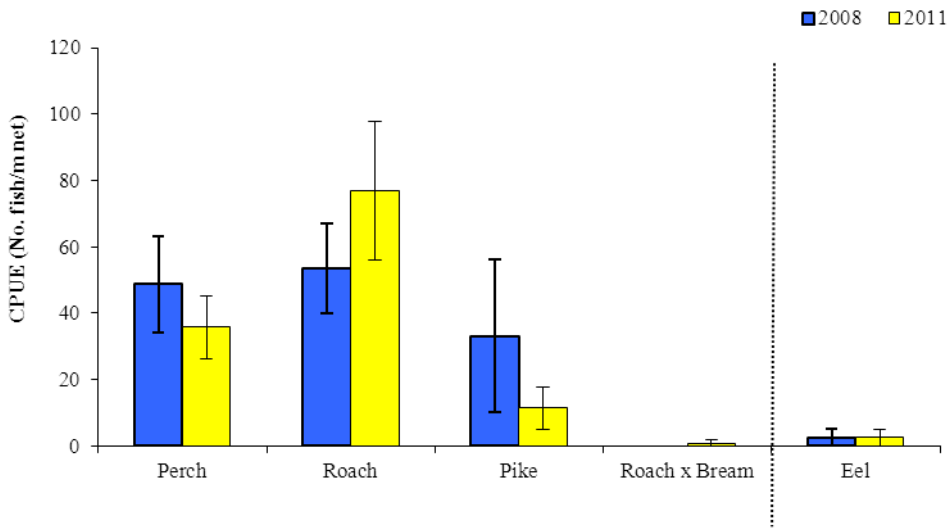

Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Lough Egish (Eel CPUE based on fyke nets only), 2008 and 2011

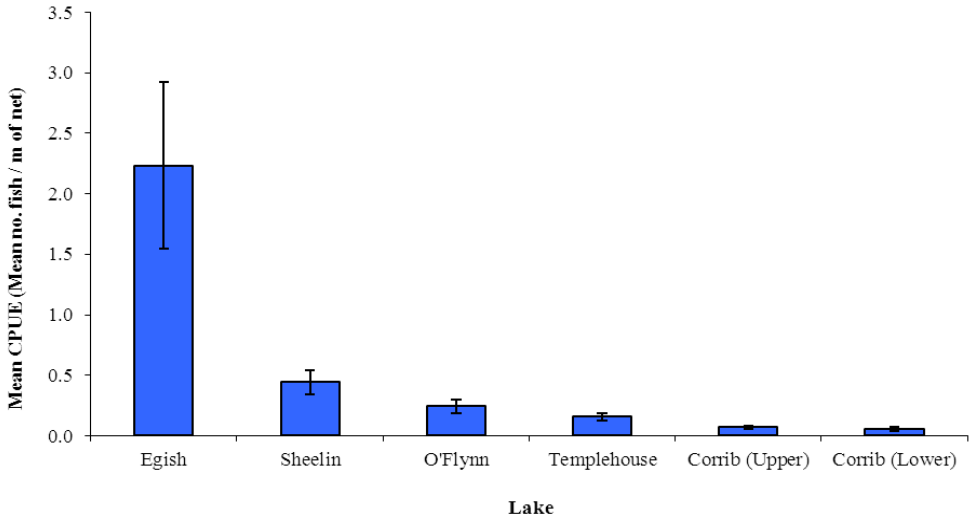

Fig. 1.4. Mean (±S.E.) perch CPUE in six lakes surveyed during 2011

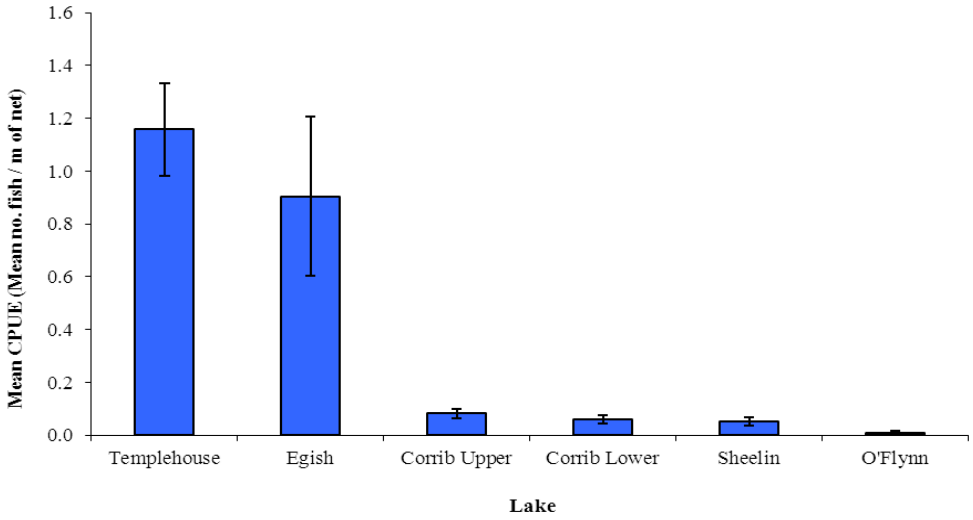

Fig. 1.5. Mean (±S.E.) roach CPUE in six lakes surveyed during 2011

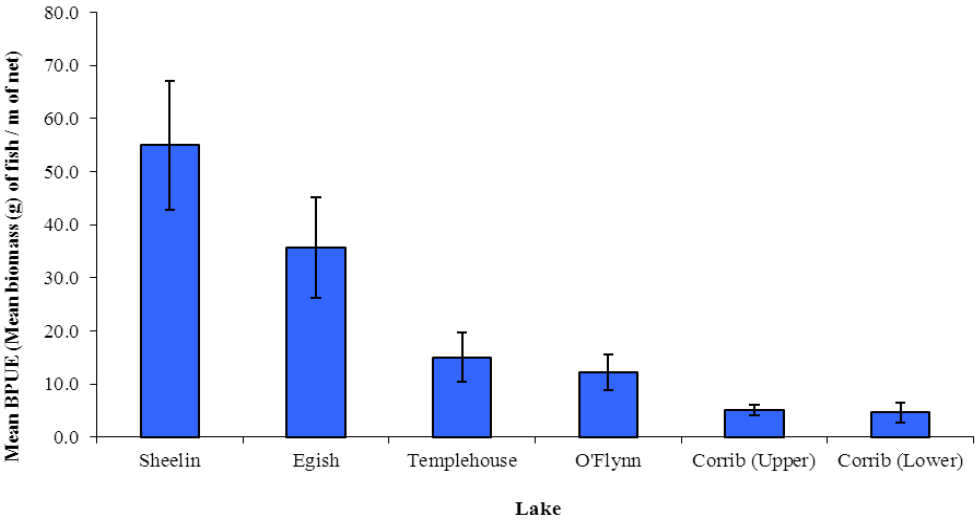

Fig. 1.6. Mean (±S.E.) perch BPUE in six lakes surveyed during 2011

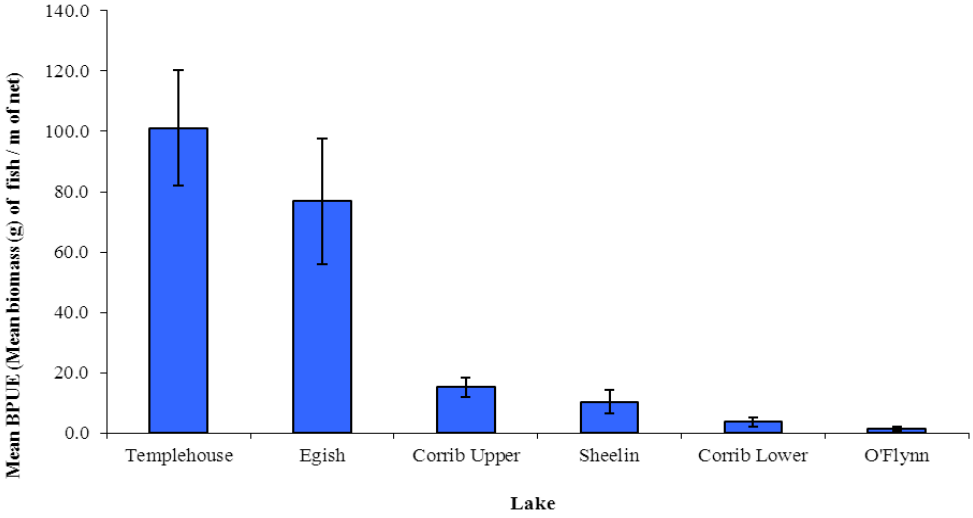

Fig. 1.7. Mean (±S.E.) roach BPUE in six lakes surveyed during 2011

1.3.3 Length frequency distributions

Perch captured during the 2011 survey ranged in length from 4.5cm to 30.4cm (mean = 7.9cm) (Fig.1.6). Perch captured during the 2008 survey had lengths ranging from 5.0cm to 38.0cm (Fig.1.6).

Roach captured during the 2011 survey ranged in length from 7.5cm to 29.5cm (mean = 14.8cm) (Fig. 1.7). Roach captured during the 2008 survey ranged in length from 6.0cm to 28.0cm (Fig. 1.7).

Pike captured during the 2011 survey ranged in length from 46.0cm to 72.0cm, one eel was recorded at 64.0cm and one roach x bream hybrid was recorded at 28.7cm.

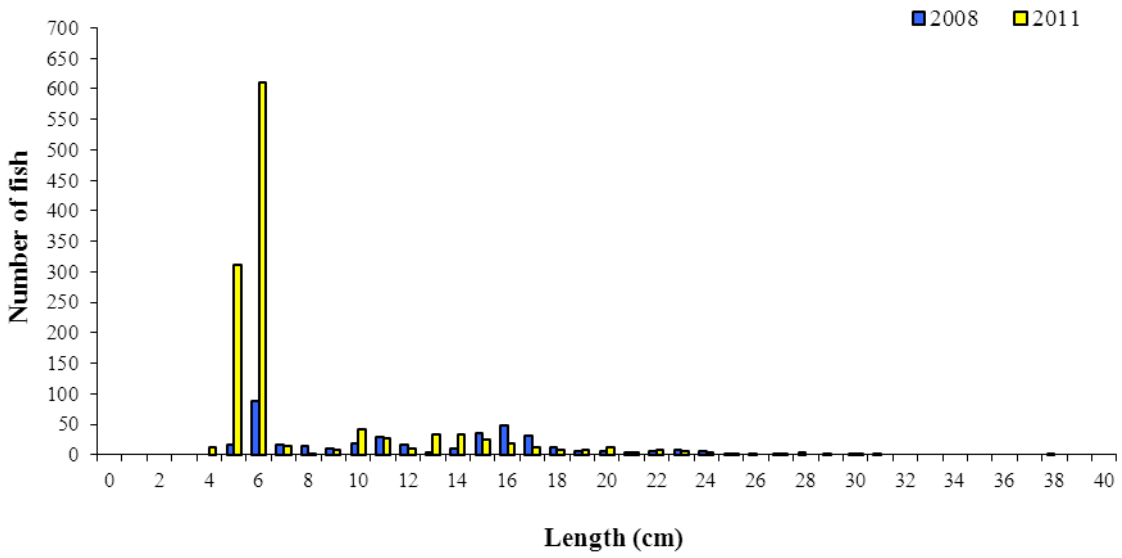

Fig. 1.6. Length frequency of perch captured on Lough Egish

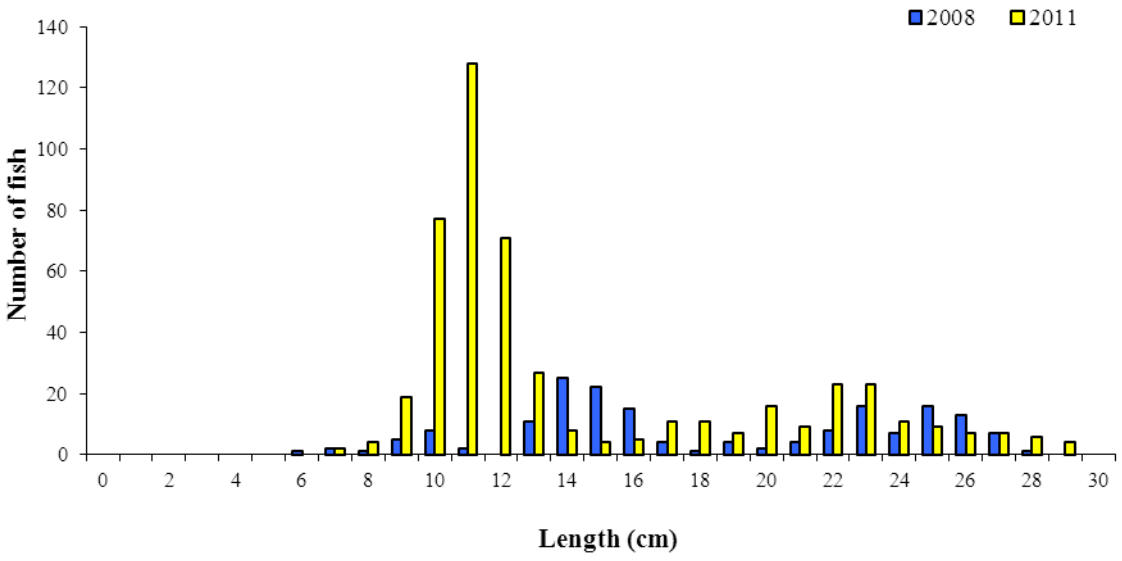

Fig. 1.7. Length frequency of roach captured on Lough Egish

1.3.4 Fish age and growth

Seven age classes of perch were present, ranging from 0+ to 6+, with a mean L1 of 6.2cm (Table 1.3). In the 2008 survey, perch ranged in age from 0+ to 9+ with a mean L1 of 6.2cm.

Eight age classes of roach were present, ranging from 2+ to 9+, with a mean L1 of 2.4cm (Table 1.4). In the 2008 survey, roach ranged from 1+ to 6+ with a mean L1 of 3.9cm.

Table 1.3. Mean (±SE) perch length (cm) at age for Lough Egish, August 2011

	L_1	L_2	L_3	L_4	L_5	L_6
Mean	6.2 (0.1)	11.2 (0.1)	15.6 (0.2)	18.7 (0.3)	22.4 (0.5)	23.3
N	97	75	53	32	19	1
Range	5.0-8.8	8.1-14.5	12.0-20.2	15.5-24.9	18.9-28.4	23.2-23.2

Table 1.4. Mean (±SE) roach length (cm) at age for Lough Egish, August 2011

	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8	L_9
Mean	2.4 (0.1)	6.7 (0.2)	12.4 (0.4)	17.0 (0.4)	21.1 (0.3)	23.6 (0.4)	26.3 (0.4)	26.6 (0.8)	24.0
N	77	77	55	45	38	27	18	4	1
Range	1.4-4.4	2.9-10.4	7.5-16.6	10.8-21.9	17.3-25.3	20.1-27.7	23.2-28.6	24.5-28.5	23.9-23.9

1.4 Summary

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

Although the mean perch CPUE and BPUE showed changes between 2011 and 2008, these differences were not statistically significant. The mean perch CPUE and BPUE in Lough Egish was significantly higher than Upper Lough Corrib and Lower Lough Corrib, other similar lakes surveyed. Perch ranged in age from 0+ to 6+, with 0+ and 1+ fish being captured indicating reproductive success in recent years. The dominant age classes of perch were 1+ and 2+.

Although the mean roach CPUE and BPUE showed changes between 2011 and 2008, these differences were not statistically significant. The mean roach CPUE and BPUE in Lough Egish was significantly higher than Upper Lough Corrib, Lower Lough Corrib, Lough Sheelin and Lough O'Flynn, other similar lakes surveyed. Roach ranged in age from 2+ to 9+, with no 0+ or 1+ fish being captured indicating a reduction in reproductive success in in recent 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 Egish has been assigned an ecological status of Poor/Bad based on the fish populations present. The ecological status assigned to the lake based on the 2008 survey data was also Poor/Bad.

In the 2007 to 2009 surveillance monitoring reporting period, the EPA assigned Lough Egish an overall ecological status of Bad, 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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