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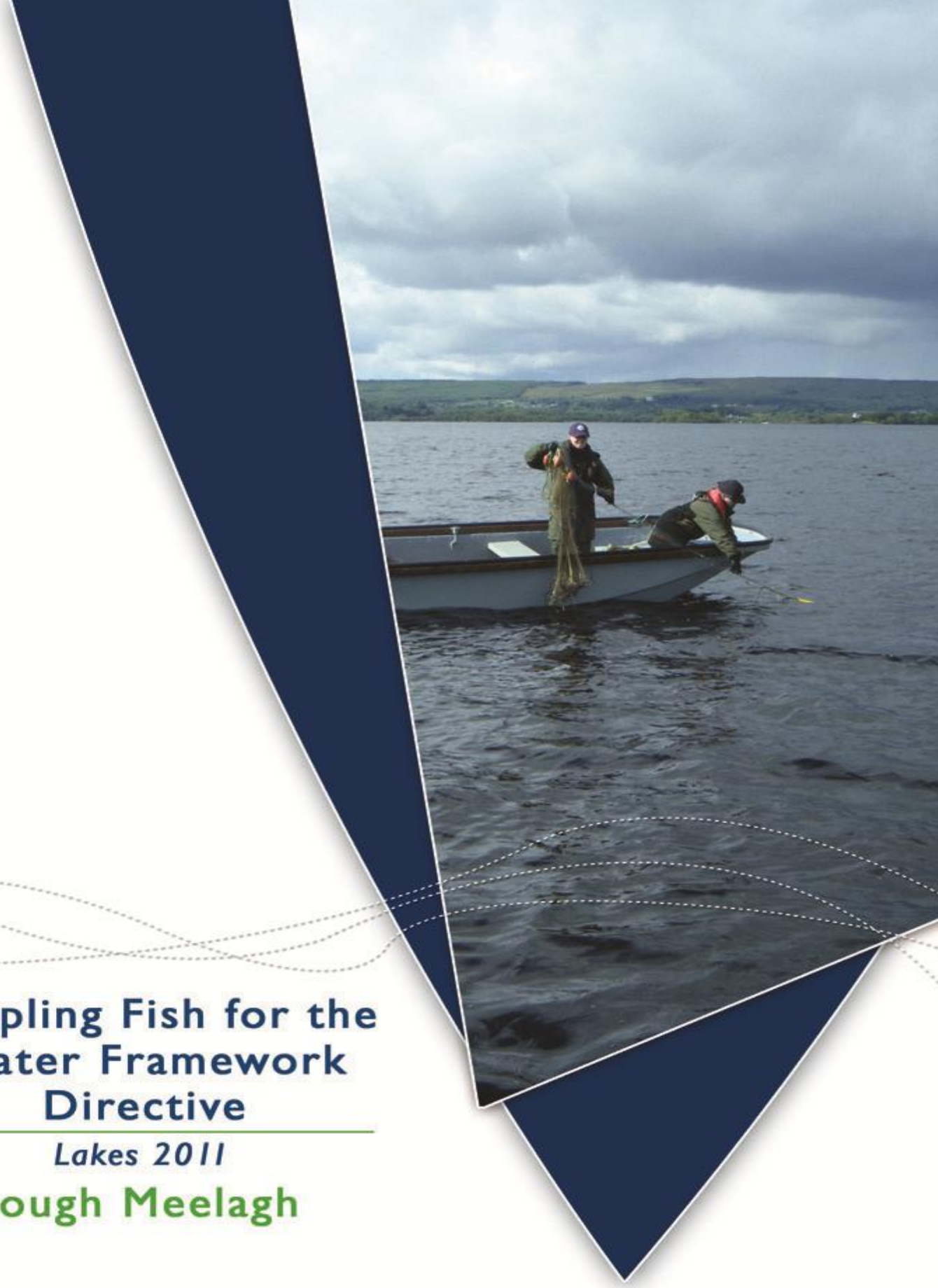

Sampling Fish for the Water Framework Directive

Lakes 2011

Lough Meelagh

Iascach Intíre Éireann
Inland Fisheries Ireland

Water Framework Directive Fish Stock Survey of Lough Meelagh, August/September 2011

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Cover photo: Lynda and Fiona gill netting © Inland Fisheries Ireland

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1.1 Introduction

Lough Meelagh is located west of Keadew, Co. Roscommon (Plate 1.1, Fig. 1.1). The lake has a surface area of 116ha and a maximum depth of 14m. The lake falls into typology class 6 (as designated by the EPA for the Water Framework Directive), i.e. shallow (mean depth <4m), greater than 50ha and moderate alkalinity (<20mg/l $CaCO_3$). Much of the lake is inaccessible due to the presence of extensive reed beds. However, extensive development of the launch site at Lough Meelagh and the building of two angling stands have been completed by the Keadew Development Association.

Lough Meelagh was previously surveyed in 1981 by the Inland Fisheries Trust and in 2000 by Inland Fisheries Ireland (previously the Central Fisheries Board). In the 1981 survey the proportion of the catch composed of roach was 3%. In the 2000 survey, this figure had risen dramatically to 66%. The greatest component of the 1981 catch was made up of pike (65%), which only comprised 8% of the fish population in the latter survey. The trout component of the catch dropped from 8% to 0.5%, while the percentage of perch remained relatively constant at 24% (1981) and 25% (2000) (IFI, unpublished data).

More recently Lough Meelagh was surveyed in 2008 as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al*., 2009). During this survey, roach were found to be the dominant species present in the lake, followed by perch. Brown trout, tench, pike, roach x bream hybrids, roach x rudd hybrids, bream 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 Meelagh (photo courtesy of Oliver Dixon @ geograph.ie)

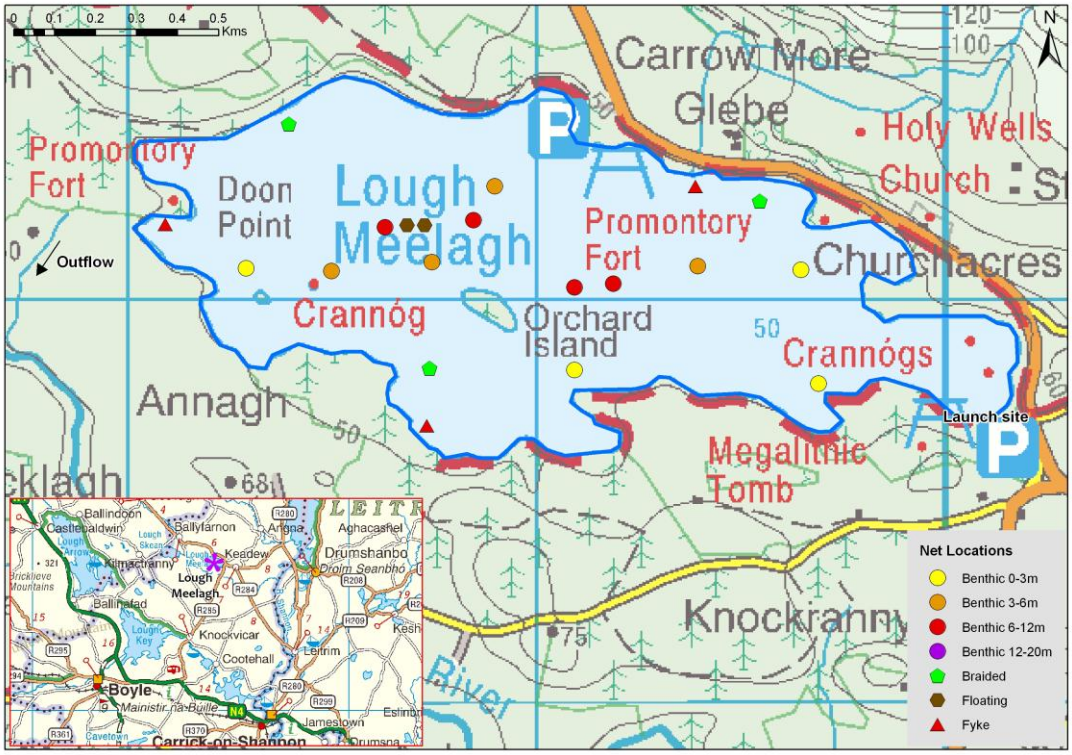

Fig. 1.1. Location map of Lough Meelagh showing locations and depths of each net (outflow is indicated on map)

1.2 Methods

Lough Meelagh was surveyed over two nights between the 31st of August and the 2nd of September 2011. 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 and 4 @ 6-11.9m) and two floating monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets were deployed in the lake (17 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, pike, tench, bream and hybrids. 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 and one type of hybrid were recorded on Lough Meelagh in August/September 2011, with 599 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. Roach, pike, roach x bream hybrids, tench and eels were also recorded. During the previous survey in 2008 the same species composition was recorded with the exception of brown trout, bream and roach x rudd hybrids, which were present during the 2008 survey but were not captured in the current survey.

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

Scientific name	Common name	Number of fish captured				
		Benthic mono multimesh gill nets	Surface mono multimesh gill nets	Benthic braided gill nets	Fyke nets	Total
Perca fluviatilis	Perch	398	13	0	0	411
Rutilus rutilus	Roach	136	8	1	0	145
Rutilus rutilus x Abramis brama	Roach x Bream	30	0	2	0	32
Esox lucius	Pike	4	1	0	1	6
Tinca tinca	Tench	0	0	2	0	2
Anguilla anguilla	Eel	0	0	0	3	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 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 CPUE and BPUE was higher in 2011 than in 2008, these differences were not statistically significant (Figs. 1.2 and 1.3).

The differences in the mean perch CPUE between Lough Meelagh and four other similar lakes were assessed, with no overall significant differences being found (Fig. 1.4). However, Independent-Samples Mann-Whitney U tests between each lake showed that Lough Meelagh had a significantly higher mean perch CPUE than Lough Melvin, Lough Leane and Lough Gill ($z = -2.165$ $P<0.05$, $z = -2.388$ $P<0.05$ and $z = -2.043$ $P<0.05$). The differences in the mean perch BPUE between Lough Meelagh and four other similar lakes were also assessed, with no overall significant differences being found (Fig. 1.5).

The mean roach CPUE was significantly lower in 2011 than in 2008 (t-test, $t_{31}=-2.151$, $P<0.05$) and although the mean roach BPUE was lower in 2011 than in 2008, this difference was not statistically significant (Figs. 1.2 and 1.3).

The differences in the mean roach CPUE between Lough Meelagh and three other similar lakes were 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 Meelagh had a significantly higher mean roach CPUE than Lough Gill and Lough Owel ($z = -3.115$ $P<0.05$ and $z = -4.573$ $P<0.05$).

The differences in the mean roach BPUE between Lough Meelagh and three other similar lakes were 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 Meelagh had a significantly higher mean roach BPUE than Lough Allua, Lough Gill and Lough Owel ($z = -5.001$ $P<0.05$, $z = -6.936$ $P<0.05$ and $z = -4.745$ $P<0.05$).

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

Scientific name	Common name	2008	2011
		Mean CPUE	
Salmo trutta	Brown trout	0.001 (0.001)	-
Perca fluviatilis	Perch	0.425 (0.089)	0.685 (0.167)
Rutilus rutilus	Roach	0.459 (0.086)	0.241 (0.052)
Esox lucius	Pike	0.028 (0.005)	0.009 (0.003)
Tinca tinca	Tench	0.003 (0.003)	0.003 (0.003)
Rutilus rutilus x Abramis brama	Roach x bream hybrid	0.021 (0.006)	0.053 (0.013)
Abramis brama	Bream	0.001 (0.001)	-
Rutilus rutilus x Scardinius erythrophthalmus	Roach x rudd hybrid	0.01 (0.005)	-
Anguilla anguilla	European eel	0.144 (0.048)	0.016
		Mean BPUE	
Salmo trutta	Brown trout	0.013 (0.013)	-
Perca fluviatilis	Perch	8.921 (2.50)	26.192 (7.514)
Rutilus rutilus	Roach	68.235 (11.301)	54.332 (11.609)
Esox lucius	Pike	20.189 (6.928)	5.964 (3.250)
Tinca tinca	Tench	2.592 (2.592)	5.171 (5.171)
Rutilus rutilus x Abramis brama	Roach x bream hybrid	19.329 (6.429)	17.105 (5.002)
Abramis brama	Bream	0.026 (0.026)	-
Rutilus rutilus x Scardinius erythrophthalmus	Roach x rudd hybrid	2.768 (1.520)	-
Anguilla anguilla	European eel	45.594 (18.06)	6.016 (0.659)

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

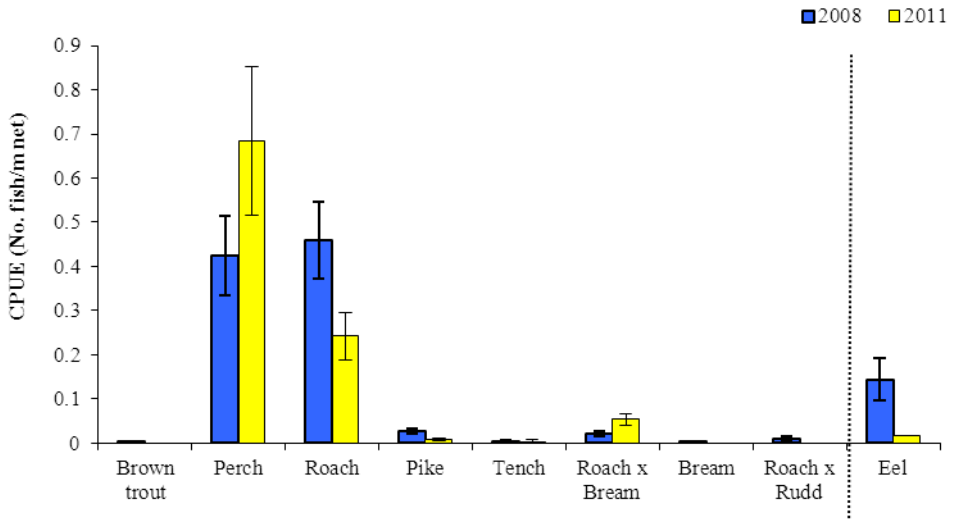

Fig. 1.2. Mean (±S.E.) CPUE for all fish species captured in Lough Meelagh (Eel CPUE based on fyke nets only), 2008 and 2011

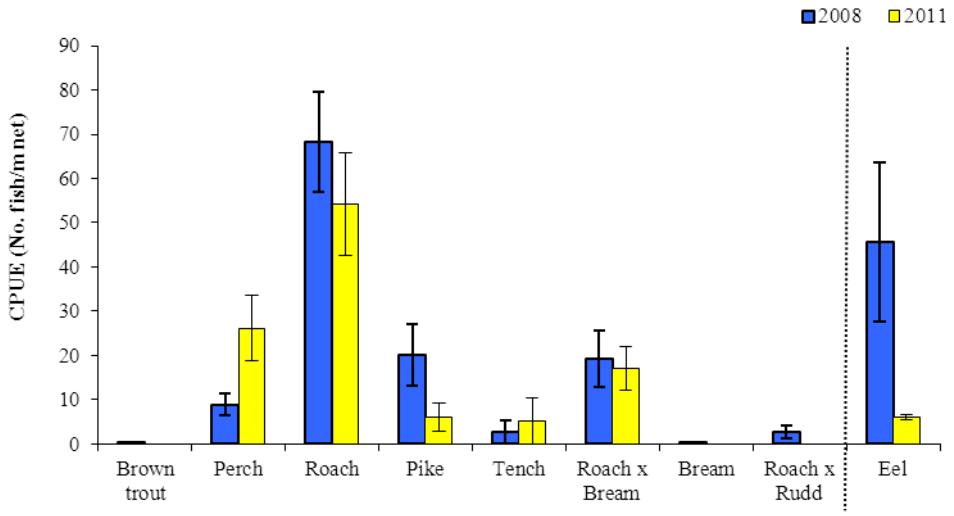

Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Lough Meelagh (Eel CPUE based on fyke nets only), 2008 and 2011

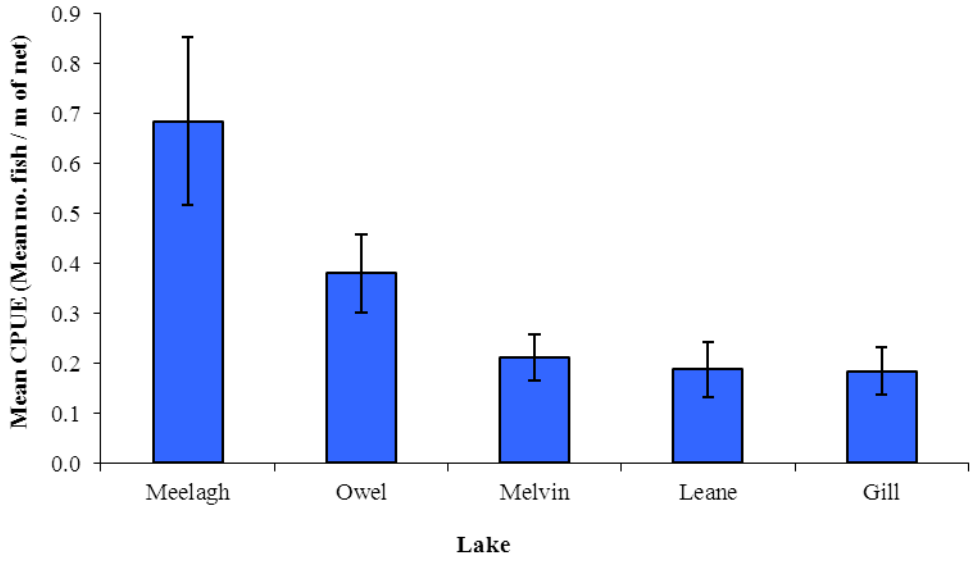

Fig. 1.4. Mean (±S.E.) perch CPUE in five lakes surveyed during 2011

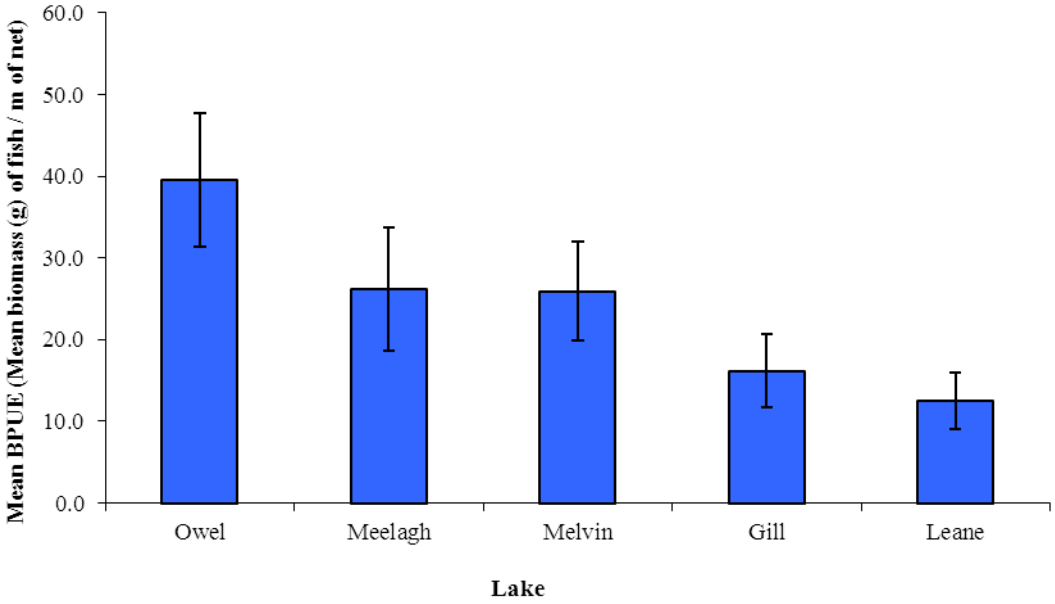

Fig. 1.5. Mean (±S.E.) perch BPUE in five lakes surveyed during 2011

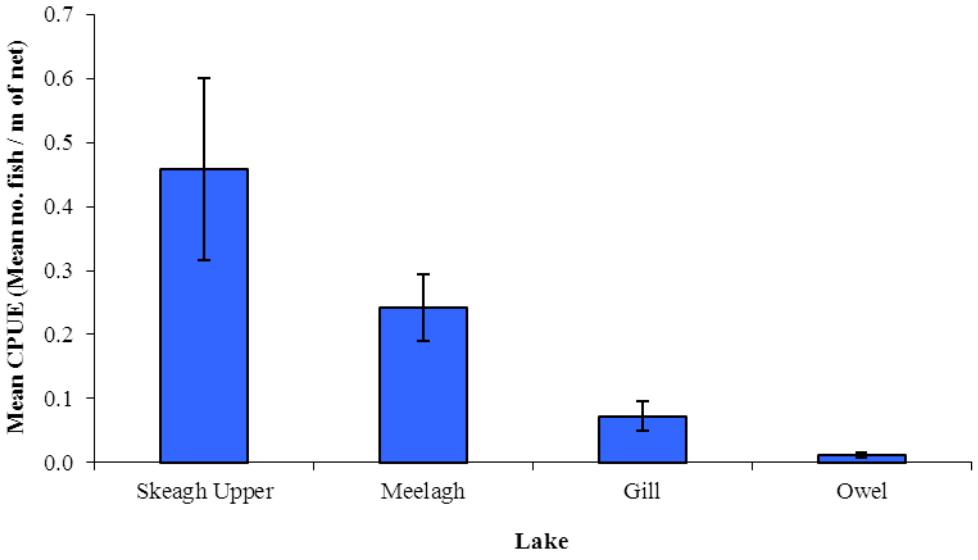

Fig. 1.6. Mean (±S.E.) roach CPUE in four lakes surveyed during 2011

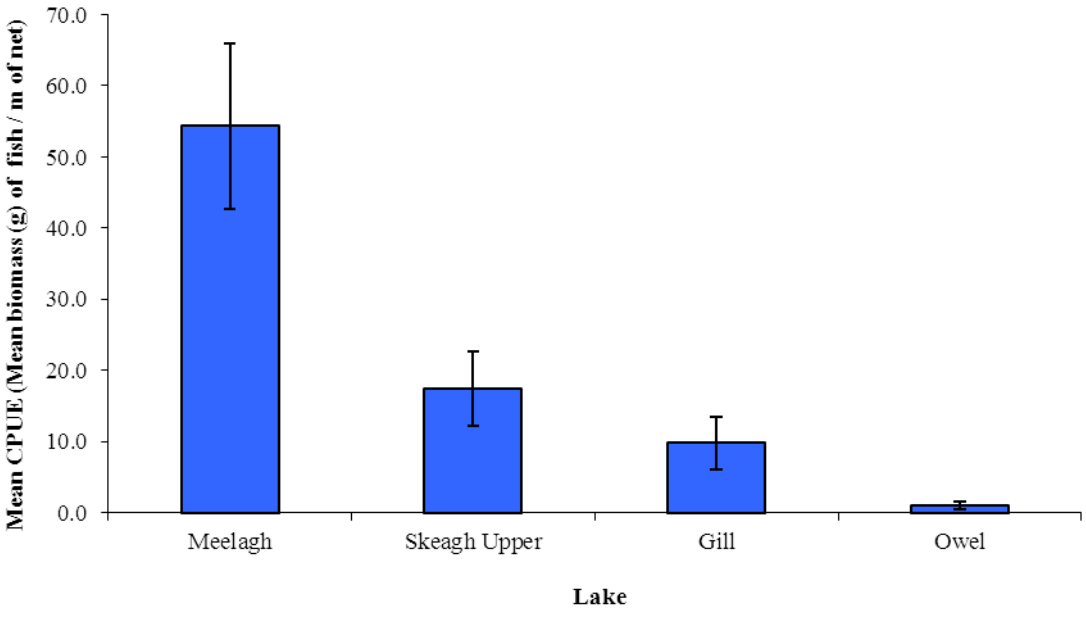

Fig. 1.7. Mean (±S.E.) roach BPUE in four lakes surveyed during 2011

1.3.3 Length frequency distributions

Perch captured during the 2011 survey ranged in length from 4.2cm to 23.0cm (mean = 12.1cm) (Fig.1.8). Perch captured during the 2008 survey had a wider length range, ranging from 4.0cm to 32.5cm (Fig.1.8).

Roach captured during the 2011 survey ranged in length from 5.5cm to 31.0cm (mean = 20.9cm) (Fig. 1.9). Roach captured during the 2008 survey ranged in length from 4.5cm to 34.6cm (Fig. 1.9).

Pike captured during the 2011 survey ranged in length from 14.0cm to 60.3cm, eels ranged in length from 50.0cm to 63.4cm, roach x bream hybrid ranged in length from 17.7cm 44.0cm and two tench were recorded at 44.0cm and 47.1cm.

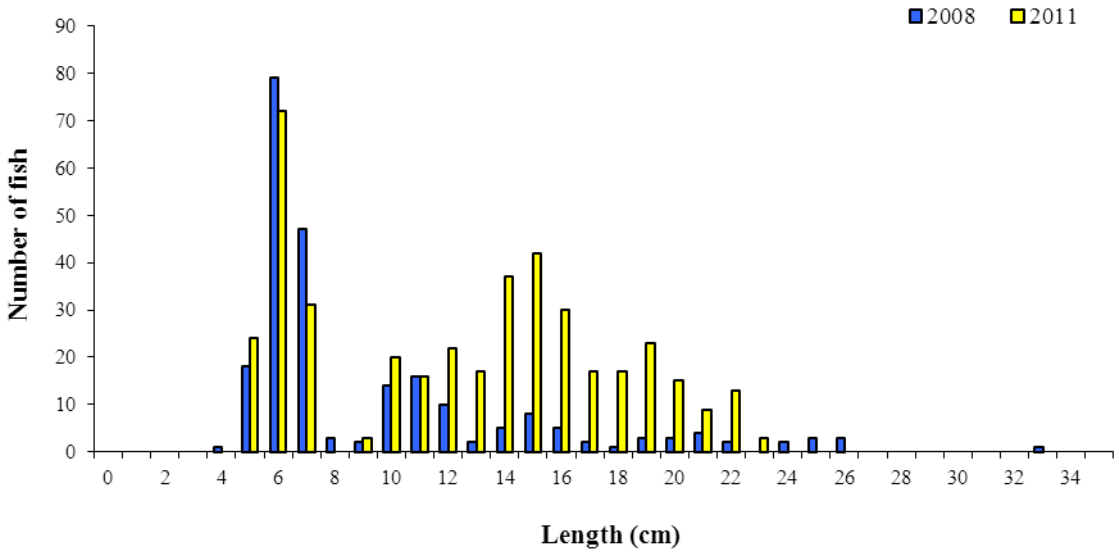

Fig. 1.8. Length frequency of perch captured on Lough Meelagh, August 2008 and 2011

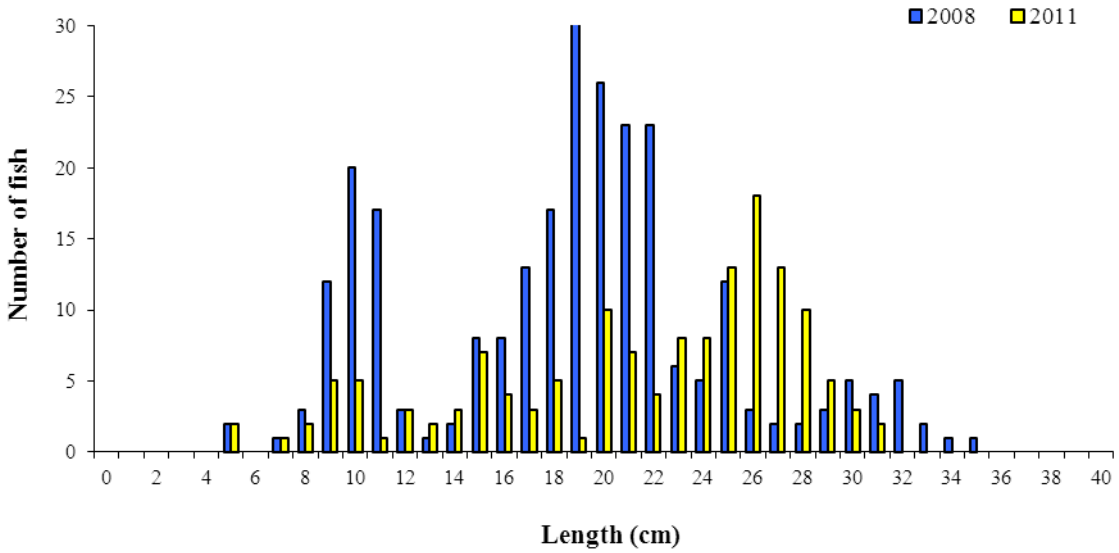

Fig. 1.9. Length frequency of roach captured on Lough Meelagh, August 2008 and 2011

1.3.4 Fish age and growth

Six age classes of perch were present, ranging from 0+ to 5+, with a mean L1 of 5.6cm (Table 1.3). In the 2008 survey, perch ranged from 0+ to 5+ with a mean L1 of 7.8cm. The dominant age class of perch was 0+, with ages ranging from 0+ to 5+ indicating reproductive success in each of the previous six years.

Nine age classes of roach were present, ranging from 0+ to 8+, with a mean L1 of 2.5cm (Table 1.4). Similarly in the 2008 survey, roach ranged from 0+ to 8+ with a mean L1 of 5.0cm.

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

	L_1	L_2	L_3	L_4	L_5
Mean	5.6 (0.1)	10.0 (0.2)	15.0 (0.2)	18.5 (0.2)	20.9 (0.3)
N	50	37	29	22	9
Range	4.0-7.4	8.3-13.8	11.4-17.1	16.7-20.9	19.6-22.5

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

	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8
Mean	2.5 (0.1)	6.7 (0.2)	12.5 (0.2)	18.1 (0.3)	21.9 (0.4)	24.8 (0.3)	27.0 (0.5)	27.9 (0.2)
N	64	58	52	48	29	26	10	2
Range	1.7-4.9	3.9-10.1	7.5-15.5	14.5-21.3	17.9-26.1	20.9-28.1	24.8-30.3	27.6-28.1

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 was higher in 2011 than in 2008, these differences were not statistically significant. The mean perch CPUE in Lough Meelagh was significantly higher than in three other similar lakes surveyed; Lough Melvin, Co. Leitrim, Lough Leane, Co. Kerry and Lough Gill, Co. Sligo. The mean perch BPUE in Lough Meelagh was also compared to four similar lakes, with no statistically significant differences being found between lakes. Perch ranged in age from 0+ to 5+, with 0+ and 1+ fish being captured indicating reproductive success in recent years. The dominant age class of perch was 0+.

The mean roach CPUE was significantly lower in 2011 than in 2008 and although the mean roach BPUE was also lower in 2011 than in 2008 this was not significantly different. The mean roach CPUE in Lough Meelagh was significantly higher than Lough Gill and Lough Owel, Co. Westmeath and the mean roach BPUE in Lough Meelagh was significantly higher than in Lough Allua, Co. Kerry, Lough Gill and Lough Owel. Roach ranged in age from 0+ to 8+, with 0+ and 1+ fish being captured indicating 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 Meelagh 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 Meelagh 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.

1.5 References

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