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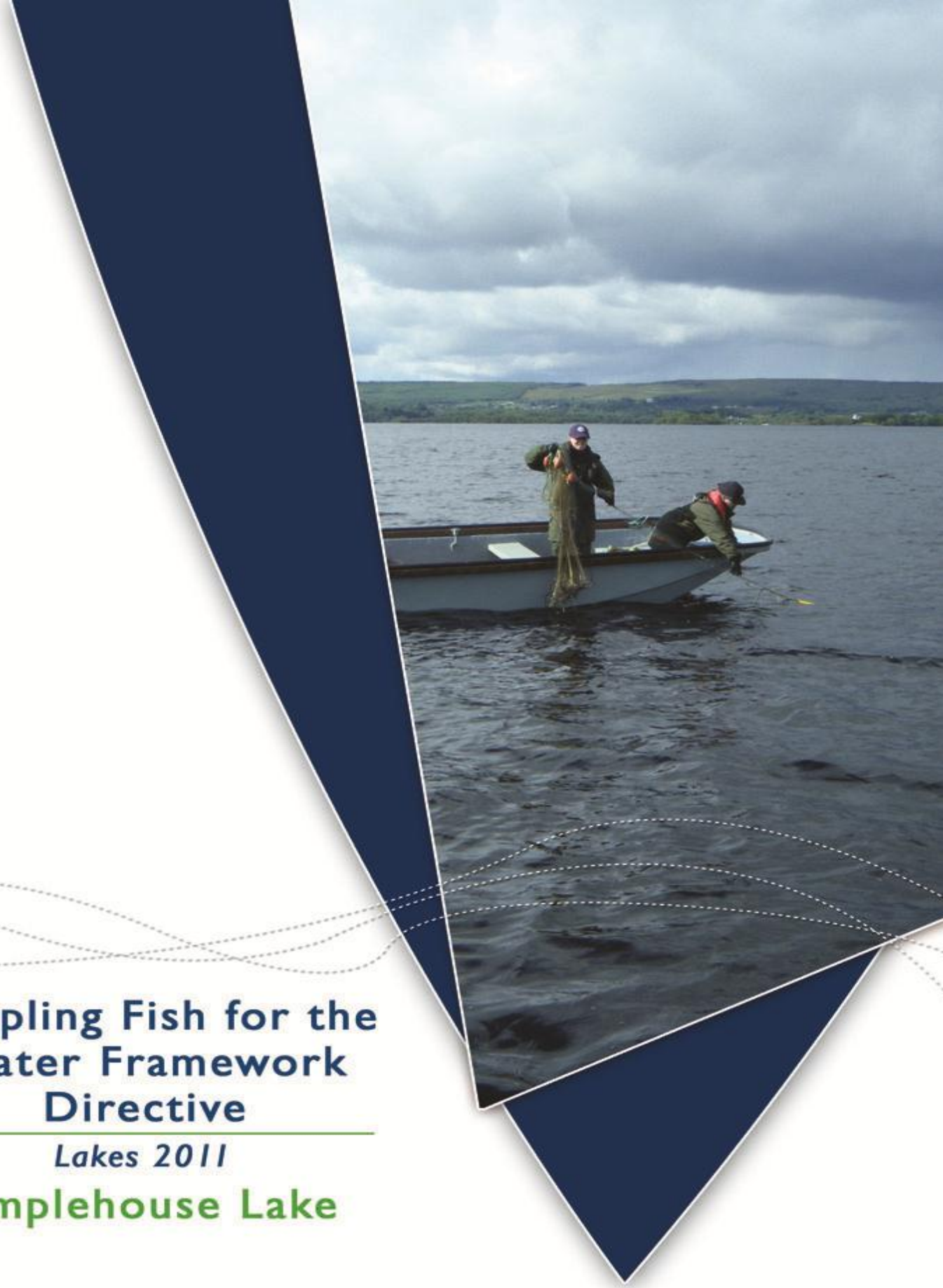

Sampling Fish for the Water Framework Directive

Lakes 2011

Templehouse Lake

Iascach Intíre Éireann
Inland Fisheries Ireland

Water Framework Directive Fish Stock Survey of Templehouse Lake, October 2011

Fiona L. Kelly, Lynda Connor, Emma Morrissey, Ciara Wogerbauer, Ronan Matson, Rory Feeney and Kieran Rocks

Inland Fisheries Ireland, Swords Business Campus, Swords, Co. Dublin

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

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1.1 Introduction

Templehouse Lake is situated approximately six kilometres south of Ballymote, Co. Sligo in the Owenmore catchment (Plate 1.1, Fig. 1.1). The lake is located on the private 405 hectare Templehouse Estate. The lake has a surface area of 118.6ha, a mean depth of 2.6m and a maximum depth of 5.3m. The underlying geology is carboniferous limestone. The lake falls into typology class 10 (as designated by the EPA for the Water Framework Directive), i.e. shallow (mean depth <4m), greater than 50ha and high alkalinity (>100 mg/l $CaCO_3$).

Templehouse Lake forms part of the Templehouse and Cloonacleigha Loughs Special Area of Conservation. It has been designated as a SAC under the EU Habitats Directive due to the diversity of habitats present; namely hard oligo-mesotrophic waters containing benthic vegetation made up of *Chara* spp. (hard water lakes with stoneworts) and water courses of plain to montane levels with *Ranunculion fluitantis* and *Callitricho- Batrachion* vegetation (submerged or floating river vegetation). Templehouse Lake in particular supports typical aquatic vegetation for hard water lakes, with well-developed and diverse marginal vegetation (NPWS, 2006).

The lake is well known for its coarse fishing and supports populations of pike, bream, rudd, perch and eels. Templehouse Estate promotes angling and regularly plays host to fishing competitions. Densities of pike have been described by Inland Fisheries Ireland (IFI Ballina) as good, with individuals of up to 13.6kg present. The lake was surveyed in 1980 by the Inland Fisheries Trust and was found to have good stocks of bream, rudd and pike (IFT, unpublished data).

More recently Templehouse Lake 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. Brown trout, perch, pike, roach x bream hybrids, roach x rudd hybrids, rudd, 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.

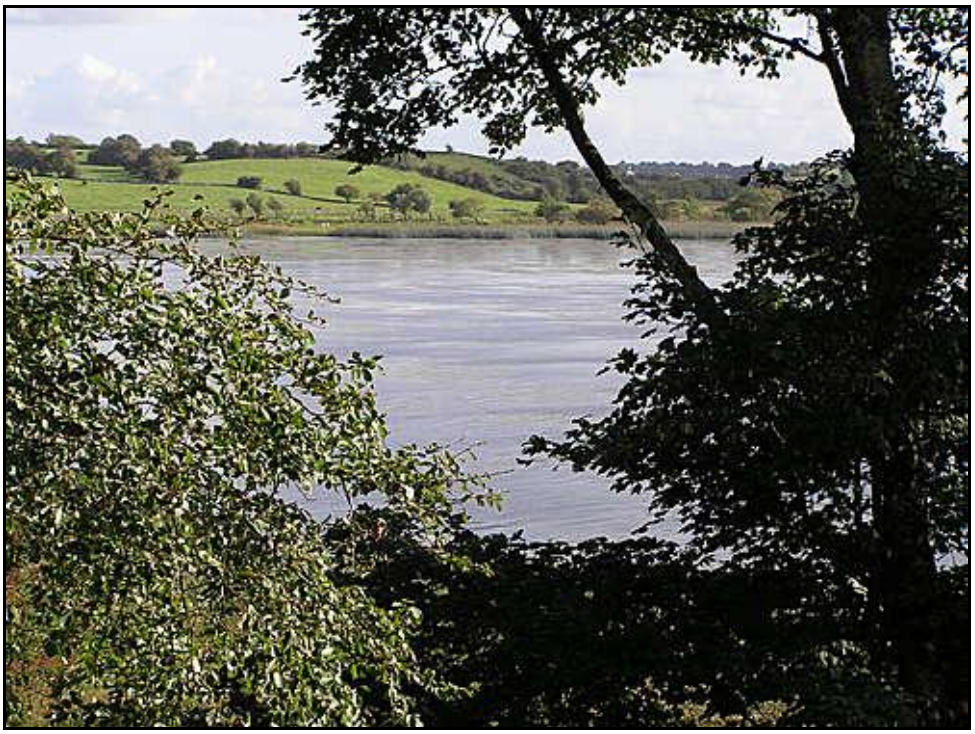

Plate 1.1. Templehouse Lake (© courtesy of Claudia F. panoramio.com)

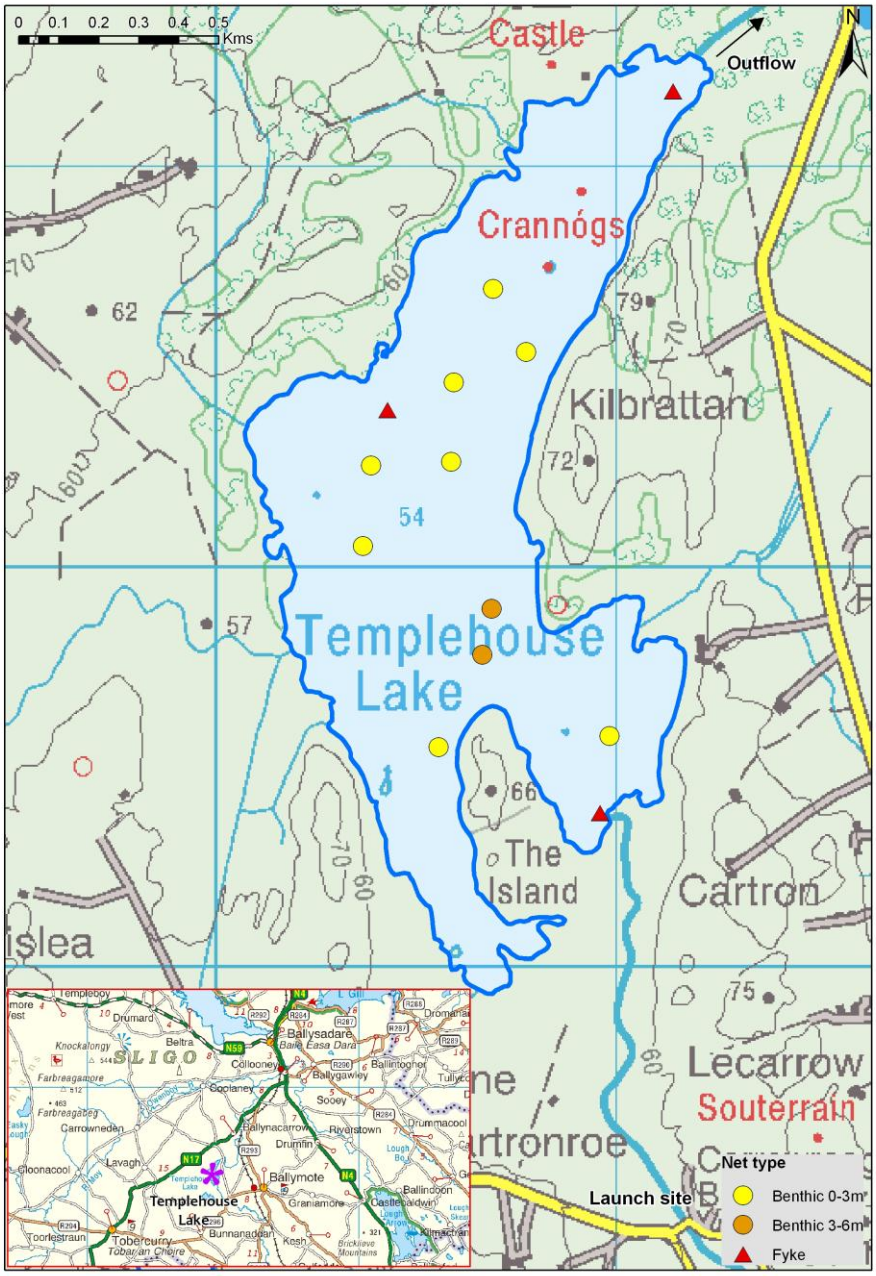

Fig. 1.1. Location map of Templehouse Lake showing locations and depths of each net (outflow is indicated on map)

1.2 Methods

Templehouse Lake was surveyed over one night between the 3rd and the 4th of October 2011. A total of three sets of Dutch fyke nets and 10 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (8 @ 0-2.9m and 2 @ 3-5.9m) were deployed in the lake (13 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 rudd, bream, pike, roach 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 seven fish species and two types of hybrids were recorded on Templehouse Lake in October 2011, with 563 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. Perch, rudd, roach x bream hybrids, rudd x bream hybrids, pike, bream, gudgeon and eels were also recorded. During the previous survey in 2008 the same species composition was recorded with the exception of brown trout and roach x rudd hybrids, which were present during the 2008 survey but were not captured in the current survey. Gudgeon and rudd x bream hybrids were present during the current survey but were not captured in the 2008 survey.

Table 1.1. Number of each fish species captured by each gear type during the survey on Templehouse Lake, October 2011

Scientific name	Common name	Number of fish captured		
		Benthic mono multimesh gill nets	Fyke nets	Total
Rutilus rutilus	Roach	415	4	419
Rutilus rutilus x Abramis brama	Roach x bream hybrid	62	0	62
Perca fluviatilis	Perch	56	0	56
Anguilla anguilla	Eel	15	0	15
Esox lucius	Pike	5	0	5
Scardinius erythrophthalmus	Rudd	3	0	3
Abramis brama	Bream	1	0	1
Rutilus rutilus x Scardinius erythrophthalmus	Rudd x bream hybrid	1	0	1
Gobio gobio	Gudgeon	1	0	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.

The mean roach CPUE and BPUE was significantly higher in 2011 than in 2008 (t-test, t_{-19}=3.36, P<0.05 and t-test, t_{-14}=3.371, P<0.05 respectively) (Figs. 1.2 and 1.3).

The differences in the mean roach CPUE between Templehouse Lake and five other similar lakes were 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 Templehouse Lake had a significantly higher mean roach CPUE than Upper Lough Corrib, Lower Lough Corrib, Lough Sheelin and Lough O'Flynn (z = -5.052 P<0.05, z = -4.428 P<0.05, z = -4.371 P<0.05 and z = -4.591 P<0.05).

The differences in the mean roach BPUE between Templehouse Lake 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 Templehouse Lake had a significantly higher mean roach BPUE than Upper Lough Corrib, Lough Sheelin, Lower Lough Corrib and Lough O'Flynn (z = -4.737 P<0.05, z = -4.109 P<0.05, z = -4.437 P<0.05 and z = -4.510 P<0.05).

There were no significant differences in the mean perch CPUE and BPUE between 2008 and 2011. The differences in the mean perch CPUE between Templehouse Lake and five 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 Templehouse Lake had a significantly higher mean perch CPUE than Upper Lough Corrib and Lower Lough Corrib ($z = -2.882$ $P<0.05$ and $z = -3.040$ $P<0.05$).

The differences in the mean perch BPUE between Templehouse Lake and five 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 Templehouse Lake had a significantly higher mean perch BPUE than Upper Lough Corrib and Lower Lough Corrib ($z = -2.910$ $P<0.05$ and $z = -2.918$ $P<0.05$).

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

Scientific name	Common name	2008	2011
		Mean CPUE	
Salmo trutta	Brown trout	0.002 (0.002)	-
Rutilus rutilus	Roach	0.434 (0.123)	1.158 (0.176)
Perca fluviatilis	Perch	0.152 (0.083)	0.155 (0.029)
Esox lucius	Pike	0.0231 (0.006)	0.0138 (0.006)
Scardinius erythrophthalmus	Rudd	0.005 (0.003)	0.008 (0.005)
Gobio gobio	Gudgeon	-	0.003 (0.003)
Abramis brama	Bream	0.005 (0.005)	0.003 (0.003)
Rutilus rutilus x Abramis brama	Roach x bream hybrid	0.043 (0.014)	0.172 (0.025)
Rutilus rutilus x Scardinius erythrophthalmus	Rudd x bream hybrid	-	0.003 (0.003)
Rutilus rutilus x Scardinius erythrophthalmus	Roach x rudd hybrid	0.023 (0.008)	-
Anguilla anguilla	European eel	0.033 (0.019)	0.125 (0.041)
		Mean BPUE	
Salmo trutta	Brown trout	0.069 (0.069)	-
Rutilus rutilus	Roach	31.064 (7.876)	101.159 (19.246)
Perca fluviatilis	Perch	7.287 (2.351)	15.036 (4.561)
Esox lucius	Pike	13.535 (4.294)	7.991 (4.618)
Scardinius erythrophthalmus	Rudd	2.302 (1.618)	4.441 (3.321)
Gobio gobio	Gudgeon	-	0.055 (0.055)
Abramis brama	Bream	2.084 (1.655)	1.183 (1.183)
Rutilus rutilus x Abramis brama	Roach x bream hybrid	11.929 (3.975)	47.344 (8.583)
Rutilus rutilus x Scardinius erythrophthalmus	Rudd x bream hybrid	-	1.911 (1.911)
Rutilus rutilus x Scardinius erythrophthalmus	Roach x rudd hybrid	8.393 (5.277)	-
Anguilla anguilla	European eel	10.894 (6.656)	47.6 (17.55)

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

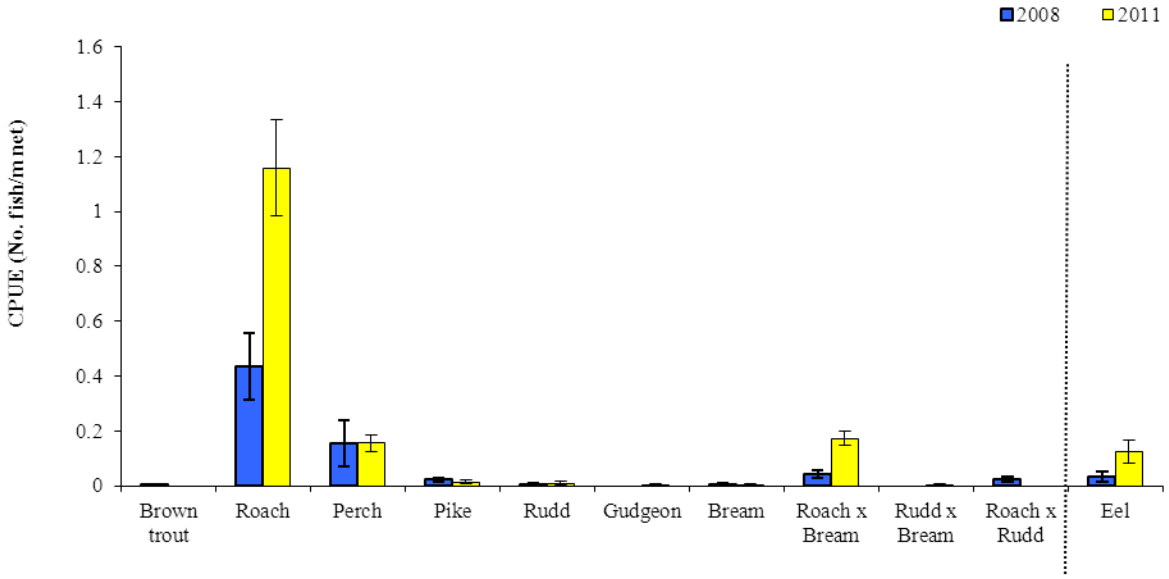

Fig. 1.2. Mean (±S.E.) CPUE for all fish species captured in Templehouse Lake (Eel CPUE based on fyke nets only), 2008 and 2011

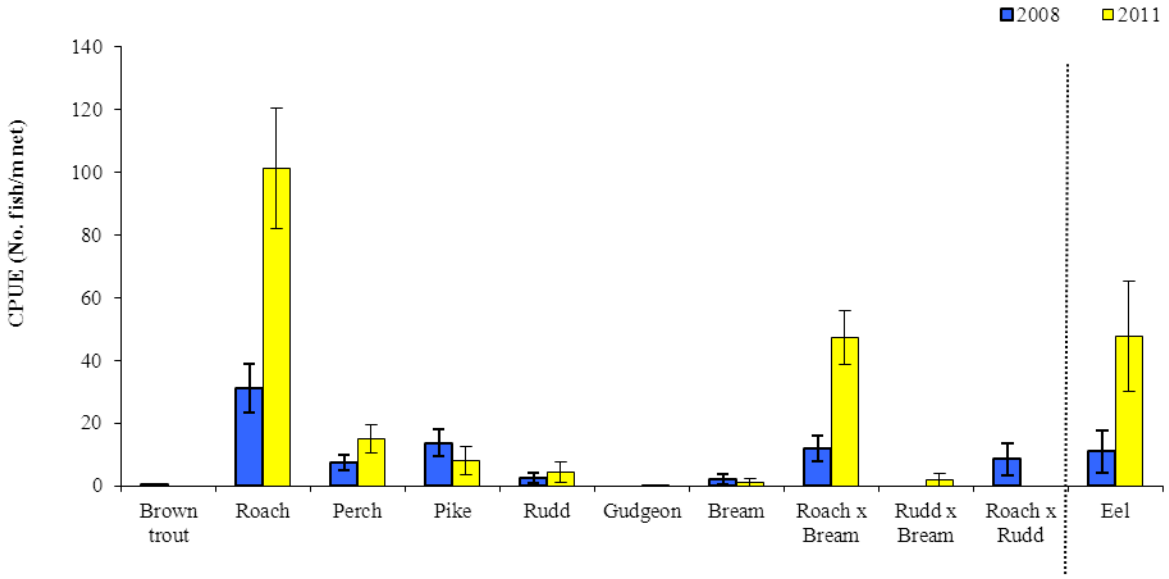

Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Templehouse Lake (Eel CPUE based on fyke nets only), 2008 and 2011

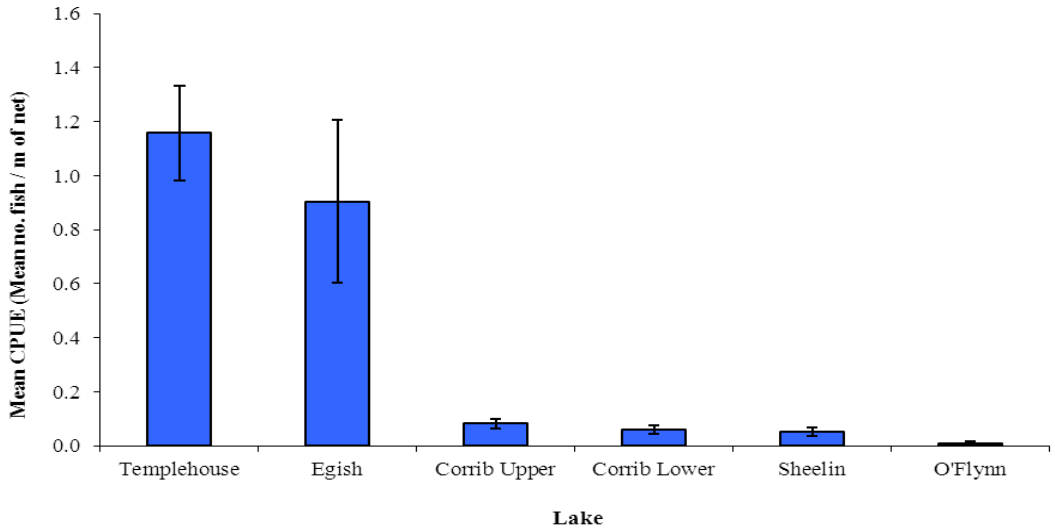

Fig. 1.4. Mean (±S.E.) roach CPUE in six lakes surveyed during 2011

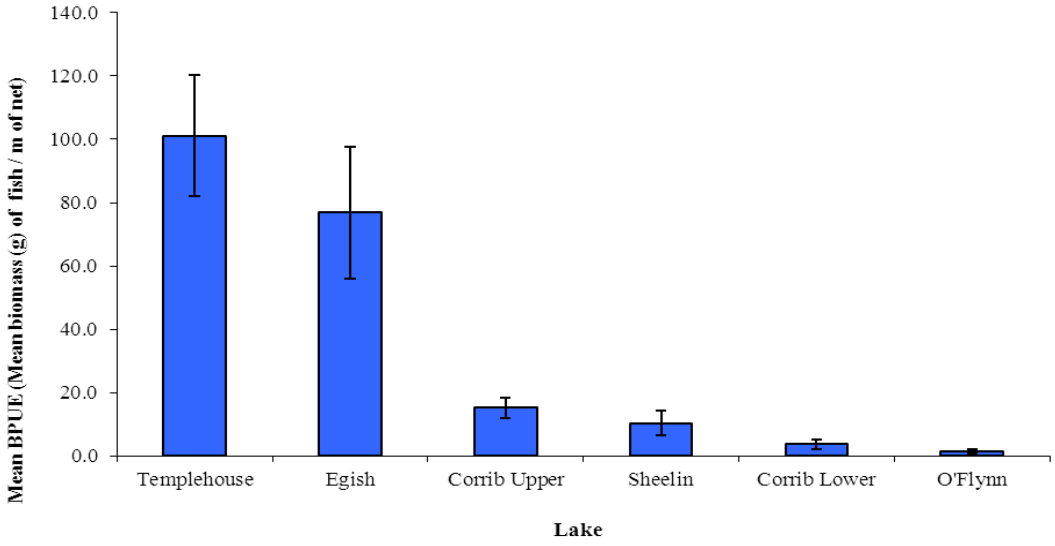

Fig. 1.5. Mean (±S.E.) roach BPUE in six lakes surveyed during 2011

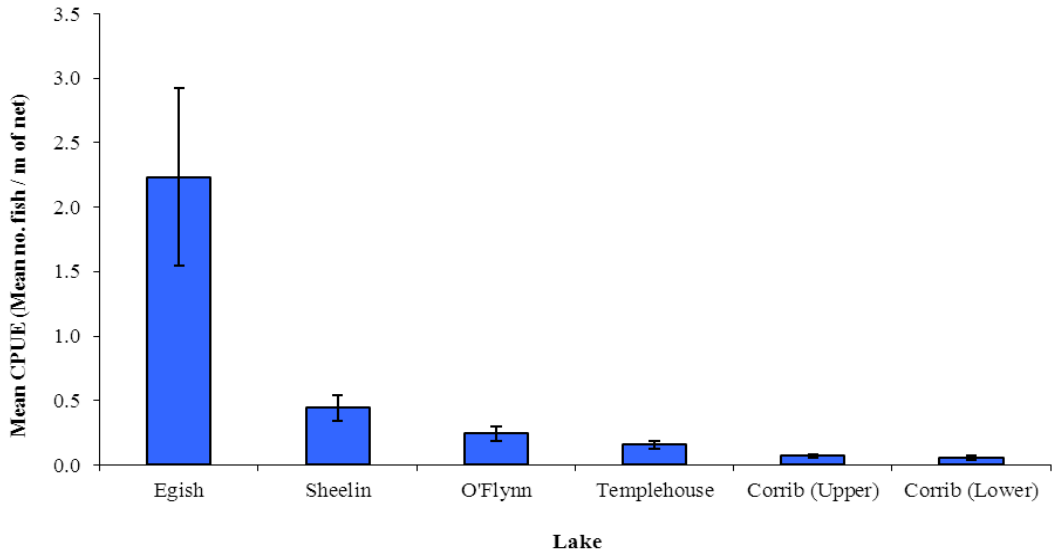

Fig. 1.6. Mean (±S.E.) perch CPUE in six lakes surveyed during 2011

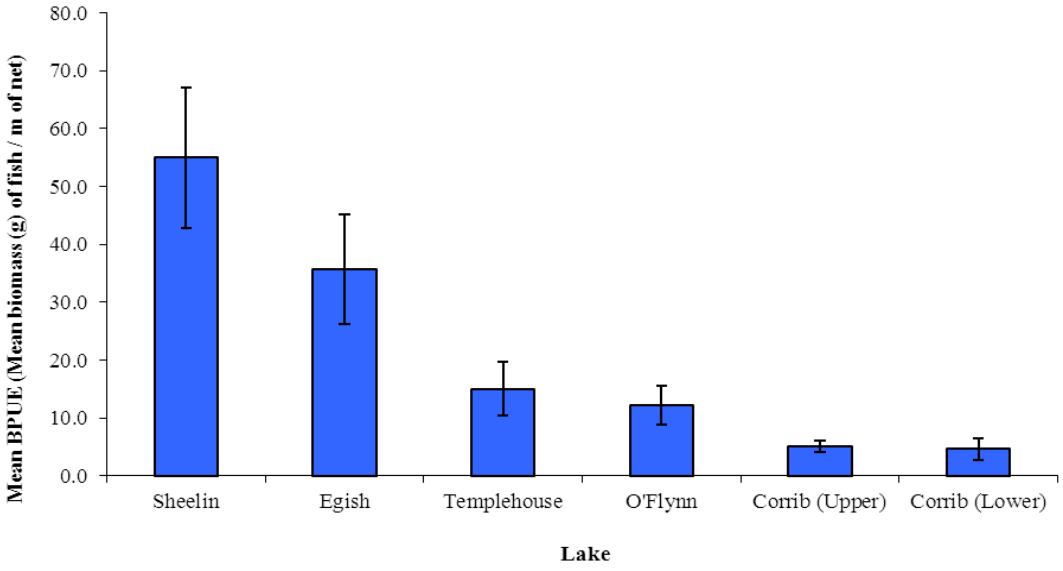

Fig. 1.7. Mean (±S.E.) perch BPUE in six lakes surveyed during 2011

1.3.3 Length frequency distributions

Roach captured during the 2011 survey ranged in length from 4.7cm to 30.2cm (mean = 14.9cm) (Fig.1.8). Roach captured during the 2008 survey had similar lengths ranging from 4.5cm to 31.6cm (Fig.1.8).

Perch captured during the 2011 survey ranged in length from 5.4cm to 34.7cm (mean = 13.6cm) (Fig. 1.9). Perch captured during the 2008 survey ranged in length from 5.2cm to 29.0cm (Fig. 1.9). The dominant age class of perch in 2011 was 0+.

Roach x bream hybrids captured during the 2011 survey ranged in length from 11.0cm to 35.0cm, pike ranged in length from 34.2cm to 60.2cm, rudd ranged from 21.8cm to 34.5cm and eels ranged in length from 42.3cm to 73.5cm. One rudd x bream hybrid was recorded at 29.4cm, one bream was recorded at 28.0cm and one gudgeon was recorded at 11.6cm.

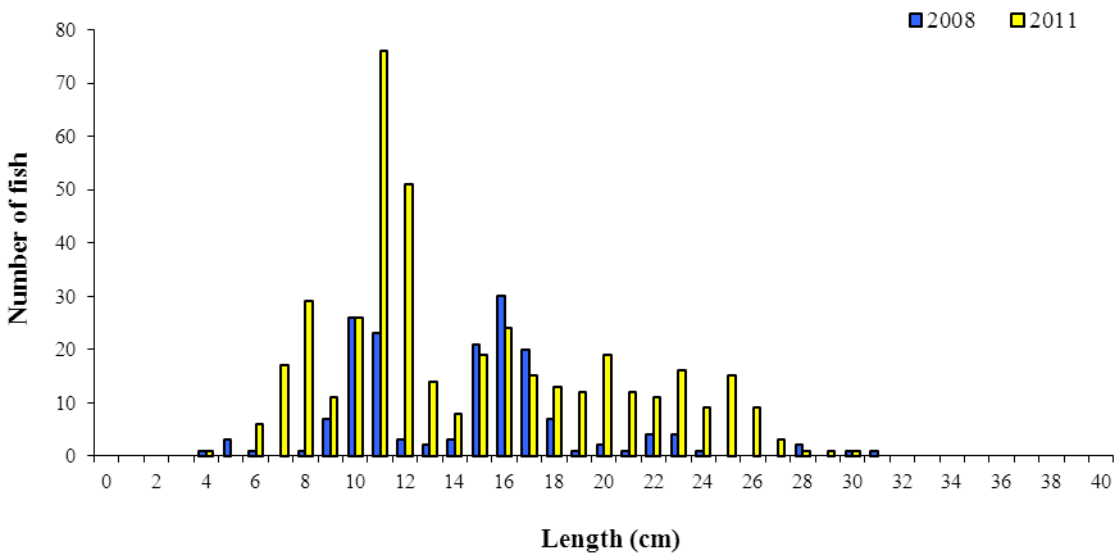

Fig. 1.8. Length frequency of roach captured on Templehouse Lake, 2008 and 2011

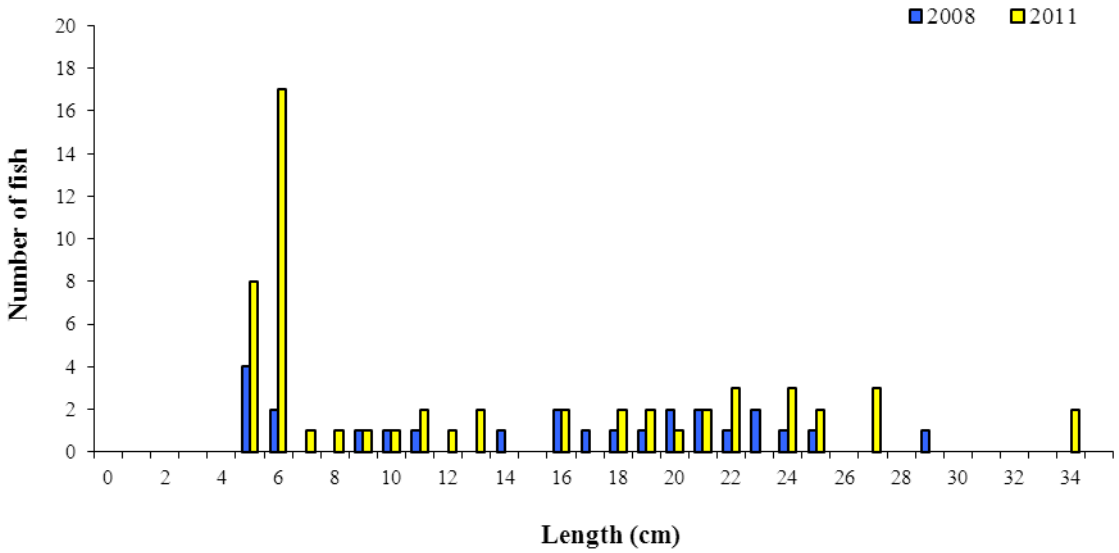

Fig. 1.9. Length frequency of perch captured on Templehouse Lake, 2008 and 2011

1.3.4 Fish age and growth

Eight age classes of roach were present, ranging from 0+ to 7+, indicating reproductive success in each of the previous eight years. The dominant age class of roach was 2+ and the mean L1 of 2.7cm (Table 1.3). In the 2008 survey, roach ranged from 1+ to 7+ with a mean L1 of 4.3cm.

Eight age classes of perch were present, ranging from 0+ to 7+, with a mean L1 of 5.7cm (Table 1.4). In the 2008 survey, perch ranged from 0+ to 4+ with a mean L1 of 5.6cm. The dominant age class of perch in 2011 was 0+.

Table 1.3. Mean (±SE) roach length (cm) at age for Templehouse Lake, October 2011

	L_1	L_2	L_3	L_4	L_5	L_6	L_7
Mean	2.7 (0.1)	8.1 (0.1)	14.1 (0.2)	18.5 (0.2)	22.2 (0.3)	26.4 (0.5)	28.5
N	106	93	70	52	36	6	1
Range	1.4-4.1	4.5-11.3	10.7-16.5	14.4-22.4	18.0-25.4	24.8-28.4	28.4-28.4

Table 1.4. Mean (±SE) perch length (cm) at age for Templehouse Lake, October 2011

	L_1	L_2	L_3	L_4	L_5	L_6	L_7
Mean	5.8 (0.2)	11.1 (0.5)	16.5 (0.8)	20.0 (1.0)	23.5 (1.5)	25.5 (1.9)	23.8 (1.7)
N	30	24	16	12	9	5	2
Range	4.4-7.9	7.5-17.3	11.0-23.0	16.2-27.4	19.7-31.4	21.2-32.4	22.1-25.5

1.4 Summary

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

The mean roach CPUE and BPUE was significantly higher in 2011 than in 2008. The mean roach CPUE and BPUE in Templehouse Lake were significantly higher than that recorded in four other lake waterbodies surveyed during 2011; Upper Lough Corrib and Lower Lough Corrib, Co. Galway, Lough Sheelin, Co. Cavan and Lough O'Flynn, Co. Roscommon, other similar lakes surveyed. Roach ranged in age from 0+ to 7+, with 0+ and 1+ fish being captured indicating reproductive success in recent years. The dominant age class of roach was 2+.

The mean perch CPUE and BPUE in Templehouse Lake was significantly higher than Upper Lough Corrib and Lower Lough Corrib. Perch ranged in age from 0+ to 7+, 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, Templehouse Lake 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 Templehouse Lake an overall ecological status of Moderate, 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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Inland Fisheries Ireland
Swords Business Campus,
Swords,
Co. Dublin,
Ireland.

Web: www.fisheriesireland.ie
Email: info@fisheriesireland.ie
Tel: +353 1 8842 600
Fax: +353 1 8360 060