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Sampling Fish for the Water Framework Directive

Lakes 2014

Templehouse Lake

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INLAND FISHERIES IRELAND

Water Framework Directive Fish Stock Survey of Templehouse Lake, September/October 2014

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

Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

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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 is categorised as 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lake was surveyed in 1980 by the Inland Fisheries Trust and was found to have good stocks of bream, rudd and pike (IFT, unpublished data).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 and 2011 as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al*., 2009 and Kelly *et al*., 2012a). During the 2011 survey, roach were found to be the dominant species present in the lake. Brown trout, perch, pike, gudgeon, roach x bream hybrids, rudd x bream hybrids, roach x rudd hybrids, rudd, bream and eels were also captured during the survey.

This report summarises the results of the 2014 fish stock survey carried out on the lake, as part of the Water Framework Directive surveillance monitoring programme.

Plate 1.1. Templehouse Lake

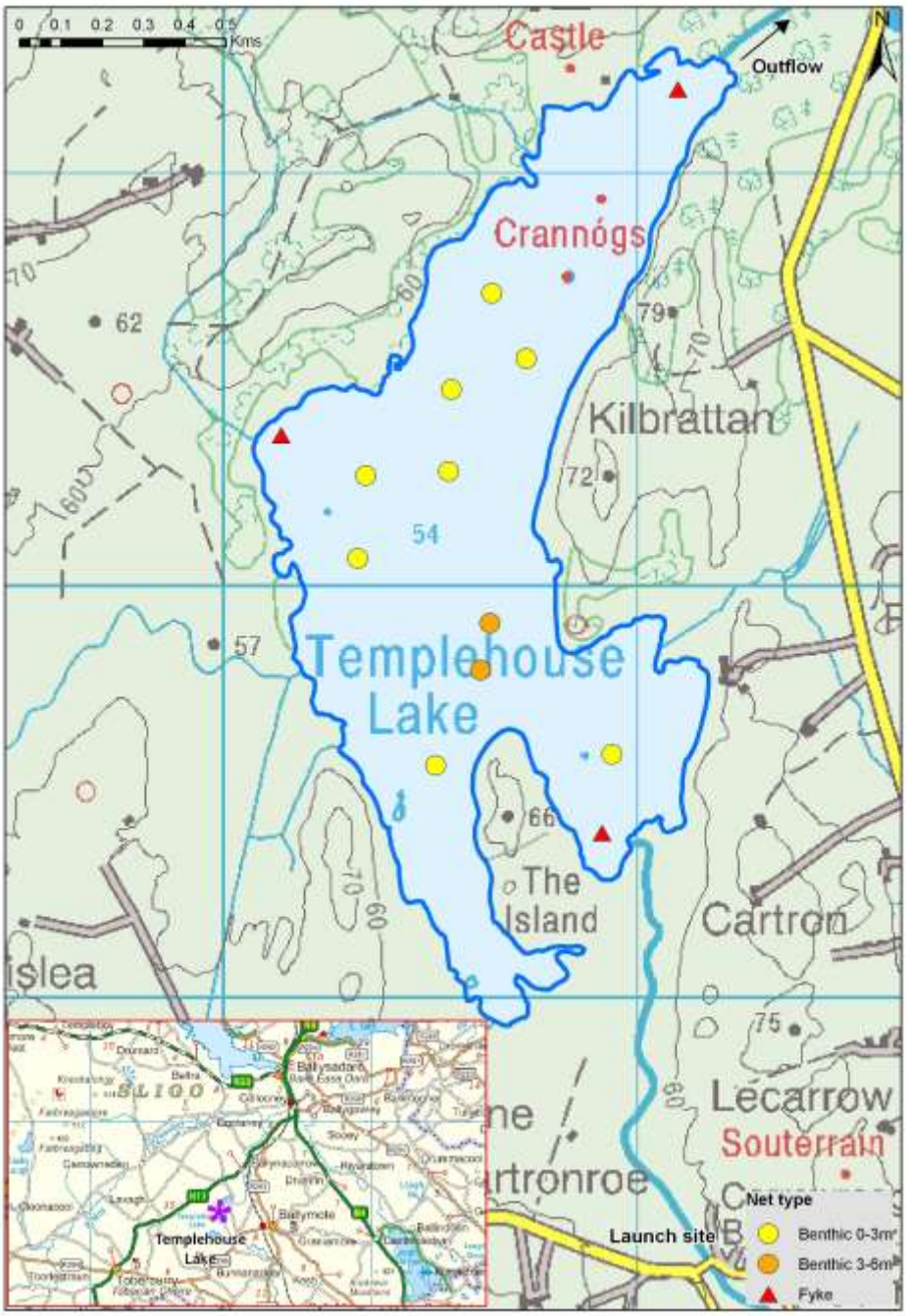

Fig. 1.1 Location map of Templehouse Lake showing locations and depths of each net (outflow is indicated on map)

1.2 Methods

Templehouse Lake was surveyed over two nights between the 30th of September and the 2nd of October 2014. 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 surveys in 2008 and 2011. 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 and roach x bream 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 four fish species and one type of hybrid were recorded in Templehouse Lake in September/October 2014, with 540 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 perch, roach x bream hybrids, pike and eels. During the previous surveys in 2008 and 2011 the same species composition was recorded with the exception of brown trout and roach x rudd hybrids, which were only recorded in the 2008 survey. Gudgeon and rudd x bream hybrids were only captured in the 2011 survey. Rudd and bream were not captured during the 2014 survey but were recorded during the 2008 and 2011 surveys.

Table 1.1. Number of each fish species captured by each gear type during the survey on Templehouse Lake, September/October 2014

Scientific name	Common name	Number of fish captured		
		Benthic mono multimesh gill nets	Fyke nets	Total
Rutilus rutilus	Roach	373	6	379
Perca fluviatilis	Perch	100	0	100
Rutilus rutilus x Abramis brama	Roach x bream hybrid	52	0	52
Esox lucius	Pike	4	4	8
Anguilla anguilla	Eel	0	8	8

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 2008, 2011 and 2014 surveys are summarised in Table 1.2. Mean CPUE and BPUE for all species is illustrated in Figure 1.2 and 1.3.

Roach was the dominant species in terms of abundance (CPUE) and roach x bream hybrids was dominant in terms of biomass (BPUE). The mean roach CPUE was significantly higher in 2014 than in 2008 (Kruskal-Wallis $H=7.6$, $P<0.05$); however, the mean roach BPUE was not significantly different in 2014 to the other sampling occasions (Table 1.2; Fig 1.2 and 1.3).

Although the mean perch CPUE and BPUE fluctuated slightly over the three year sampling period, 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 captured on Templehouse Lake, 2008, 2011 and 2014

Scientific name	Common name	2008	2011	2014
			Mean CPUE	
Rutilus rutilus	Roach	0.434 (0.123)	1.158 (0.176)	0.964 (0.212)
Perca fluviatilis	Perch	0.152 (0.083)	0.155 (0.029)	0.256 (0.081)
Rutilus rutilus x Abramis brama	Roach x bream hybrid	0.043 (0.014)	0.172 (0.025)	0.133 (0.035)
Salmo trutta	Brown trout	0.002 (0.002)	-	-
Esox lucius	Pike	0.0231 (0.006)	0.0138 (0.006)	0.015 (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 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)	0.044 (0.022)
			Mean BPUE	
Rutilus rutilus	Roach	31.064 (7.876)	101.159 (19.246)	63.139 (13.274)
Perca fluviatilis	Perch	7.287 (2.351)	15.036 (4.561)	14.657 (5.187)
Rutilus rutilus x Abramis brama	Roach x bream hybrid	11.929 (3.975)	47.344 (8.583)	72.890 (18.739)
Salmo trutta	Brown trout	0.069 (0.069)	-	-
Esox lucius	Pike	13.535 (4.294)	7.991 (4.618)	16.426 (12.471)
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 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)	14.331 (7.174)

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

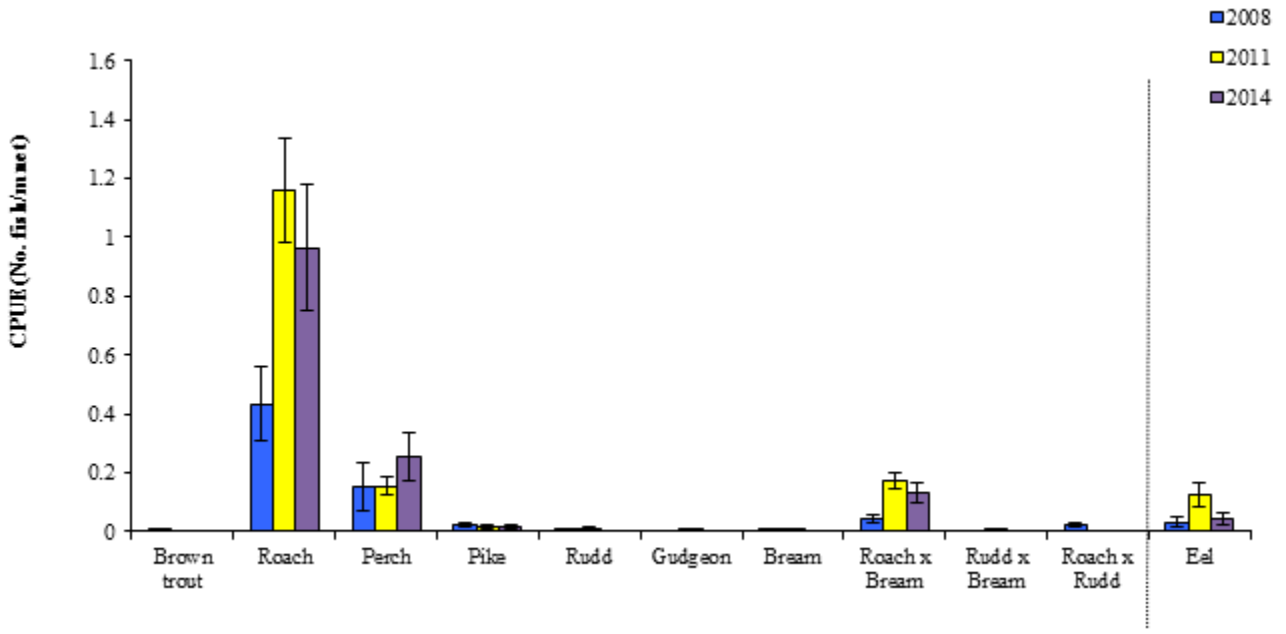

Fig. 1.2. Mean (±S.E.) CPUE for all fish species captured in Templehouse Lake (Eel CPUE based on fyke nets only), 2008, 2011 and 2014

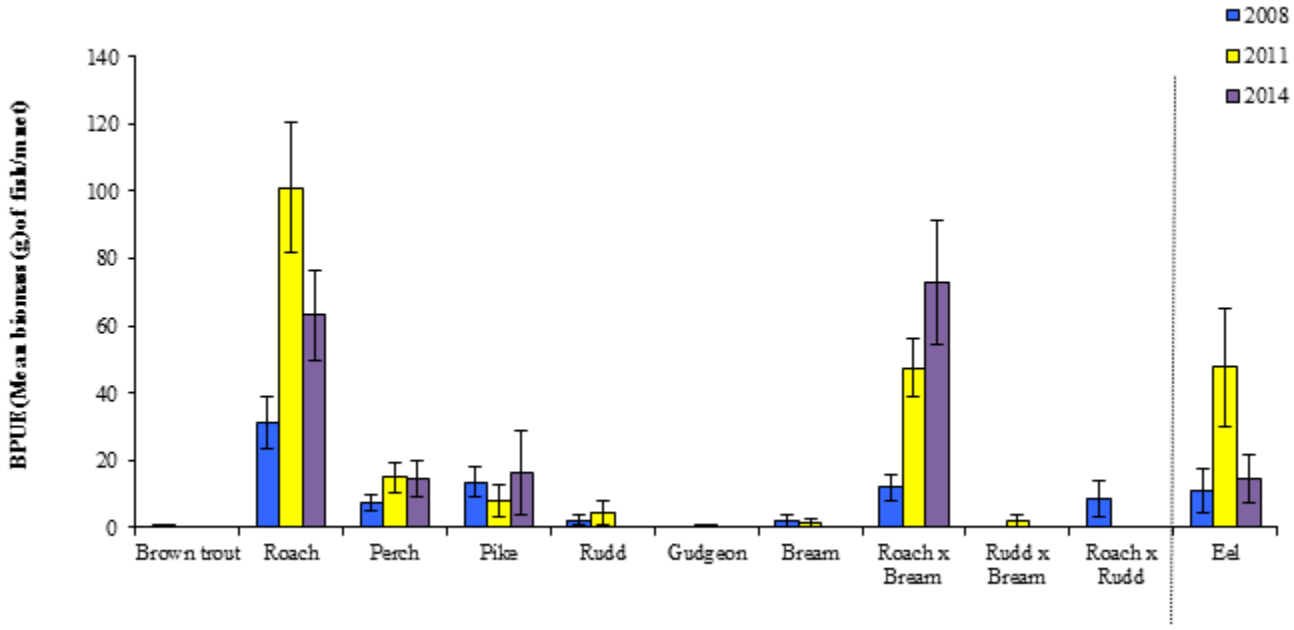

Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Templehouse Lake (Eel BPUE based on fyke nets only), 2008, 2011 and 2014

1.3.3 Length frequency distributions and growth

Roach captured during the 2014 survey ranged in length from 4.0cm to 32.6cm (mean = 13.1cm) (Fig. 1.4) with ten age classes present, ranging from 1+ to 11+, with a mean L1 of 3.1cm (Table 1.3). The dominant age class was 1+ (Fig. 1.4). Roach captured during the 2008 and 2011 surveys had a similar length range (Fig. 1.4) and a smaller age range (0+ to 7+) and growth rate to the 2014 survey (Fig. 1.4). There was also a shift in the dominant age class between the three sampling years.

Perch captured during the 2014 survey ranged in length from 4.8cm to 33.8cm (mean = 12.1cm) (Fig.1.5) with nine age classes present, ranging from 0+ to 11+, with a mean L1 of 6.1cm (Table 1.4). The dominant age class was 0+ (Fig. 1.5). Perch captured during the 2008 and 2011 surveys had a similar length range (Fig.1.5) and a narrower age range (0+ to 4+ and 0+ to 7+ respectively) when compared to the 2014 survey (Fig.1.5).

Pike captured during the 2014 survey ranged in length from 20.5cm to 86.0cm and eels ranged from 46.2cm to 62.5cm. Roach x bream hybrids ranged in length from 8.7cm to 41.8cm.

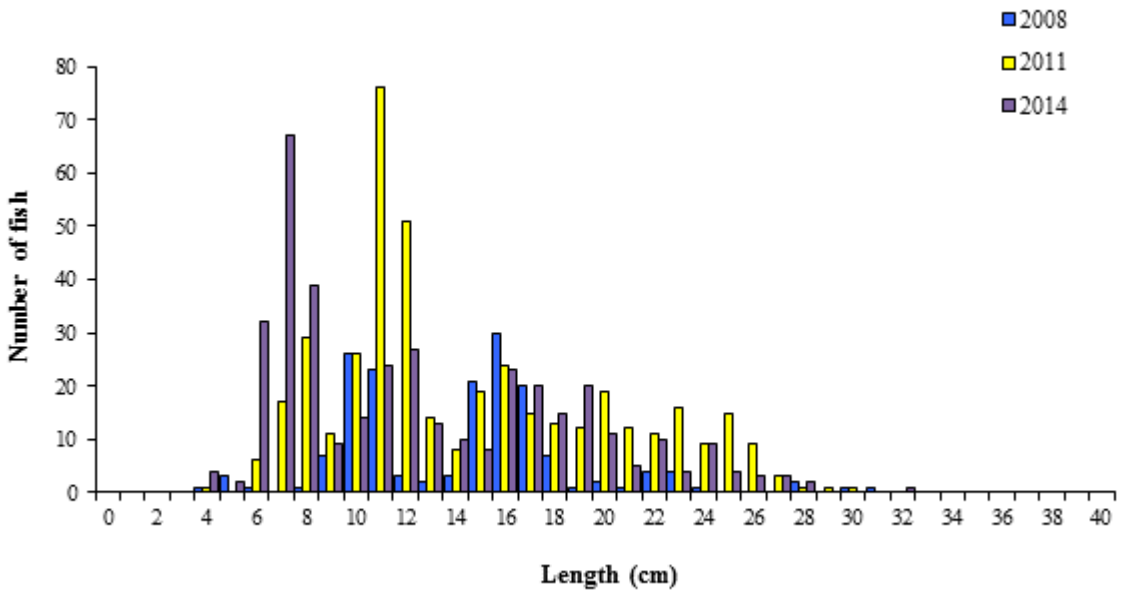

Fig. 1.4. Length frequency of roach captured on Templehouse Lake, 2008, 2011 and 2014

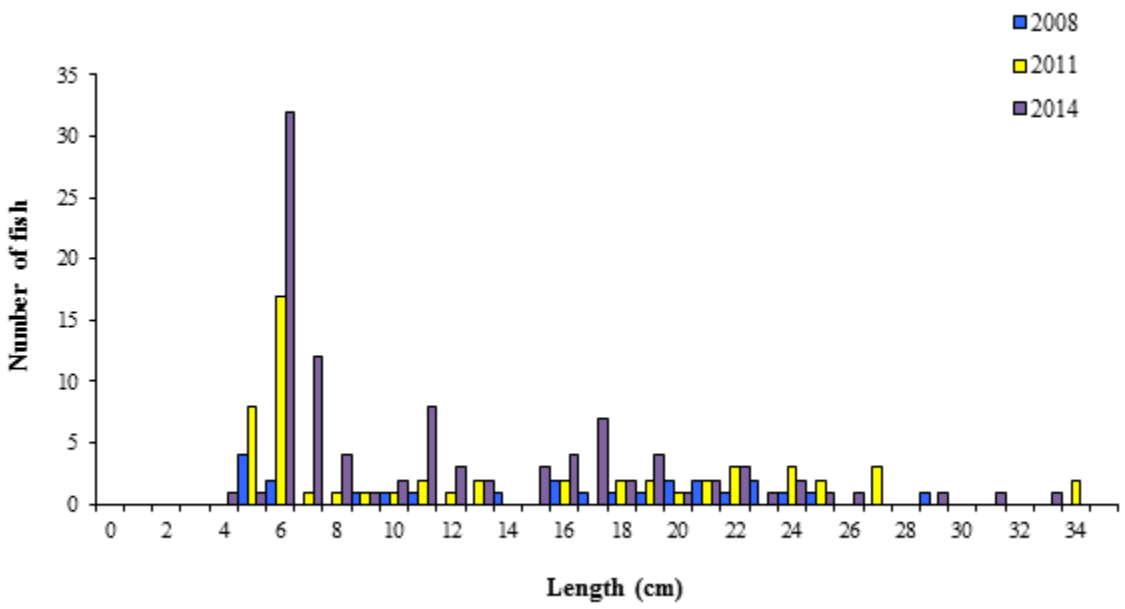

Fig. 1.5. Length frequency of perch captured on Templehouse Lake, 2008, 2011 and 2014

Table 1.3. Mean (±SE) roach length (cm) at age for Templehouse Lake, September/October 2014

	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8	L_9	L_{10}	L_{11}
Mean	3.1 (0.1)	6.5 (0.2)	10.4 (0.2)	14.3 (0.2)	18.1 (0.2)	20.8 (0.3)	22.8 (0.3)	24.6 (0.5)	25.6 (0.8)	27.8 (2.4)	29.5 (2.3)
N	63	57	44	35	27	18	15	9	5	2	2
Range	1.6-5.3	4.0-8.8	8.1-13.1	11.1-17.6	16.1-20.6	18.2-23.2	20.5-24.8	21.9-26.1	24.1-28.4	25.4-30.2	27.2-31.8

Table 1.4. Mean (±SE) perch length (cm) at age for Templehouse Lake, September/October 2014

	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8	L_9	L_{10}	L_{11}
Mean	6.1 (0.1)	10.2 (0.3)	14.8 (0.6)	17.4 (1.7)	22.7 (1.3)	24.8 (1.7)	26.3 (2.3)	30.3	31.5	32.7	33.4
N	42	28	18	13	7	5	2	1	1	1	1
Range	4.2-7.7	6.4-12.7	10.4-19.1	14.1-24.8	19.5-29.2	21.7-30.5	24.0-28.6	30.3-30.3	31.5-31.5	32.7-32.7	33.4-33.4

1.4 Summary

Roach was the dominant species in terms of abundance (CPUE) and roach x bream hybrids was dominant in terms of biomass (BPUE) captured in the survey gill nets during the 2014 survey.

The mean roach CPUE was significantly higher in 2014 than in 2008; however, the mean roach BPUE was not significantly different in 2014 to the other sampling occasions. Roach ranged in age from 1+ to 11+, indicating reproductive success in eleven of the previous twelve years. The dominant age class was 1+.

The mean perch CPUE and BPUE fluctuated slightly over the three year sampling occasions; however, these differences were not statistically significant. Perch ranged in age from 0+ to 11+, with three age classes not recorded. The dominant age class was 0+.

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*., 2012b). Using the FIL2 classification tool, Templehouse Lake has been assigned an ecological status of Poor in 2008 and Bad for both 2011 and 2014 based on the fish populations present.

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

1.5 References

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IFI Dublin,
3044 Lake Drive,
Citywest Business Campus,
Dublin 24,
Ireland

www.fisheriesireland.ie
dublin@fisheriesireland.ie
+353 1 8842 600