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Sampling Fish for the Water Framework Directive

Lakes 2011

Upper Lough Skeagh

Iascach Intíre Éireann
Inland Fisheries Ireland

Water Framework Directive Fish Stock Survey of Upper Lough Skeagh, October 2011

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1.1 Introduction

Upper Lough Skeagh is located seven kilometres north-west of Bailieborough, Co. Cavan, in the Boyne catchment (Plate 1.1 and Fig. 1.1). The lake has a surface area of 61ha and a maximum depth of 4.9m. 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 (20-100mg/l $CaCO_3$).

Upper Lough Skeagh historically holds stocks of bream, pike, roach and perch. The lake is a public water supply and a pump house is present on the shores of the lake. According to the draft river basin management plan for the Eastern River Basin District, the major pressures affecting the ecological status of Upper Lough Skeagh include excess nutrients from agriculture and septic tanks (ERBD, 2008).

Upper Lough Skeagh was previously surveyed in 2008 as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al*., 2009). During this survey, perch were found to be the dominant species present in the lake. Roach, pike, bream and roach x bream hybrids were also recorded.

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. Upper Lough Skeagh

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

1.2 Methods

Upper Lough Skeagh was surveyed over two nights between the 11th and the 13th of October 2011. A total of three sets of Dutch fyke nets and ten benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (4 @ 0-2.9m, 4 @ 3-5.9m and 2 @ 6-11.9m) were deployed in the lake (13 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, bream 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 five fish species and one type of hybrid were recorded on Upper Lough Skeagh in October 2011, with 445 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, pike, bream, roach x bream hybrids and eels were also recorded. During the previous survey in 2008 the same species composition was recorded with the exception of eels, which were present during the 2011 survey but were not captured in 2008.

Table 1.1. Number of each fish species captured by each gear type during the survey on Upper Lough Skeagh, October 2011

Scientific name	Common name	Number of fish captured			
		Benthic mono multimesh gill nets	Benthic braided gill nets	Fyke nets	Total
Rutilus rutilus	Roach	218	0	4	222
Perca fluviatilis	Perch	146	0	1	147
Abramis brama	Bream	37	4	0	41
Rutilus rutilus x Abramis brama	Roach x bream hybrid	26	0	0	26
Anguilla anguilla	Eel	1	0	5	6
Esox lucius	Pike	3	0	0	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 lower in 2011 than in 2008, these differences were not statistically significant. The differences in the mean perch CPUE and BPUE between Upper Lough Skeagh and three similar lakes was assessed, with no overall significant differences being found (Fig. 1.4 and Fig. 1.5).

There were no significant differences in the mean roach CPUE and BPUE between 2008 and 2011. The differences in the mean roach CPUE between Upper Lough Skeagh 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 Upper Lough Skeagh had a significantly higher mean roach CPUE than Lough Gill and Lough Owel ($z = -2.728$ $P<0.05$ and $z = -3.914$ $P<0.05$).

The differences in the mean roach BPUE between Upper Lough Skeagh and three other similar lakes were also 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 Upper Lough Skeagh had a significantly higher mean roach BPUE than Lough Gill and Lough Owel ($z = -2.222$ $P<0.05$ and $z = -3.888$ $P<0.05$).

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

Scientific name	Common name	2008	2011
		Mean CPUE	
Perca fluviatilis	Perch	1.075 (0.374)	0.306 (0.09)
Rutilus rutilus	Roach	0.416 (0.104)	0.458 (0.141)
Esox lucius	Pike	0.014 (0.006)	0.006 (0.003)
Abramis brama	Bream	0.048 (0.017)	0.086 (0.023)
Rutilus rutilus x Abramis brama	Roach x bream hybrid	0.034 (0.011)	0.054 (0.023)
Anguilla anguilla	European eel	-	0.027 (0.011)
		Mean BPUE	
Perca fluviatilis	Perch	17.221 (5.224)	10.304 (2.879)
Rutilus rutilus	Roach	27.532 (7.895)	17.382 (5.214)
Esox lucius	Pike	21.733 (14.218)	9.652 (7.326)
Abramis brama	Bream	12.145 (4.233)	16.436 (6.298)
Rutilus rutilus x Abramis brama	Roach x bream hybrid	9.309 (5.099)	5.033 (2.726)
Anguilla anguilla	European eel	-	8.938 (3.081)

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

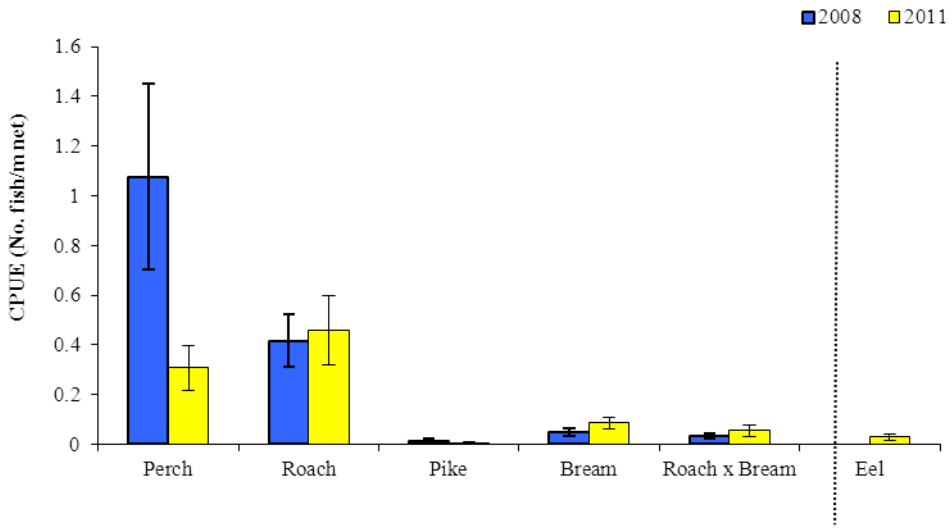

Fig. 1.2. Mean (±S.E.) CPUE for all fish species captured in Upper Lough Skeagh (Eel CPUE based on fyke nets only), 2008 and 2011

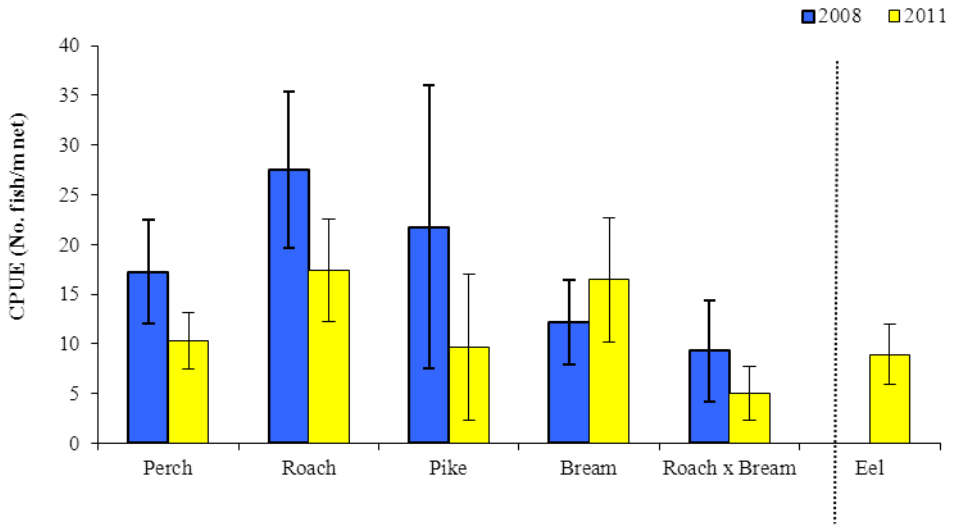

Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Upper Lough Skeagh (Eel CPUE based on fyke nets only), 2008 and 2011

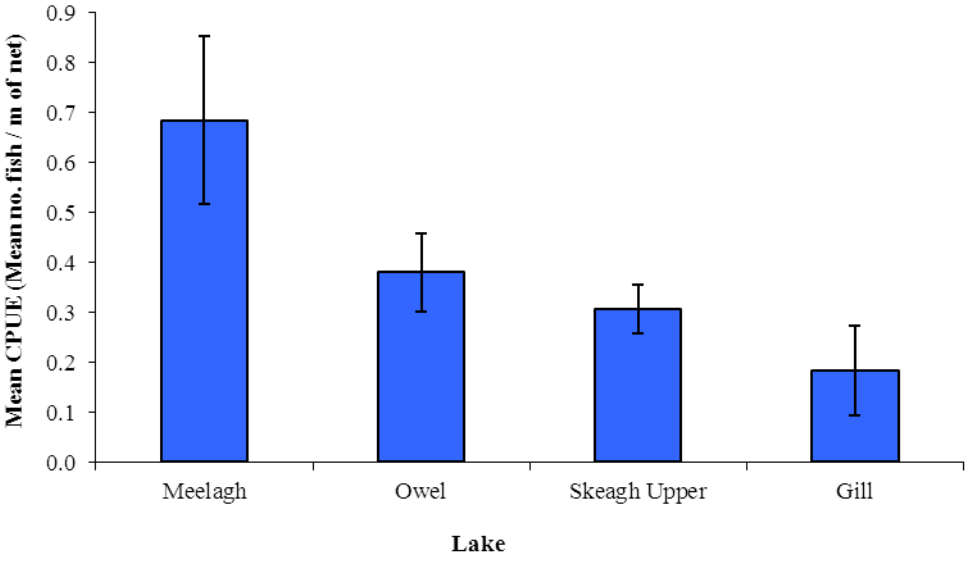

Fig. 1.4. Mean (±S.E.) perch CPUE in four lakes surveyed during 2011

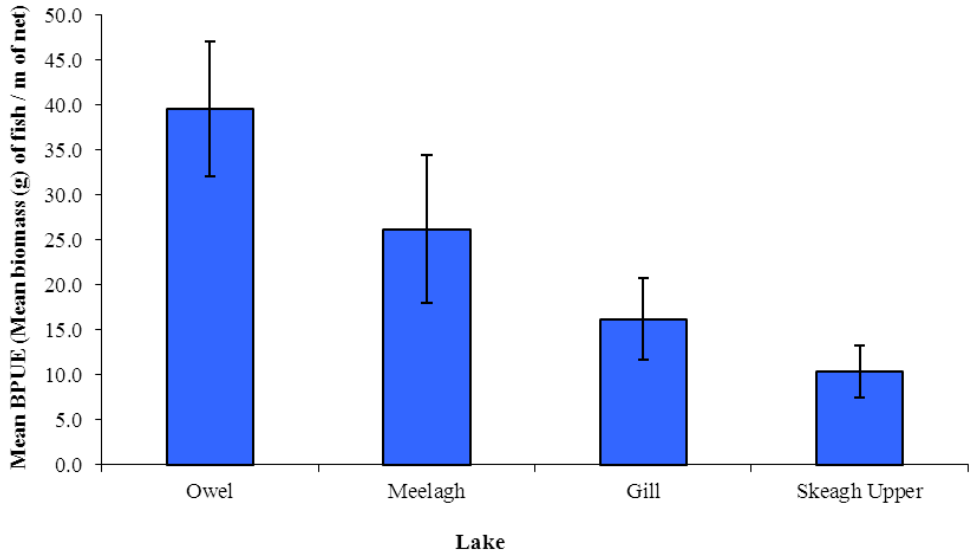

Fig. 1.5. Mean (±S.E.) perch BPUE in four lakes surveyed during 2011

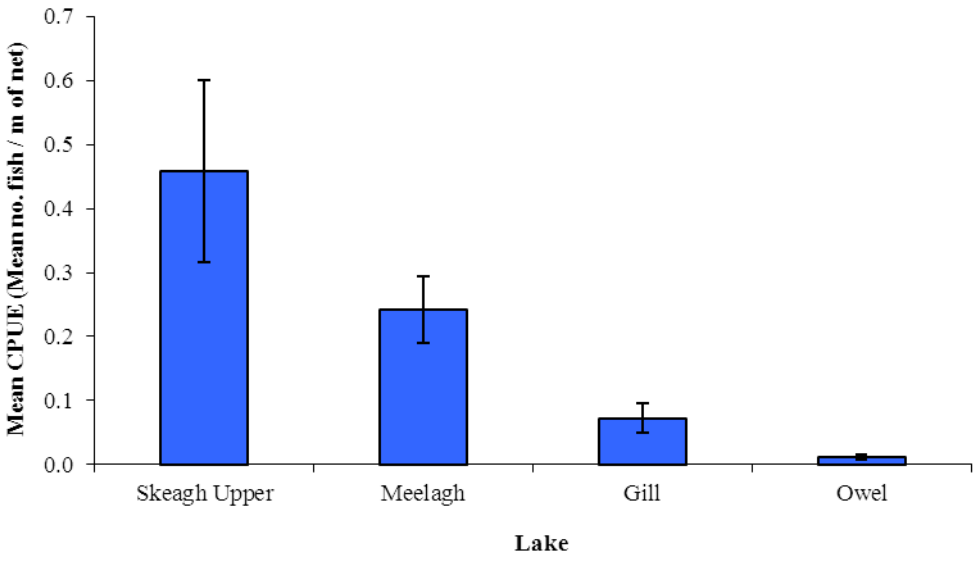

Fig. 1.6. Mean (±S.E.) roach CPUE in four lakes surveyed during 2011

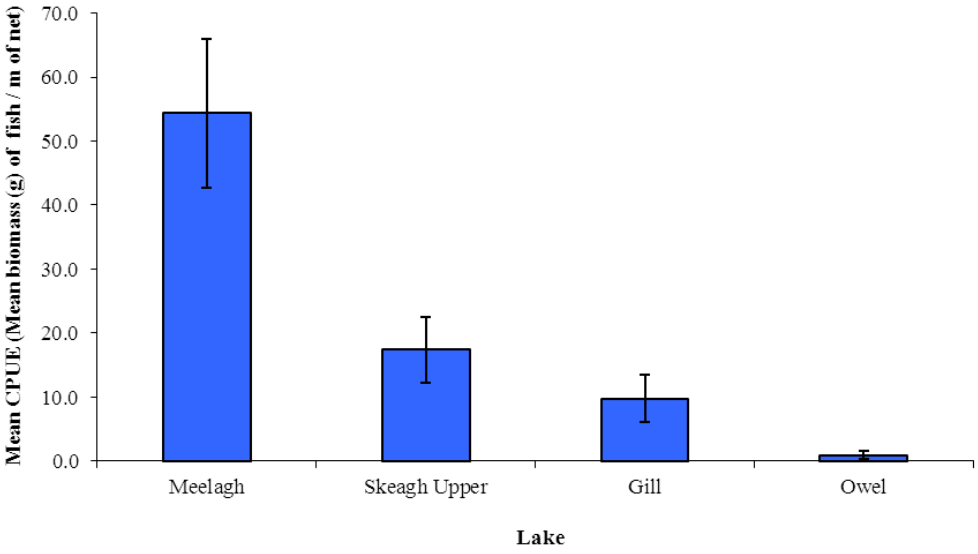

Fig. 1.7. Mean (±S.E.) roach BPUE in four lakes surveyed during 2011

1.3.3 Length frequency distributions

Roach captured during the 2011 survey ranged in length from 6.2cm to 22.1cm (mean = 12.4cm) (Fig.1.8). Roach captured during the 2008 survey had lengths ranging from 4.6cm to 24.0cm (Fig.1.8).

Perch captured during the 2011 survey ranged in length from 5.3cm to 25.3cm (mean = 12.0cm) (Fig. 1.9). Perch captured during the 2008 survey ranged in length from 4.0cm to 22.5cm (Fig. 1.9).

Roach x bream hybrids captured during the 2011 survey ranged in length from 8.8cm to 27.6cm, bream ranged in length from 10.0cm to 34.3cm, pike ranged in length from 40.8cm to 76.0cm and eels ranged in length from 49.0cm to 71.0cm.

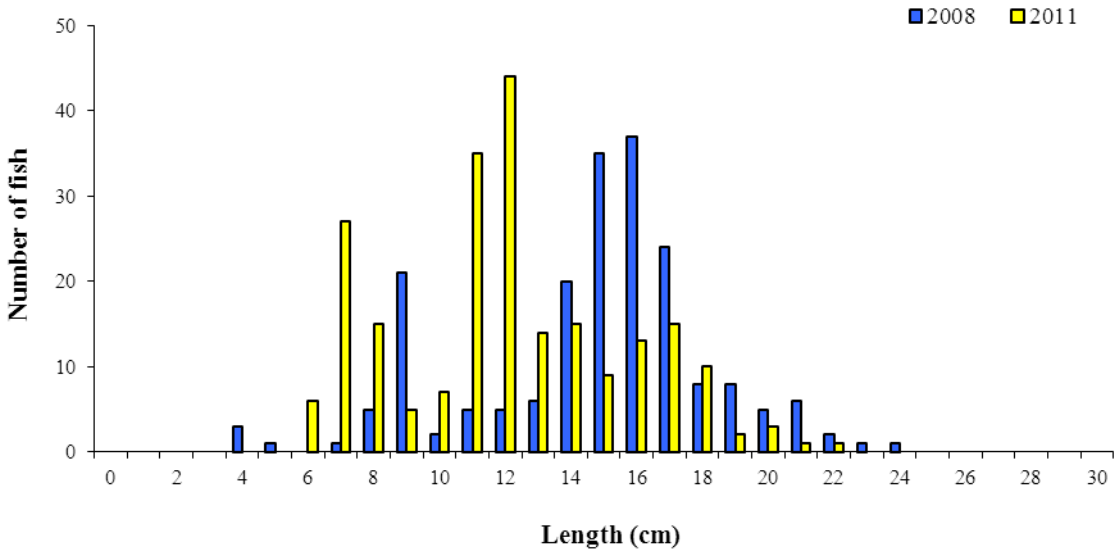

Fig. 1.8. Length frequency of roach captured on Upper Lough Skeagh, 2008 and 2011

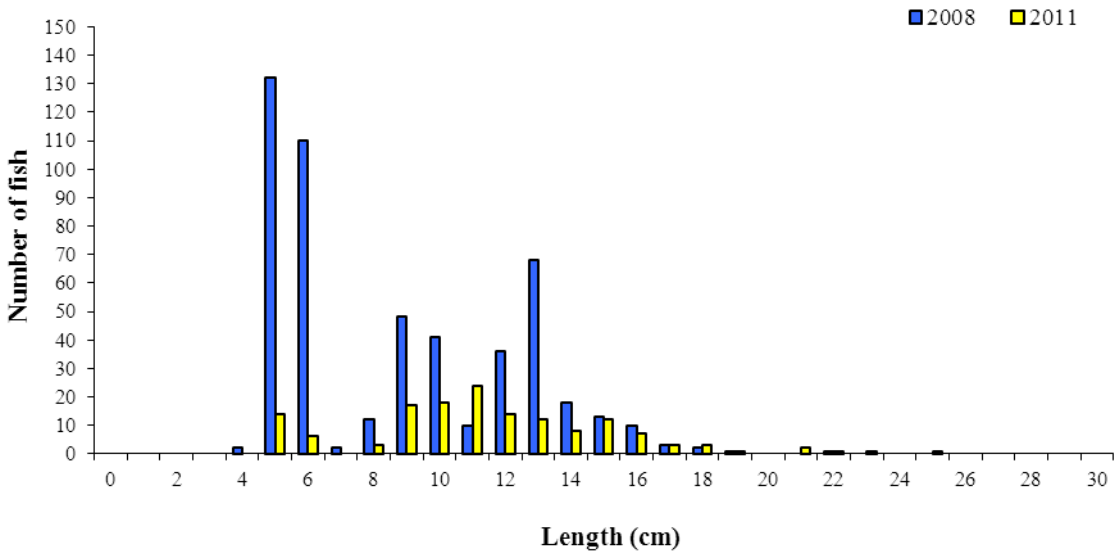

Fig. 1.9. Length frequency of perch captured on Upper Lough Skeagh, 2008 and 2011

1.3.4 Fish age and growth

Seven age classes of roach were present, ranging from 1+ to 7+ indicating reproductive success in recent years. The dominant age class of roach was 2+and the mean L1 of 2.5cm (Table 1.3). In the 2008 survey, roach ranged from 1+ to 6+ with a mean L1 of 3.7cm.

Seven age classes of perch were present, ranging from 0+ to 6+, with a mean L1 of 5.4cm (Table 1.4). The dominant age class of perch was 2+. In the 2008 survey, perch ranged from 0+ to 4+ with a mean L1 of 5.3cm. ,

Table 1.3. Mean (±SE) roach length (cm) at age for Upper Lough Skeagh, October 2011

	L_1	L_2	L_3	L_4	L_5	L_6	L_7
Mean	2.5 (0.1)	6.1 (0.2)	9.8 (0.3)	13.5 (0.3)	15.5 (0.3)	17.6 (0.3)	18.8 (0.4)
N	62	57	38	29	23	13	7
Range	1.4-4.2	3.2-8.6	5.9-13.4	9.3-15.9	11.0-18.3	15.6-20.1	17.8-20.8

Table 1.4. Mean (±SE) perch length (cm) at age for Upper Lough Skeagh, October 2011

	L_1	L_2	L_3	L_4	L_5	L_6
Mean	5.4 (0.1)	9.4 (0.1)	12.1 (0.2)	14.4 (0.3)	17.0 (0.9)	18.0 (2.3)
N	53	42	21	16	9	2
Range	3.9-7.0	7.4-10.9	10.3-14.6	12.0-16.9	14.0-22.6	15.6-20.3

1.4 Summary

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

There were no significant differences in the mean roach CPUE and BPUE between 2008 and 2011. The mean roach CPUE and BPUE in Upper Lough Skeagh was significantly higher than Lough Gill and Lough Owel, other similar lakes surveyed. Roach ranged in age from 1+ to 7+, with 1+ fish being captured indicating reproductive success in recent years. The dominant age class of roach was 2+.

There were no significant differences in the mean perch CPUE and BPUE between 2008 and 2011. The mean perch CPUE and BPUE in Upper Lough Skeagh was similar to the other lakes assessed (Lough Meelagh, Lough Owel and Lough Gill), with no statistically significant differences being found between lakes. Perch ranged in age from 0+ to 6+, indicating reproductive success in each of the previous seven years. The dominant age class of roach was 2+.

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, Upper Lough Skeagh 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 Upper Lough Skeagh an overall ecological status of Poor, 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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