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Sampling Fish for the Water Framework Directive

Lakes 2012

Inchicronan Lough

Iascach Intíre Éireann
Inland Fisheries Ireland

Water Framework Directive Fish Stock Survey of Inchicronan Lough, September 2012

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1.1 Introduction

Inchicronan Lough is located in the upper reaches of the Fergus system (Plate 1.1, Fig. 1.1). It is situated approximately 2km south of Crusheen, Co. Clare. It has a surface area of 120ha and a maximum depth of 18.8m. The lake is categorised as typology class 10 (as designated by the EPA for the purposes of the Water Framework Directive), i.e. shallow (<4m), greater than 50ha and high alkalinity (>100mg/l CaCO3).

Inchicronan Lough and the surrounding area contain a diverse range of habitats and species, including reed beds, scrub islands, cut-over bog, woodland, wet grassland, marsh lands and a variety of bird species (Clare Library, 2009). Threats to the lake include agricultural improvement, land reclamation, drainage and housing (Clare Library, 2009).

The lake was previously surveyed by the Inland Fisheries Trust in 1986 and was found to contain pike, perch and rudd (IFT unpublished data). The lake was also previously surveyed in September 2009 as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al*., 2010). During this survey, perch were found to be the dominant species present in the lake. Rudd, pike and eels were also captured during the survey.

Plate 1.1. Inchicronan Lough

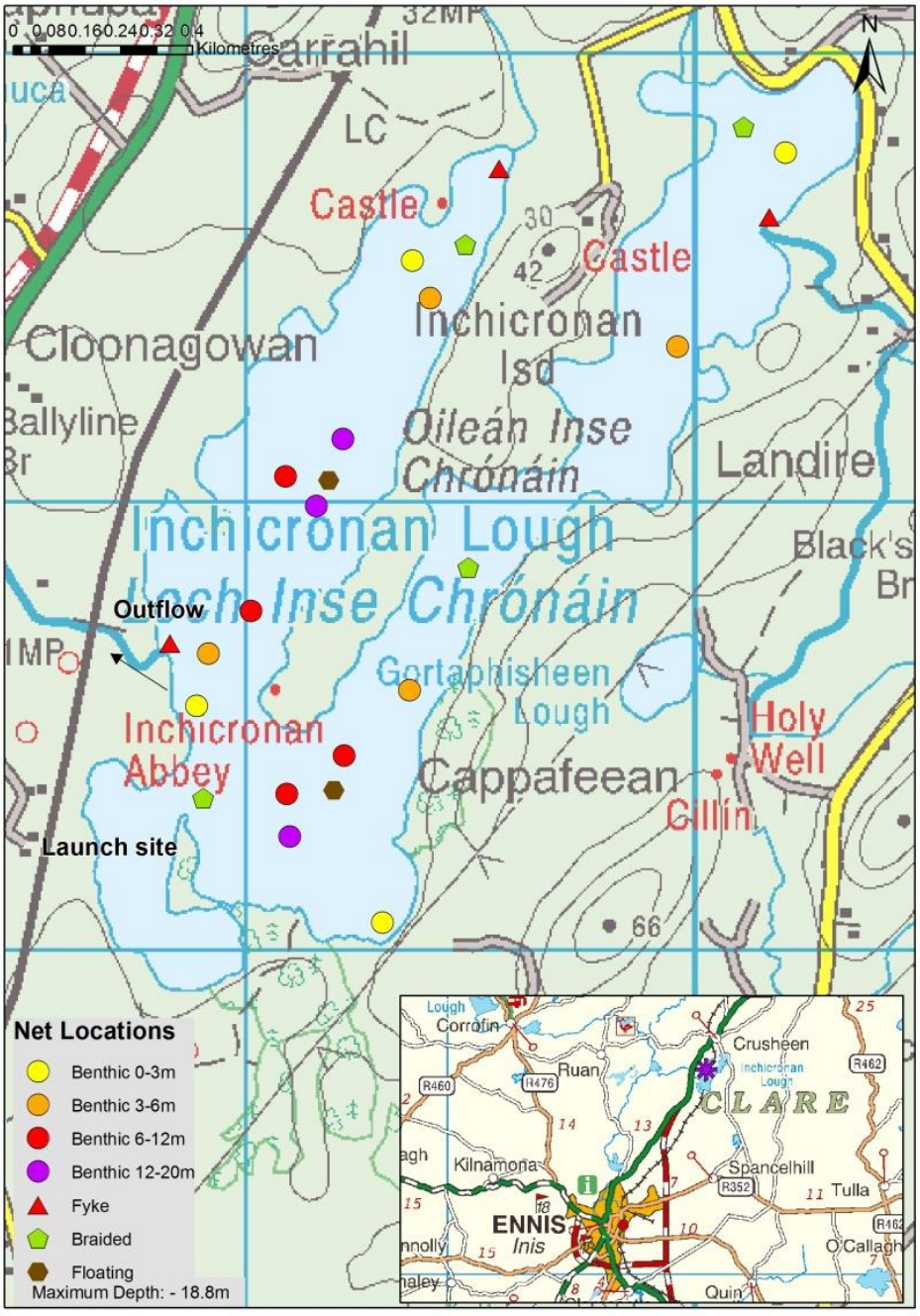

Fig. 1.1. Location map of Inchicronan Lough showing locations and depths of each net (outflow is indicated on map)

1.2 Methods

Inchicronan Lough was surveyed over two nights between the 5th and the 7th of September 2012. A total of three sets of Dutch fyke nets, 15 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (4 @ 0-2.9m, 4 @ 3-5.9m, 4 @ 6-11.9m and 3 @ 12-19.9m) and two surface monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets were deployed randomly in the lake (20 sites). The netting effort was supplemented using four benthic braided survey gill nets (62.5mm mesh knot to knot) at four additional sites. Nets were deployed in the same locations as were randomly selected in the previous survey 2009. 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 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 returned to the laboratory for further analysis.

1.3 Results

1.3.1 Species Richness

A total of four fish species were recorded on Inchicronan Lough in September 2012, with 615 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 rudd, pike and eels. A similar species composition was recorded during the previous survey in 2009 (Kelly *et al.*, 2010.

Table 1.1. Number of each fish species captured by each gear type during the survey on Inchicronan Lough, September 2012

Scientific name	Common name	Number of fish captured				
		Benthic mono multimesh gill nets	Benthic braided gill nets	Surface mono multimesh gill nets	Fyke nets	Total
Perca fluviatilis	Perch	570	0	2	3	575
Scardinius erythropthalmus	Rudd	0	0	17	0	17
Esox Lucius	Pike	11	1	0	1	13
Anguilla anguilla	European eel	0	0	0	10	10

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 2009 and 2012 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 were higher in 2012 than in 2009, these differences were not statistically significant (Fig. 1.2 and Fig. 1.3).

The differences in the mean perch CPUE and BPUE between Inchicronan Lough and six similar lakes were assessed, with overall significant differences being found (Kruskal-Wallis, $P<0.05$) (Fig. 1.4 and Fig. 1.5). Independent-Samples Mann-Whitney U tests between each lake showed that Inchicronan Lough had a significantly higher mean perch CPUE and BPUE than Lough Mask ($z = 2.767$, $P<0.05$ and $z = 2.19$, $P<0.05$) and a significantly higher mean perch CPUE than Lough Derg ($z = 1.78$, $P<0.05$).

Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Inchicronan Lough, 2009 and 2012

Scientific name	Common name	2009	2012
		Mean CPUE	
Perca fluviatilis	Perch	0.338 (0.091)	0.796 (0.240)
Scardinius erythropthalmus	Rudd	0.031 (0.017)	0.023 (0.017)
Esox Lucius	Pike	0.010 (0.005)	0.017 (0.007)
Anguilla anguilla	European eel	0.244 (0.122)	0.055 (0.020)
		Mean BPUE	
Perca fluviatilis	Perch	11.069 (3.511)	13.736 (4.288)
Scardinius erythropthalmus	Rudd	3.827 (2.888)	1.686 (1.295)
Esox Lucius	Pike	23.856 (13.181)	8.851 (5.386)
Anguilla anguilla	European eel	77.833 (39.825)	18.522 (8.256)

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

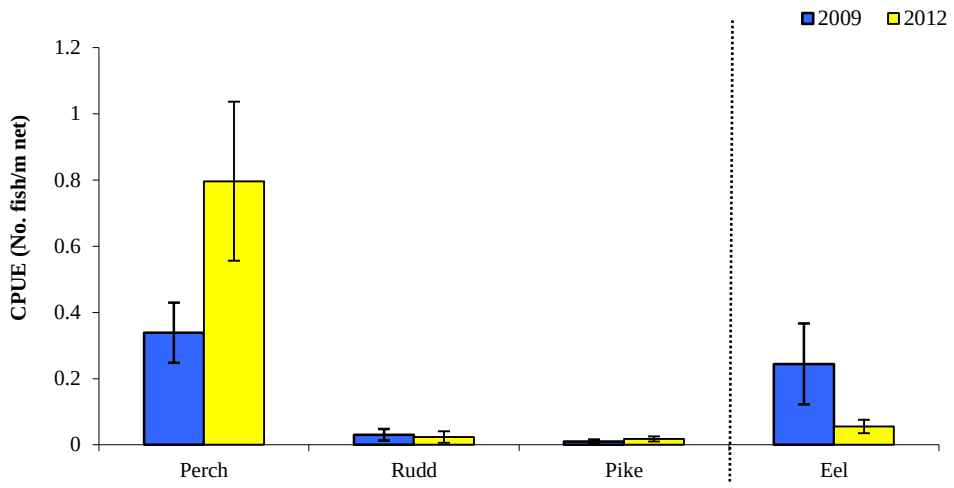

Fig. 1.2. Mean (±S.E.) CPUE for all fish species captured in Inchicronan Lough (Eel CPUE based on fyke nets only), 2009 and 2012

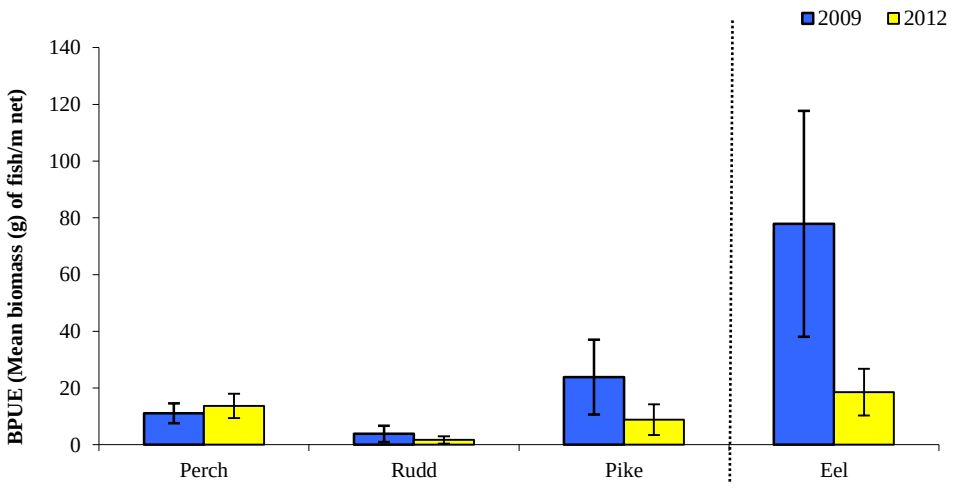

Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Inchicronan Lough (Eel BPUE based on fyke nets only), 2009 and 2012

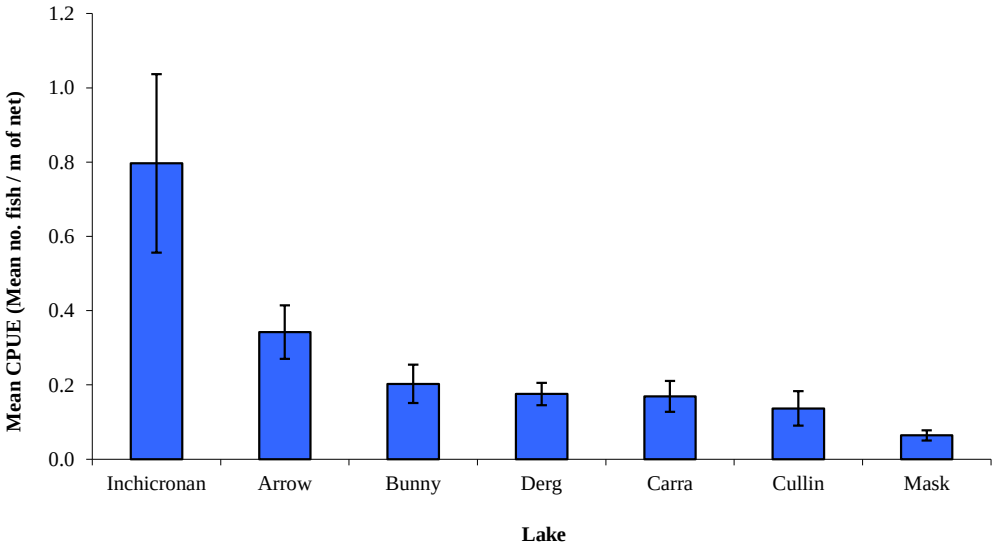

Fig. 1.4. Mean (±S.E.) perch CPUE in seven lakes surveyed during 2012

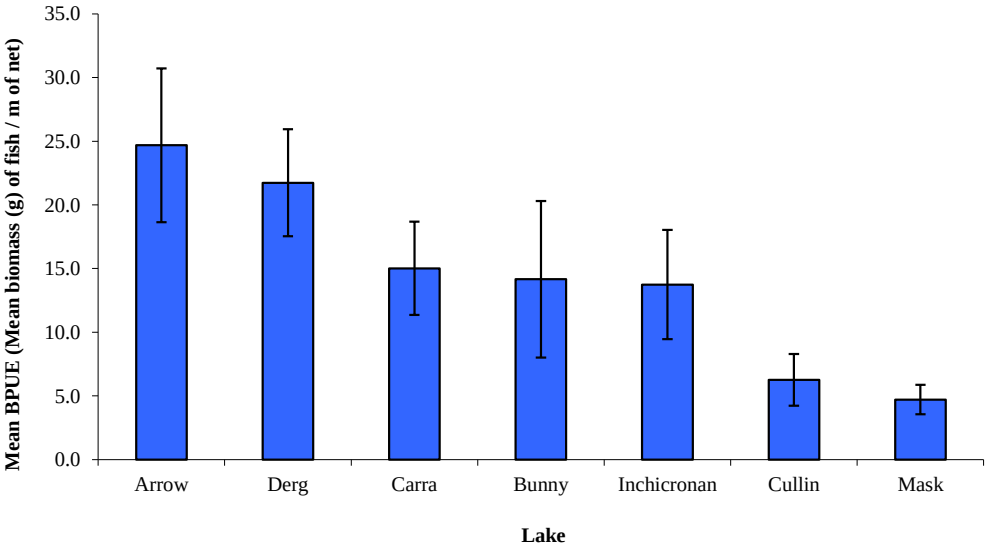

Fig. 1.5. Mean (±S.E.) perch BPUE in seven lakes surveyed during 2012

1.3.3 Length frequency distributions

Perch captured during the 2012 survey ranged in length from 4.0cm to 23.8cm (mean = 8.5cm) (Fig. 1.6). Perch captured during the 2009 survey ranged in length from 4.6cm to 24.3cm (Fig. 1.6).

Rudd captured during the 2012 survey ranged in length from 7.2cm to 21.9cm (mean = 14.6cm) (Fig. 1.7). Rudd captured during the 2009 survey ranged in length from 8.7cm to 25.3cm (Fig. 1.7).

Eels captured during the 2012 survey ranged in length from 47.0cm to 73.0cm and pike ranged in length from 17.6cm to 79.2cm.

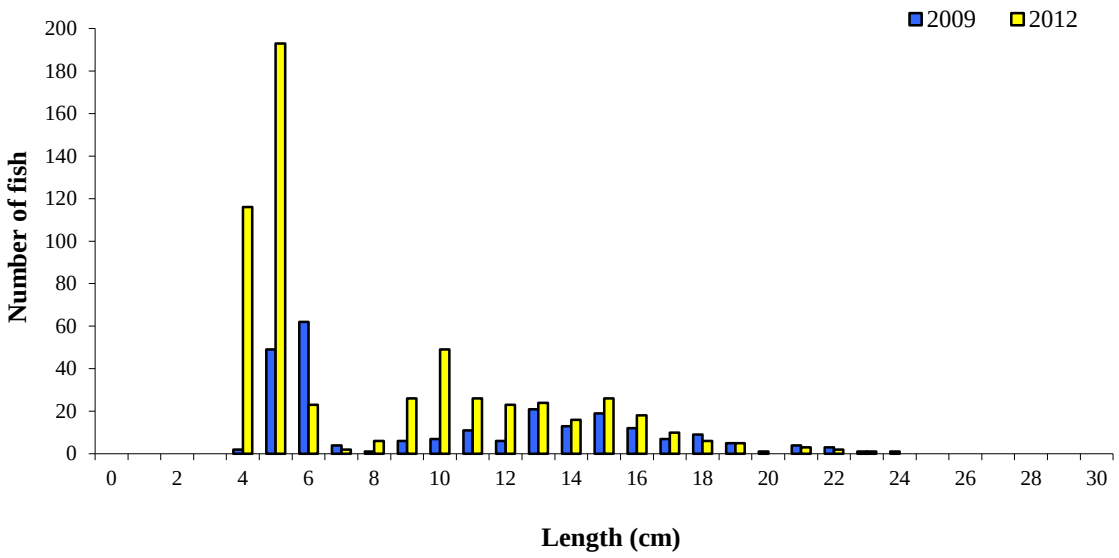

Fig. 1.6. Length frequency of perch captured on Inchicronan Lough, 2009 and 2012

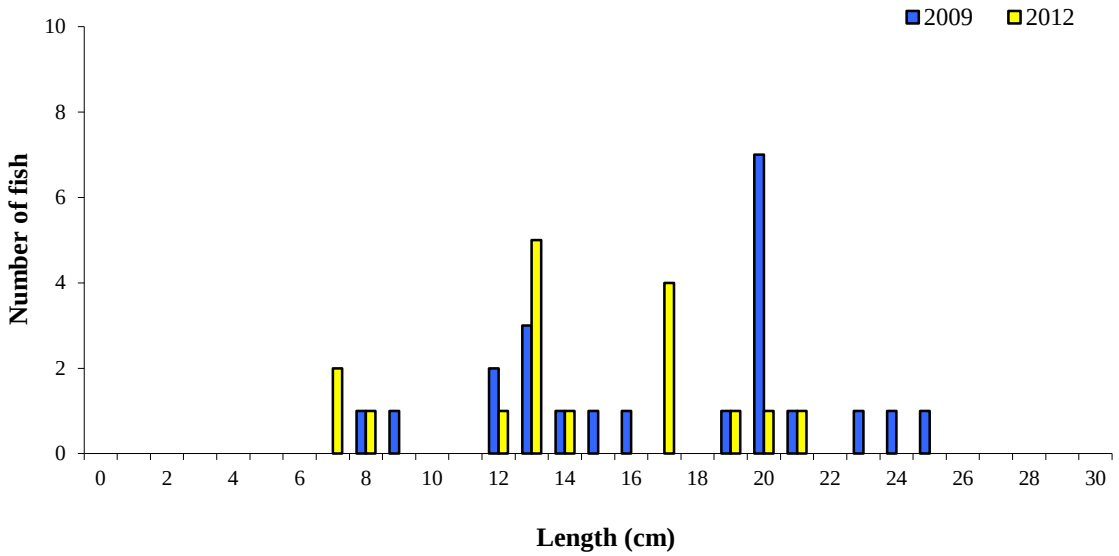

Fig. 1.7. Length frequency of rudd captured on Inchicronan Lough, 2009 and 2012

1.3.4 Fish age and growth

Seven age classes of perch were present, ranging from 0+ to 6+, with a mean L1 of 5.8cm (Table 1.3). The dominant age class was 0+ (Fig. 1.6). In the 2009 survey, perch ranged from 0+ to 5+ with a mean L1 of 6.8cm.

Three age classes of rudd were present, ranging from 1+ to 3+, with a mean L1 of 2.1cm (Table 1.4). In the 2009 survey, rudd ranged from 1+ to 4+ with a mean L1 of 2.3cm.

Four age classes of pike were present, ranging from 0+ to 5+.

Table 1.3. Mean (±SE) perch length (cm) at age for Inchicronan Lough, September 2012

	L_1	L_2	L_3	L_4	L_5	L_6
Mean	5.8 (0.1)	10.5 (0.1)	14.8 (0.2)	18.0 (0.4)	20.6 (0.7)	23.0
N	73	51	25	7	3	1
Range	4.4-7.9	8.2-13.7	13.1-16.8	16.5-19.6	19.2-21.4	23.0-23.0

Table 1.4. Mean (±SE) rudd length (cm) at age for Inchicronan Lough, September 2012

	L_1	L_2	L_3
Mean	2.1 (0.2)	7.0 (0.5)	11.6 (0.9)
N	17	14	7
Range	1.6-4.4	4.0-10.7	8.0-15.7

1.4 Summary

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

Although the mean perch CPUE and BPUE in Inchicronan Lough were slightly higher in 2012 than in the 2009 survey, these differences were not statistically significant. The mean perch CPUE and BPUE in Inchicronan Lough was significantly higher than Lough Mask and the mean perch CPUE was significantly higher than Lough Derg. Perch ranged in age from 0+ to 6+, indicating reproductive success in the seven previous years. The dominant age class was 0+.

Rudd ranged in age from 1+ to 3+, indicating reproductive success in the three of the previous four 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, Inchicronan Lough has been assigned an ecological status of High based on the fish populations present in 2012. The ecological status assigned to the lake based on the 2009 survey data was Good.

In the 2007 to 2009 surveillance monitoring reporting period, the EPA assigned Inchicronan Lough 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

Clare Library (2009) Site Brief: Inchicronan Lough www.clarelibrary.ie/eolas/coclare/heritage/site_brief.htm

Kelly, F.L., Harrison, A., Connor, L., Allen, M., Rosell, R. and Champ, T. (2008) *FISH IN LAKES Task 6.9: Classification tool for Fish in Lakes. FINAL REPORT*. Central Fisheries Board, NSSHARE project.

Kelly, F., Harrison A., Connor, L., Matson, R., Morrissey, E., O'Callaghan, R., Wogerbauer, C., Feeney, R., Hanna, G. and Rocks, K. (2010) *Sampling Fish for the Water Framework Directive – Summary Report 2009*. The Central and Regional Fisheries Boards.

Kelly, F.L., Harrison, A.J., Allen, M., Connor, L. and Rosell, R. (2012) Development and application of an ecological classification tool for fish in lakes in Ireland. *Ecological Indicators*, **18**, 608-619.

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