Sampling Fish for the Water Framework Directive
Lakes 2012
White Lough

Iascach Intíre Éireann
Inland Fisheries Ireland

Water Framework Directive Fish Stock Survey of White Lough, August 2012

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

ACKNOWLEDGEMENTS

1.1 Introduction

White Lough is located in the Erne catchment, approximately 5km south-west of Ballybay, Co. Monaghan (Plate 1.1, Fig. 1.1). The lake is situated at an altitude of 80m a.s.l. It has a surface area of 54ha, a mean depth of <4m and a maximum depth of 6m. The lake is categorised as typology class 6 (as designated by the EPA for the purposes of the Water Framework Directive), i.e. shallow (<4m), greater than 50ha and moderately alkaline (20-100mg/l CaCO3). The lake has been classed as 1a (i.e. risk of failing to meet good status by 2015) in the WFD Characterization report (EPA, 2005).

White Lough was previously surveyed in 1969 by the Inland Fisheries Trust (IFT unpublished data). Bream and rudd were abundant during the 1969 survey, with pike (up to 6300g), perch (up to 675g), roach (up to 675g), and roach x bream hybrids also being recorded (Inland Fisheries Trust, unpublished data).

The lake was also surveyed in 2006 and 2009 as part of the NSSHARE Fish in Lakes Project (Kelly *et al*., 2007) and as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al*., 2010). In both years perch was found to be the dominant species, followed by roach, bream, roach x bream hybrids, eel and tench.

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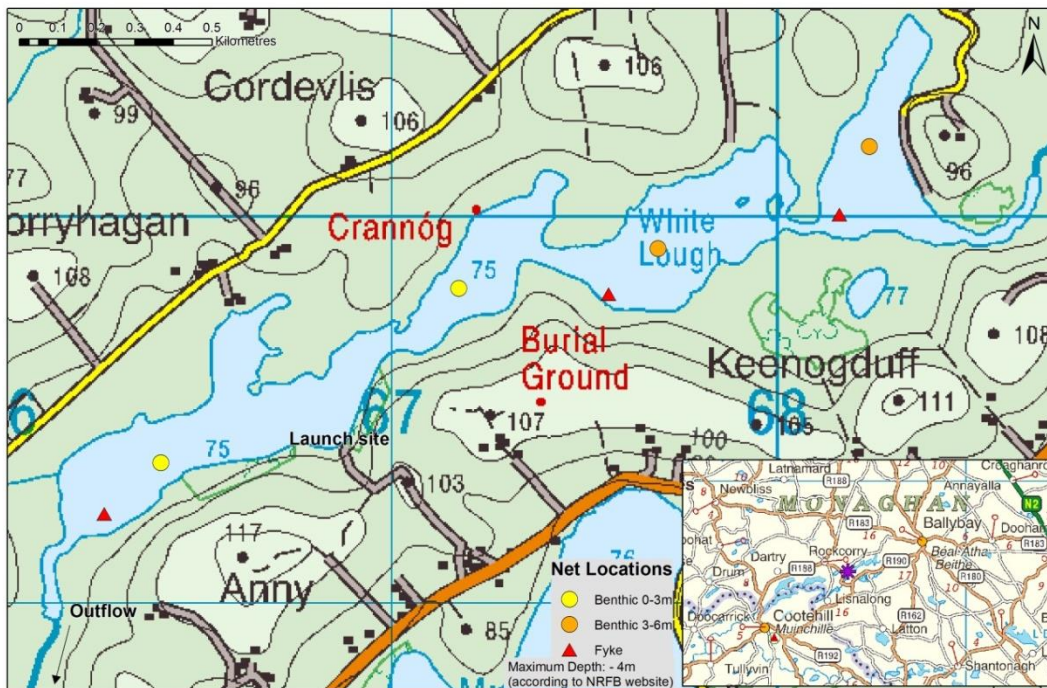
Fig. 1.1. Location map of White Lough showing locations and depths of each net (outflow is indicated on map)

1.2 Methods

White Lough was surveyed over one night on the 27th of August 2012. A total of three sets of Dutch fyke nets and four benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (2 @ 0-2.9m and 2 @ 3-5.9m) were deployed in the lake (7 sites). Nets were deployed in the same locations as were randomly selected in the previous surveys in 2009 and 2006. 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 returned to the laboratory 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 White Lough in August 2012, with 340 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 roach, roach x bream hybrids, pike, tench and eels. During the previous survey in 2009 the same species composition was recorded with the exception of tench, which were present during the 2012 survey but were not captured in 2009 and bream, which were present during the 2009 survey but were not captured in 2012 (Kelly *et al.*, 2010).

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

Scientific name	Common name	Number of fish captured		
		Benthic mono multimesh gill nets	Fyke nets	Total
Perca fluviatilis	Perch	191	3	194
Rutilus rutilus	Roach	105	0	105
Rutilus rutilus x Abramis brama	Roach x bream hybrid	30	0	30
Esox lucius	Pike	1	0	1
Tinca tinca	Tench	1	0	1
Anguilla anguilla	European eel	0	9	9

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 White Lough and two similar lakes was assessed, with no overall significant differences being found (Fig. 1.4 and Fig. 1.5). However, Independent-Samples Mann-Whitney U tests between each lake showed that White Lough had a significantly higher mean perch BPUE than Lough Alewnaghta ($P<0.05$).

Although the mean roach CPUE and BPUE appeared higher in 2012 than in 2009, these differences were not statistically significant (Fig. 1.2 and Fig. 1.3).

The differences in the mean roach CPUE and BPUE between White Lough and two similar lakes was assessed, with no overall significant differences being found (Fig. 1.6 and Fig. 1.7).

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

Scientific name	Common name	2009	2012
		Mean CPUE	
Perca fluviatilis	Perch	0.867 (0.416)	0.970 (0.397)
Rutilus rutilus	Roach	0.390 (0.161)	0.522 (0.242)
Rutilus rutilus x Abramis brama	Roach x bream hybrid	0.048 (0.020)	0.150 (0.055)
Esox lucius	Pike	0.005 (0.005)	0.005 (0.005)
Tinca tinca	Tench	-	0.005 (0.005)
Abramis brama	Bream	0.010 (0.010)	-
Anguilla anguilla	European eel	0.006 (0.006)	0.100 (0.038)
		Mean BPUE	
Perca fluviatilis	Perch	11.867 (5.182)	36.858 (13.625)
Rutilus rutilus	Roach	27.523 (10.794)	40.167 (18.406)
Rutilus rutilus x Abramis brama	Roach x bream hybrid	8.057 (4.146)	41.286 (15.631)
Esox lucius	Pike	11.429 (11.429)	9.365 (9.365)
Tinca tinca	Tench	-	4.639 (4.369)
Abramis brama	Bream	0.271 (0.271)	-
Anguilla anguilla	European eel	2.627 (2.627)	13.206 (5.245)

* On the rare occasion where biomass data was unavailable for an individual fish, this was determined from a length/weight regression for that species.
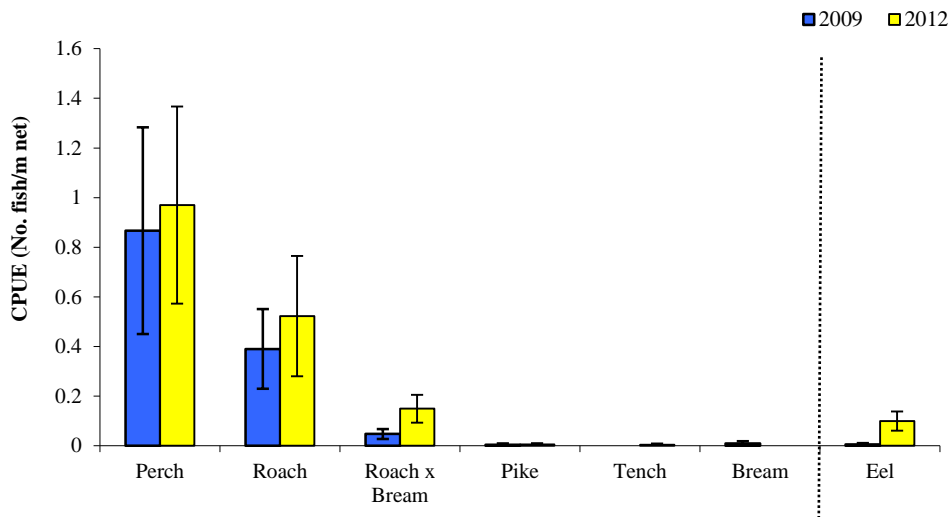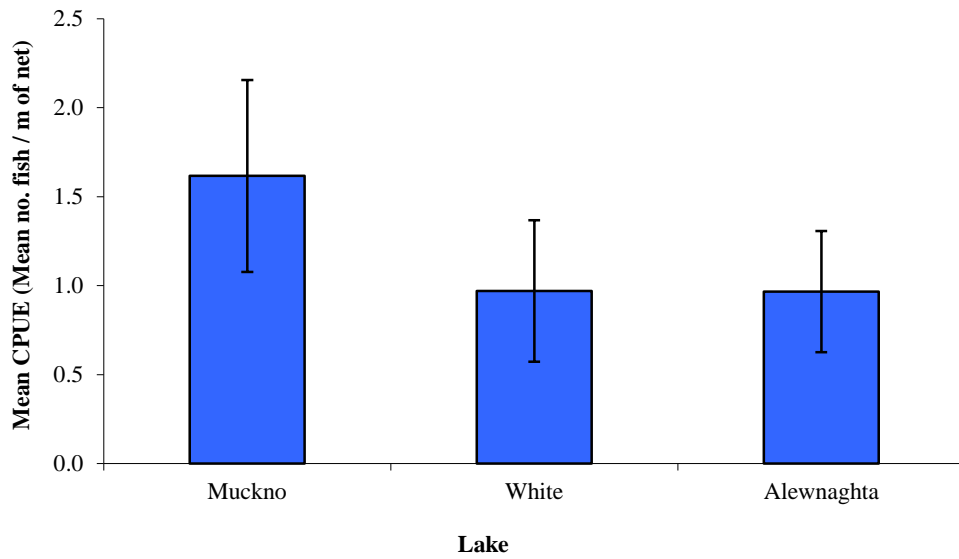
Fig. 1.2. Mean (±S.E.) CPUE for all fish species captured in White Lough (Eel CPUE based on fyke nets only), 2009 and 2012
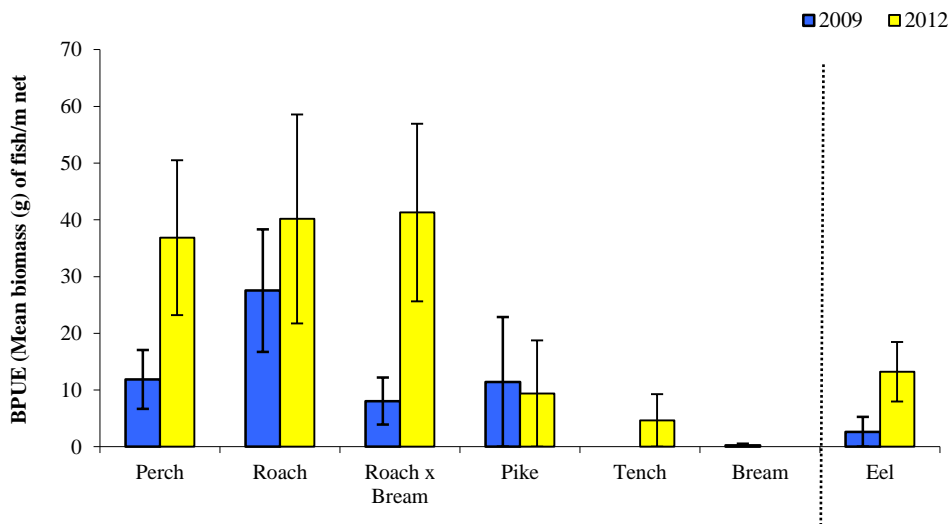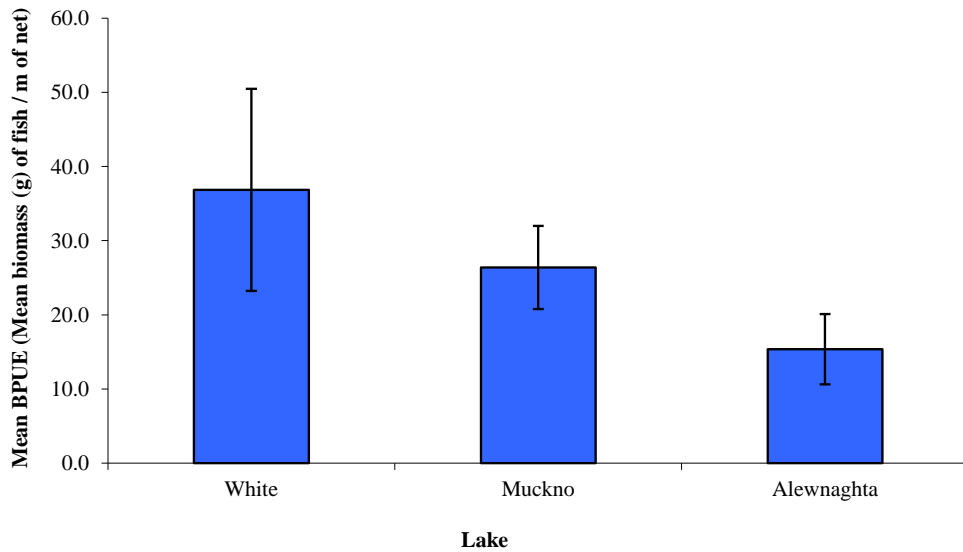

Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in White Lough (Eel BPUE based on fyke nets only), 2009 and 2012
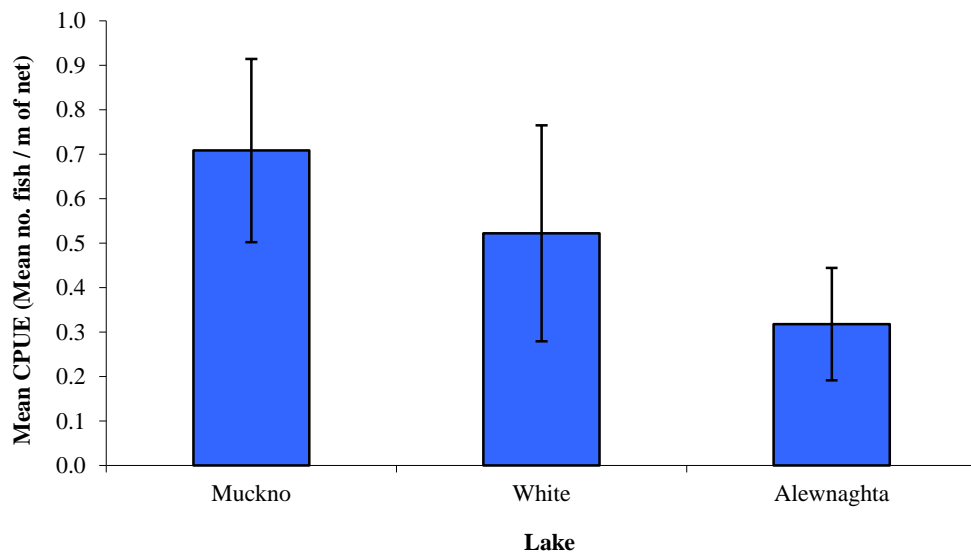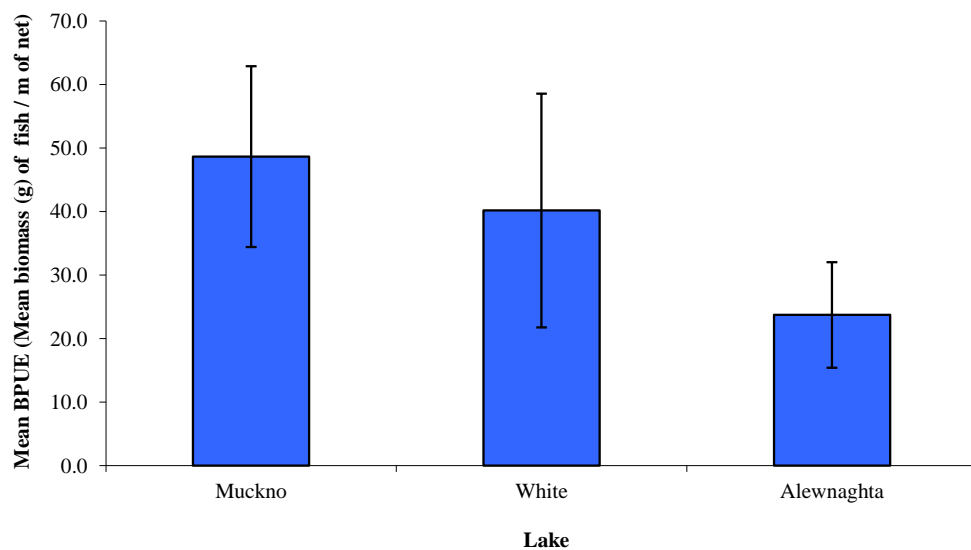
Fig. 1.4. Mean (±S.E.) perch CPUE in three lakes surveyed during 2012

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

Fig. 1.6. Mean (±S.E.) roach CPUE in three lakes surveyed during 2012


Fig. 1.7. Mean (±S.E.) roach BPUE in three lakes surveyed during 2012

1.3.3 Length frequency distributions

Perch captured during the 2012 survey ranged in length from 5.7cm to 26.2cm (mean = 11.7cm) (Fig. 1.6). Perch captured during the 2009 survey ranged in length from 5.0cm to 20.5cm (Fig. 1.6).

Roach captured during the 2012 survey ranged in length from 4.6cm to 22.8cm (mean = 15.4cm) (Fig. 1.7). Roach captured during the 2009 survey ranged in length from 10.8cm to 25.0cm (Fig. 1.7).

Eels captured during the 2012 survey ranged in length from 41.0cm to 59.2cm and salmon ranged in length from 7.9cm to 32.6cm. One tench was recorded at 39.0cm and one pike measured 61.8cm.
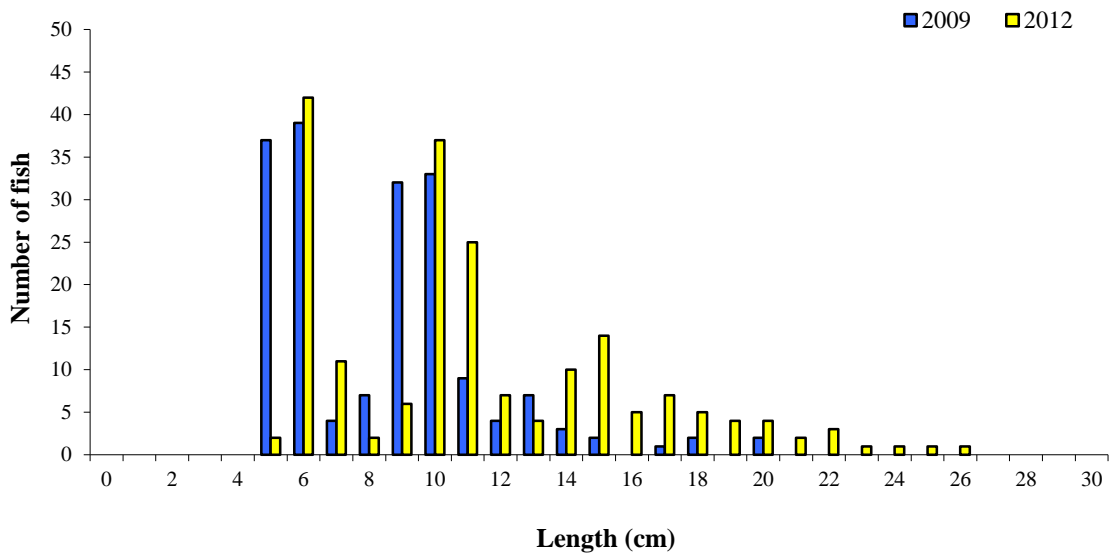
Fig. 1.6. Length frequency of perch captured on White Lough, 2009 and 2012
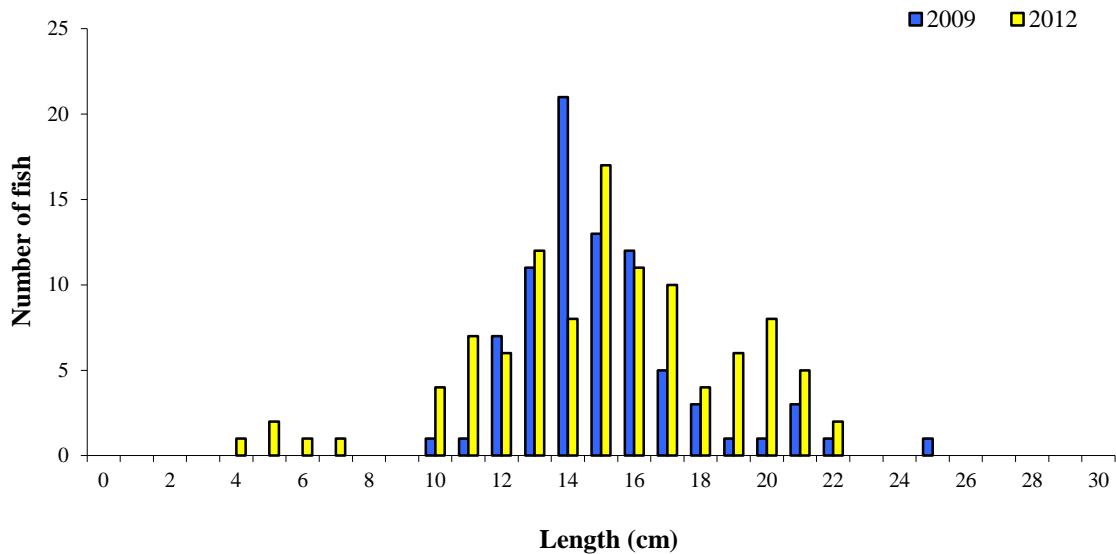
Fig. 1.7. Length frequency of roach captured on White Lough, 2009 and 2012

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). In the 2009 survey, perch ranged from 1+ to 3+ with a mean L1 of 5.7cm.

Seven age classes of roach were present, ranging from 1+ to 7+, with a mean L1 of 2.4cm (Table 1.4). In the 2009 survey, roach ranged from 2+ to 9+ with a mean L1 of 3.5cm.

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

	L_1	L_2	L_3	L_4	L_5	L_6
Mean	5.8 (0.1)	9.8 (0.1)	13.3 (0.2)	16.6 (0.3)	21.6 (1.6)	22.5
N	81	48	28	23	2	1
Range	4.5-7.0	8.2-12.5	11.3-16.2	14.0-20.4	20.0-23.2	22.5-22.5

Table 1.4. Mean (±SE) roach length (cm) at age for White Lough, August 2012

	L_1	L_2	L_3	L_4	L_5	L_6	L_7
Mean	2.4 (0.1)	5.8 (0.2)	10.2 (0.3)	13.5 (0.3)	15.8 (0.5)	17.5 (0.4)	20.6
N	58	56	39	27	21	17	1
Range	1.6-4.1	3.6-8.7	6.9-13.8	10.5-17.1	12.6-18.9	14.3-19.5	20.6-20.6

1.4 Summary

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

Although the mean perch CPUE and BPUE in White Lough were slightly higher in 2012 than in the 2009 survey, these differences were not statistically significant. The mean perch BPUE in White Lough was significantly higher than Lough Alewnaghta, another similar lake surveyed. Perch ranged in age from 0+ to 6+, indicating reproductive success in the previous seven years.

Although the mean roach CPUE and BPUE in White Lough was slightly higher in 2012 than in the 2009 survey, these differences were not statistically significant. The mean perch CPUE and BPUE in White Lough was similar to the other lakes assessed during 2012, with no statistically significant differences being found between lakes. Roach ranged in age from 1+ to 7+, indicating reproductive success in seven of the previous eight 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, White Lough has been assigned an ecological status of Bad based on the fish populations present in 2012. The ecological status assigned to the lake based on the 2009 survey data was Moderate.

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

EPA (2005) *The Characterisation and Analysis of Ireland's River Basin Districts in accordance with section 7 (2&3) of the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003)*. National Summary Report (Ireland). 166pp.

Kelly, F.L., Connor, L., and Champ, W.S.T. (2007) *A Survey of the Fish Populations in 46 lakes in the Northern Regional Fisheries Board, June to September 2005 and 2006*. Central Fisheries Board, unpublished report.

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, NS Share 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.