



Sampling Fish for the Water Framework Directive

Lakes 2013

Ross Lake



Iascach Intíre Éireann
Inland Fisheries Ireland

Water Framework Directive Fish Stock Survey of Ross Lake, August 2013

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

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

CITATION: Kelly, F.L., Connor, L., Morrissey, E., Coyne, J., Matson, R., Feeney, R. and Rocks, K. (2014)
Water Framework Directive Fish Stock Survey of Ross Lake, August 2013. Inland Fisheries Ireland, 3044 Lake
Drive, Citywest Business Campus, Dublin 24.

Cover photo: Netting survey on Glen Lough © Inland Fisheries Ireland

© Inland Fisheries Ireland 2014

ACKNOWLEDGEMENTS

The authors wish to gratefully acknowledge the help and co-operation of the regional director Dr. John Conneely and the staff from IFI, Galway. The authors would also like to gratefully acknowledge the help and cooperation of all their colleagues in IFI, Swords.

The authors would also like to acknowledge the funding provided for the project from the Department of Communications, Energy and Natural Resources for 2013.

The report includes Ordnance Survey Ireland data reproduced under OSi Copyright Permit No. MP 007508.

*Unauthorised reproduction infringes Ordnance Survey Ireland and Government of Ireland copyright.
© Ordnance Survey Ireland, 2010.*

1.1 Introduction

Ross Lake is situated in the Corrib catchment, located approximately 1km south-east of Rosscahill and 3km north-west of Moycullen in a chain of lakes entering Lough Corrib in Moycullen Bay (Plate 1.1, Fig. 1.1). It has a surface area of 139ha, a mean depth of >4m, a maximum depth of 14m and is categorised as typology class 12 (as designated by the EPA for the purposes of the Water Framework Directive), i.e. deep (>4m), greater than 50ha and high alkalinity (>100mg/l CaCO₃). The lake is a coarse fishery and holds stocks of roach, bream, roach x bream hybrids and pike. The presence of zebra mussels was confirmed in Ross Lake in May 2007 (WRFB, pers. comm.).

Ross Lake and the surrounding woodlands have been designated as a Special Area of Conservation (SAC) for containing a hard water lake, a habitat listed on Annex I of the EU Habitats Directive (Council Directive 92/43/EEC) (NPWS, 1999). The SAC also contains a breeding colony of the lesser horseshoe bat (*Rhinolophus hipposideros*), a species listed on Annex II of the same Directive. The woodlands and lakeside vegetation on the site provide foraging habitat within a small radius of the roost site (NPWS, 1999). The underlying geology of the area is limestone, with the main habitat in the SAC being Ross Lake, which has a limestone bed covered by deposits of precipitated marl and a shoreline of marl-encrusted limestone boulders. The lake supports communities of *Chara pedunculata* and *Chara curta*, both of which are characteristic of marl lakes. The rocky limestone shore supports mostly fen-type vegetation characterised by Black Bog-rush (*Schoenus nigricans*). The site also contains otter, a species listed on Annex II of the EU Habitats Directive, and a small colony of common gull. The main land uses within the site are angling, commercial forestry, and grazing of the woodland and wetland areas (NPWS, 1999).

Ross Lake was previously surveyed in 2007 and 2010 as part of the WFD surveillance monitoring programme (Kelly and Connor, 2007 and Kelly *et al.*, 2011). During the 2010 survey roach were found to be the dominant species present in the lake followed closely by perch. Roach x bream hybrids, bream, eels and pike were also recorded.



Plate 1.1. Ross Lake

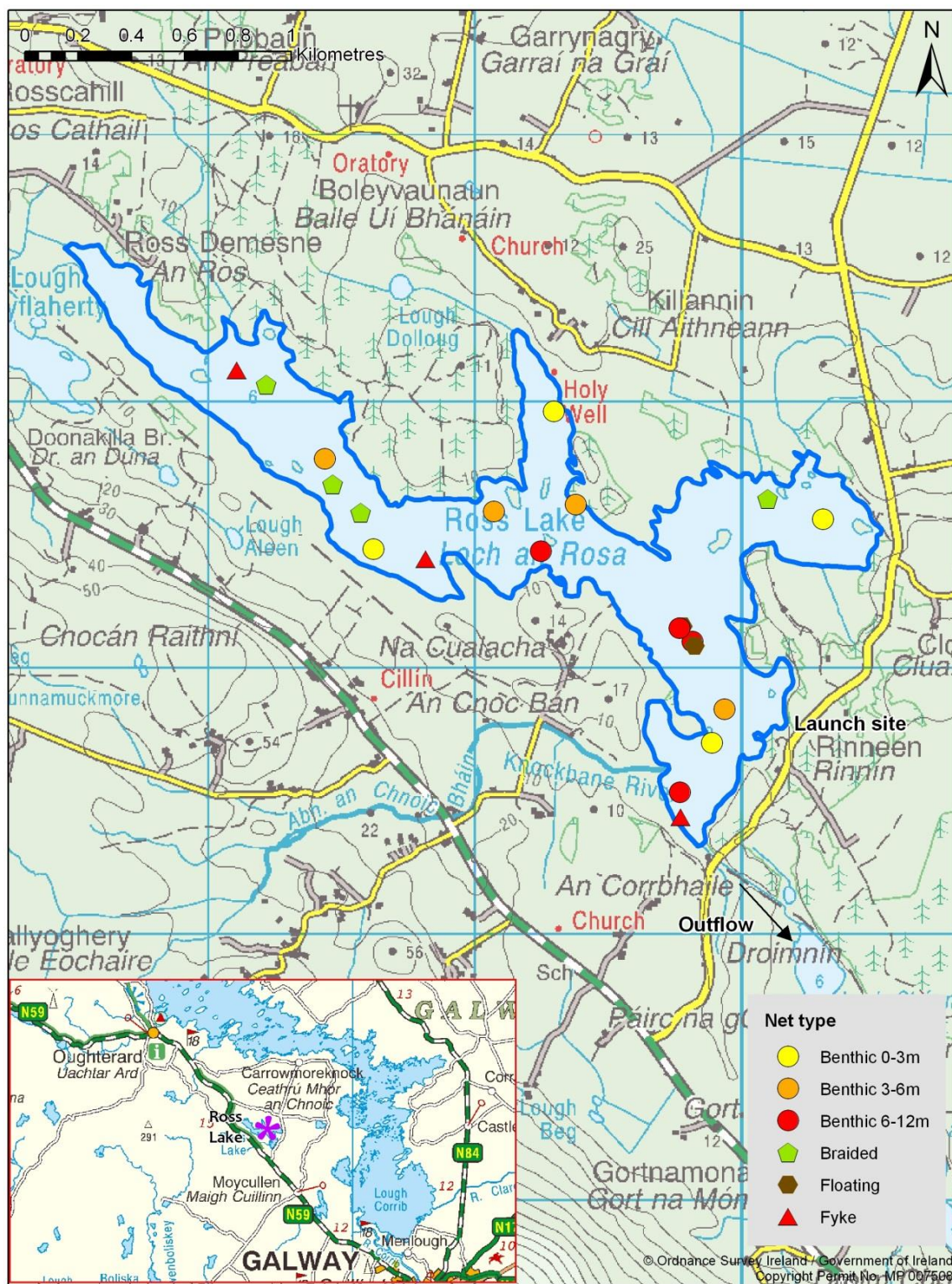


Fig. 1.1. Location map of Ross Lake showing net locations and depths of each net (outflow is indicated on map)

1.2 Methods

Ross Lake was surveyed over two nights from the 13th of August to the 15th of August 2013. A total of three sets of Dutch fyke nets, 12 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (4 @ 0-2.9m, 4 @ 3-5.9m and 4 @ 6-11.9m) and two floating monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets were deployed in the lake (17 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. A handheld GPS was used to locate 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 bream, roach, roach x bream hybrids 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 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 in Ross Lake in August 2013, with 752 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. During the previous surveys in 2010 and 2007 the same species composition was recorded with the exception of eels, which were present during the current survey and in 2007 but were not captured in the 2010 survey.

Table 1.1. Number of each fish species captured by each gear type during the survey on Ross Lake, August 2013

Scientific name	Common name	Number of fish captured				Total
		Benthic mono multimesh gill nets	Surface mono multimesh gill nets	Benthic braided gill nets	Fyke nets	
<i>Perca fluviatilis</i>	Perch	429	34	1	0	464
<i>Rutilus rutilus</i>	Roach	146	11	0	0	157
<i>Rutilus rutilus x Abramis brama</i>	Roach x bream hybrid	102	1	0	0	103
<i>Abramis brama</i>	Bream	10	0	6	0	16
<i>Esox lucius</i>	Pike	7	0	1	0	8
<i>Anguilla anguilla</i>	European eel	0	0	0	4	4

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 2010 and 2013 surveys are summarised in Table 1.2. Mean CPUE and BPUE for all species is illustrated in Figure 1.2 and 1.3.

Perch was the dominant species in terms of abundance (CPUE) and pike was the dominant species in terms of biomass (BPUE).

Although the mean perch CPUE and BPUE was higher in 2013 than in 2010 and 2007, these differences were not statistically significant (Table 1.2; Fig 1.2 and 1.3).

The mean roach CPUE fluctuated slightly between years and the mean roach BPUE increased every year, however, these differences were also 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 in Ross Lake, 2007, 2010 and 2013

Scientific name	Common name	2007	2010	2013
Mean CPUE				
<i>Rutilus rutilus</i>	Roach	0.343 (0.101)	0.200 (0.065)	0.249 (0.073)
<i>Perca fluviatilis</i>	Perch	0.421 (0.172)	0.197 (0.058)	0.710 (0.215)
<i>Rutilus rutilus x Abramis brama</i>	Roach x bream hybrid	0.082 (0.029)	0.077 (0.021)	0.163 (0.047)
<i>Abramis brama</i>	Bream	0.072 (0.024)	0.036 (0.012)	0.026 (0.010)
<i>Esox lucius</i>	Pike	0.009 (0.003)	0.010 (0.005)	0.013 (0.005)
<i>Anguilla anguilla</i>	European eel*	0.022 (0.011)	-	0.022 (0.015)
Mean BPUE				
<i>Rutilus rutilus</i>	Roach	10.065 (3.582)	12.548 (3.796)	20.907 (5.972)
<i>Perca fluviatilis</i>	Perch	10.490 (3.322)	9.441 (3.577)	18.469 (6.941)
<i>Rutilus rutilus x Abramis brama</i>	Roach x bream hybrid	11.611 (3.932)	10.632 (3.039)	16.001 (4.418)
<i>Abramis brama</i>	Bream	13.930 (5.127)	11.967 (6.257)	10.636 (4.381)
<i>Esox lucius</i>	Pike	7.769 (4.643)	25.593 (18.315)	29.134 (17.011)
<i>Anguilla anguilla</i>	European eel*	6.994 (4.204)	-	3.739 (1.964)

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

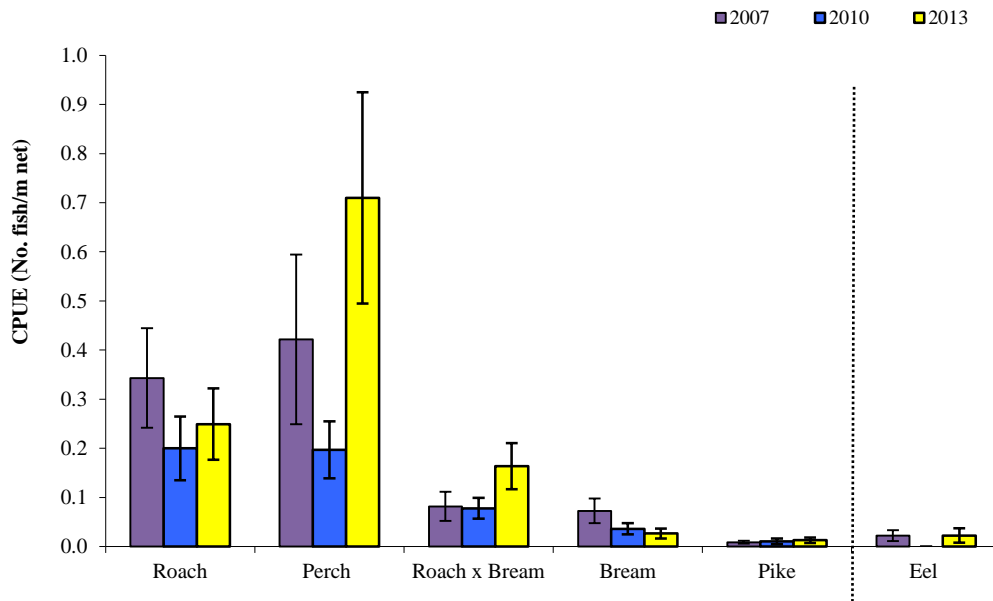


Fig. 1.2. Mean (\pm S.E.) CPUE for all fish species captured on Ross Lake (Eel CPUE based on fyke nets only), 2007, 2010 and 2013

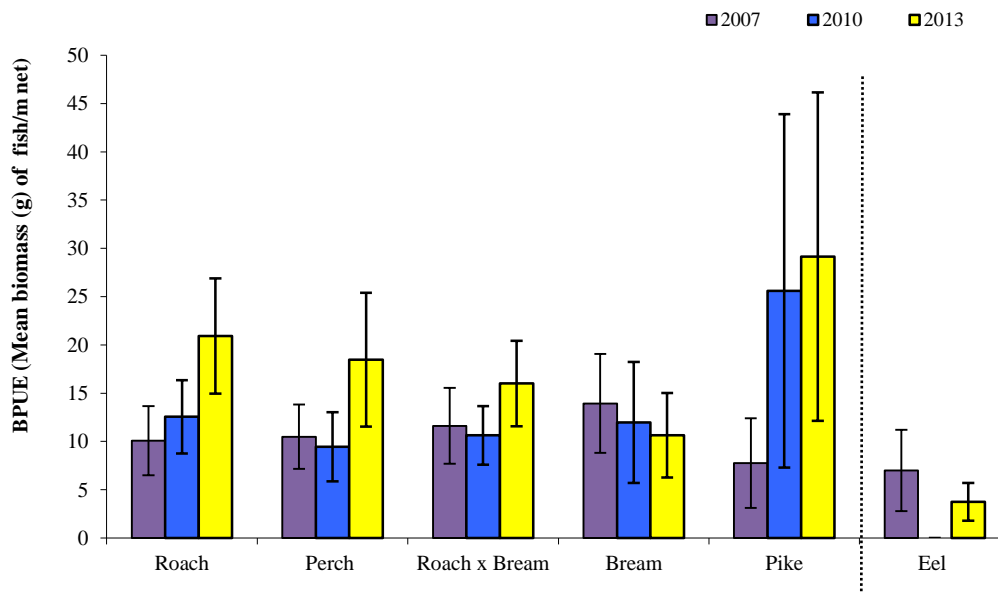


Fig. 1.3. Mean (\pm S.E.) BPUE for all fish species captured in Ross Lake (Eel BPUE based on fyke nets only), 2007, 2010 and 2013

1.3.3 Length frequency distributions and growth

Perch captured during the 2013 survey ranged in length from 4.5cm to 35.4cm (mean = 10.0cm) (Fig.1.4) with eight age classes present, ranging from 0+ to 7+, with a mean L1 of 5.5cm (Table 1.3). The dominant age class was 1+ (Fig 1.4). Perch captured during the 2010 and 2007 surveys had a similar length and age range (Fig 1.4). The dominant age class in 2007 was also 1+ (Fig 1.4). No such dominant age class was evident in the perch population in the 2010 survey.

Roach captured during the 2013 survey ranged in length from 4.0cm to 31.2cm (mean = 15.2cm) (Fig. 1.5) with ten age classes present, ranging from 1+ to 10+, with a mean L1 of 2.5cm (Table 1.4). The dominant age class was 4+ (Fig 1.5). Roach captured during the 2010 and 2007 surveys had a similar length and age range (Fig. 1.5). The dominant age class in 2007 was 2+ (Fig 1.5).

Roach x bream hybrids captured during the 2013 survey ranged in length from 6.5cm to 35.7cm, bream ranged in length from 6.9cm to 33.7cm and pike ranged from 12.6cm to 100cm.

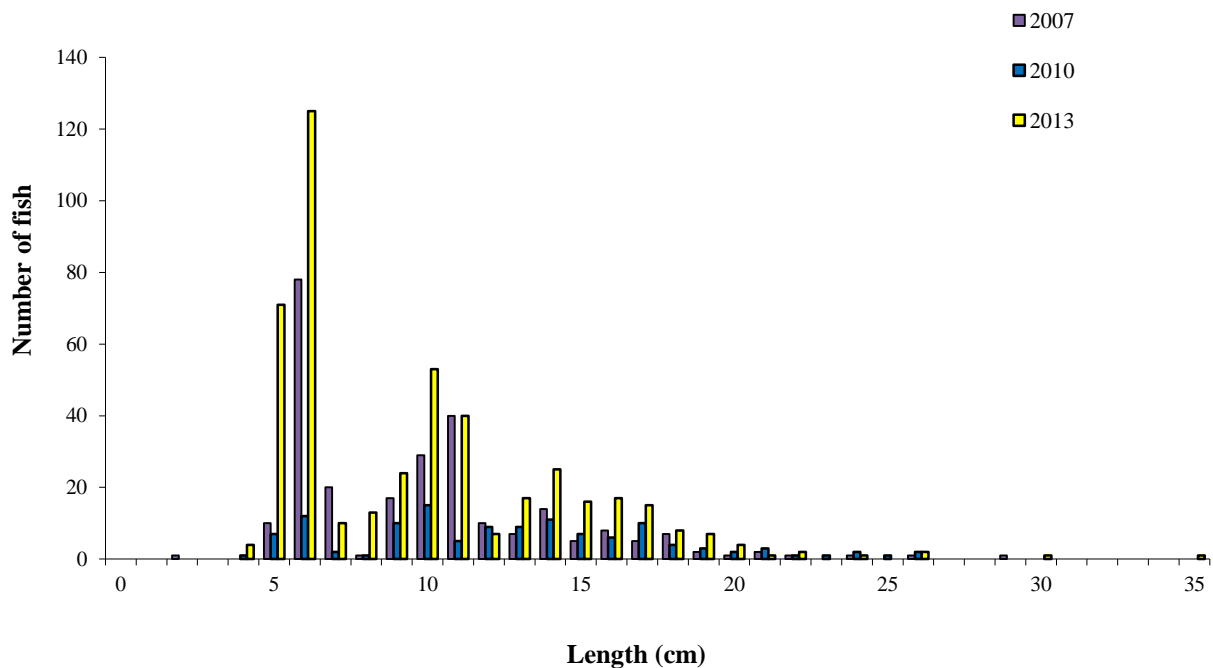


Fig. 1.4. Length frequency of perch captured on Ross Lake, 2007, 2010 and 2013

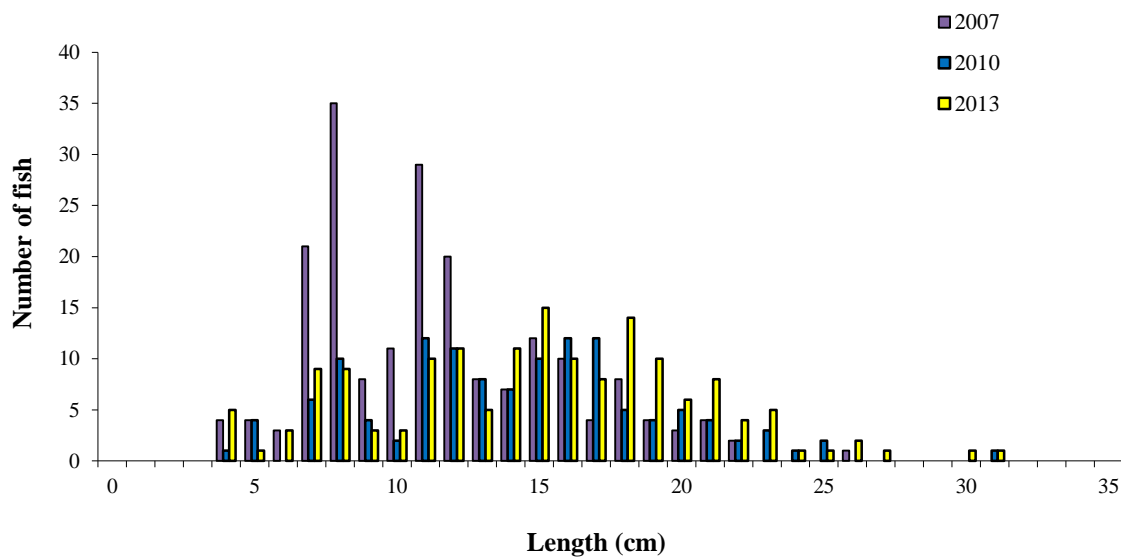


Fig. 1.5. Length frequency of roach captured on Ross Lake, 2007, 2010 and 2013

Table 1.3. Mean (\pm SE) perch length (cm) at age for Ross Lake, August 2013

	L₁	L₂	L₃	L₄	L₅	L₆	L₇
Mean	5.5	9.8	13.5	16.8	19.0	22.6	23.2
N	88	49	43	29	13	7	3
Range	3.2-8.1	6.8-13.2	10.2-19.7	12.8-25.9	15.1-29.3	17.2-33.6	19.0-29.2

Table 1.4. Mean (\pm SE) roach length (cm) at age for Ross Lake, August 2013

	L₁	L₂	L₃	L₄	L₅	L₆	L₇	L₈	L₉	L₁₀
Mean	2.5	5.7	10.0	13.4	16.2	18.6	20.9	23.9	24.2	26.3
	(0.1)	(0.2)	(0.2)	(0.2)	(0.2)	(0.3)	(0.5)	(0.9)	(2.0)	(3.8)
N	88	81	59	46	31	24	17	9	3	2
Range	1.2-4.9	3.6-10.3	6.1-14.8	9.8-16.4	14.3-19.7	15.9-23.2	18.9-25.8	20.7-28.6	21.5-28.2	22.6-30.1

1.4 Summary

Perch was the dominant species in terms of abundance (CPUE) and pike was the dominant species in terms of biomass (BPUE) during the 2013 survey.

Although the mean perch CPUE and BPUE was higher in 2013 than in 2010 and 2007, these differences were not statistically significant. Perch ranged in age from 0+ to 7+, indicating reproductive success in each of the last eight years. The dominant age class was 1+.

The mean roach CPUE fluctuated slightly between years and the mean roach BPUE increased every year, however, these differences were also not statistically significant. Roach ranged in age from 1+ to 10+, indicating reproductive success in ten of the previous eleven years. The dominant age class was 4+.

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, Ross Lake has been assigned an ecological status of Poor for both 2010 and 2013 and Moderate for 2007 based on the fish populations present.

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

1.5 References

- Kelly, F. and Connor, L. (2007) *WFD Surveillance Monitoring - Fish in Lakes 2007*. Central Fisheries Board 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, NSSHARE project.
- Kelly, F., Harrison A., Connor, L., Matson, R., Morrissey, E., Wogerbauer, C., Feeney, R., O'Callaghan, R. and Rocks, K. (2011) *Sampling Fish for the Water Framework Directive – Summary Report 2010*. Inland Fisheries Ireland.
- Kelly, F.L., Harrison A., Connor, L., Morrissey, E., Wogerbauer, C., Matson, R., Feeney, R., O'Callaghan, R. and Rocks, K. (2011) *Water Framework Directive Fish Stock Survey of Ross Lake, September 2010*. Inland Fisheries Ireland.
- 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.
- NPWS (1999) *Site synopsis: Ross Lake and Woods. Site code: 001312*. Site Synopsis report, National Parks and Wildlife Service.

A series of three overlapping, wavy dotted lines in a light grey color, positioned horizontally across the middle of the page, partially overlapping the dark blue background.

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

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