



**Sampling Fish for the
Water Framework
Directive**

Lakes 2013

Lough Mushlin



Iascach Intíre Éireann
Inland Fisheries Ireland

Water Framework Directive Fish Stock Survey of Lough Mushlin, July 2013

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1.1 Introduction

Lough Mushlin is located in the Erne catchment, situated in the townland of Tunnyduff, in County Cavan, approximately 8km north-west of Bailieborough on the Bailieborough to Cootehill road (Plate 1.1, Fig. 1.1). The lake is situated 190m a.s.l., has a surface area of 4.3ha, mean depth >4m, maximum depth of 2.2m and falls into typology class 1 (as designated by the EPA for the Water Framework Directive), i.e. shallow (<4m), less than 50ha and low alkalinity (<20mg/l CaCO₃).

Lough Mushlin was previously surveyed in 2010 as part of the WFD surveillance monitoring programme (Kelly *et al.*, 2011a and b). During this survey perch was the most abundant fish species recorded. Rudd and brown trout were also present.



Plate 1.1. Lough Mushlin

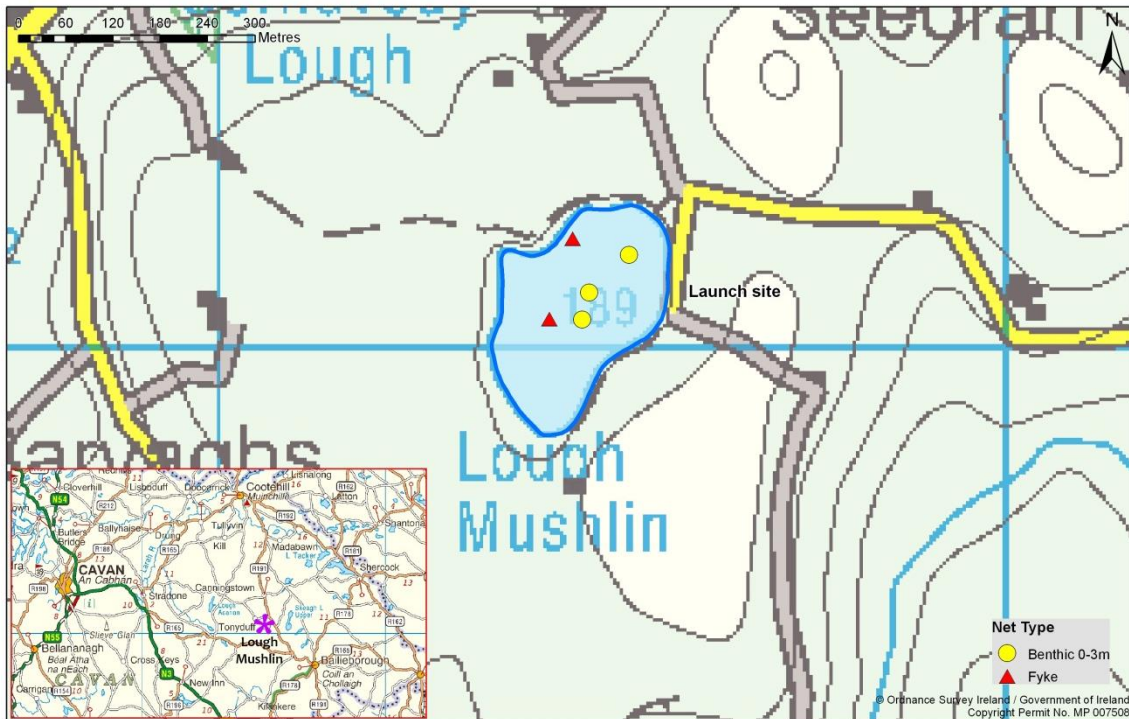


Fig. 1.1. Location map of Lough Mushlin showing net locations and depths of each net

1.2 Methods

Lough Mushlin was surveyed over one night on the 1st of July 2013. A total of two sets of Dutch fyke nets and three benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (3 @ 0-2.9m) were deployed randomly in the lake (5 sites). Nets were deployed in the same locations as were randomly selected in the previous survey. 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. 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 two fish species were recorded in Lough Mushlin during the July 2013 survey, with 270 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. Brown trout were recorded in 2010 but were not recorded in 2013.

Table 1.1. Number of each fish species captured by each gear type during the survey on Lough Mushlin, July 2013

Scientific name	Common name	Number of fish captured		
		Benthic mono multimesh gill nets	Fyke nets	Total
<i>Perca fluviatilis</i>	Perch	218	21	239
<i>Scardinius erythrophthalmus</i>	Rudd	30	1	31

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 biomass (BPUE), followed by rudd. Although the mean perch CPUE was higher in 2013 than in 2010 and BPUE was lower in 2013 than in 2010, these differences were not statistically significant (Table 1.2; Fig 1.2 and 1.3). The mean rudd CPUE and BPUE was lower in 2013 than in 2010, 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 Lough Mushlin, 2010 and 2013

Scientific name	Common name	2010	2013
		Mean CPUE	
<i>Perca fluviatilis</i>	Perch	1.436 (0.745)	1.523 (0.599)
<i>Scardinius erythrophthalmus</i>	Rudd	0.450 (0.183)	0.203 (0.084)
<i>Salmo trutta</i>	Brown trout	0.006 (0.006)	-
		Mean BPUE	
<i>Perca fluviatilis</i>	Perch	41.316 (18.378)	23.927 (9.915)
<i>Scardinius erythrophthalmus</i>	Rudd	54.466 (22.624)	22.320 (12.336)
<i>Salmo trutta</i>	Brown trout	0.973 (0.973)	-

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.

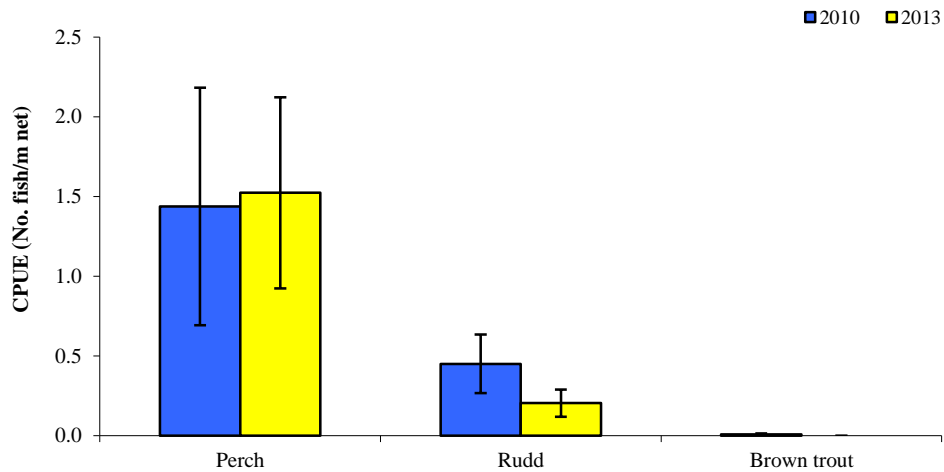


Fig. 1.2. Mean (\pm S.E.) CPUE for all fish species captured on Lough Mushlin, 2010 and 2013 (Eel CPUE based on fyke nets only)

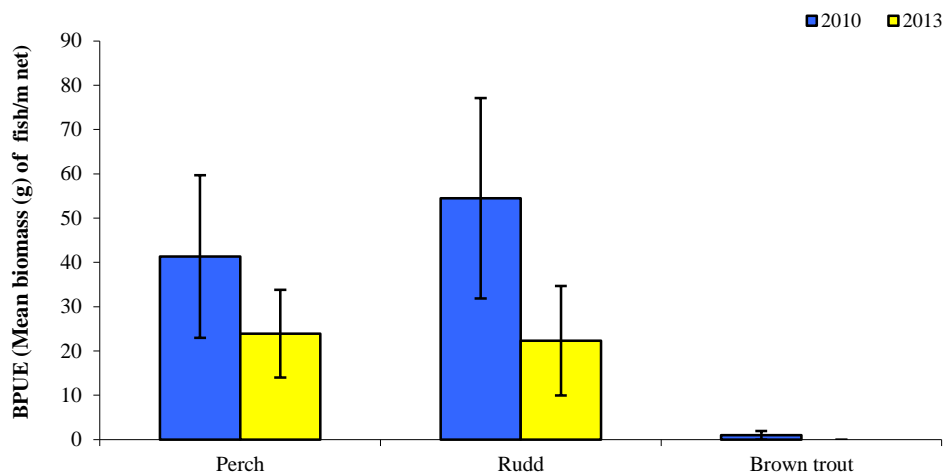


Fig. 1.3. Mean (\pm S.E.) BPUE for all fish species captured in Lough Bane (Eel BPUE based on fyke nets only), 2010 and 2013

1.3.3 Length frequency distributions and growth

Perch captured during the 2013 survey ranged in length from 4.9cm to 25.5cm (mean = 8.8cm) (Fig. 1.4) with seven age classes present, ranging from 1+ to 7+, with a mean L1 of 6.0cm (Table 1.3). The dominant age class was 1+ (Fig 1.4). Perch captured during the 2010 survey ranged in length from 4.3cm to 26.0cm (Fig. 1.4) with nine age classes present, ranging from 0+ to 8+. The dominant age class was 0+ which corresponded to the 4cm to 5cm length class (Fig 1.4).

Rudd captured during the 2013 survey ranged in length from 9.5cm to 26.0cm (mean = 16.3cm) (Fig. 1.5), with five age classes present, ranging from 2+ to 7+, with a mean L1 of 3.5cm (Table 1.4). The dominant age class was 2+ (Fig 1.5). Rudd captured during the 2010 survey ranged in length from 6.0cm to 28.4cm (mean = 17.6cm) (Fig. 1.5) with eight age classes present, ranging from 1+ to 8+. The dominant age class was 4+ (Fig 1.5).

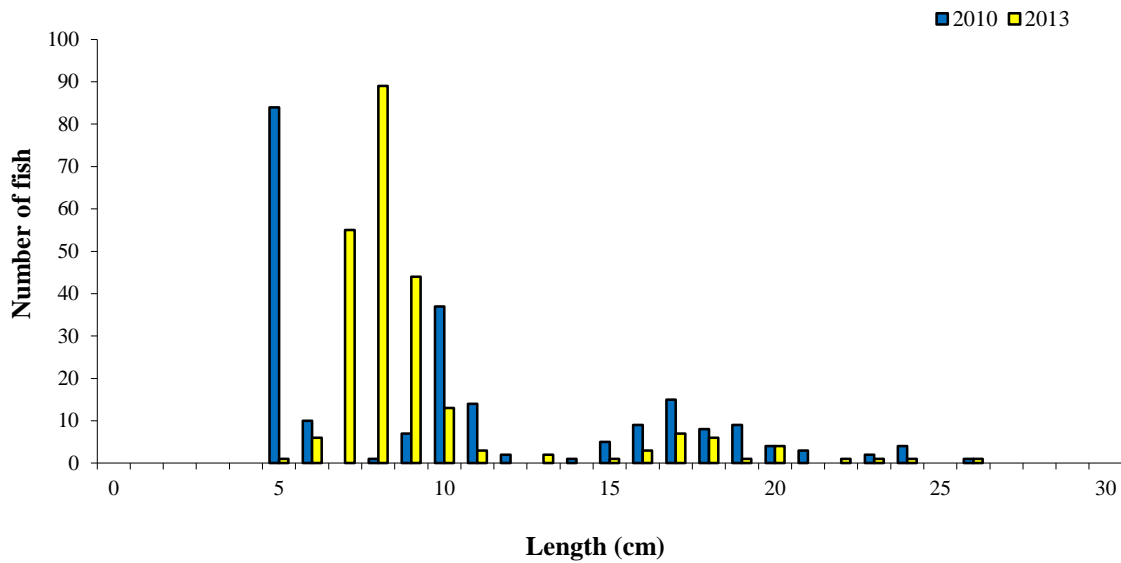


Fig. 1.4. Length frequency of perch captured in Lough Mushlin, 2010 and 2013

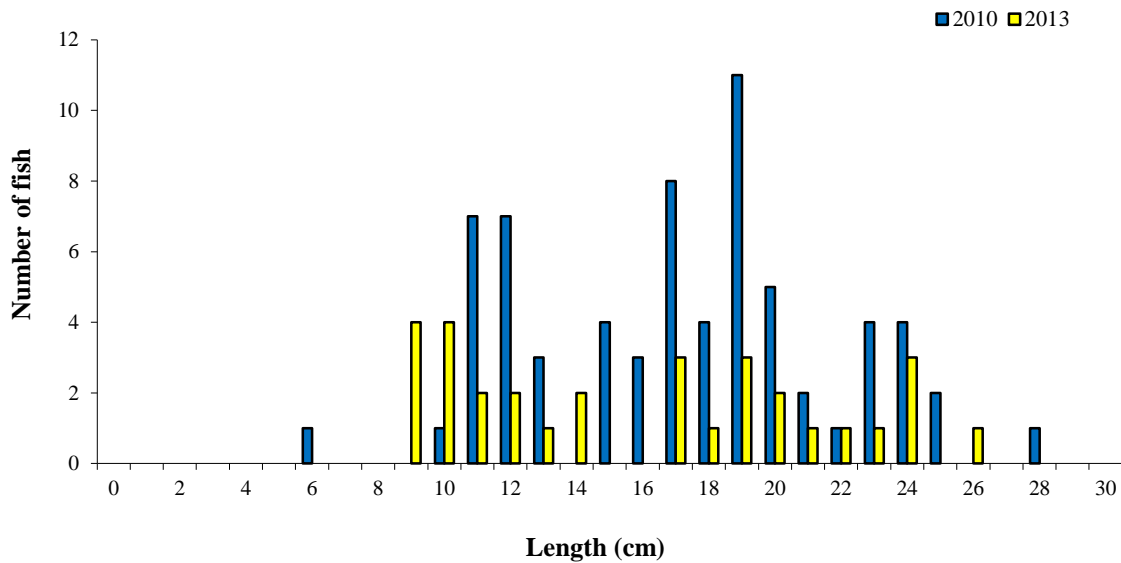


Fig. 1.5. Length frequency of rudd captured in Lough Mushlin, 2010 and 2013

Table 1.3. Mean (\pm SE) perch length (cm) at age in Lough Mushlin, July 2013

	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇
Mean	6.0 (0.1)	11.0 (0.2)	15.7 (0.2)	18.6 (0.5)	20.4 (1.7)	21.8 (3.0)	21.6
N	48	25	22	9	3	2	1
Range	4.1-7.9	9.6-13.3	13.6-17.5	15.7-20.7	17.2-23.1	18.7-24.8	21.6-21.6

Table 1.4. Mean (\pm SE) rudd length (cm) at age for Lough Mushlin, July 2013

	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇
Mean	3.5 (0.2)	7.5 (0.2)	12.0 (0.3)	16.1 (0.5)	18.3 (0.4)	20.6 (0.6)	22.6 (0.7)
N	31	31	23	16	16	12	6
Range	2.1-5.8	5.2-11.1	9.5-17.2	13.7-20.3	16.1-21.0	17.7-24.3	19.6-24.2

1.4 Summary

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

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

Although the mean rudd CPUE and BPUE was lower in 2013 than in 2010, these differences were also not statistically significant. Rudd ranged in age from 2+ to 7+, indicating reproductive success in six of the previous eight years. However, no 0+ or 1+ fish were recorded. The dominant age class was 2+.

1.5 References

- Kelly, F.L., Harrison A., Connor, L., Morrissey, E., Wogerbauer, C., Matson, R., Feeney, R., O'Callaghan, R. and Rocks, K. (2011a) *Water Framework Directive Fish Stock Survey of Lough Mushlin, July 2010*. Inland Fisheries Ireland.
- Kelly, F., Harrison A., Connor, L., Matson, R., Morrissey, E., Wogerbauer, C., Feeney, R., O'Callaghan, R. and Rocks, K. (2011b) *Sampling Fish for the Water Framework Directive – Summary Report 2010*. Inland Fisheries Ireland.

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