Sampling Fish for the Water Framework Directive

Lakes 2010

Lough Mushlin

Iascach Intíre Éireann
Inland Fisheries Ireland

ACKNOWLEDGEMENTS

1.1 Introduction

Lough Mushlin (Plate 1.1, Fig. 1.1) 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. 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 $CaCO_3$).
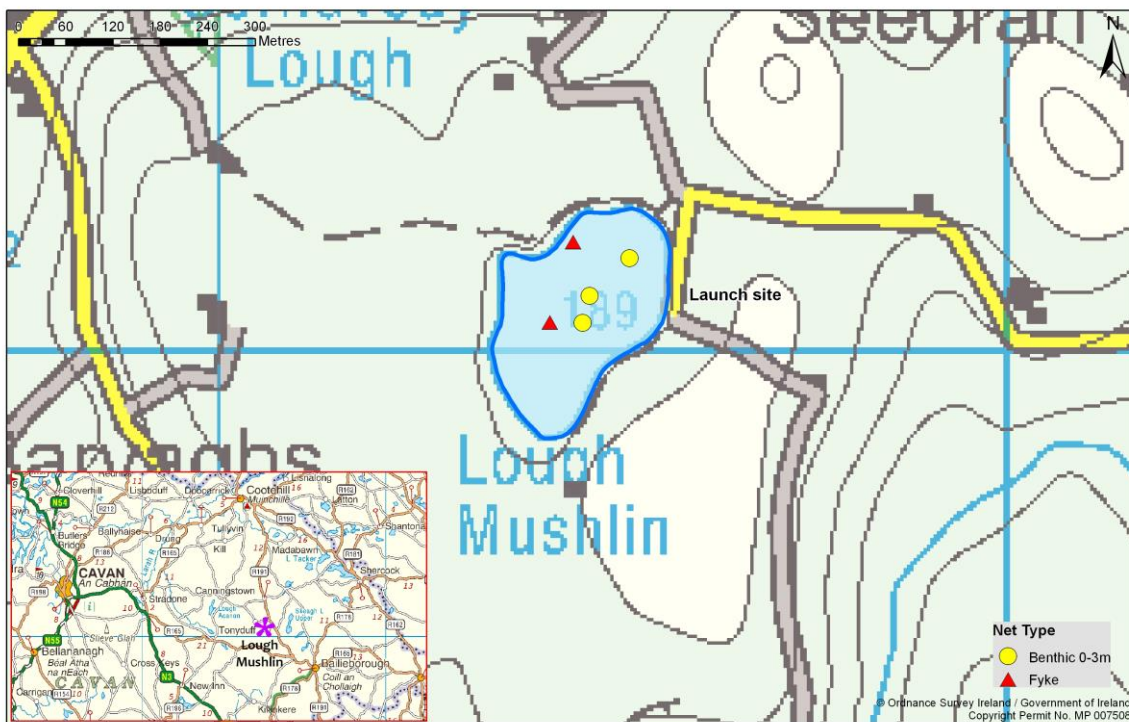

Plate 1.1. Lough Mushlin

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 21st of July 2010. 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). Survey locations were randomly selected within each depth zone using a grid placed over a map of the lake. 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 brown trout. 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 three fish species were recorded in Lough Mushlin during the July 2010 survey, with 285 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. A single brown trout was also captured.

Table 1.1. Number of each fish species captured by each gear type during the survey on Lough Mushlin, July 2010

Scientific name	Common name	Number of fish captured		
		Benthic mono multimesh gill nets	Fyke nets	Total
Perca fluviatilis	Perch	215	1	216
Scardinius erythrophthalmus	Rudd	67	1	68
Salmo trutta	Brown trout	1	0	1

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 are summarised in Table 1.2.

The differences in the mean perch CPUE between Lough Mushlin and three other similar lakes were assessed with no significant differences being identified (Fig. 1.2).

The differences in the mean rudd CPUE between Lough Mushlin and four other similar lakes were assessed and found to be statistically significant (Kruskal-Wallis, $P<0.001$) (Fig. 1.3). Independent-Samples Mann-Whitney U tests between each lake showed that Lough Mushlin had a significantly higher mean rudd CPUE than Lough Rea ($z = -3.278$, $P<0.05$).

Table 1.2. Mean (S.E.) CPUE and BPUE in Lough Mushlin

Scientific name	Common name	
		Mean (S.E.) CPUE
Perca fluviatilis	Perch	1.436 (0.745)
Scardinius erythrophthalmus	Rudd	0.450 (0.183)
Salmo trutta	Brown trout	0.006 (0.006)
		Mean (S.E.) BPUE
Scardinius erythrophthalmus	Rudd	54.466 (22.624)
Perca fluviatilis	Perch	41.316 (18.378)
Salmo trutta	Brown trout	0.973 (0.973)

* On the rare occasion where biomass data was unavailable for an individual fish, this was determined from a length/weight regression for that species.
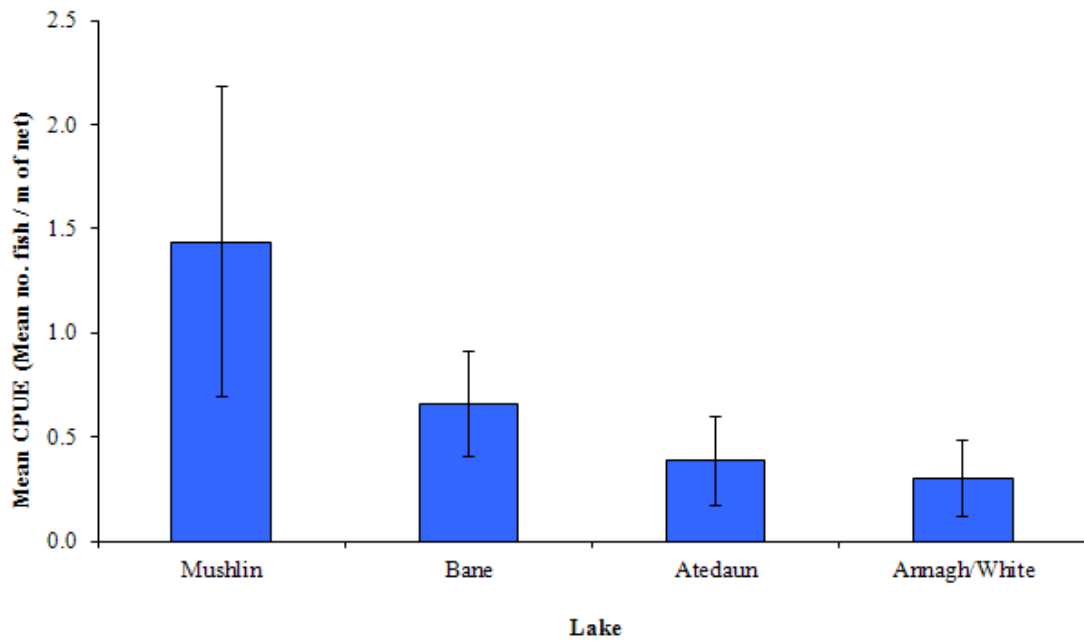
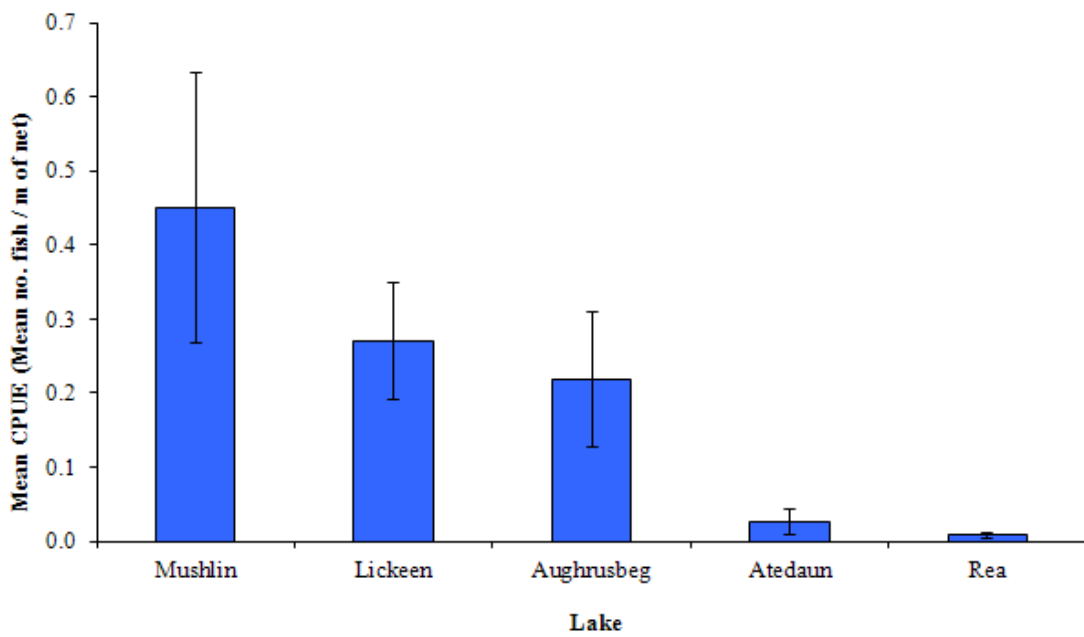**Fig. 1.2. Mean (±S.E.) perch CPUE in four lakes surveyed during 2010**

Fig. 1.3. Mean (±S.E.) rudd CPUE in five lakes surveyed during 2010

1.3.3 Length frequency distributions

Perch ranged in length from 4.3cm to 26.0cm (mean = 9.8cm) (Fig. 1.4). Rudd ranged in length from 6.0cm to 28.4cm (mean = 17.6cm) (Fig. 1.5). The single brown trout captured measured 24.0cm in length.
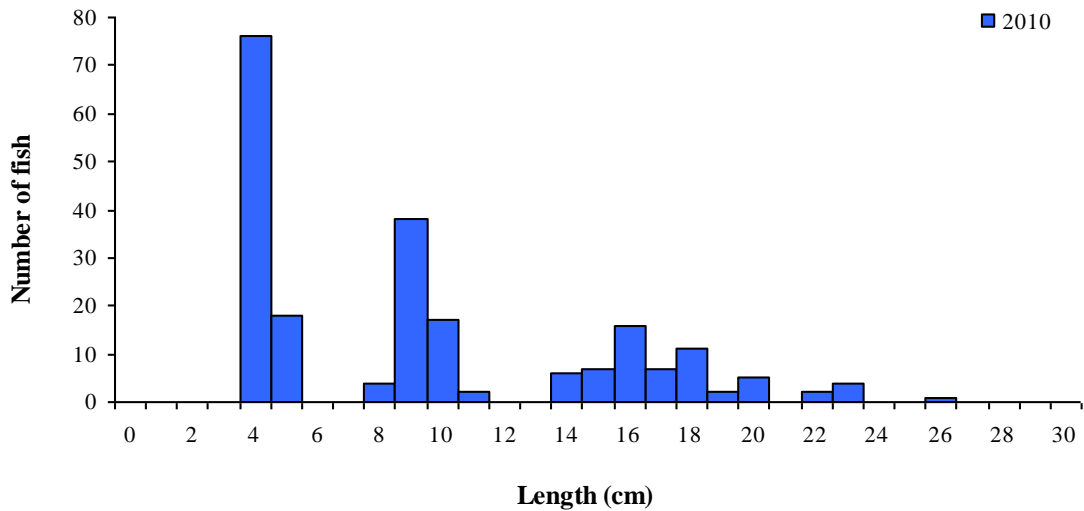
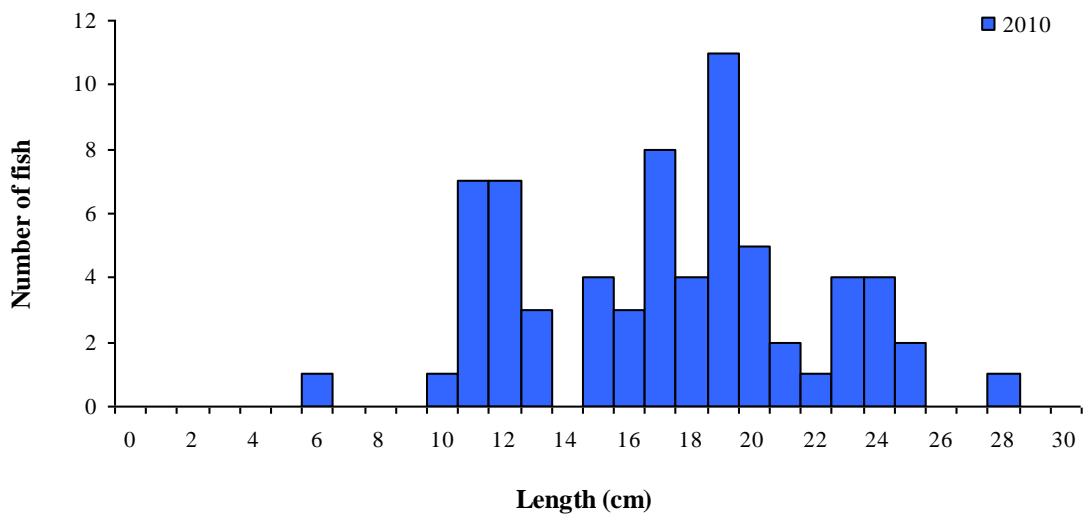**Fig. 1.4. Length frequency of perch captured in Lough Mushlin**

Fig. 1.5. Length frequency of rudd captured in Lough Mushlin

1.3.4 Fish age and growth

Nine age classes of perch were present, ranging from 0+ to 8+, with a mean L1 of 5.6cm (Table 1.3). The dominant age class was 0+ which corresponded to the 4cm to 5cm length class (Fig. 1.4).

Eight age classes of rudd were present, ranging from 1+ to 8+, with a mean L1 of 3.9cm (Table 1.4). The single brown trout captured was aged 2+.

Table 1.3. Mean (±SE) perch length (cm) at age in Lough Mushlin, July 2010

	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8
Mean	5.6 (0.1)	10.8 (0.2)	14.4 (0.2)	16.7 (0.2)	19.3 (0.6)	20.5 (0.8)	22.3 (0.3)	24.1
N	61	45	36	33	8	5	3	1
Range	4.2-7.2	9.2-12.7	12.0-17.2	14.6-19.9	16.4-21.7	18.5-22.9	21.9-22.9	24.1-24.1

Table 1.4. Mean (±SE) rudd length (cm) at age for Lough Mushlin, July 2010

	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8
Mean	3.9	9.0	13.8	17.3	19.9	22.6	24.2	23.3
N	53	52	40	35	16	11	4	1
Range	2.4-5.8	6.6-11.8	12.1-16.5	15.2-19.5	17.1-22.1	20.6-23.8	21.9-25.9	23.3-23.3

1.4 Summary

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

The mean perch CPUE in Lough Mushlin was relatively high when compared to the three other similar lakes assessed; however, this was not statistically significant. The dominant age class of perch was 0+. Perch ranged in age from 0+ to 8+, indicating reproductive success in each of the previous nine years.

The mean rudd CPUE in Lough Mushlin was significantly higher than Lough Rea, but not so for the other three similar lakes surveyed. Rudd ranged in age from 1+ to 8+, indicating reproductive success in eight of the previous nine years. However, no 0+ fish were recorded.

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. Using the FIL2 classification tool, Lough Mushlin has been assigned an ecological status of Poor/Bad based on the fish populations present.

1.5 References

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.

Inland Fisheries Ireland
Swords Business Campus,
Swords,
Co. Dublin,
Ireland.

Web: www.fisheriesireland.ie
Email: info@fisheriesireland.ie
Tel: +353 1 8842 600
Fax: +353 1 8360 060