

Muckno Lough



Sampling Fish for the Water Framework Directive - Lakes 2009



The Central and Regional
Fisheries Boards

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1.1 Introduction

Muckno Lough (Plate 1.1, Fig. 1.1) is located within the Muckno Leisure Park on the eastern side of the town of Castleblaney, Co. Monaghan. The lake has a surface area of 316ha, a mean depth of >4m and a maximum depth of 20m. The lake is categorised as typology class 8 (as designated by the EPA for the purposes of the Water Framework Directive), i.e. deep (>4m), greater than 50ha and moderately alkaline (20-100mg/l CaCo₃).

Muckno Lough has been classed as 1a (i.e. at risk of failing to meet good status by 2015) in the WFD Characterization report (EPA, 2005). The lake is designated as a Natural Heritage Area and is described as being highly eutrophic (Monaghan County Council, 2007). There was an algal bloom on the lake at the time of the current survey, along with evidence of previous algal blooms observed on the shore line (Plates 1.2 and 1.3). Algal blooms regularly occur in the lake and have done so for many years. Flanagan and Toner (1975) reported algal blooms on the lake during 1972, 1973 and 1974, stating that it was a highly eutrophic system.

Fishing on Muckno Lough is very popular, with good stocks of various species, including bream, rudd, roach, roach x bream hybrids, tench, perch and pike (IFI, 2010). The lake has also historically contained a stock of brown trout (Flanagan and Toner, 1975; Paddy Green ERFB, *pers. comm.*). A fish stock survey carried out in September 1968 revealed that bream, rudd, perch, tench, pike and brown trout were present in the lake, with brown trout up to 1800g being captured (Inland Fisheries Trust, unpublished data). The lake was surveyed again during 2006 by the Central and Eastern Regional Fisheries Boards. This survey demonstrated that roach was the dominant species in the lake followed by perch, roach x bream hybrids, eel, bream, pike and gudgeon (Kelly *et al.*, 2007).



Plate 1.1. Muckno Lough

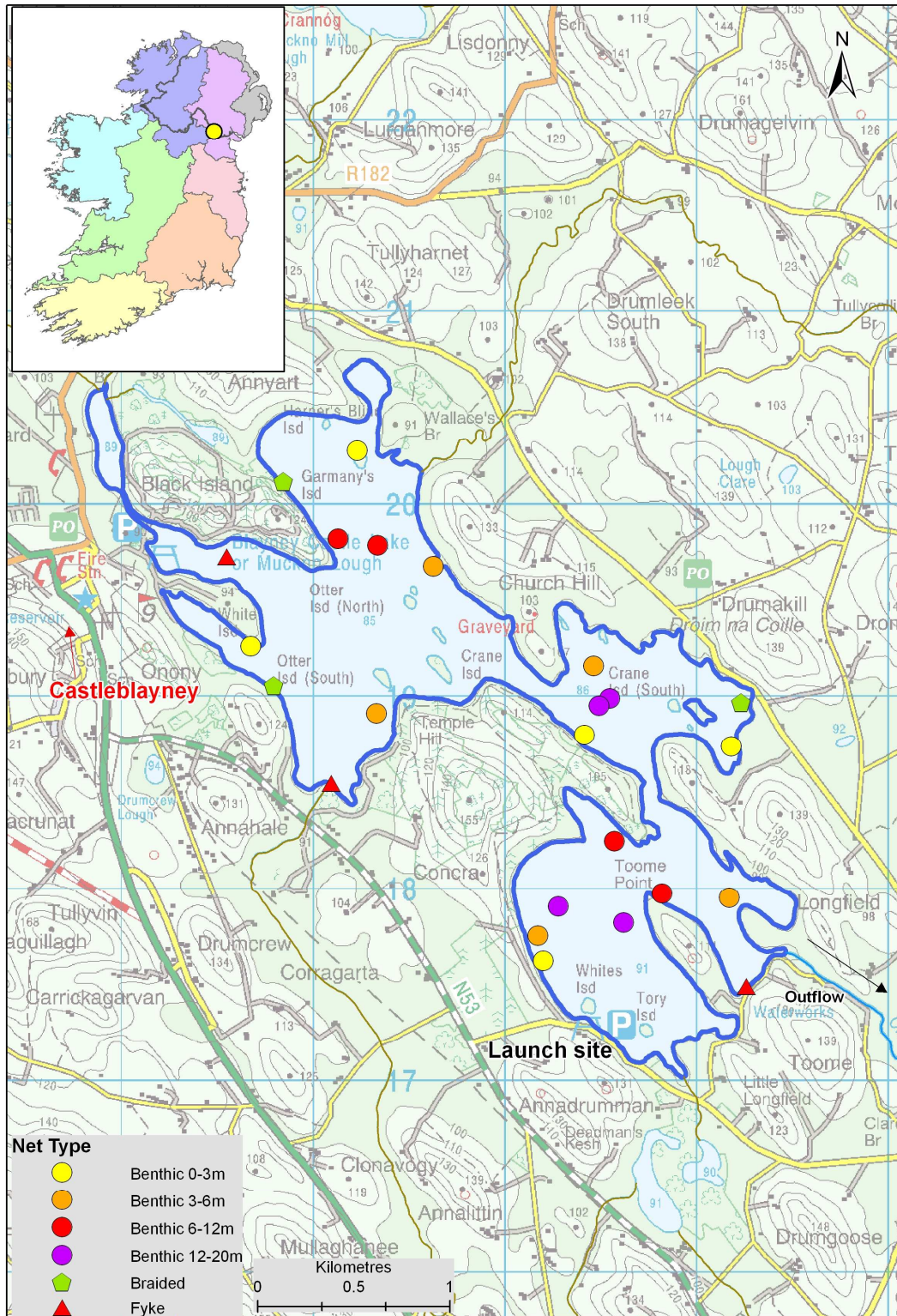


Fig. 1.1. Location map of Muckno Lough showing locations and depths of each net (outflow is indicated on map)



Plate 1.2. An algal bloom on Muckno Lough, September 2009



Plate 1.3. Evidence of algal bloom on the shore line of Muckno Lough, September 2009

1.2 Methods

Muckno Lough was surveyed over three nights between the 28th of September and the 1st of October 2009. A total of three sets of Dutch fyke nets and 18 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (5 @ 0-2.9m, 5 @ 3-5.9m, 4 @ 6-11.9m and 4 @ 12-19.9) were deployed in the lake (21 sites). The netting effort was supplemented using three benthic braided survey gill nets (62.5mm mesh knot to knot) at three additional 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 randomized.

All fish apart from perch were measured and weighed on site and scales were removed from all roach, pike, bream 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 six fish species and one type of hybrid were recorded in Muckno Lough during the survey, with 680 fish being captured (Table 1.1). Perch was the most abundant fish species recorded, followed by roach and roach x bream hybrids. Small numbers of bream, pike and gudgeon were also recorded. A previous survey in 2006 (Kelly *et al.*, 2007) found the same species composition in the lake; however, roach were the dominant species recorded in 2006 followed by perch. The numbers of fish captured were similar in both 2006 (n=680) and 2009 (n=698).

Table 1.1. List of fish species recorded (including numbers captured) during the survey on Muckno Lough, September/October 2009

Scientific name	Common name	Number of fish captured			
		Benthic mono multimesh gill nets	Benthic braided gill nets	Fyke nets	Total
<i>Perca fluviatilis</i>	Perch	381	0	0	381
<i>Rutilus rutilus</i>	Roach	182	0	0	182
<i>Rutilus rutilus x Abramis brama</i>	Roach x bream hybrid	66	1	0	67
<i>Abramis brama</i>	Bream	17	3	0	20
<i>Esox lucius</i>	Pike	11	3	3	17
<i>Gobio gobio</i>	Gudgeon	10	0	0	10
<i>Anguilla anguilla</i>	European eel	0	0	3	3

1.3.2 Fish abundance

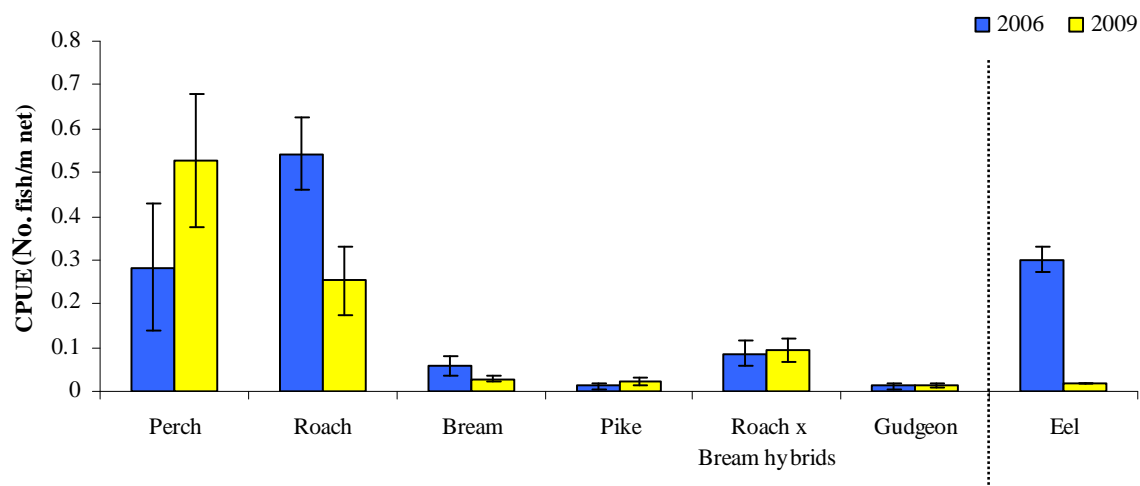
Fish abundance (mean CPUE) and biomass (mean BPUE) were calculated as the mean number/weight of fish caught per metre of net. For all fish species except eel, CPUE/BPUE is based on all nets, whereas eel CPUE/BPUE is based on fyke nets only. Mean CPUE and BPUE for all fish species are summarised in Table 1.2. Perch CPUE has increased from 2006 to 2009, whereas roach CPUE has decreased from 2006 to 2009 (Table 1.2; Fig. 1.2).

Statistical analyses (Mann Whitney U test) were conducted to assess the differences in CPUE of perch and roach from 2006 to 2009, with no significant differences being found. The differences in the mean perch CPUE between Muckno Lough and two other similar lakes were assessed and found not to be statistically significant (Fig. 1.3). There were also no significant differences detected in the mean roach CPUE between Muckno Lough and two other similar lakes (Fig. 1.4).

Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Muckno Lough, 2006 and 2009

Scientific name	Common name	2006	2009
Mean CPUE			
<i>Perca fluviatilis</i>	Perch	0.282 (0.082)	0.529 (0.152)
<i>Rutilus rutilus</i>	Roach	0.542 (0.145)	0.253 (0.078)
<i>Esox lucius</i>	Pike	0.012 (0.007)	0.022 (0.007)
<i>Rutilus rutilus x Abramis brama</i>	Roach x bream hybrid	0.087 (0.028)	0.093 (0.026)
<i>Abramis brama</i>	Bream	0.060 (0.022)	0.028 (0.008)
<i>Gobio gobio</i>	Gudgeon	0.011 (0.008)	0.014 (0.005)
<i>Anguilla anguilla</i>	European eel	0.300 (0.029)	0.017 (0.000)
Mean BPUE			
<i>Abramis brama</i>	Bream	8.649 (3.492)	9.035 (4.529)
<i>Perca fluviatilis</i>	Perch	17.950 (5.128)	28.416 (7.781)
<i>Rutilus rutilus</i>	Roach	28.821 (7.950)	19.653 (6.357)
<i>Esox lucius</i>	Pike	23.312 (14.509)	31.906 (12.701)
<i>Rutilus rutilus x Abramis brama</i>	Roach x bream hybrid	19.091 (9.010)	18.777 (6.023)
<i>Gobio gobio</i>	Gudgeon	0.057 (0.041)	0.097 (0.038)
<i>Anguilla anguilla</i>	European eel	130.394 (12.683)	2.178 (0.471)

* In 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 on Muckno Lough (Eel CPUE based on fyke nets only)**

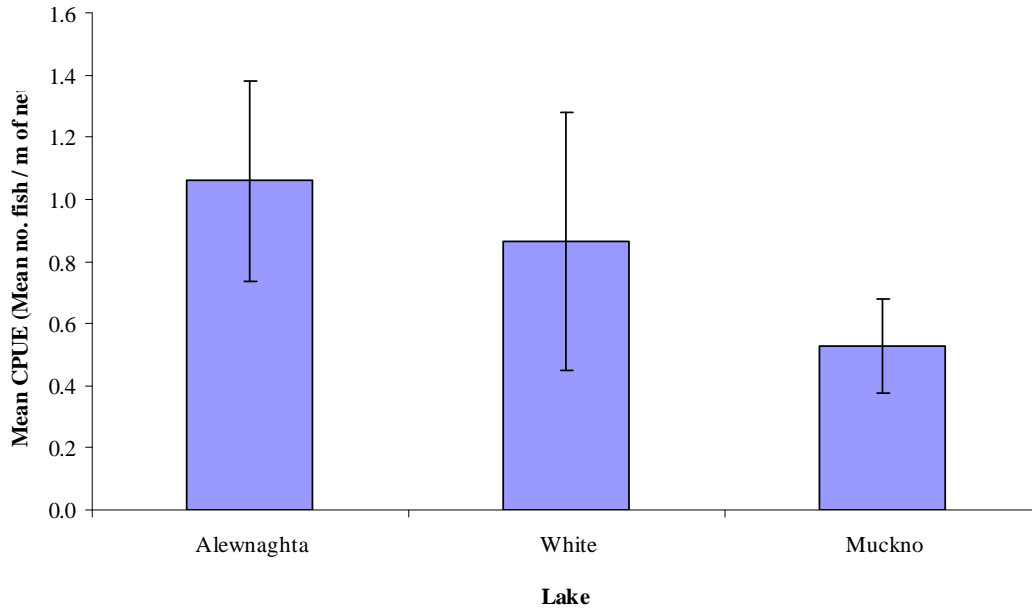


Fig. 1.3. Mean (\pm S.E.) perch CPUE in three lakes surveyed during 2009

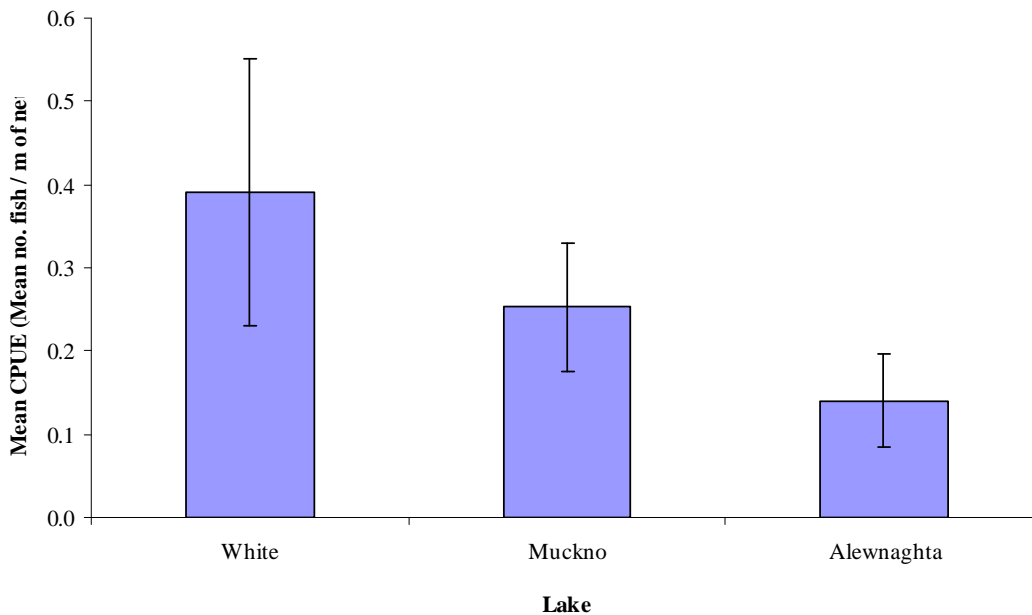


Fig. 1.4. Mean (\pm S.E.) roach CPUE in three lakes surveyed during 2009

1.3.3 Length frequency distributions

Perch ranged in length from 5.0cm to 28.6cm (mean = 13.4cm) (Fig. 1.5). Perch from the 2006 survey had similar lengths, ranging from 5.0cm to 31.0cm (Fig. 1.5) (Kelly *et. al.*, IN PREP). Roach ranged in length from 4.7cm to 26.4cm (mean = 15.8cm) (Fig.1.6). Roach from the 2006 survey also had similar lengths ranging from 4.5cm to 26.0cm (Fig. 1.6) (Kelly *et. al.*, IN PREP). Roach x bream

hybrids ranged in length from 7.5cm to 36.0cm (mean = 19.6cm) (Fig.1.7). Bream ranged in length from 11.1cm to 40.7cm. Eels ranged in length from 36.0cm to 47.0cm and pike ranged in length from 14.8cm to 84.0cm.

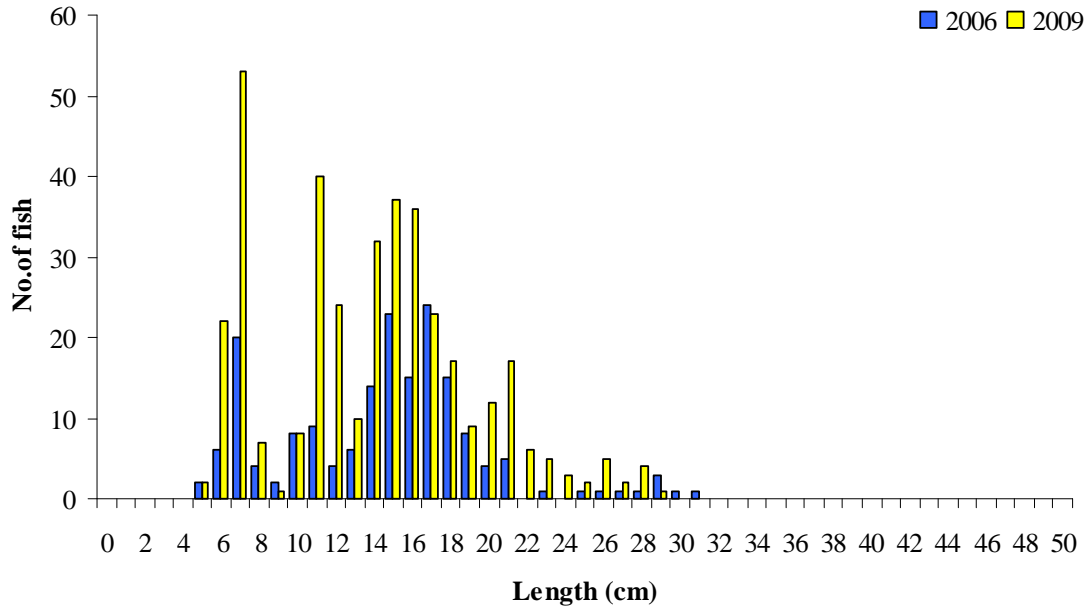


Fig. 1.5. Length frequency of perch captured on Muckno Lough

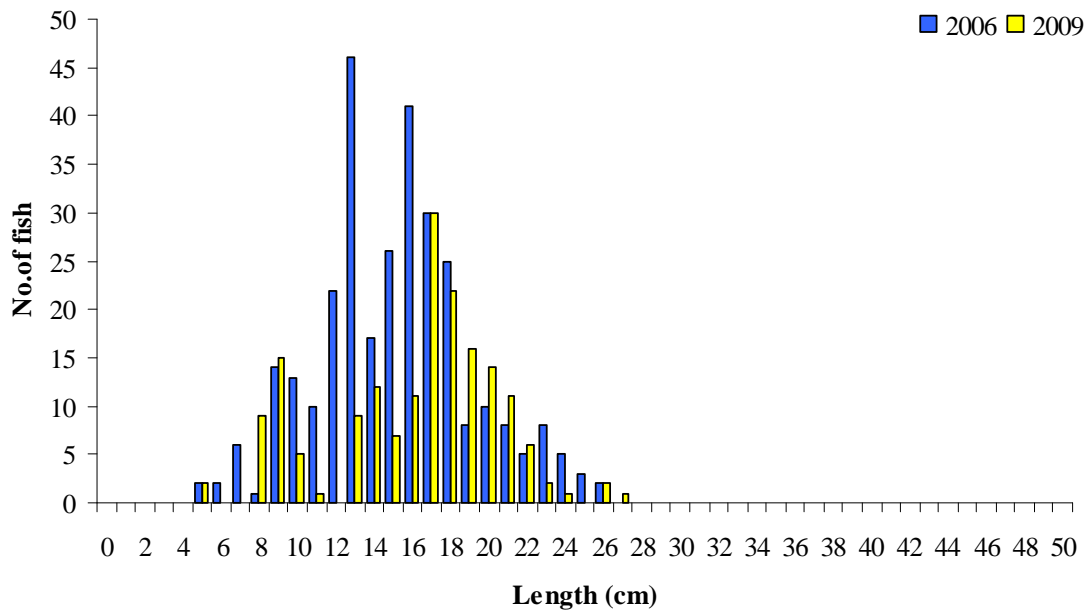


Fig. 1.6. Length frequency of roach captured on Muckno Lough

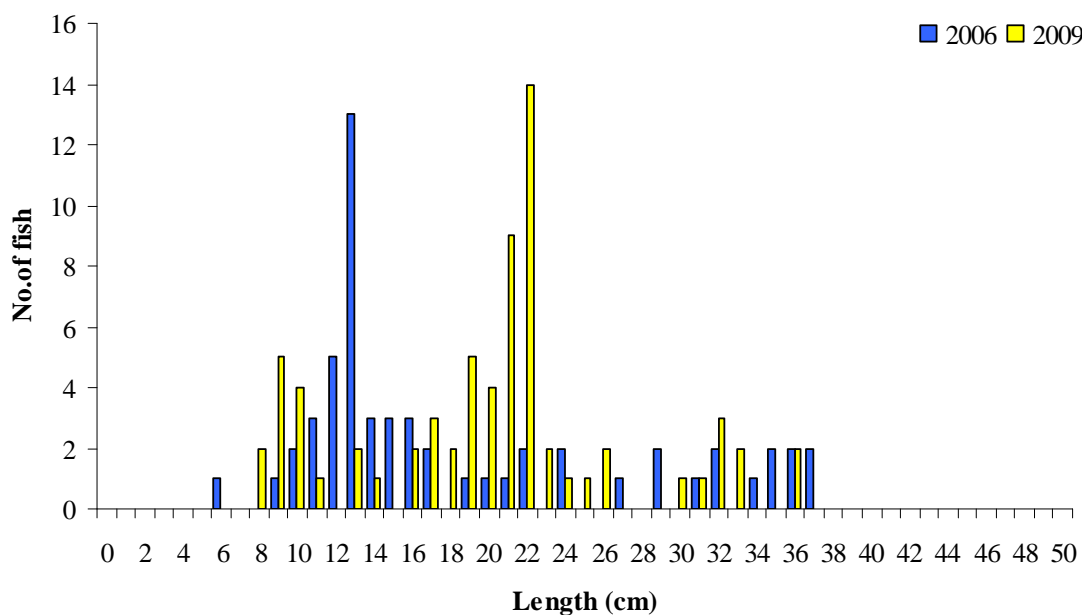


Fig. 1.7. Length frequency of roach x bream hybrids captured on Muckno Lough

1.3.4 Fish age and growth

Eight age classes of perch were present, ranging from 0+ to 7+, with a mean L1 of 5.4cm (Table 1.3). In the 2006 survey, perch ranged from 0+ to 7+ with a mean L1 of 5.7cm (Kelly *et al.*, 2007).

Nine age classes of roach were present, ranging from 1+ to 11+, with a mean L1 of 3.2cm (Table 1.4). In the 2006 survey, roach ranged in age from 1+ to 8+ with a mean L1 of 3.2cm (Kelly *et al.*, 2007).

Eleven age classes of roach x bream hybrids were present, ranging from 1+ to 11+. Seven age classes of bream were present, ranging from 2+ to 12+, similar to the 2006 survey where they ranged from 1+ to 11+ (Kelly *et al.*, 2007). Nine age classes of pike were present, ranging from 1+ to 9+.

Table 1.3. Mean (\pm SE) perch length at age for Muckno Lough, September/October 2009

	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇
Mean	5.4 (0.7)	10.6 (0.2)	14.8 (0.3)	17.8 (0.4)	21.1 (0.6)	24.7 (0.6)	25.6
N	118	96	65	29	23	4	1
Range	3.8-7.1	6.5-13.8	10.5-18.9	14.4-22.7	16.5-27.1	23.0-25.7	25.6-25.6

Table 1.4. Mean (\pm SE) roach length at age for Muckno Lough, September/October 2009

	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇	L ₈	L ₉	L ₁₀	L ₁₁
Mean	3.2 (0.1)	7.4 (0.2)	11.3 (0.3)	14.4 (0.4)	16.9 (0.4)	19.0 (0.4)	19.8 (0.8)	22.1 (0.9)	23.2 (0.8)	24.2 (0.4)	25.1 (0.4)
N	51	44	36	23	20	14	5	3	3	2	2
Range	1.9- 4.5	4.4- 10.4	7.6- 14.5	10.8- 17.5	13.3- 18.9	17.1- 21.6	18.7- 22.8	20.9- 23.7	21.8- 24.7	23.7- 24.5	24.7- 25.4

1.4 Summary

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

The mean perch CPUE in Muckno Lough was relatively low when compared to other similar lakes; however, these differences were not statistically significant. Perch ranged in age from 0+ to 7+, indicating reproductive success in each of the previous seven years.

The mean roach CPUE in Muckno Lough was comparable to other similar lakes surveyed. Roach ranged in age from 1+ to 11+, indicating reproductive success in the last number of 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 WFD multimetric fish classification tool has been developed for the island of Ireland (Ecoregion 17) using CFB and Agri-Food and Biosciences Northern Ireland (AFBINI) data generated during the NSSHARE Fish in Lakes project (Kelly *et al.*, 2008). Using this tool, Muckno Lough has been assigned an ecological status classification of Poor based on the fish populations present.

The EPA has assigned an overall status of Bad to Muckno Lough in an interim draft classification. This is based on physico-chemical parameters and biotic elements such as macroinvertebrates, macrophytes and fish.

1.5 References

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