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National Research Survey Programme

Lakes 2015

Lough Muckno

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Inland Fisheries Ireland

National Research Survey Programme

Fish Stock Survey of Lough Muckno, September 2015

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

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1.1 Introduction

Muckno Lough is located within the Muckno Leisure Park on the eastern side of the town of Castleblaney, Co. Monaghan (Plate 1.1, Fig. 1.1). 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 in autumn 2009, along with evidence of previous algal blooms observed on the shore line. 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 IFI, *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pike and brown trout were present in the lake, with brown trout up to 1800g being captured (Inland Fisheries Trust, unpublished data).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 also surveyed in 2006, 2009 and 2012, 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 and 2013). In 2006 and 2009 roach and perch respectively were found to be the dominant species, followed by roach x bream hybrids, bream, pike, gudgeon and eel. There was a similar species composition captured in 2012 with perch found to be the most dominant species. Brown trout were captured in the 2012 survey but were not present in the 2009 survey.

Plate 1.1. Lough Muckno

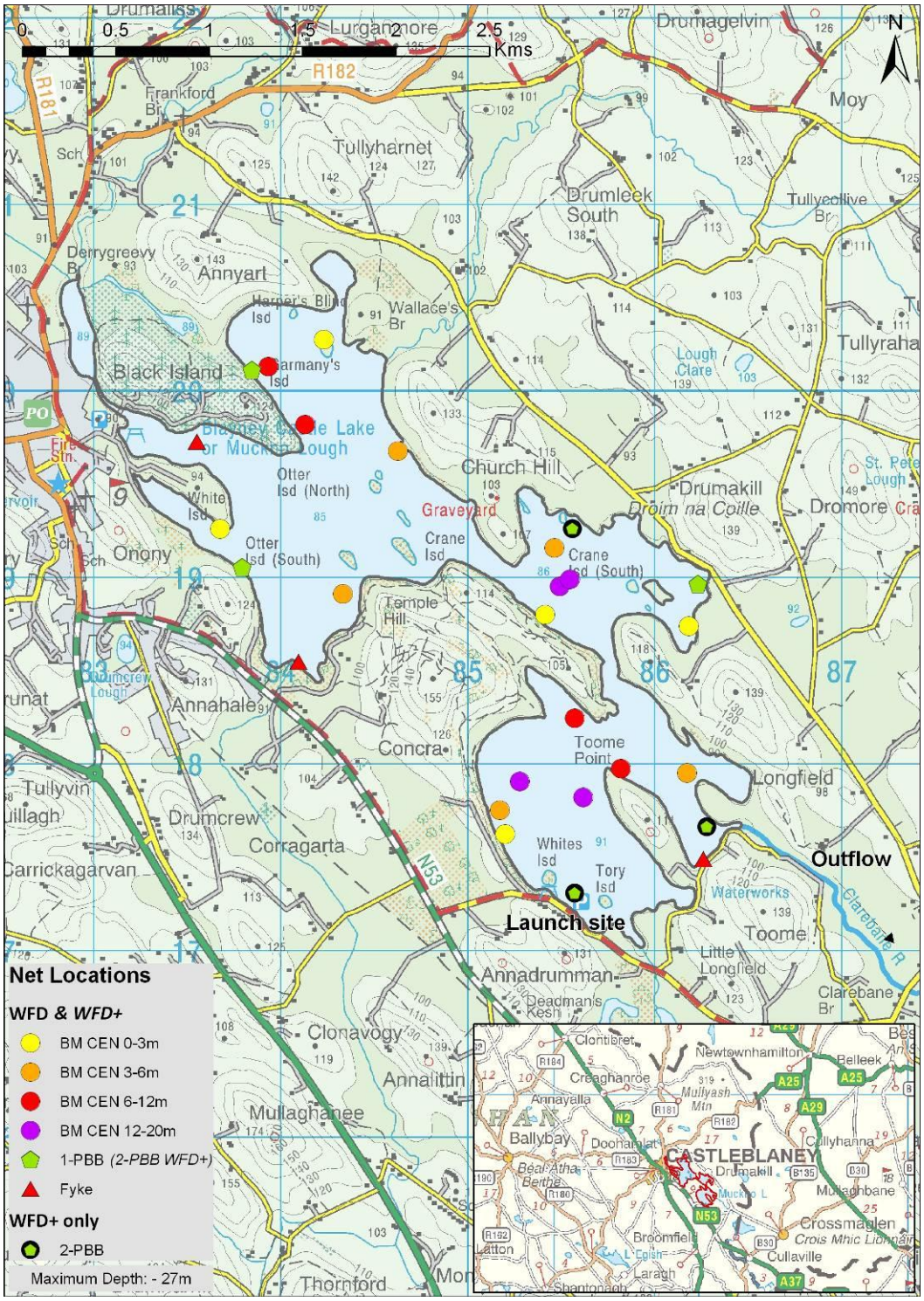

Fig. 1.1. Location map of Lough Muckno showing locations and depths of each net (outflow is indicated on map)

1.2 Methods

1.2.2 Netting methods

Lough Muckno was surveyed over two nights between the 8th and the 10th of September 2015. 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 (BM CEN) (5 @ 0-2.9m, 5 @ 3-5.9m, 4 @ 6-11.9m and 4 @ 12-19.9m) were deployed in the lake (21 sites). The netting effort was supplemented using two-panel benthic braided survey gill nets (2-PBB) (63.5mm and 88.9mm mesh knot to knot) at nine sites (Fig. 1.1).

The survey nets were deployed in the same locations as randomly chosen in the previous surveys. The site locations for the additional benthic braided survey gill nets (2-PBB) were chosen randomly within fixed depth zones. 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 also randomised.

All fish apart from perch were measured and weighed on site and scales were removed from all brown trout, bream, pike, roach 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.

1.2.2 Biosecurity - disinfection and decontamination procedures

Procedures are required for disinfection of equipment in order to prevent dispersal of alien species and other organisms to uninfected waters. A standard operating procedure was compiled by Inland Fisheries Ireland for this purpose (Caffrey, 2010) and is followed by staff on the IFI NRSP team when moving between water bodies.

1.3 Results

1.3.1 Species Richness

A total of seven fish species and one type of hybrid were recorded on Lough Muckno in September 2015, with 2082 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, bream, roach x bream hybrids, eels, pike, gudgeon and brown trout. During the WFD 2009 and 2012 surveys the same species composition was recorded with the exception of brown trout, which were not captured during the 2009 survey but were recorded during the 2012 and 2015 surveys (Kelly *et al*., 2010 and 2013).

Table 1.1. Number of each fish species captured by each gear type during the survey on Lough Muckno, September 2015

Scientific name	Common name	Number of fish captured			
		2-PBB	BM CEN	Fyke	Total
Perca fluviatilis	Perch	0	1367	1	1368
Rutilus rutilus	Roach	0	552	0	552
Abramis brama	Bream	7	65	0	72
Rutilus rutilus x Abramis brama	Roach x bream hybrid	6	50	0	56
Esox Lucius	Pike	3	6	0	9
Gobio gobio	Gudgeon	0	4	0	4
Salmo trutta	Brown trout	0	1	0	1
Anguilla anguilla	European eel	0	1	19	20

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 (WFD and WFD+). 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 during the survey are summarised in Table 1.2. Perch was the dominant fish species in terms of abundance and biomass (Table 1.2).

Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Lough Muckno, 2015

Scientific name	Common name	Mean CPUE (per m of net)**
Perca fluviatilis	Perch	1.688 (0.575)
Rutilus rutilus	Roach	0.681 (0.236)
Abramis brama	Bream	0.085 (0.020)
Rutilus rutilus x Abramis brama	Roach x bream hybrid	0.066 (0.020)
Esox Lucius	Pike	0.009 (0.004)
Salmo trutta	Brown trout	0.001 (0.001)
Anguilla Anguilla	European eel	0.106 (0.045)
		Mean BPUE (per m of net)**
Perca fluviatilis	Perch	27.725 (7.119)
Rutilus rutilus	Roach	23.127 (6.885)
Abramis brama	Bream	11.950 (2.958)
Rutilus rutilus x Abramis brama	Roach x bream hybrid	14.342 (4.510)
Esox Lucius	Pike	19.230 (8.047)
Salmo trutta	Brown trout	0.198 (0.198)
Anguilla anguilla	European eel	20.475 (9.566)

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. **CPUE and BPUE data above for all fish species except eels are not comparable to earlier surveys as an extra panel was added to the 2-PBB to provide additional information on large coarse fish.

1.3.3 Length frequency distributions and growth

Perch

Perch captured during the 2015 survey ranged in length from 4.1cm to 34.4cm (mean = 7.5cm) (Fig.1.2) with nine age classes present, ranging from 0+ to 8+ with a mean L1 of 6.0cm (Table 1.3). The dominant age class was 0+ (Fig. 1.2).

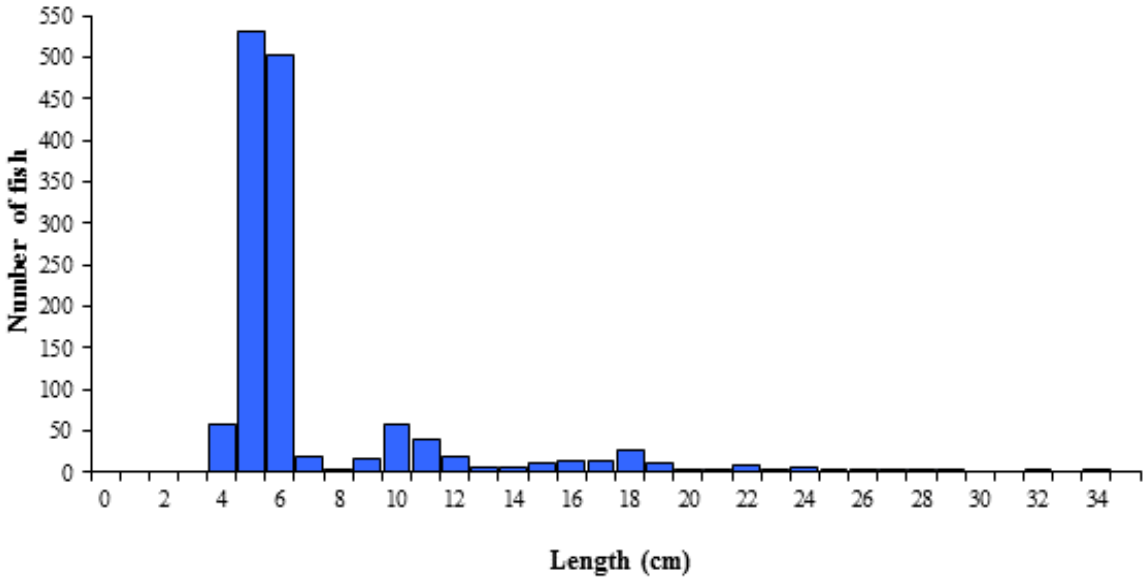

Fig. 1.2. Length frequency of perch captured on Lough Muckno, 2015

Table 1.3. Mean (±S.E.) perch length (cm) at age for Lough Muckno, September 2015

	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8
Mean (±S.E.)	6.0 (0.2)	10.9 (0.3)	16.6 (0.4)	20.9 (0.5)	23.8 (0.6)	26.1 (0.4)	29.1 (1.7)	34.0
N	54	41	31	16	11	5	2	1
Range	3.9-8.5	8.3-17.3	13.0-22.2	18.0-24.8	21.6-27.7	25.0-27.3	27.3-30.9	34.0-34.0

Roach

Roach captured during the 2015 survey ranged in length from 4.0cm to 24.0cm (mean = 11.9cm) (Fig.1.3) with eleven age classes present, ranging from 0+ to 10+ with a mean L1 of 2.9cm (Table 1.4). The dominant age class was 3+ (Fig. 1.3).

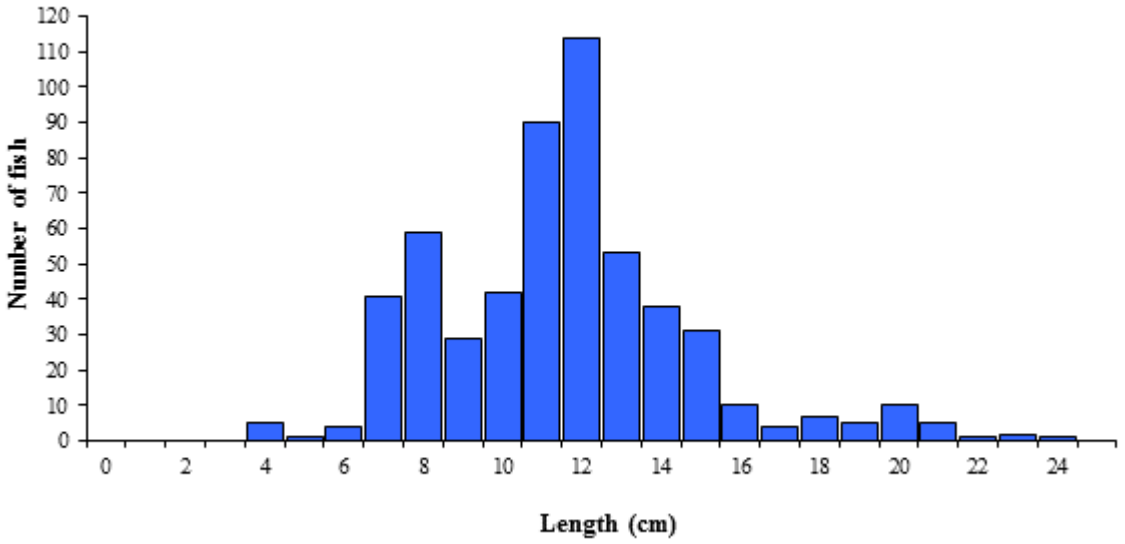

Fig. 1.3. Length frequency of roach captured on Lough Muckno, 2015

Table 1.4. Mean (±S.E.) roach length (cm) at age for Lough Muckno, September 2015

	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8	L_9	L_{10}
Mean (±S.E.)	2.9 (0.1)	6.0 (0.2)	9.2 (0.2)	12.1 (0.3)	14.9 (0.3)	17.1 (0.3)	18.7 (0.3)	20.2 (0.4)	21.8 (0.5)	23.5
N	49	45	38	28	24	18	12	5	4	1
Range	2.1-4.5	4.3-9.0	7.3-12.1	9.9-17.6	12.6-18.4	14.7-19.7	16.9-20.6	19.3-21.1	20.3-22.3	23.5-23.5

Other fish

Eels captured during the 2015 survey ranged in length from 32.5cm to 63.2cm. The single brown trout (22.8cm) captured was aged at 3+. Gudgeon ranged in length from 7.0cm to 9.0cm, bream ranged from

6.2cm to 44.7cm, pike ranged from 47.5cm to 87.0cm and roach x bream hybrids ranged from 10.5cm to 35.0cm.

1.3.4 Stomach and diet analysis

Feeding studies provide a good indication of the availability of food items and the angling methods that are likely to be successful. However, the value of stomach content analysis is limited unless undertaken over a long period as diet may change on a daily basis depending on the availability of food items.

Perch

Perch initially start to feed on pelagic zooplankton. Once they reach an intermediate size they start feeding on benthic resources eventually moving on to feed on fish once they are large enough (Hjelm *et al*., 2000). The food items recorded in a sub sample of perch captured during the survey were dominated by unidentified fish and insect remains (Fig 1.4).

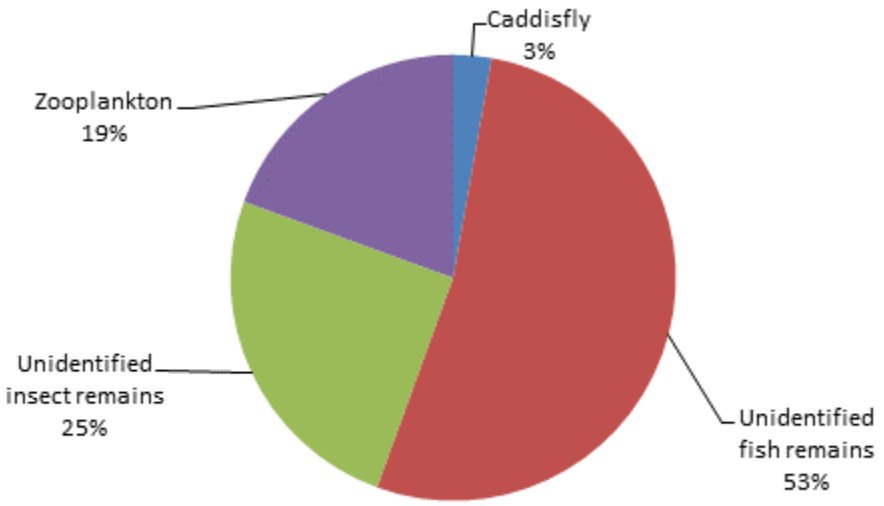

Fig. 1.4. Diet of perch captured on Lough Muckno 2015 (% occurrence) n=35

1.4 Summary and ecological status

Perch was the dominant species in terms of abundance (CPUE) and biomass (BPUE) captured in the survey gill nets during the 2015 survey.

Perch ranged in length from 4.1cm to 34.4cm and ranged in age from 0+ to 8+, indicating reproductive success in each of the previous nine years. The dominant age class was 0+.

Roach ranged in length from 4.0cm to 24.0cm and ranged in age from 0+ to 10+, indicating reproductive success in each of the previous eleven years. The dominant age class was 3+.

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*., 2012b). Using the FIL2 classification tool, Lough Muckno has been assigned an ecological status of Bad for 2006 and 2009 and Poor for 2012 and 2015 based on the fish populations present.

In the 2010 to 2012 surveillance monitoring reporting period, the EPA assigned Lough Muckno an overall draft ecological status of Bad, based on all monitored physico-chemical and biological elements, including fish. This status classification will be revised during 2016.

1.5 References

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