

# Muckanagh Lough



## Sampling Fish for the Water Framework Directive - Lakes 2009



The Central and Regional  
Fisheries Boards

## **ACKNOWLEDGEMENTS**

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## **1.1 Introduction**

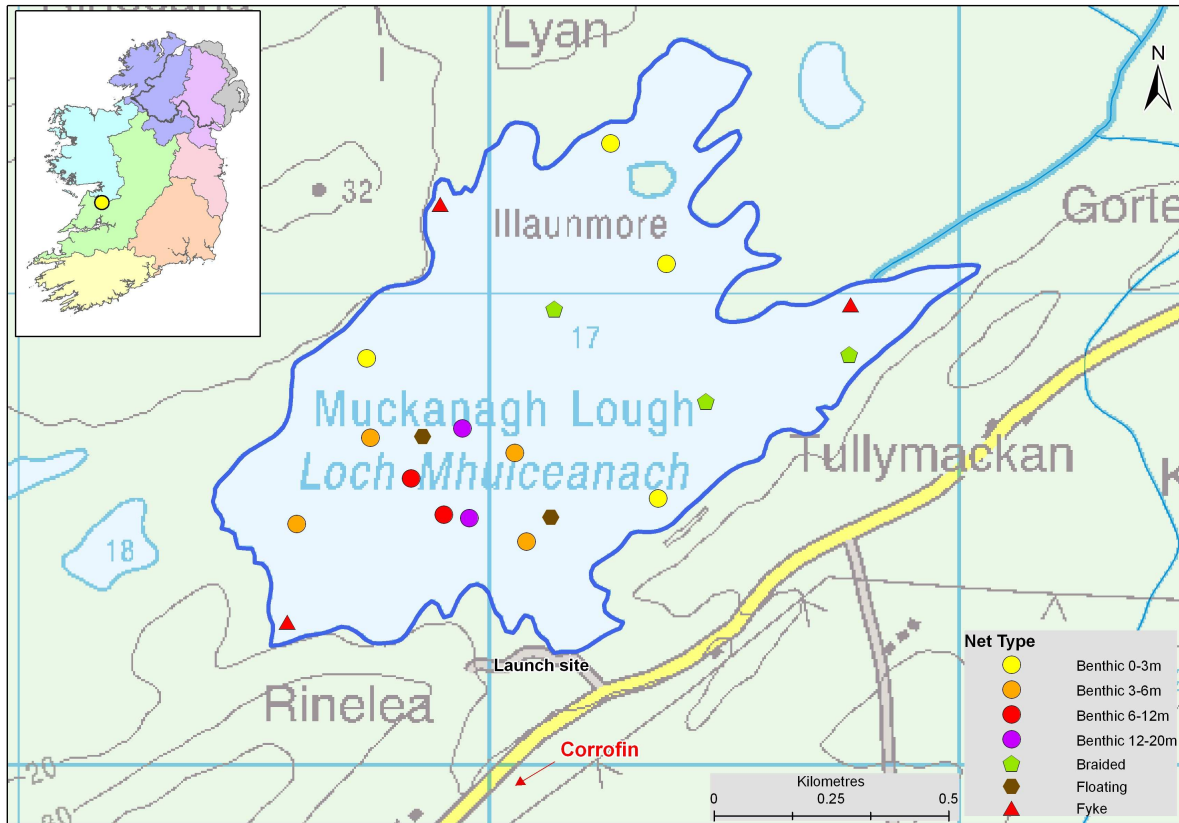
Muckanagh Lough (Plate 1.1, Fig. 1.1) is located within the Fergus catchment, approximately 10km east of the village of Corrofin, Co. Clare. It is a shallow lake, with a mean depth of 3m, a maximum depth of 19m and a surface area of 95ha. The lake is categorised as typology class 10 (as designated by the EPA for the purposes of the Water Framework Directive), i.e. shallow (<4m), greater than 50ha and high alkalinity (>100mg/l CaCO<sub>3</sub>). The lake is located in the “East Burren Complex” Special Area of Conservation. The East Burren Complex SAC is a large area that encompasses all the high ground in the east Burren. A total of 12 different habitats listed on Annex I of the EU Habitats Directive are included within the site, including areas of limestone pavement, calcareous grasslands, heath scrub, woodlands and calcareous lakes and turloughs (NPWS, 2001). The site exhibits some of the best and most extensive areas of oligotrophic limestone wetlands to be found in the Burren and in Europe. Some of the most extensive calcareous swamp fen communities in the country also occur within this complex (NPWS, 2001).

Muckanagh Lough has historically held a good stock of brown trout (O'Reilly, 1998). A survey carried out by the Inland Fisheries Trust during 1970 recorded stocks of brown trout and pike in the lake. Although perch, rudd and tench were present in the inlet canal in 1970, none of these species were recorded during this previous survey (Inland Fisheries Trust, unpublished data). The lake was previously stocked with brown trout during 1977; however test netting of the lake revealed that none of these fish survived (Inland Fisheries Trust, unpublished data).



**Plate 1.1. Muckanagh Lough**





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

## 1.2 Methods

Muckanagh Lough was surveyed over two nights between the 9<sup>th</sup> and the 11<sup>th</sup> of September 2009. 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, 2 @ 6-11.9m and 2 @ 12-19.9 and two surface monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets were deployed randomly in the lake (17 sites). The netting effort was supplemented using three benthic braided survey gill nets (62.5mm mesh knot to knot) at three additional 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 brown trout, rudd 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 returned to the laboratory for further analysis.

### 1.3 Results

#### 1.3.1 Species Richness

A total of seven fish species were recorded in Muckanagh Lough during the survey, with 91 fish being captured (Table 1.1). Perch was the most abundant fish species recorded. Eels were recorded in good numbers in fyke nets only.

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

Scientific name	Common name	Number of fish captured				Total
		Benthic mono multimesh gill nets	Benthic braided gill nets	Surface mono multimesh gill nets	Fyke nets	
<i>Perca fluviatilis</i>	Perch	38	0	0	0	38
<i>Scardinius erythrophthalmus</i>	Rudd	13	0	3	0	16
<i>Esox lucius</i>	Pike	7	1	0	0	8
<i>Salmo trutta</i>	Brown trout	2	0	0	0	2
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	1	0	0	0	1
<i>Tinca tinca</i>	Tench	0	0	0	1	1
<i>Anguilla anguilla</i>	European eel	0	0	0	25	25

#### 1.3.2 Fish abundance

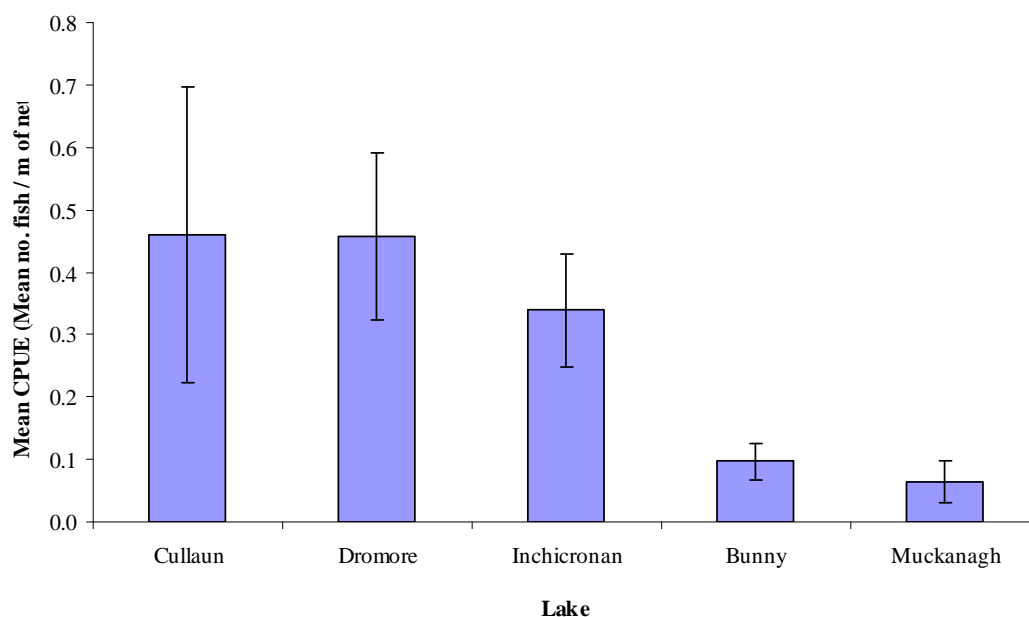
Fish abundance (mean CPUE) and biomass (mean BPUE) were calculated as the mean number/weight of fish caught per metre of net. For all fish species except eel, CPUE/BPUE is based on all nets, whereas eel CPUE/BPUE is based on fyke nets only. Mean CPUE and BPUE for all fish species are summarised in Table 1.2.

The differences in the mean perch CPUE between Muckanagh Lough and four other similar lakes were assessed and found to be statistically significant (Kruskal-Wallis,  $P < 0.05$ ) (Fig. 1.2). Independent-Samples Mann-Whitney U tests between each lake showed that Muckanagh Lough had a significantly lower mean perch CPUE than Dromore Lough ( $z = -2.943$ ,  $P < 0.001$ ) and Inchicronan Lough ( $z = -1.996$ ,  $P < 0.051$ ).

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

Scientific name	Common name	Mean CPUE
<i>Perca fluviatilis</i>	Perch	0.063 (0.034)
<i>Scardinius erythrophthalmus</i>	Rudd	0.027 (0.010)
<i>Esox lucius</i>	Pike	0.014(0.005)
<i>Salmo trutta</i>	Brown trout	0.003 (0.002)
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	0.002 (0.002)
<i>Tinca tinca</i>	Tench	0.001 (0.001)
<i>Anguilla anguilla</i>	European eel	0.139 (0.098)
		<b>Mean BPUE</b>
<i>Esox lucius</i>	Pike	8.123 (5.645)
<i>Scardinius erythrophthalmus</i>	Rudd	2.837 (1.208)
<i>Salmo trutta</i>	Brown trout	0.335 (0.236)
<i>Perca fluviatilis</i>	Perch	0.332 (0.160)
<i>Tinca tinca</i>	Tench	0.250 (0.250)
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	0.003 (0.003)
<i>Anguilla anguilla</i>	European eel	35.506 (26.673)

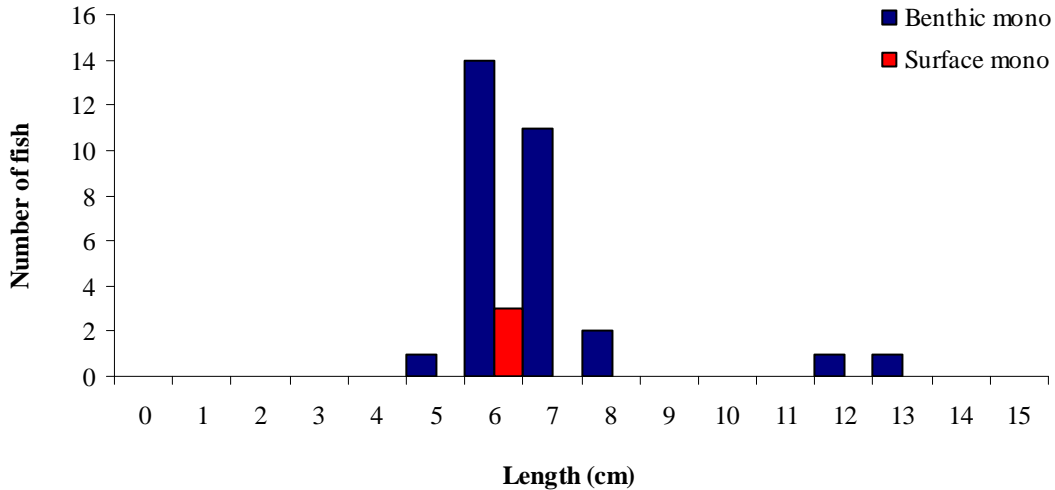
\* On the rare occasion where biomass data was unavailable for an individual fish, this was determined from a length/weight regression for that species. Standard error is displayed in brackets.

**Fig. 1.2. Mean (±S.E.) perch CPUE in five lakes surveyed during 2009**

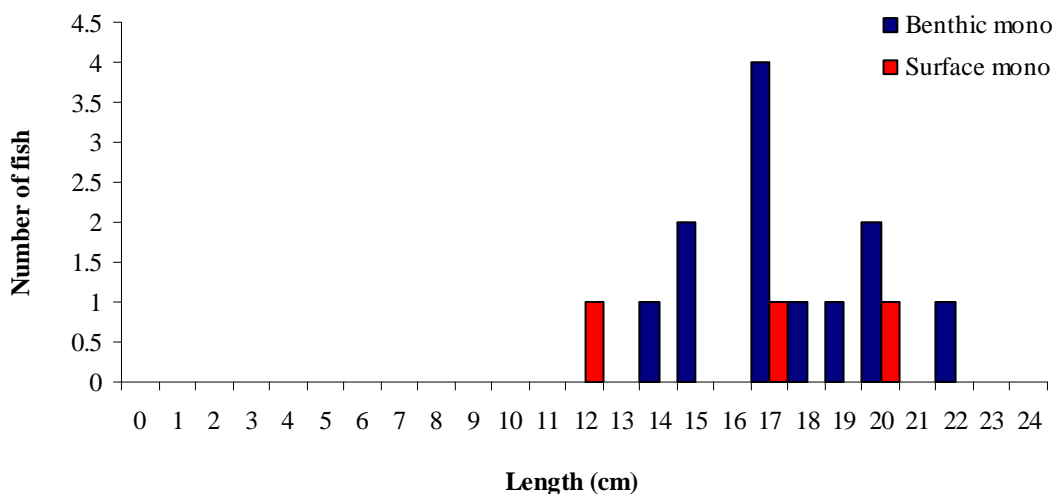
### 1.3.3 Length frequency distributions

The two brown trout recorded measured 18.4cm and 21.8cm in length (mean = 20.1cm). Perch ranged in length from 5.8cm to 13.8cm (mean = 7.2cm) (Fig. 1.3). Rudd ranged in length from 12.2cm to 22.8cm (mean = 17.8cm) (Fig.1.4). Pike ranged in length from 18.4cm to 71.5cm. Eels

ranged in length from 42.0cm to 62.0cm. One three-spined stickleback and one tench were also recorded, measuring 5.0cm and 25.5cm in length respectively.



**Fig. 1.3. Length frequency of perch (n=33) captured on Muckanagh Lough, September 2009**



**Fig. 1.4. Length frequency of rudd (n=15) captured on Muckanagh Lough, September 2009**

#### 1.3.4 Fish age and growth

Two age classes of perch were present, ranging from 0+ to 1+, with a mean L1 of 6.0cm (Table 1.3). The dominant age class was 0+, corresponding to the 5cm to 8cm length class (Fig. 1.3). Three age classes of rudd were present, ranging from 2+ to 4+, with a mean L1 of 2.9cm (Table 1.4). Four age classes of pike were present, ranging from 1+ to 6+ and the two brown trout captured were aged 2+.

**Table 1.3. Mean ( $\pm$ SE) perch length at age for Muckanagh Lough, September 2009**

	<b>L<sub>1</sub></b>
Mean	6.0 (0.3)
N	3
Range	5.7-6.6

**Table 1.4. Mean ( $\pm$ SE) rudd length at age for Muckanagh Lough, September 2009**

	<b>L<sub>1</sub></b>	<b>L<sub>2</sub></b>	<b>L<sub>3</sub></b>	<b>L<sub>4</sub></b>
Mean	2.9 (0.2)	6.8 (0.4)	11.7 (0.5)	16.0 (0.7)
N	14	14	13	7
Range	2.0-4.6	4.9-10.3	9.0-16.0	12.8-19.0

## 1.4 Summary

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

The mean perch CPUE in Muckanagh Lough was significantly lower than Dromore Lough and Inchicronan Lough; however, there were no other statistically significant differences between the other lakes included in the statistical comparison. Two age classes were present, 0+ and 1+, indicating reproductive success in each of the previous two 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, Muckanagh Lough has been assigned an ecological status classification of Moderate based on the fish populations present.

The EPA has assigned an overall status of Moderate to Muckanagh 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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