Annaghmore Lough

Sampling Fish for the Water Framework Directive - Lakes 2008

The Central and Regional Fisheries Boards

ACKNOWLEDGEMENTS

The authors wish to gratefully acknowledge the help and co-operation of the CEO Mr. Eamon Cusack, the ACEO Mr. Sean Ryan and the staff of the Shannon Regional Fisheries Board. The authors would also like to gratefully acknowledge the help and co-operation from all their colleagues in the Central Fisheries Board (CFB).

The authors would also like to acknowledge the funding provided for the project from the Department of Communications, Energy and Natural Resources for 2008.

1.1 Introduction

Annaghmore Lough (Plate 1.1, Fig. 1.1) is located approximately five kilometres north-west of Strokestown, Co. Roscommon, in the Upper Shannon catchment. The lake has a surface area of approximately 53ha and a maximum depth of 16m. The lake falls into typology class 10 (as designated by the EPA for the Water Framework Directive), i.e. shallow (mean depth <4m), greater than 50ha and high alkalinity (>100mg/l $CaCO_3$).

Annaghmore Lough has been designated as a candidate Special Area of Conservation. It has been classified as such due to the presence of extensive areas of alkaline fen around the shoreline, a habitat listed on Annex I of the EU Habitats Directive. The site also contains the rare snail *Vertigo geyeri*, a species listed on Annex II of the EU Habitats Directive.

Annaghmore Lough is located in the centre of a network of small glacially formed lakes. It is a shallow, calcareous lake with a gently sloping shoreline. Due to these gently sloping banks the low lying margins are extensively flooded in winter months. During the summer, water levels recede substantially to reveal extensive areas of marl. The lake is surrounded by areas of common club-rush (*Scirpus lacustris*) which are backed by reed beds made up of common reed (*Phragmites australis*). Extensive areas of alkaline fen surround the shoreline which is dominated by black bog-rush (*Schoenus nigricans*). The site is important for wintering birds and is listed as a wildfowl sanctuary. Two species of bird present are listed on Annex I of the EU Birds Directive, the whooper swan and the golden plover (NPWS, 2003).

Annaghmore Lough historically holds bream, roach, tench, rudd, perch, eels and pike. It is particularly known for its specimen rudd up to 1.75kg, and produces perch to over 0.45kg in weight (ShRFB, 2010).

Plate 1.1. Annaghmore Lough

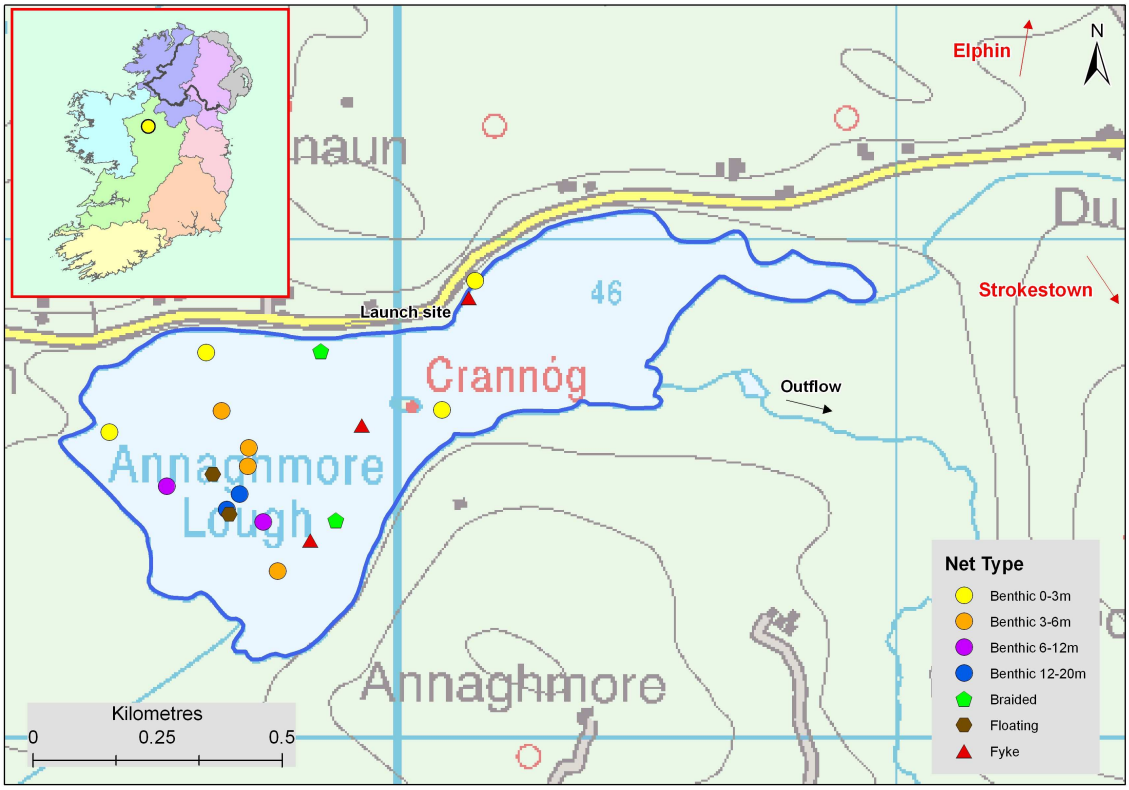

Fig. 1.1. Location map of Annaghmore Lough indicating sampling sites and depths of each net (outflow is displayed on map)

1.2 Methods

The lake was surveyed over two nights between the 30th of September and the 1st of October 2008. A total of three sets of Dutch fyke nets, 12 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) survey gill nets (4 @ 0-2.9m, 4 @ 3-5.9m, 2 @ 6-11.9m and 2 @ 12-19.9m) and two surface floating monofilament multi-mesh (12 panel, 5-55mm mesh size) survey gill nets were deployed randomly in the lake (17 sites). The netting effort was supplemented using two benthic single panel braided (62.5mm mesh knot to knot) survey gill nets (two additional sites). Survey locations were randomly selected using a grid placed over the 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 roach, 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 six fish species were recorded on Annaghmore Lough in October 2008 and a total of 208 fish were captured during the survey. A list of the species encountered and numbers captured by each gear type is compiled in Table 1.1. Perch were the most common fish species encountered in the benthic gill nets. Eels were captured using fyke nets.

Table 1.1. List of fish species recorded (including numbers captured) during the survey on Annaghmore Lough, October 2008

Scientific name	Common name	Number of fish captured				
		Benthic mono multimesh gill nets	Benthic braided gill nets	Surface mono multimesh gill nets	Dutch fykes	Total
Perca fluviatilis	Perch	167	3	0	0	170
Rutilus rutilus	Roach	12	0	4	0	16
Scardinius erythrophthalmus	Rudd	8	2	0	0	10
Esox lucius	Pike	1	1	0	0	2
Tinca tinca	Tench	0	1	0	0	1
Anguilla anguilla	Eel	0	0	0	9	9

1.3.2 *Fish abundance*

Fish abundance was calculated as the mean number of fish caught per metre of net, i.e. mean CPUE. Fish biomass was calculated as the mean weight of fish caught per metre of net, i.e. mean BPUE. A

summary of CPUE and BPUE data for each species and gear type is shown in Table 1.2. Perch were the dominant fish species in terms of abundance, however the biomass of rudd in the lake was higher than that for perch.

Table 1.2. Mean CPUE (mean number of fish per m of net) and mean BPUE (mean weight of fish per m of net) for all fish species recorded on Annaghmore Lough, October 2008

Gear type	Perch	Roach	Pike	Rudd	Tench	Eel
			Mean CPUE (mean number of fish/m of net)			
Gill nets (all)	0.355	0.029	0.004	0.025	0.002	-
Fyke nets	0.000	0.000	0.000	0.000	0.000	0.05
			Mean BPUE (mean weight (g) of fish/m of net)			
Gill nets (all)	17.370	3.939	3.561	22.678	0.000	-
Fyke nets	0.000	0.000	0.000	0.000	0.000	27.744

* In the rare occasion where biomass data was unavailable for an individual fish, this was determined from a length/weight regression for that species

1.3.3 *Length frequency distributions*

Perch ranged in length from 3.4cm to 37.0cm (mean = 10.04cm) (Fig. 1.2). Roach ranged in length from 6.0cm to 24.0cm (mean length 16.23cm) (Fig. 1.3). Rudd ranged in length from 33.0cm to 37.7cm (Fig. 1.4). Eels ranged in length from 46.0cm to 74.0cm. Two pike measuring 24.3cm and 57.8cm in length and one tench measuring 25.0cm were also recorded.

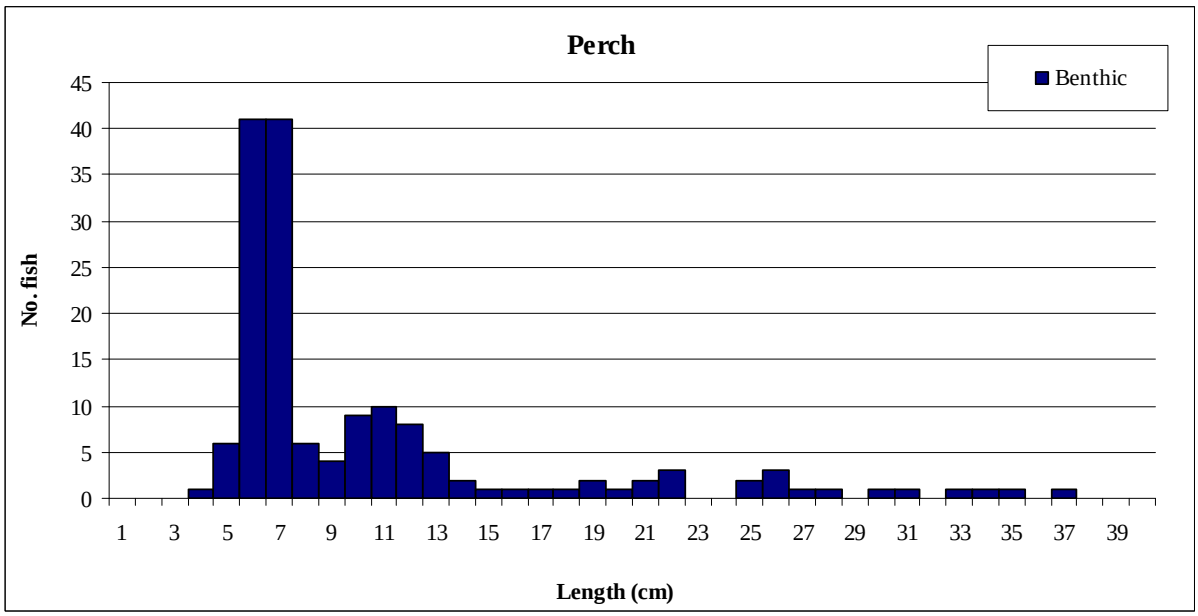

Fig. 1.2. Length frequency of perch captured on Annaghmore Lough, October 2008

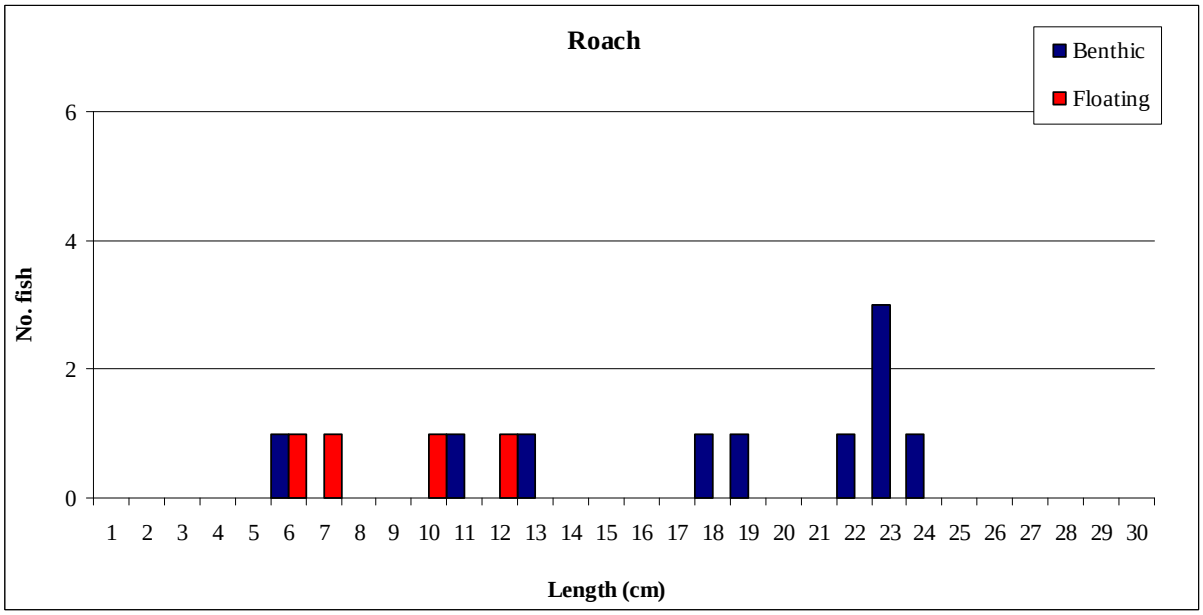

Fig. 1.3. Length frequency of roach captured on Annaghmore Lough, October 2008

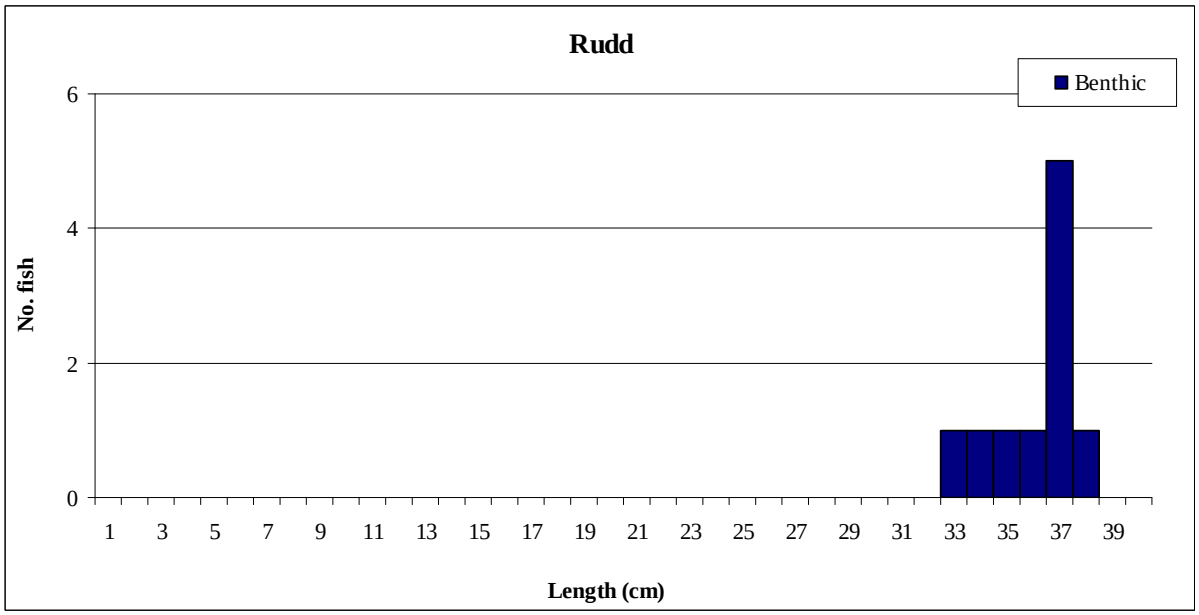

Fig. 1.4. Length frequency of rudd captured on Annaghmore Lough, October 2008

1.3.4 *Fish age and growth*

Seven age classes of perch were recorded during the survey. Length frequency and age analysis revealed that 0+ fry were the dominant age category of perch in the lake at the time of sampling, accounting for 60% of the population. The remaining perch ranged in age from 1+ to 5+, accounting for 18%, 8%, 5%, 4% and 3% respectively. One 8+ perch was also recorded. Mean perch L1 was 5.9cm (Table 1.3).

Five age classes of roach were recorded during the survey, these included 1+, 2+, 3+, 5+ and 6+. Mean roach L1 was 4.1cm. Only two age classes of rudd were captured during the survey, 9+ and 10+. Two pike (1+ and 3+) were also present.

Table 1.3. Mean (SD) perch length at age for Annaghmore Lough, October 2008

	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8
Mean	5.9 (0.97)	11.8 (2.1)	18.1 (1.74)	22.7 (2.51)	25.5 (1.41)	28.0	30.6	32.1
N	42	28	16	9	4	1	1	1
Range	4.0-9.0	8.0-16.9	15.7-21.3	19.8-27.1	24.0-27.3	28.0	30.6	32.1

Table 1.4. Mean (SD) roach length at age for Annaghmore Lough, October 2008

	L_1	L_2	L_3	L_4	L_5	L_6
Mean	4.1 (0.39)	7.1 (0.59)	10.9 (1.0)	14.8 (0.8)	18 (0.89)	21.2
N	10	8	6	6	5	1
Range	3.4-4.8	6.3-8.3	9.7-12.6	14.3-16.4	17.0-19.4	21.2

1.4 Summary

Perch was the dominant species in terms of abundance in Annaghmore Lough, followed by roach, rudd, and eels. The survey has shown that the mean abundance (CPUE) and biomass (BPUE) for perch in the lake was average when compared with all other high alkalinity lakes surveyed during 2008 (Kelly *et al*, 2009). The CPUE for roach was low compared with other high alkalinity lakes, e.g. Lough Egish and Cavetown Lough (Kelly *et al*, 2009). Rudd biomass for Annaghmore lough was the highest amongst all lakes surveyed; however this population was composed of only a small number of large nine and ten year old females. Abundance and biomass of eels in the lake was relatively high compared to the rest of the high alkalinity lakes sampled (Kelly *et al*, 2009).

Perch growth was slightly above average for the first few years in comparison to other high alkalinity lakes surveyed, e.g. Derrybrick Lough and Lough Corrib. However, from year three onwards the growth rate increased substantially, as many of the older fish had become piscivorous (confirmed through stomach analysis). The roach population in Annaghmore Lough had the slowest growth rate when compared with other high alkalinity lakes. In fact, the growth rate was more typical of the moderate and low alkalinity lakes, e.g. Lough Skeagh Upper and Lough Allua (Kelly *et al*., 2009).

An essential step in the WFD monitoring process is the classification of the ecological status of lakes. This in turn will assist in identifying and setting the required objectives within the individual River Basin Management Plans, allowing 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 new WFD fish classification tool has been developed for the island of Ireland

(Ecoregion 1) using Republic of Ireland (CFB) and Northern Ireland (Agri-Food and Biosciences Institute) data generated during the North South Share Fish in Lakes project (Kelly *et al*., 2008). Using this tool and expert opinion on non-native/alien species, Annaghmore Lough has been assigned a draft classification of moderate status for fish. The EPA has assigned an overall classification of moderate status to Annaghmore Lough in an interim draft classification. This is based on physico-chemical parameters and biotic elements, such as macroinvertebrates and macrophytes.

1.5 References

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