Lough Caragh

Sampling Fish for the Water Framework Directive - Lakes 2008

The Central and Regional Fisheries Boards

ACKNOWLEDGEMENTS

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1.1 Introduction

Lough Caragh (Plate 1.1, Fig. 1.1) is situated in Co. Kerry at the mouth of the Glencar Valley, approximately two kilometres north-east of Glenbeigh. The lake has a surface area of 490ha, mean depth of 11m and maximum depth of 40m. The lake falls into typology class 4 (as designated by the EPA for the Water Framework Directive), i.e. deep (mean depth >4m), greater than 50ha and low alkalinity (<20mg/l $CaCO_3$).

Lough Caragh forms part of the Killarney National Park, Macgillycuddy's Reeks and Caragh river catchment candidate Special Area of Conservation. This is a large area that encompasses a wide variety of habitats designated under Annex I of the EU Habitats Directive, including blanket bog, alluvial woodlands, alpine heath and both upland and lowland oligotrophic lakes. The site has also been selected for the following species, Killarney fern, slender naiad, freshwater pearl mussel, Kerry slug, marsh fritillary, Killarney shad, Atlantic salmon, brook lamprey, river lamprey, sea lamprey, lesser horseshoe bat and otter; all species listed on Annex II of the EU Habitats Directive (NPWS, 2005).

Lough Caragh is known for its spring salmon and grilse fishing, and to a lesser extent for brown trout and sea trout. The best salmon fishing is at the southern end of the lake along the west and east shores. Early in the season fish average 6.3kg and the record for the lake is 12.7kg. The sea trout arrive in the lake in July. The brown trout are to be found on all the shores and generally average 0.2-0.4kg (O'Reilly, 2007).

Plate 1.1. Lough Caragh looking north-east over the lake

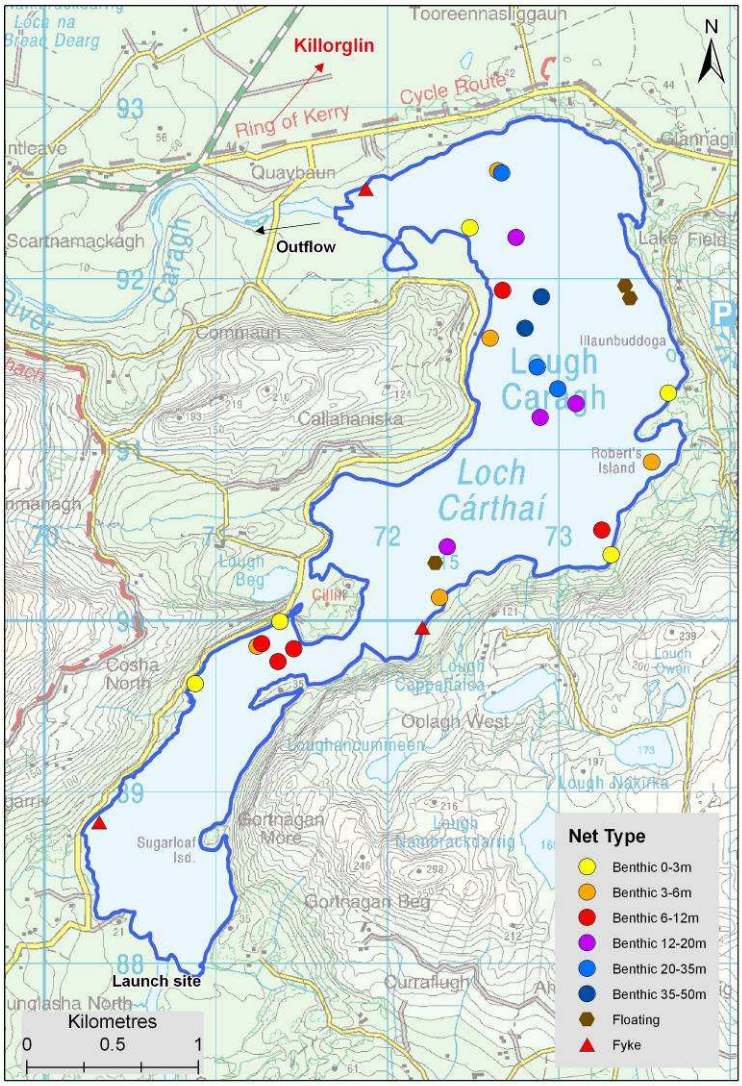

Fig. 1.1. Location map of Lough Caragh showing locations and depths of each net (outflow is indicated on map)

1.2 Methods

Lough Caragh was surveyed over two nights between the 20th of August and the 22nd of August 2008. A total of three sets of Dutch fykes, 24 benthic monofilament survey gill nets (5 @ 0-2.9m, 5 @ 3-5.9m, 5 @ 6-11.9m, 4 @) 12-19.9m, 3 @ 20-34.9m and 2 @ 35-49.9m) and three surface floating survey gill nets were deployed randomly in the lake (30 sites). Survey locations were randomly selected 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 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 returned to the laboratory for further analysis.

1.3 Results

1.3.1 *Species Richness*

A total of four fish species were recorded on Lough Caragh in August 2008. A list of the species encountered and numbers captured by each gear type is compiled in Table 1.1. A total of 206 fish were captured during the survey. Brown trout were the most common fish species encountered in the benthic gill nets. Small numbers of Arctic char were also captured in the gill nets. Perch were also captured during the survey.

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

Scientific name	Common name	Number of fish captured			
		Benthic mono multimesh gill nets	Surface mono multimesh gill nets	Dutch fykes	Total
Salmo trutta	Brown trout	89	26	0	115
Perca fluviatilis	Perch	50	0	11	61
Salvelinus alpinus	Arctic char	6	0	0	6
Anguilla anguilla	Eel	2	0	22	24

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.

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 Lough Caragh, August 2008

Gear type	Brown trout	Perch	Char	Eel
Mean CPUE (mean number of fish/m of net)				
Gill nets (all)	0.119	0.053	0.007	-
Fyke nets	0.000	0.061	-	0.122
Mean BPUE (mean weight (g) of fish/m of net)				
Gill nets (all)	13.652	2.749	0.806	-
Fyke nets	0.000	11.619	-	13.944

* On 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 4.3cm to 33.2cm (mean = 15.2cm) (Fig. 1.2). Brown trout ranged in length from 13.5cm to 28.3cm (mean = 21.6cm) (Fig. 1.3). Arctic char ranged in length from 18.1cm to 24.2cm. Eels ranged from 33.0cm to 47.6cm in length.

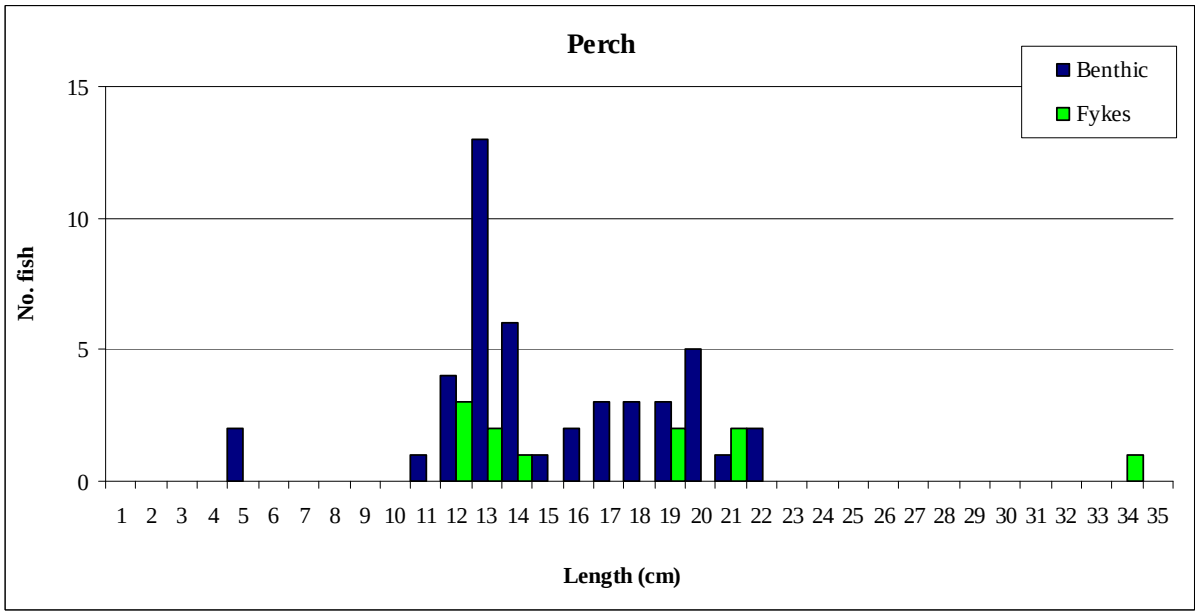

Fig. 1.2. Length frequency of perch captured on Lough Caragh, August 2008

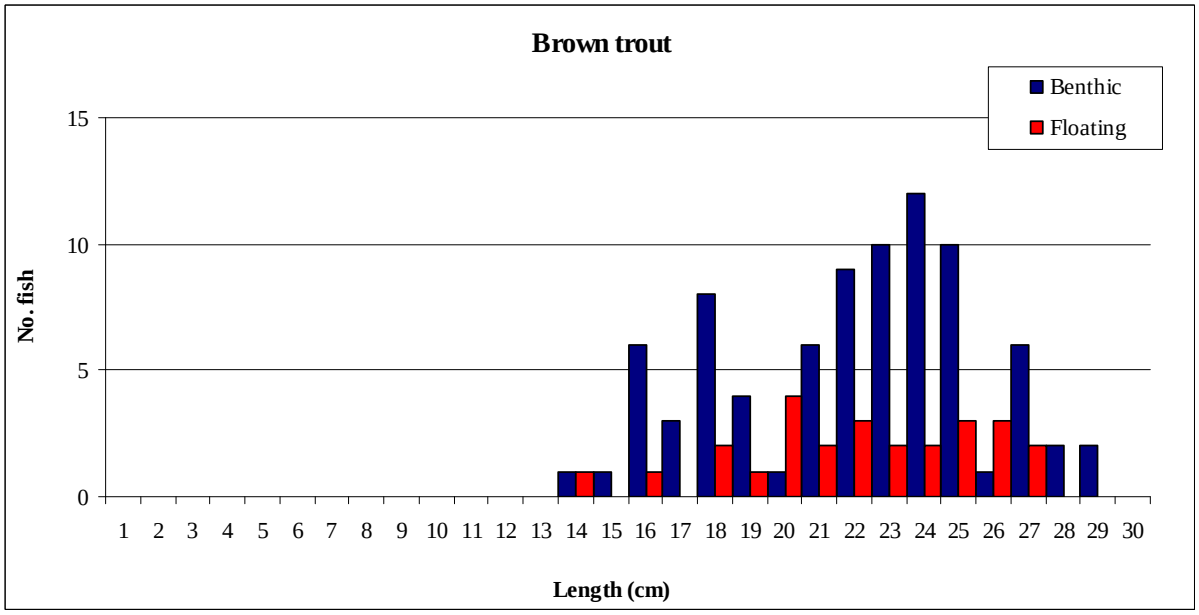

Fig. 1.3. Length frequency of brown trout captured on Lough Caragh, August 2008

2.3.4 *Fish age and growth*

Perch ranged in age from 0+ to 5+. Mean perch L1 was 7.8cm (Table 1.3). Brown trout ranged in age from 1+ to 4+ (Table 1.4). Mean brown trout L4 was 24.7cm (Table 1.4). Based on a classification of growth in lakes by Kennedy and Fitzmaurice (1971), trout growth in Lough Caragh was therefore categorised as very slow (Kelly *et al*., 2009). Length frequency and age analysis revealed that 2+ and 3+ were the dominant age groups in the population accounting for approximately 84% of the fish recorded. Arctic char ranged in age from 2+ to 4+.

Table 1.3. Mean (SD) perch length (cm) at age for Lough Caragh, August 2008

	L_1	L_2	L_3	L_4	L_5
Mean	7.8 (1.39)	16.2 (1.95)	23.8 (4.26)	30.5	31.7
N	37	21	3	1	1
Range	5.69-11.47	11.5-21.9	20.3-28.2	-	-

Table 1.4. Mean (SD) brown trout length (cm) at age for Lough Caragh, August 2008

	L_1	L_2	L_3	L_4
Mean	6.16 (1.29)	14.5 (2.93)	21.0 (2.49)	24.7(1.25)
N	69	59	33	6
Range	3.8-8.9	9.5-19.7	17.4-25.7	23.2-26.2

1.4 Summary

Brown trout was the dominant species in Lough Caragh, followed by perch, Arctic char and eels. The survey has shown that the mean CPUE for brown trout in the lake is average when compared with other low alkalinity lakes surveyed in 2008 (Kelly *et al*., 2009). Lough Caragh had the lowest mean CPUE for arctic char when compared to other low alkalinity lakes surveyed during 2008, e.g. Lough Beagh, Co. Donegal and Lough Acoose, Co. Kerry. The mean CPUE was over seven times smaller than that for Lough Acoose, which is also a low alkalinity lake in the same catchment (Kelly *et al*., 2009). No juvenile arctic char were recorded during the survey. Lough Caragh had an average mean CPUE for eels when compared with other low alkalinity lakes (Kelly *et al*., 2009).

Based on a classification of growth in lakes by Kennedy and Fitzmaurice (1971), trout growth in Lough Caragh was categorised as very slow (Kelly *et al*., 2009). Although length at age for trout was average for L1 and L2 in comparison with other low alkalinity lakes, there was a steep increase in length at age for L3 and L4. A similar pattern of growth was also detected in Glencullin Lake and Lough Beagh.

Perch in Lough Caragh had the second highest growth rate of all lakes sampled in 2008. The growth rate when compared to other low alkalinity lakes such as Lough Allua and Upper Lake was found to be substantially faster and more typical of a moderate alkalinity perch population (Kelly *et al*., 2009).

It is recommended that the fish populations in Lough Caragh should be closely monitored as it contains a population of Arctic char, a salmonid species that is sensitive to anthropogenic impacts and is listed in the Irish Red Data Book for fish as vulnerable (Whilde, 1983). Only a small number of specimens of Arctic char were captured during the current survey, none of which were young of the year, highlighting that the population may be under threat and the potential pressures this small population may already be under. The presence of coniferous forestry further in the upper catchment is one of the main causes for concern, both in terms of nutrient input and acidification.

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 new WFD multimetric fish classification tool has been developed for the island of Ireland (Ecoregion 1) using Agri-Food and Biosciences Institute Northern Ireland (AFBINI) and CFB data (Kelly *et al*., 2008). Using this tool and expert opinion Lough Caragh has been assigned a draft classification of good status for fish. The EPA has assigned an overall classification of good status to Lough Caragh 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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