

Upper Lake Killarney



Sampling Fish for the Water Framework Directive - Lakes 2008



The Central and Regional
Fisheries Boards

ACKNOWLEDGEMENTS

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1.1 Introduction

Upper Lake, Killarney is situated at the bottom of Killarney's Black Valley in Killarney National Park, Co. Kerry (Plate 1.1, Fig. 1.1). Upper Lake has a surface area of 169ha, mean depth of 14.5m and a maximum depth of 36m. The lake falls into typology class 4 (as designated by the EPA for the Water Framework Directive), i.e. deep (mean depth >4m), larger than 50ha and low alkalinity (<20mg/l CaCO₃).

Upper Lake 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). Upper Lake itself is a long and rocky lake holding both salmon (spring salmon and grilse) and brown trout. Brown trout in the lake average around 0.2kg (O'Reilly, 2007).



Plate 1.1. Upper Lake, Killarney

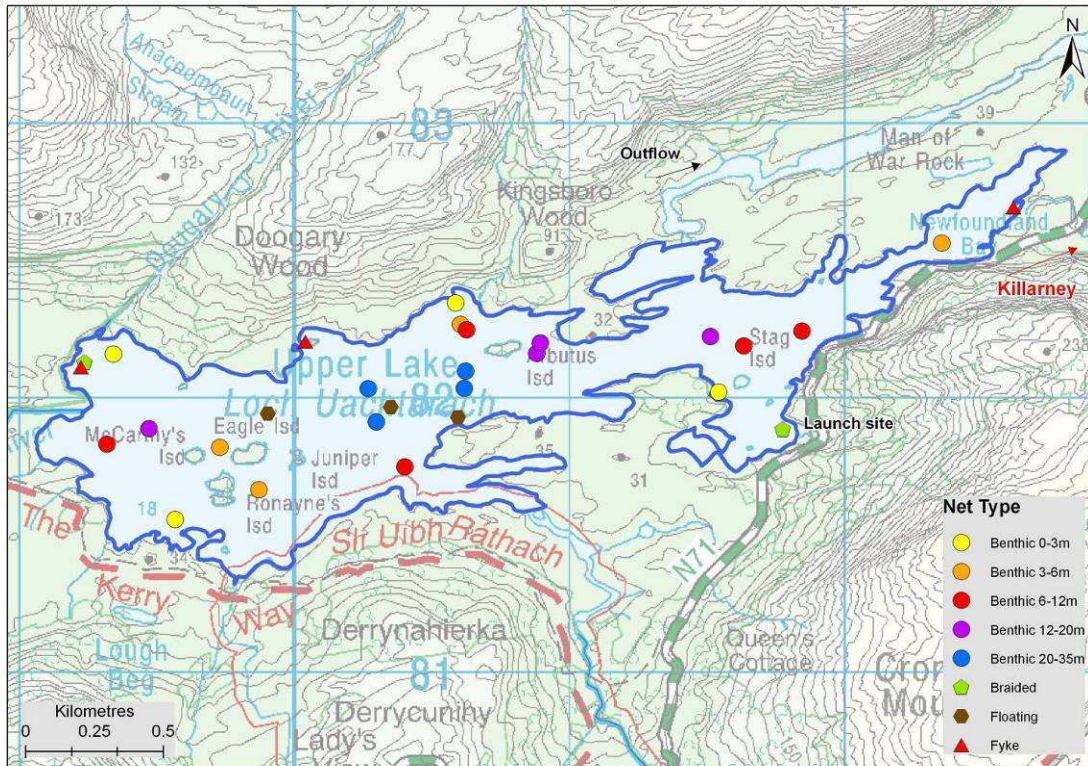


Fig: 1.1. Location map of Upper Lake showing locations and depths of each net (outflow is indicated on map)

1.2 Methods

Upper Lake was surveyed over one night on the 15th of September 2008. A total of three sets of Dutch fyke nets, 21 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) survey gill nets (4 @ 0-2.9m, 4 @ 3-5.9m, 5 @ 6-11.9m, 4 @ 12-19.9m and 4 @ 20-34.9m) and three surface floating survey gillnets were deployed randomly in the lake (27 sites). The netting effort was supplemented using two benthic braided (62.5mm mesh knot to knot) survey gill nets (2 additional 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, salmon and rudd. 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 on Upper Lake in September 2008. A list of the species encountered and numbers captured by each gear type is compiled in Table 1.1. A total of 121 fish were captured during the survey. Perch was the most common fish species encountered in the benthic gill nets followed by brown trout (Table 1.1). Eels were captured in both the gill and fyke nets.

Table 1.1. List of fish species recorded (including numbers captured) during the survey on Upper Lake, September 2008

Scientific name	Common name	Number of fish captured				Total
		Benthic mono multimesh gill nets	Benthic braided gill nets	Surface mono multimesh gill nets	Dutch fykes	
<i>Perca fluviatilis</i>	Perch	59	0	0	4	63
<i>Salmo trutta</i>	Brown trout	24	1	4	1	30
<i>Scardinius erythrophthalmus</i>	Rudd	16	0	0	0	16
<i>Salmo salar</i>	Salmon	2	0	0	0	2
<i>Phoxinus phoxinus</i>	Minnnow	1	0	0	0	1
<i>Tinca tinca</i>	Tench	1	0	0	0	1
<i>Anguilla anguilla</i>	Eel	2	0	0	6	8

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 Upper Lake, September 2008

Gear type	Brown trout	Salmon	Minnnow	Perch	Rudd	Tench	Eel
	Mean CPUE (mean number of fish/m of net)						
Gill nets (all)	0.037	0.003	0.001	0.076	0.021	0.001	-
Fykes	0.006	0.000	0.000	0.022	0.000	0.000	0.033
	Mean BPUE (mean weight (g) of fish/m of net)						
Gill nets (all)	4.210	6.785	0.006	4.015	3.191	1.054	-
Fykes	1.139	0.000	0.000	1.744	0.000	0.000	2.361

* 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 4.2cm to 25.5cm (mean = 16.4cm) (Fig. 1.2). Brown trout ranged in length from 15.3cm to 27.0cm (mean = 21.7cm) (Fig. 1.3). Rudd ranged in length from 12.2cm to 24.3cm. Eels ranged from 29.5cm to 66.0cm in length.

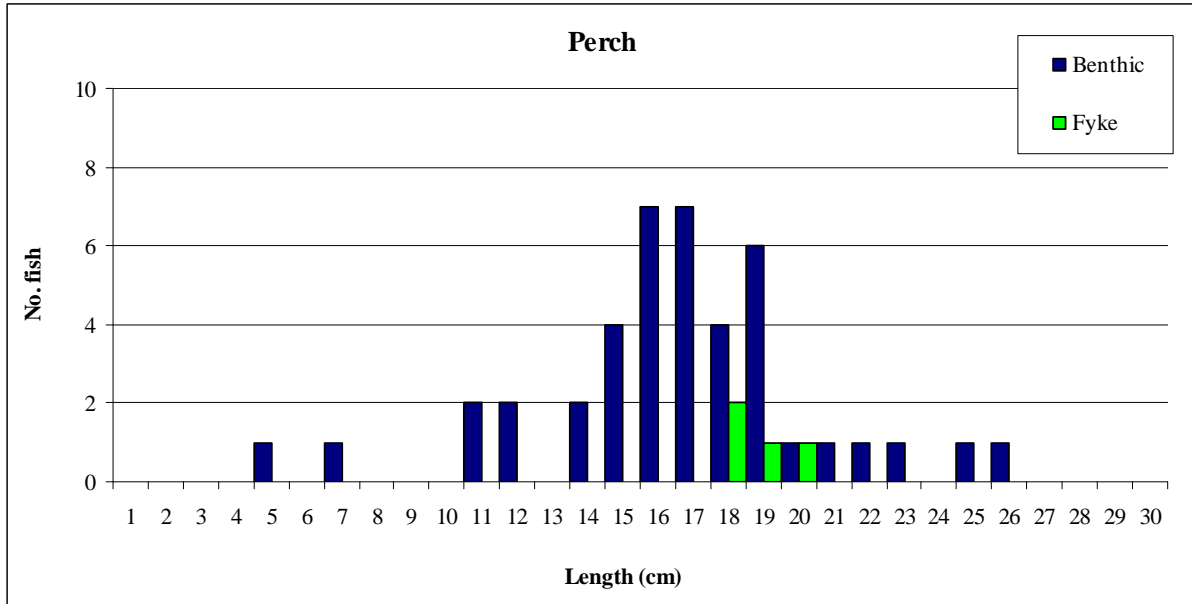


Fig. 1.2. Length frequency of perch captured on Upper Lake, September 2008

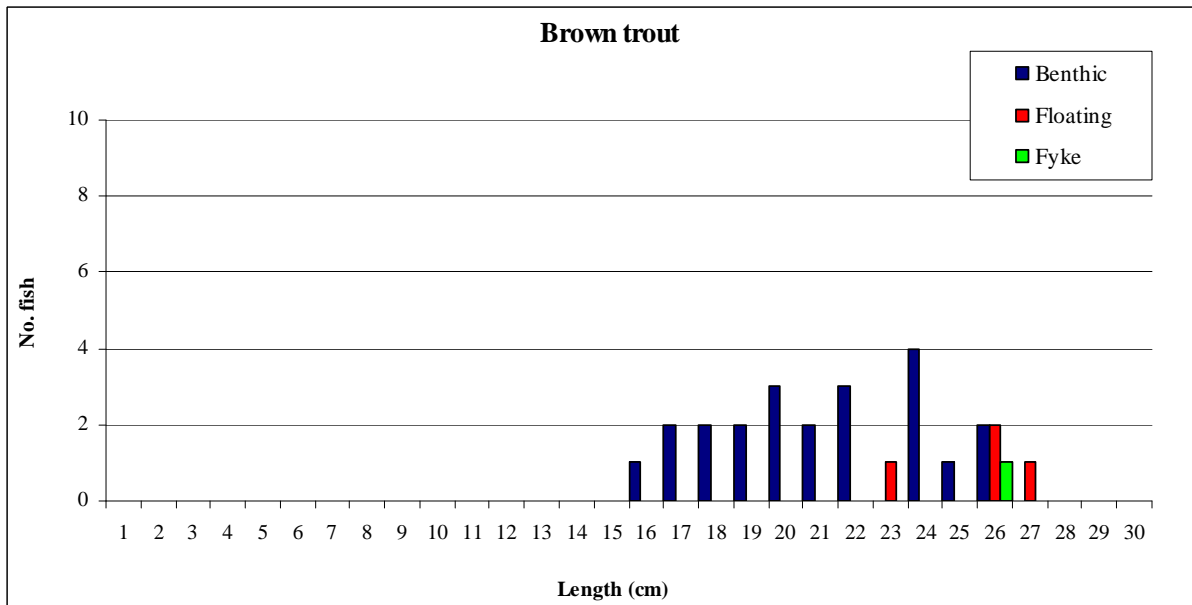


Fig. 1.3. Length frequency of brown trout captured on Upper Lake, September 2008

1.3.4 Fish age and growth

Perch ranged in age from 0+ to 5+. Mean perch L1 was 6.6cm (Table 1.3). Brown trout ranged in age from 1+ to 3+. Mean brown trout L1 was 7.1cm (Table 1.4). Length frequency and age analysis revealed that 3+ were the dominant age group in the brown trout population followed by 2+ and 1+ fish, accounting for approximately 46% and 36% and 18% respectively of the brown trout recorded during the survey. Rudd ranged in age from 1+ to 8+.

Table 1.3. Mean (SD) perch length (cm) at age for Upper Lake, September 2008

	L ₁	L ₂	L ₃	L ₄	L ₅
Mean	6.6 (1.28)	12.7 (0.98)	16.6 (1.51)	19.1 (2.15)	20.8 (2.96)
N	41	34	21	6	5
Range	4.3-10.9	10.8-14.9	13.6-19.8	16.5-21.8	17.4-23.7

Table 1.4. Mean (SD) brown trout length (cm) at age for Upper Lake, September 2008

	L ₁	L ₂	L ₃
Mean	7.1 (0.82)	16.1 (1.86)	21.2 (1.97)
N	25	21	11
Range	5.1-8.8	12.6-19.7	18.5-24.5

1.4 Summary

Perch were the dominant fish species recorded in Upper Lake followed by brown trout and rudd. Mean CPUE for perch in the lake was average when compared with other low alkalinity lakes surveyed during 2008 (Kelly *et al.*, 2009). In contrast the CPUE for brown trout was the lowest when compared to other low alkalinity lakes surveyed in 2008, e.g. Lough Barra, Co. Donegal and Lough Easky, Co. Sligo (Kelly *et al.*, 2009). The mean CPUE for eels in Upper Lake was at the lower end of the low alkalinity lakes sampled, and subsequently was lower than that of many moderate and high alkalinity lakes surveyed (Kelly *et al.*, 2009).

Perch growth was slightly low in comparison to other low alkalinity lakes surveyed in 2008, e.g. Lough Allua and Lough Caragh. The brown trout population in Upper Lake had the highest growth rate when compared with other low alkalinity lakes. Rudd in Upper Lake exhibited a higher growth rate between L1 and L2 when compared with the only other low alkalinity lake that contained rudd i.e. Lough Allua. After the second year, however, growth declined and became slower than rudd in Lough Allua (Kelly *et al.*, 2009).

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 Upper Lake has been assigned a draft classification of good status for fish. The EPA has assigned an overall classification of high status to Upper Lake in an interim draft classification. This is based on physico-chemical parameters and biotic elements such as macroinvertebrates and macrophytes.

1.5 References

- Kelly, F.L., Harrison, A., Connor, L., Allen, M., Rosell, R. and Champ, T. (2008) *FISH IN LAKES Task 6.9: Classification tool for Fish in Lakes. FINAL REPORT*. Central Fisheries Board. NS Share project report.
- Kelly, F.L., Connor, L., Wightman, G., Matson, R. Morrissey, E., O’Callaghan, R., Feeney, R., Hanna, G. and Rocks, K. (2009) *Sampling fish for the Water Framework Directive – Summary report 2008*. Central and Regional Fisheries Boards. Internal report.
- NPWS (2005) Site synopsis: Killarney National Park, Macgillicuddy’s Reeks and Caragh River catchment. Available at <http://www.npws.ie/en/media/Media,3931,en.pdf>
- O’ Reilly P. (2007) *Loughs of Ireland. A Flyfishers Guide*. 4th Edition. Merlin Unwin Books.

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