

Lough Bunny



Sampling Fish for the Water Framework Directive - Lakes 2009



The Central and Regional
Fisheries Boards

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1.1 Introduction

Lough Bunny (Plate 1.1, Fig. 1.1) is located just within the boundary of the Burren National Park, approximately 8km from Corrofin, County Clare. The lake is situated in the “East Burren Complex” Special Area of Conservation; a large area that encompasses all of the high ground in the east Burren. A total of 12 different habitats listed on Annex I of the EU Habitats Directive exist 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 occur within this complex and especially around the shores of Lough Bunny. The shores of the lough are home to a number of important bird species (NPWS, 2001). The area also contains some ecologically-sensitive habitats, including large areas of alkaline fen (Pybus *et. al.*, 2003). Such vegetation is in serious decline in Europe and has been included in Annex I of the Habitats Directive (CEC, 1992).

Lough Bunny is a permanent lake and is believed to have been formed by the localised collapse of the underlying bedrock (Ragneborn-Tough *et al.*, 1999). The surrounding geology of the lake is composed of Upper Carboniferous limestone. Most of the lakes to the south of Lough Bunny are connected to the River Fergus by small streams; however, Lough Bunny has no permanent over ground inflow or outflow. It is fed from springs and drains through sinkholes at the northern end of the lake (Ragneborn-Tough *et al.*, 1999).



Plate 1.1. Lough Bunny

Lough Bunny has a surface area of 102ha, a mean depth of 2.7m and maximum depth of 14m. 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 CaCO₃).

Surveys conducted by the Inland Fisheries Trust in 1970 and 1980 reported stocks of pike, rudd and perch in the lake. Eels were also reported in the 1970 survey (IFT, 1980; CFB unpublished data).

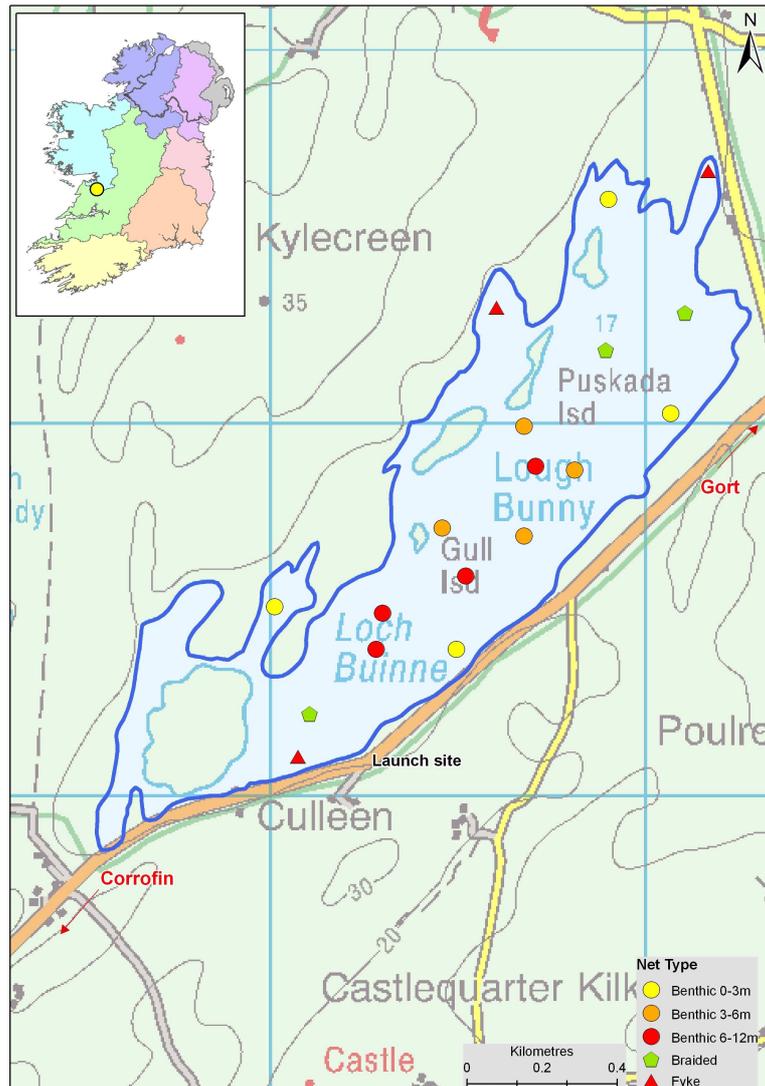


Fig. 1.1. Location map of Lough Bunny showing locations and depths of each net

1.2 Methods

Lough Bunny was surveyed over two nights from 21st to 23rd September 2009. A total of three sets of Dutch fyke nets and 12 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (4 @ 0-2.9m, 4 @ 3-5.9m and 4 @ 6-11.9m) were deployed randomly in the lake (15 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 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 four fish species were recorded on Lough Bunny in September 2009, with 87 fish being captured (Table 1.1). Perch was the most abundant fish species recorded. Small numbers of rudd and pike were also captured in the gill nets. Eels were captured in fyke nets only.

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

Scientific name	Common name	Number of fish captured			
		Benthic mono multimesh gill nets	Benthic braided gill nets	Fyke nets	Total
<i>Perca fluviatilis</i>	Perch	52	0	0	52
<i>Scardinius erythrophthalmus</i>	Rudd	14	0	0	14
<i>Esox lucius</i>	Pike	2	2	0	4
<i>Anguilla anguilla</i>	Eel	0	0	17	17

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 Lough Bunny 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 Lough Bunny had a significantly lower mean perch CPUE than Dromore Lough ($z = -2.086$, $P < 0.05$).

The differences in the mean rudd CPUE between Lough Bunny and four other similar lakes were also assessed and found to be statistically significant (Kruskal-Wallis, $P < 0.001$) (Fig. 1.3). Independent-Samples Mann-Whitney U tests between each lake showed that Lough Bunny had a significantly lower mean rudd CPUE than Lough Gur ($z = -3.803$, $P < 0.001$).

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

Scientific name	Common name	Mean CPUE
<i>Perca fluviatilis</i>	Perch	0.096 (0.029)
<i>Scardinius erythrophthalmus</i>	Rudd	0.026 (0.017)
<i>Esox lucius</i>	Pike	0.008 (0.005)
<i>Anguilla anguilla</i>	European eel	0.094 (0.053)
		Mean BPUE
<i>Perca fluviatilis</i>	Perch	17.107 (5.495)
<i>Esox lucius</i>	Pike	14.405 (13.446)
<i>Scardinius erythrophthalmus</i>	Rudd	3.156 (1.916)
<i>Anguilla anguilla</i>	European eel	22.433 (12.057)

* 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.

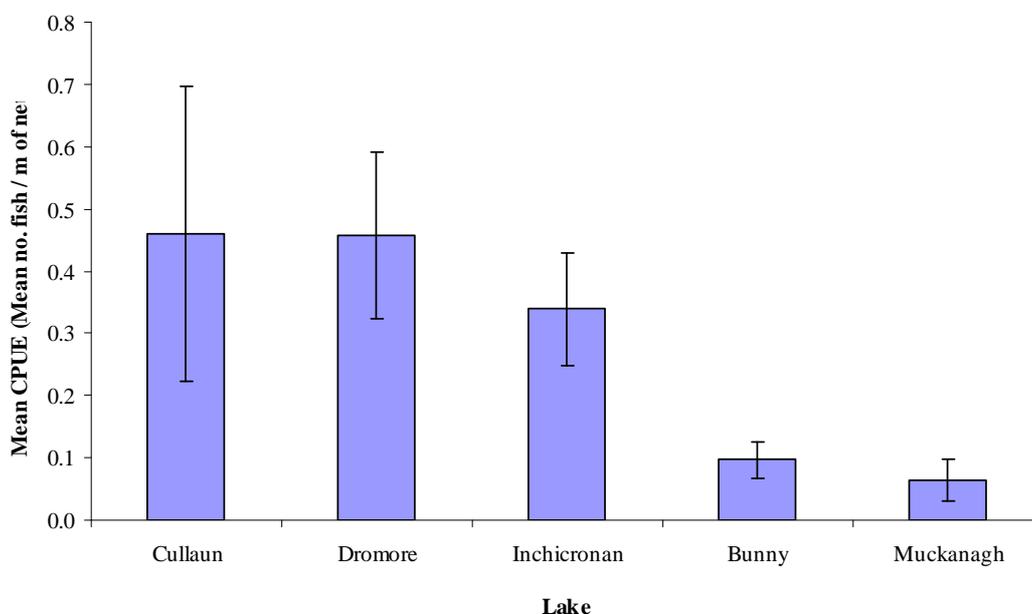


Fig. 1.2. Mean (±S.E.) perch CPUE in five lakes surveyed during 2009

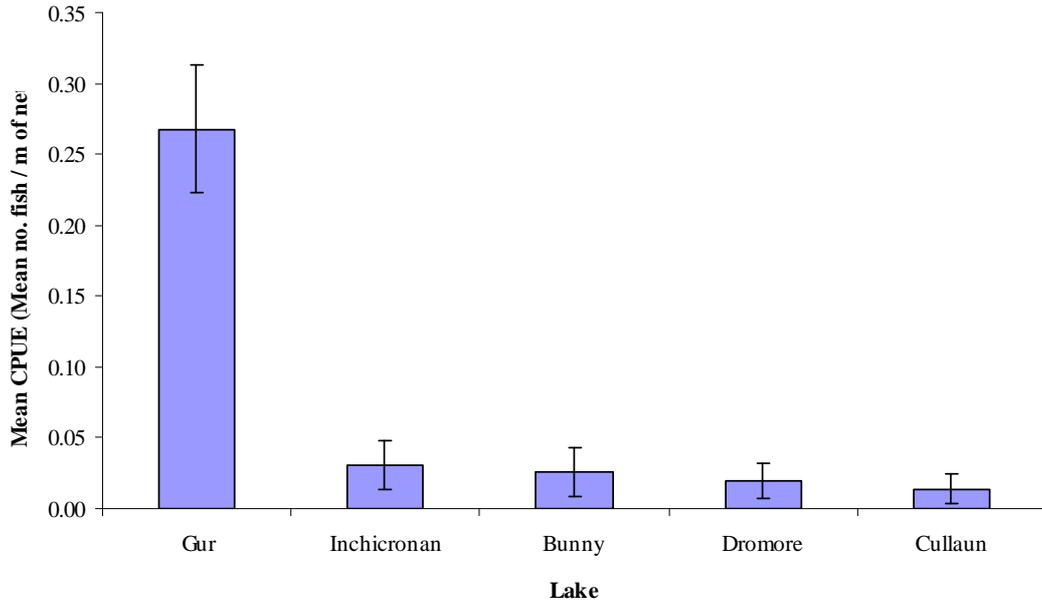


Fig. 1.3. Mean (\pm S.E.) rudd CPUE in five lakes surveyed during 2009

1.3.3 Length frequency distributions

Perch ranged in length from 5.3cm to 29.1cm (mean = 19.4cm) (Fig. 1.4). Rudd ranged in length from 15.0cm to 22.5cm (mean = 18.5cm) (Fig.1.5). Pike ranged in length from 23.0cm to 80.0cm. Eels ranged in length from 36.0cm to 61.0cm.

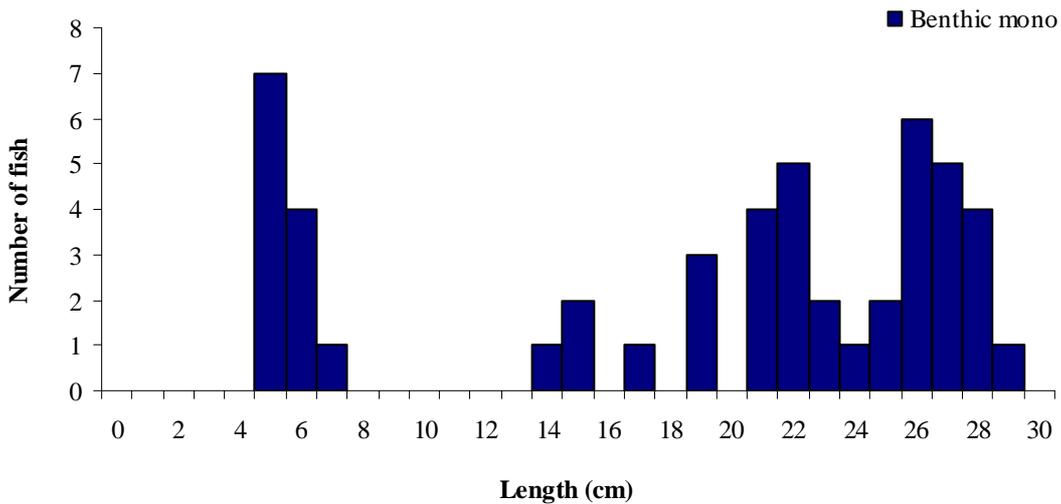


Fig. 1.4. Length frequency of perch (n=49) captured on Lough Bunny, September 2009

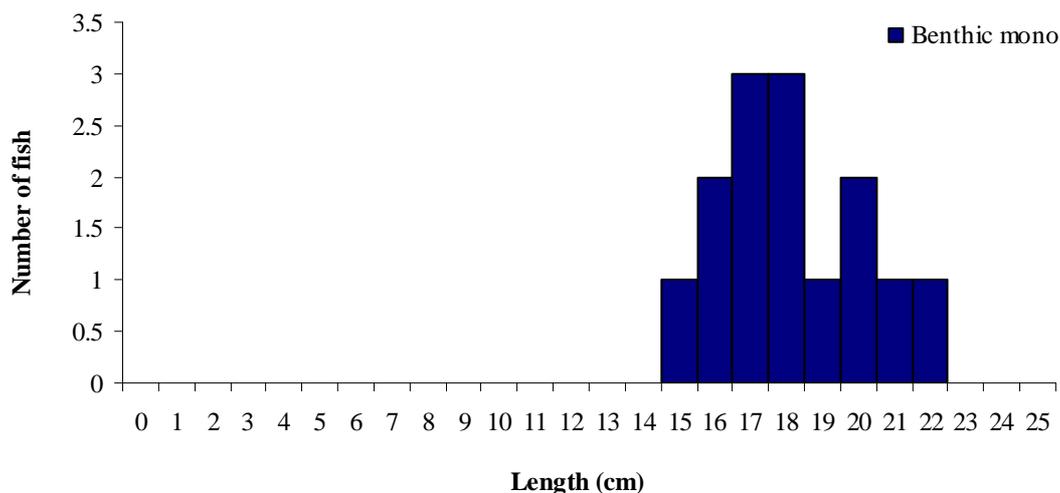


Fig. 1.5. Length frequency of rudd (n=14) captured on Lough Bunny, September 2009

1.3.4 Fish age and growth

Five age classes of perch were present, ranging from 0+ to 4+, with a mean L1 of 7.2cm (Table 1.3). The dominant age class was 0+, corresponding to the 5cm to 7cm length class (Fig. 1.3). Three age classes of rudd were present, ranging from 3+ to 5+, with a mean L1 of 2.6cm (Table 1.4). Three age classes of pike were present, ranging from 2+ to 8+.

Table 1.3. Mean (\pm SE) perch length (cm) at age for Lough Bunny, September 2009

	L ₁	L ₂	L ₃	L ₄
Mean	7.2 (0.2)	14.6 (0.4)	20.8 (0.5)	25.1 (0.3)
N	36	33	25	3
Range	5.5-9.0	10.5-19.0	16.3-24.0	24.7-25.7

Table 1.4. Mean (\pm SE) rudd length (cm) at age for Lough Bunny, September 2009

	L ₁	L ₂	L ₃	L ₄	L ₅
Mean	2.6 (0.2)	6.1 (0.4)	10.9 (0.5)	15.0 (0.5)	18.4
N	14	14	14	9	1
Range	1.7-3.9	4.3-8.5	7.5-13.4	12.9-17.9	18.4-18.4

1.4 Summary

Perch was the dominant species in terms of abundance (CPUE) and eel was the dominant species in terms of biomass (BPUE).

The mean perch CPUE in Lough Bunny was significantly lower than Dromore Lough; however, there were no other statistically significant differences between the other similar lakes assessed. The dominant length class of perch corresponded to the 0+ age class, with ages ranging from 0+ to 4+, indicating reproductive success in each of the previous four years.

The mean rudd CPUE in Lough Bunny was significantly lower than Lough Gur; however, it was not statistically different to the three other similar lake types included in the comparison. Rudd ranged in age from 3+ to 5+, with smaller age classes not recorded.

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, Lough Bunny 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 Lough Bunny 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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