National Research Survey Programme

Lakes 2015

Lough Bunny

Inland Fisheries Ireland

National Research Survey Programme

**Fish Stock Survey of Lough Bunny,
September 2015**

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1.1 Introduction

Lough Bunny is located just within the boundary of the Burren National Park, approximately 8km from Corrofin, County Clare (Plate 1.1, Fig. 1.1). 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). 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 SAC, 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 lake 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).

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 Eels were also reported in the 1970 survey (IFT, 1980; IFI unpublished data).

This lake was surveyed as part of the Water Framework Directive surveillance monitoring programme in 2009 and 2012 (Kelly *et al*., 2010 and 2013). During both surveys, perch were found to be the dominant species present in the lake. Rudd, pike and eels were also captured during the survey.
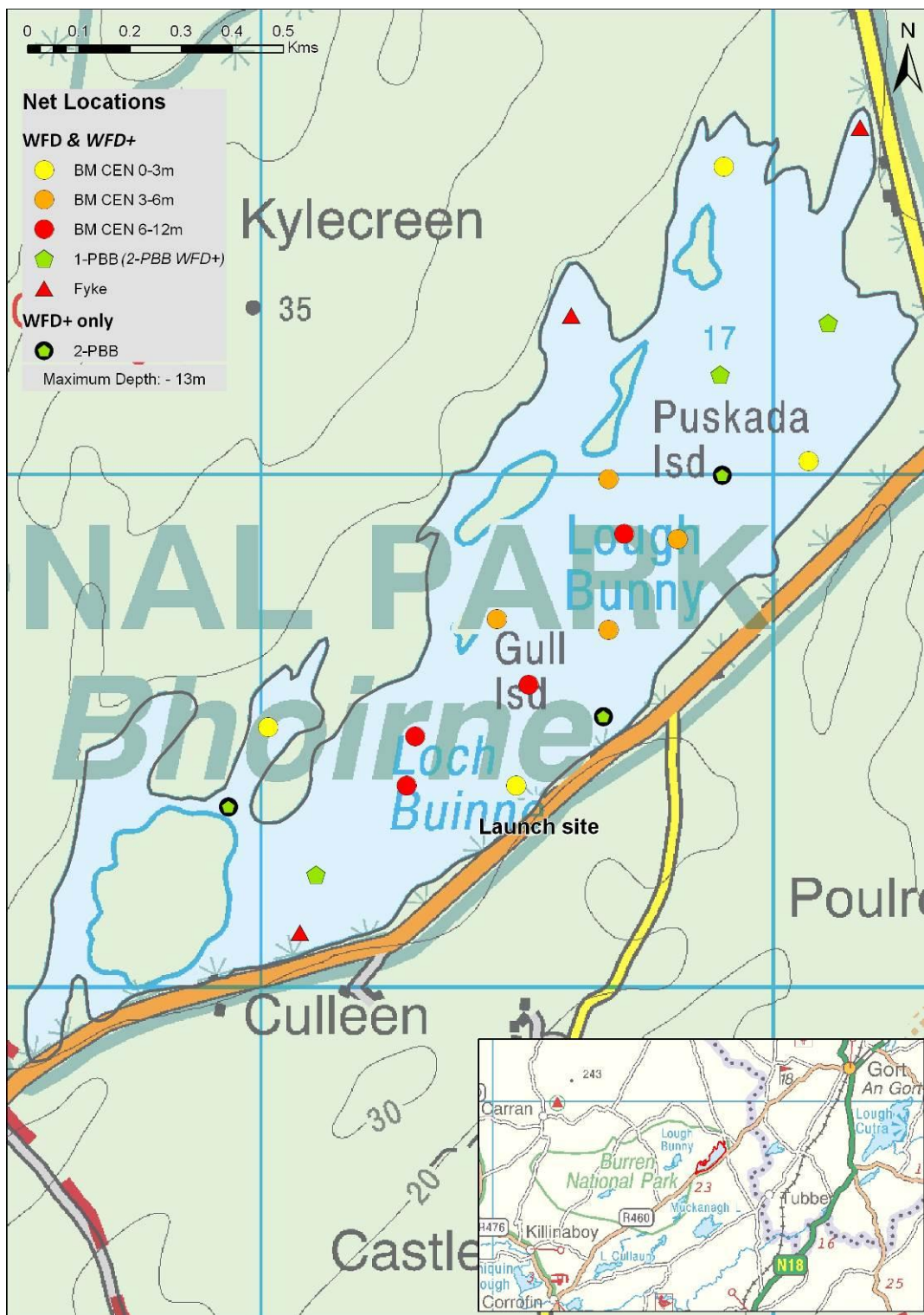
Plate 1.1. Lough Bunny

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

1.2 Methods

1.2.2 Netting methods

Lough Bunny was surveyed over two nights between the 15th and the 17th of September 2015. A total of three sets of Dutch fyke nets and 12 benthic monofilament multi-mesh (BM CEN) (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 six two-panel benthic braided survey gill nets (2-PBB) (63.5mm and 88.9mm mesh knot to knot) (Fig. 1.1).

The nets were deployed in the same locations as randomly chosen in the previous surveys. Site locations for additional two-panel benthic braided survey gill nets (2-PBB) were chosen randomly within fixed depth zones. 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 also 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.

1.2.2 Biosecurity - disinfection and decontamination procedures

Procedures are required for disinfection of equipment in order to prevent dispersal of alien species and other organisms to uninfected waters. A standard operating procedure was compiled by Inland Fisheries Ireland for this purpose (Caffrey, 2010) and is followed by staff on the IFI NRSP team when moving between water bodies.

1.3 Results

1.3.1 Species Richness

A total of five fish species were recorded on Lough Bunny in September 2015, with 173 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Rudd was the most abundant fish species recorded, followed by perch, pike, three-spined stickleback and eels. In contrast perch was the most abundant fish species recorded during the previous 2009 and 2012 surveys, followed by rudd, pike and eels (Kelly *et al.*, 2010 and 2013).

Table 1.1. Number of each fish species captured by each gear type during the survey on Lough Bunny, September 2015

Scientific name	Common name	Number of fish captured			
		2-PBB	BM CEN	Fyke	Total
Scardinius erythropthalmus	Rudd	0	88	0	88
Perca fluviatilis	Perch	0	66	0	66
Esox lucius	Pike	0	11	0	11
Gasterosteus aculeatus	Three-spined stickleback	0	2	0	2
Anguilla anguilla	European eel	0	0	6	6

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 (WFD and WFD+). 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 captured in the surveys are summarised in Table 1.2.

Rudd was the dominant fish species in terms of abundance and eel was the dominant species in terms of biomass (Table 1.2).

Table 1.2 Mean (S.E.) CPUE and BPUE for all fish species captured on Lough Bunny (WFD+)

Scientific name	Common name	Mean CPUE (S.E.) **
Scardinius erythropthalmus	Rudd	0.140 (0.064)
Perca fluviatilis	Perch	0.105 (0.067)
Esox lucius	Pike	0.017 (0.007)
Gasterosteus aculeatus	Three-spined stickleback	0.003 (0.002)
Anguilla anguilla	European eel	0.033 (0.010)
		**Mean BPUE (S.E.) **
Scardinius erythropthalmus	Rudd	5.721 (2.632)
Perca fluviatilis	Perch	1.008 (0.646)
Esox lucius	Pike	1.294 (0.556)
Gasterosteus aculeatus	Three-spined stickleback	0.002 (0.001)
Anguilla anguilla	European eel	8.894 (2.400)

Note: On the rare occasion where biomass data was unavailable for an individual fish, this was determined from a length/weight regression for that species.

*Eel CPUE and BPUE based on fyke nets only

**CPUE and BPUE data above for all fish species except eels are not comparable to earlier surveys as an extra panel was added to the 2-PBB to provide additional information on large coarse fish.
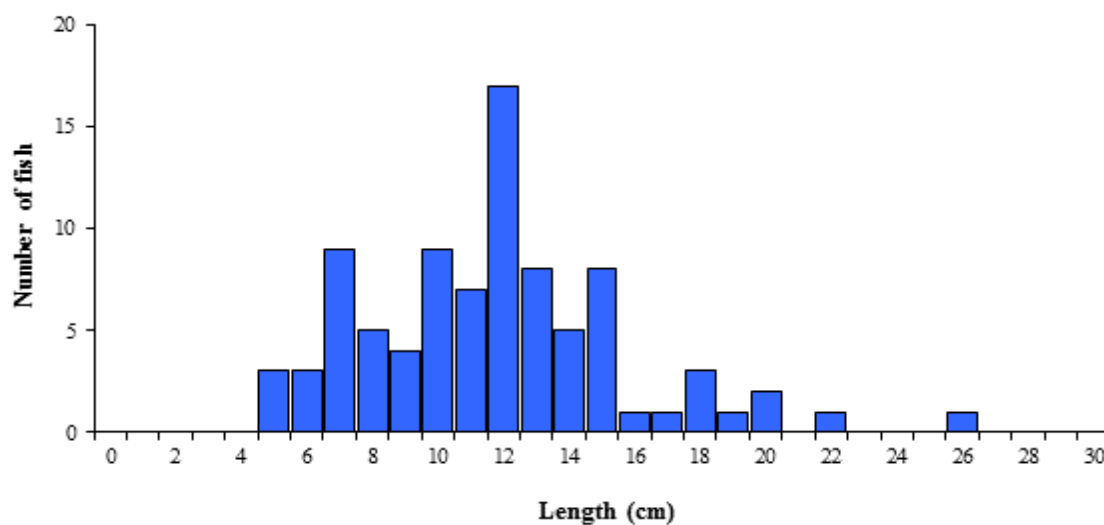
1.3.3 Length frequency distributions and growth

Rudd

Rudd captured during the 2015 survey ranged in length from 5.0cm to 26.9cm (mean = 12.1cm) (Fig. 1.2) with seven age classes present, ranging from 1+ to 10+ with a mean L1 of 2.3cm (Table 1.3). The dominant age class was 2+ (Fig. 1.2).

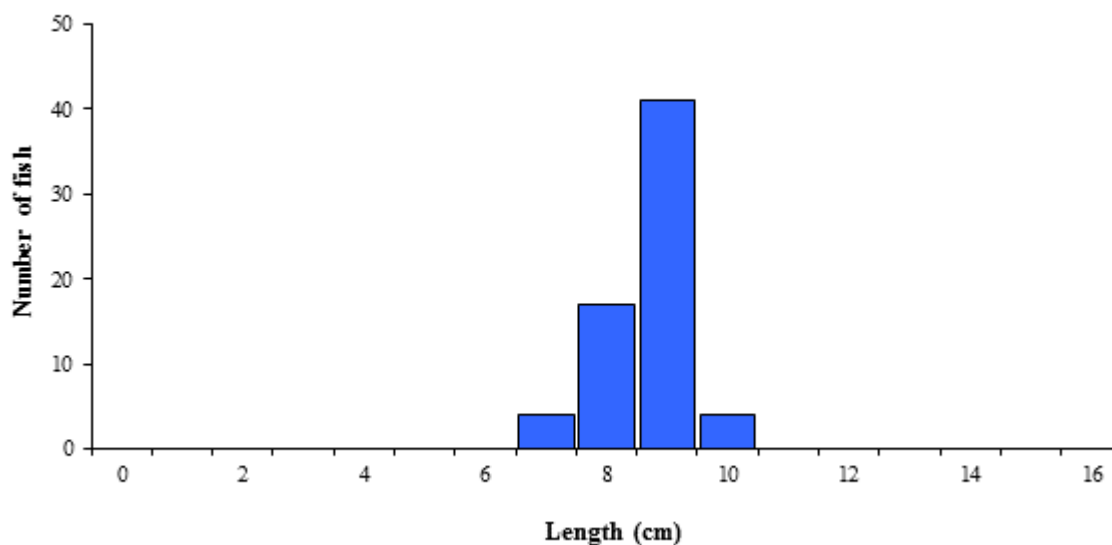**Fig. 1.2 Length frequency of rudd captured on Lough Bunny, 2015**

Table 1.3 Mean (±SE) rudd length (cm) at age for Lough Bunny, September 2015

	Mean (±SE)	N	Range
L1	2.3 (0.1)	46	1.3-3.6
L2	5.9 (0.2)	32	2.9-8.1
L3	10.2 (0.5)	16	5.5-13.8
L4	13.5 (1.2)	7	8.7-19.0
L5	15.3 (0.8)	4	13.3-17.3
L6	18.3 (0.5)	4	17.5-19.8
L7	20.3 (0.4)	2	19.8-20.7
L8	23.0	1	23.0-23.0
L9	25.0	1	25.0-25.0
L10	26.5	1	26.5-26.5

Perch

Perch captured during the 2015 survey ranged in length from 7.0cm to 10.5cm (mean = 9.0cm) (Fig.1.3) with one age class present, 1+, with a mean L1 of 7.0cm (Table 1.4). The dominant age class was 1+ (Fig. 1.3).

Fig. 1.3 Length frequency of perch captured on Lough Bunny, 2015

Table 1.4 Mean (±SE) perch length (cm) at age for Lough Bunny, September 2015

|	Mean (±SE)	N	Range
L1	7.0 (0.2)	13	5.7-8.1

Other fish species

Pike captured during the 2015 survey ranged in length from 13.6cm to 28.5cm and three-spined stickleback ranged in length from 4.2cm to 4.3cm. Six eels were captured during the survey and ranged in length from 42.0cm to 61.5cm.

1.3.4 Stomach and diet analysis

Feeding studies provide a good indication of the availability of food items and the angling methods that are likely to be successful. However, the value of stomach content analysis is limited unless undertaken over a long period as diet may change on a daily basis depending on the availability of food items.

Perch initially start to feed on pelagic zooplankton. Once they reach an intermediate size they start feeding on benthic resources and eventually move on to feed on fish once they are large enough (Hjelm *et al*., 2000). The food items recorded in a sub sample of perch captured during the survey were dominated by unidentified insect remains (Fig 1.4).
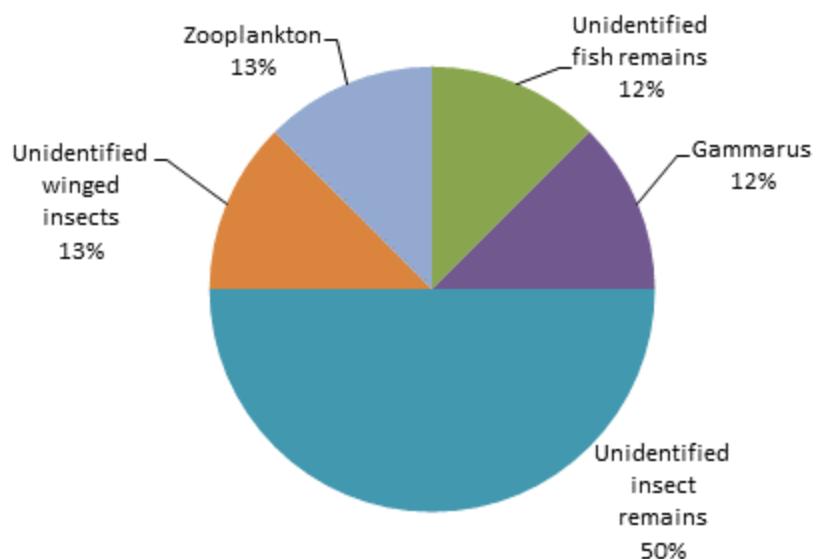
Fig. 1.4. Diet of perch captured on Lough Bunny 2015 (% occurrence) n=8

1.4 Summary and ecological status

Rudd was the dominant species in terms of abundance (CPUE) and eel was the dominant species in terms of biomass (BPUE) captured in the 2015 survey.

Rudd ranged in length from 5.0cm to 26.9cm and ranged in age from 1+ to 10+, indicating reproductive success in seven of the previous eleven years. The dominant age class was 2+.

Perch ranged in length from 7.0cm to 10.5cm and had one age class present (1+). The dominant age class was 1+.

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 multimetric fish ecological classification tool (Fish in Lakes – 'FIL') was developed for the island of Ireland (Ecoregion 17) using IFI and Agri-Food and Biosciences Institute Northern Ireland (AFBINI) data generated during the NSSHARE Fish in Lakes project (Kelly *et al.*, 2008). This tool was further developed during 2010 (FIL2) in order to make it fully WFD compliant, including producing EQR values for each lake and associated confidence in classification (Kelly *et al*., 2012). Using the FIL2 classification tool, Lough Bunny has been assigned an ecological status of High based on the fish populations present in 2015. The ecological status assigned to the in 2009 was Good and it was High in 2012.

In the 2010 to 2012 surveillance monitoring reporting period, the EPA assigned Lough Bunny an overall ecological status of High, based on all monitored physico-chemical and biological elements, including fish. This status classification will be revised during 2016.

1.5 References

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