



**National Research
Survey Programme**
Lakes 2015

Lough Cullaun





Inland Fisheries Ireland
National Research Survey Programme
**Fish Stock Survey of Lough Cullaun,
August 2015**

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Cover photo: Netting survey on Lough Dan © Inland Fisheries Ireland



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1.1 Introduction

Lough Cullaun is located approximately 4km from Corrofin, Co.Clare and forms part of the “East Burren Complex” Special Area of Conservation (NPWS, 2001) (Plate 1.1, Fig. 1.1). The East Burren Complex SAC is a large area that encompasses all the high ground in the east Burren. A total of 12 different habitats listed on Annex I of the EU Habitats Directive are present, 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. The shores of Lough Cullaun are also home to a number of important bird species (NPWS, 2001).

Lough Cullaun is a shallow lake that has excellent water clarity as it flows from the Burren (O’ Reilly, 2007). The lake has a surface area of 25ha and a mean depth of 6.7m. Lough Cullaun lies in a rich and productive limestone area which produces high quality fish (ShIRBD, 2009). It is primarily a coarse fishery (ShIRBD, 2009) but also holds brown trout which have an average weight of less than one kilogram (O’ Reilly, 2007). Pike, tench, roach, bream, rudd, perch and eel have all been previously reported from the lake (ShIRBD, 2009). The lake is categorised as typology class 11 (as designated by the EPA for the purposes of the Water Framework Directive), i.e. deep (>4m), less than 50ha and of high alkalinity (>100 mg/l CaCO₃).

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 of these surveys, perch were found to be the dominant species present in the lake. Brown trout, rudd, pike and eels were also captured during the survey.



Plate 1.1. Lough Cullaun

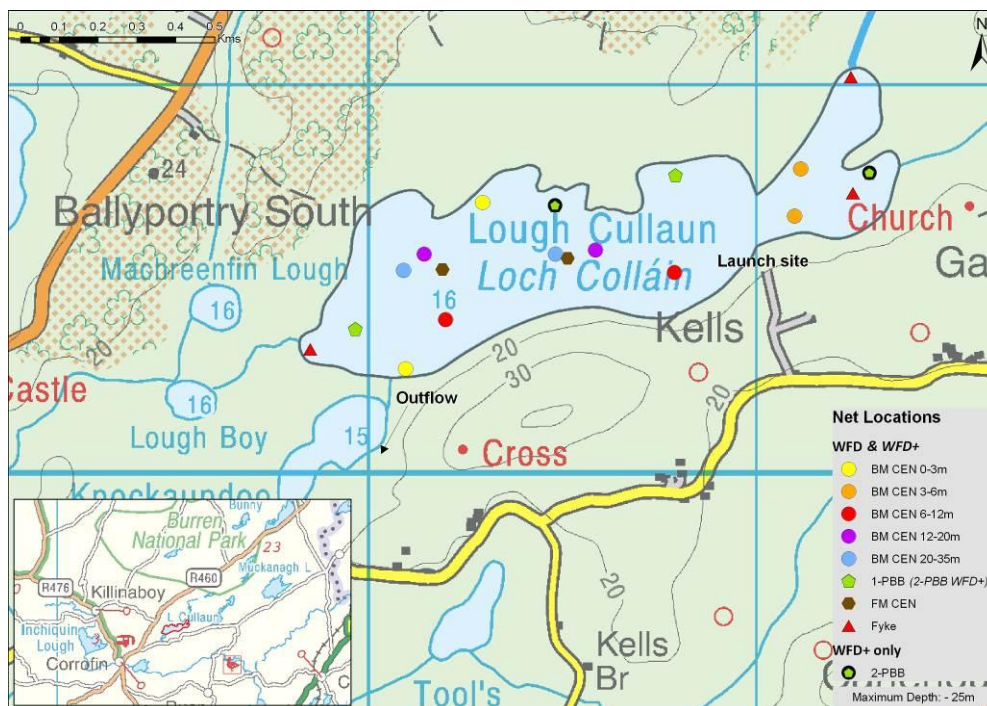


Fig. 1.1. Location Lough Cullaun showing locations and depths of each net (outflow is indicated on map)



1.2 Methods

1.2.2 Netting methods

Lough Cullaun was surveyed over one night on the 26th of August 2015. A total of three sets of Dutch fyke nets, ten benthic monofilament multi-mesh (12 panel, 5-55mm mesh knot to knot) CEN standard survey gill nets (BM CEN) (2 @ 0-2.9m, 2 @ 3-5.9m, 2 @ 6-11.9m, 2 @ 12-19.9m and 2 @ 20-34.9m) and two surface monofilament multi-mesh (FM CEN) (12 panel, 5-55mm mesh knot to knot) CEN standard survey gill nets were deployed randomly in the lake (15 sites). The netting effort was supplemented using four two-panel benthic braided (63.5mm and 88.9mm mesh knot to knot) survey gill nets (2-PBB) (Table 1.1).

The nets were deployed in the same locations as randomly chosen in 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 brown trout, 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 Cullaun in August 2015, with 217 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Perch was the



most abundant fish species recorded, followed by rudd, pike, eels and brown trout. During the previous WFD surveys in 2009 and 2012 the same species composition was recorded (Kelly *et al.*, 2010 and 2013).

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

Scientific name	Common name	Number of fish captured				
		2-PBB	BM CEN	FM CEN	Fyke	Total
<i>Perca fluviatilis</i>	Perch	0	158	0	0	158
<i>Scardinius erythrophthalmus</i>	Rudd	0	18	31	1	50
<i>Esox lucius</i>	Pike	0	2	0	2	4
<i>Salmo trutta</i>	Brown trout	1	0	0	0	1
<i>Anguilla anguilla</i>	European eel	0	0	0	4	4

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 captured in the survey are summarised in Table 1.2.

Perch 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 Cullaun, 2015

Scientific name	Common name	Mean CPUE (S.E.) **
<i>Perca fluviatilis</i>	Perch	0.277 (0.109)
<i>Scardinius erythrophthalmus</i>	Rudd	0.087 (0.043)
<i>Esox lucius</i>	Pike	0.005 (0.002)
<i>Salmo trutta</i>	Brown trout	0.001 (0.001)
<i>Anguilla anguilla</i>	European eel	0.022 (0.022)*
Mean BPUE (S.E.) **		
<i>Perca fluviatilis</i>	Perch	6.301 (2.723)
<i>Scardinius erythrophthalmus</i>	Rudd	3.299 (1.546)
<i>Esox lucius</i>	Pike	1.836 (1.353)
<i>Salmo trutta</i>	Brown trout	1.774 (1.774)
<i>Anguilla anguilla</i>	European eel	6.928 (6.928)*

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

Perch

Perch captured during the 2015 survey ranged in length from 5.0cm to 22.3cm (mean = 10.3cm) (Fig.1.2) with five age classes present, ranging from 0+ to 4+ with a mean L1 of 7.3cm (Table 1.3). The dominant age class was 1+ (Fig. 1.2).

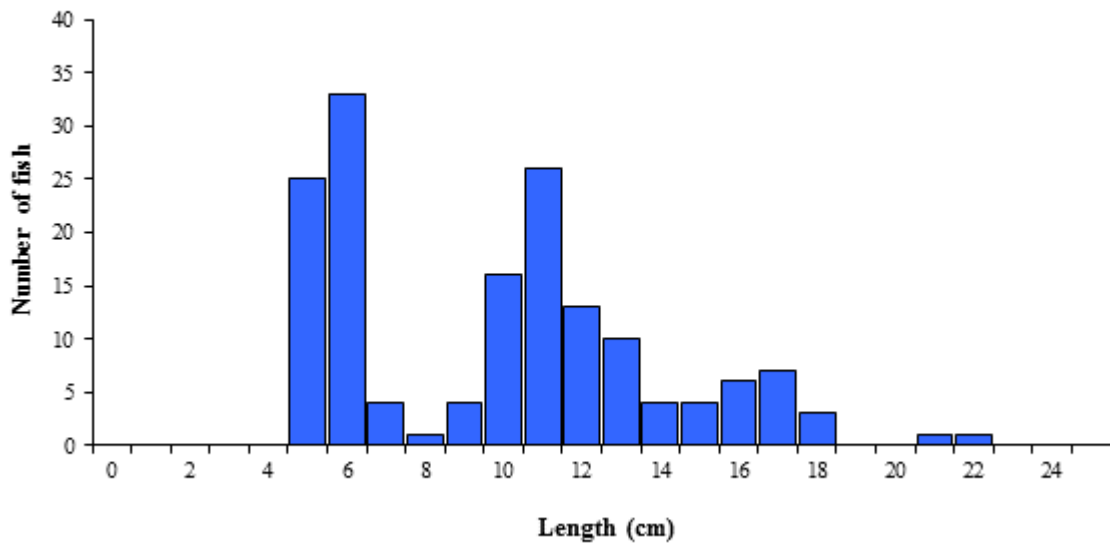


Fig. 1.2. Length frequency of perch captured on Lough Cullaun, 2015

Table 1.3. Mean (\pm S.E.) perch length (cm) at age for Lough Cullaun, August 2015

	L₁	L₂	L₃	L₄
Mean (\pm S.E.)	7.3 (0.4)	12.1 (0.6)	16.0 (0.7)	19.5 (1.1)
N	28	13	5	3
Range	5.0-11.0	9.9-16.0	14.3-17.8	17.3-20.7

Rudd

Rudd captured during the 2015 survey ranged in length from 5.0cm to 24.0cm (mean = 11.9cm) (Fig.1.3) with five age classes present, ranging from 1+ to 5+ with a mean L1 of 2.0cm (Table 1.4). The dominant age class was 1+ (Fig. 1.3).

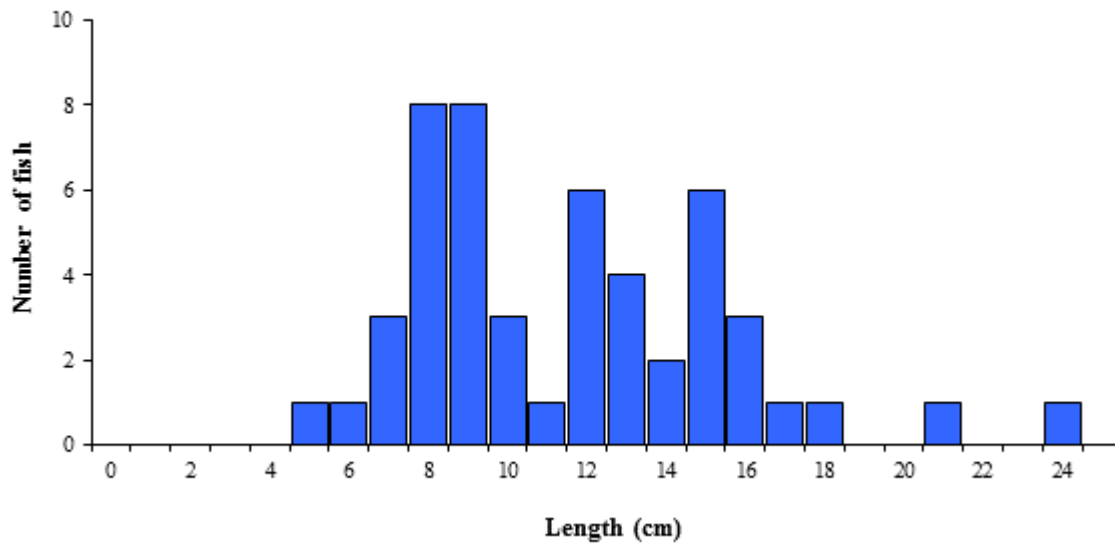


Fig. 1.3. Length frequency of rudd captured on Lough Cullaun, 2015

Table 1.4. Mean (\pm S.E.) rudd length (cm) at age for Lough Cullaun, August 2015

	L₁	L₂	L₃	L₄	L₅
Mean (\pm S.E.)	2.0 (0.1)	5.7 (0.3)	10.5 (0.4)	13.7 (0.8)	18.1 (0.4)
N	32	22	12	4	3
Range	1.0-3.1	3.9-8.4	8.1-12.5	11.4-15.0	17.5-18.8

Other fish species

Eels captured during the 2015 survey ranged in length from 52.0cm to 61.5cm. Four pike ranged in length from 15.6cm to 60.6cm and one brown trout at 50.2cm was recorded and aged at 5+.

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 eventually moving 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 zooplankton (Fig 1.4).

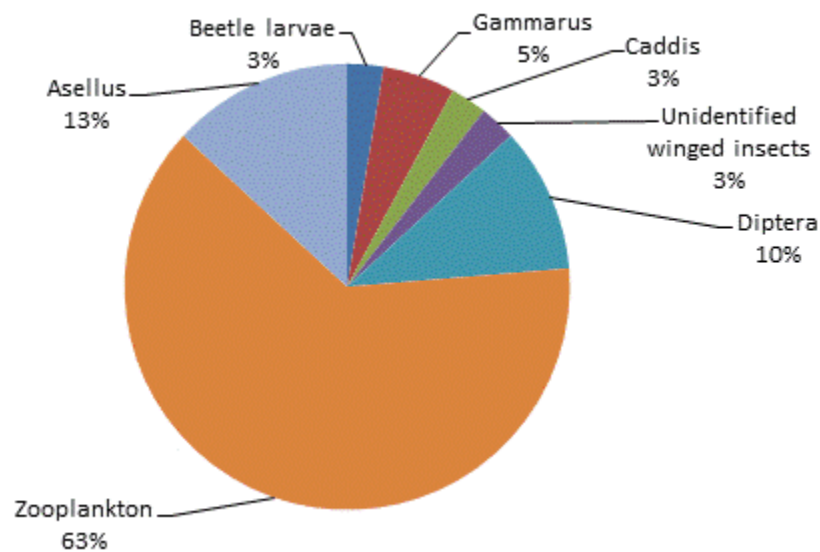


Fig. 1.4 Diet of perch captured on Lough Cullaun 2015 (% occurrence) n=29



1.4 Summary and ecological status

Perch was the dominant species in terms of abundance (CPUE) and eel was the dominant species in terms of biomass (BPUE) captured during the 2015 survey. Perch ranged in length from 5.0cm to 22.3cm and ranged in age from 0+ to 4+, indicating reproductive success in each of the previous five years. The dominant age class was 1+.

Rudd ranged in length from 5.0cm to 24.0cm and ranged in age from 1+ to 5+, indicating reproductive success in five of the previous six years. 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 (AFBNI) 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 Cullaun has been assigned an ecological status of High based on the fish populations present in 2015. The ecological status assigned to the lake in 2009 and 2012 was also High.


In the 2010 to 2012 surveillance monitoring reporting period, the EPA assigned Lough Cullaun an overall ecological status of Good, 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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