

National Research Survey Programme

Lakes 2016

Ballyquirke Lough

IFI/2017/1-4367



Iascach Intíre Éireann
Inland Fisheries Ireland



Inland Fisheries Ireland

National Research Survey Programme - Coarse Fish and Pike

Fish Stock Survey of Ballyquirke Lough,

September 2016

Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

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

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1.1 Introduction

Ballyquirke Lough (Loch Bhaile Ui Choirc) is located approximately 1km south of Moycullen, Co. Galway. The lake is connected to Lough Corrib via the Ballyquirke Canal which exits from the north-east corner of the lake (Fig. 1.1). The lake is situated at an altitude of 5 m.a.s.l., has a surface area of 73.6ha, mean depth of 2.9 m and maximum depth of 12.2m. The dominant geology of the lake is limestone and calcareous shale. Adjacent land use is predominantly agricultural with a large proportion of pasture. The lake is categorised as typology class 6 for the purposes of Water Framework Directive (WFD), i.e. shallow (<4m), greater than 50ha and moderately alkaline (> 20mg/l CaCO₃). The lake has been assigned a good ecological status (EPA, 2014).

The lake falls within the Lough Corrib Special Area of Conservation (SAC) (00297). The SAC supports a number of protected habitats species including the sea lamprey (*Petromyzon marinus*), Brook Lamprey (*Lampetra planeri*) and Atlantic salmon (*Salmo salar*) (NPWS, 2015).

The lake was previously surveyed in 1996 when roach, bream, roach x bream hybrids, perch and pike were recorded (CFB, 1997). One rudd and one rudd x bream hybrid were also captured. The lake supports an important coarse fish and pike fishery.



Plate 1.1. Ballyquirke Lough, September 2016



Loch Bhaile Uí Choirc, Galway

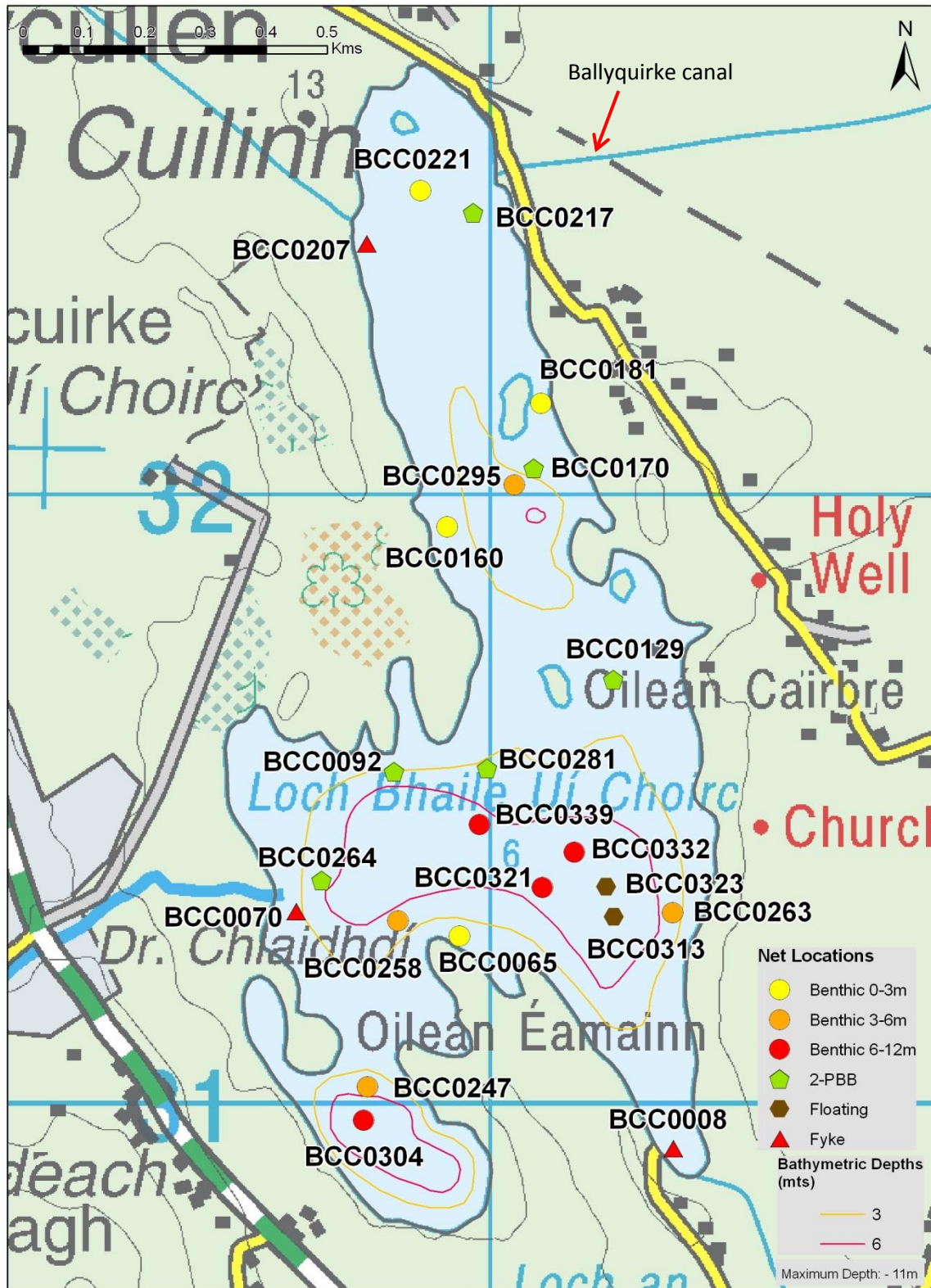


Fig. 1.1. Location map of Ballyquirke Lough showing net locations and depths of each net (outflow canal is indicated on map)



1.2 Methods

1.2.1 Netting methods

Ballyquirke Lough was surveyed over two nights from the 13th to 15th of September 2016. A total of three sets of Dutch fyke nets, 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) and two floating monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets were deployed in the lake (17 sites). The netting effort was supplemented using six two-panel benthic braided (63.5mm and 88.9mm mesh knot to knot) survey gill nets (2-PBB).

A handheld GPS was used to locate 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 bream 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 retained for further analysis. Fish were frozen immediately after the survey and subsequently dissected in the IFI laboratory.

1.2.2 Fish diet

Total stomach contents were inspected and individual items were counted and identified to the lowest taxonomic level possible. The percentage frequency occurrence (%FO) of prey items was then calculated to identify key prey items (Amundsen *et al.*, 1996).

$$\%FO_i = (N_i/N) \times 100$$

Where:

%FO_i is the percentage frequency of prey items I,

N_i is the number of a particular species with prey I in their stomach,

N is total number of a particular species with stomach contents

1.2.3 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 six fish species were recorded in Ballyquirke Lough in September 2016, with 424 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Roach was the most common fish species recorded, followed by perch and roach x bream hybrids respectively. A similar species composition was recorded in a survey conducted in 1996. At that time, however, rudd and rudd hybrids were also recorded (CFB, 1997).

Table 1.1. Number of each fish species captured by each gear type during the survey on Ballyquirke Lough, September 2016

Scientific name	Common name	Number of fish captured				
		2-PBB	BM CEN	FM CEN	Fyke	Total
<i>Rutilus rutilus</i>	Roach	0	119	70	2	191
<i>Perca fluviatilis</i>	Perch	1	156	2	4	163
<i>Rutilus rutilus x Abramis brama</i>	Roach x bream hybrid	22	36	0	0	58
<i>Esox lucius</i>	Pike	1	4	1	1	7
<i>Abramis brama</i>	Bream	1	1	0	1	3
<i>Anguilla anguilla</i>	European eel	0	0	0	2	2

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 2016 survey are summarised in Table 1.2.

Roach and perch were the two most dominant fish species in terms of abundance (CPUE) respectively. Roach x bream hybrids and pike were the dominant fish species in terms of biomass (BPUE) respectively (Table 1.2).

The mean CPUE and BPUE for all species captured 2016 survey are illustrated in Figures 1.2 and 1.3.



Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Ballyquirke Lough, September 2016

Scientific name	Common name	Mean CPUE (\pm S.E.)	Mean BPUE (\pm S.E.)
<i>Rutilus rutilus</i>	Roach	0.275 (0.093)	14.624 (3.957)
<i>Perca fluviatilis</i>	Perch	0.233 (0.066)	6.436 (1.606)
<i>Rutilus rutilus x Abramis brama</i>	Roach x bream hybrid	0.071 (0.018)	55.007 (18.400)
<i>Esox lucius</i>	Pike	0.009 (0.004)	18.805 (9.918)
<i>Abramis brama</i>	Bream	0.003 (0.002)	2.647 (1.860)
<i>Anguilla anguilla</i>	European eel	0.011 (0.011)	3.233 (3.233)

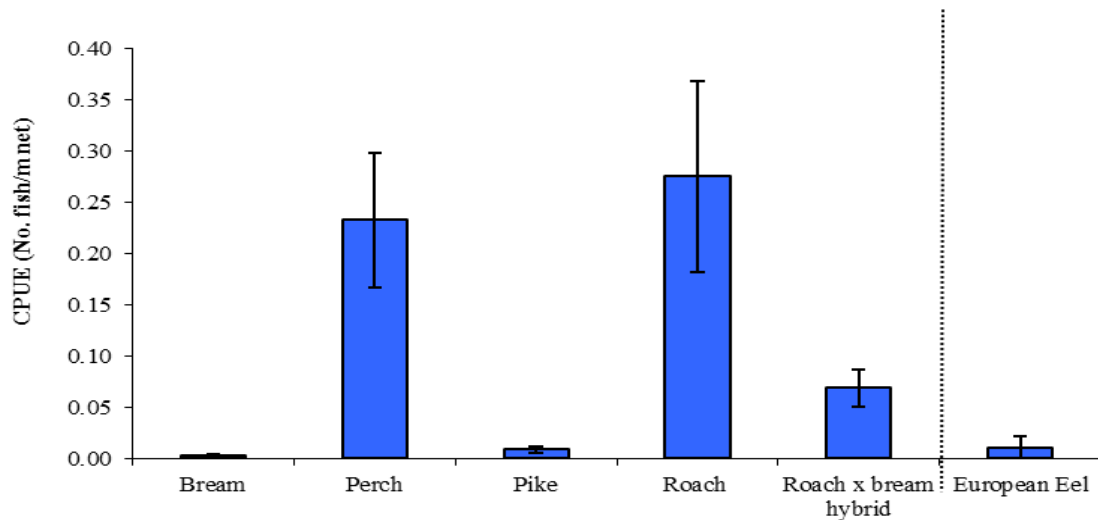


Fig. 1.2. Mean (\pm S.E.) CPUE for all fish species captured in Ballyquirke Lough in September 2016 (Eel CPUE based on fyke nets only)

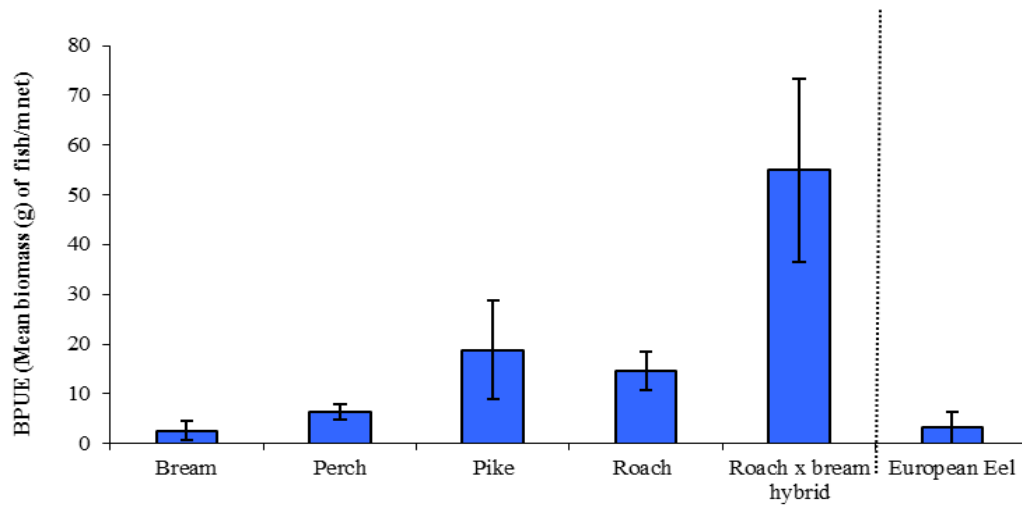


Fig. 1.3. Mean (\pm S.E.) BPUE for all fish species captured in Ballyquirke Lough in September 2016 (Eel BPUE based on fyke nets only), 2010, 2013 and 2016

1.3.3 Length frequency distributions and growth

Roach

Roach captured during the 2016 survey ranged in length from 5.4cm to 32.9 (mean = 12.8cm) (Fig.1.4). Smaller fish dominated and relatively few fish greater than 25cm were recorded. Roach aged from 1+ to 9+ years old, and all intervening year classes, with the exception of 7+ fish (spawned in 2008), were represented in the sample (Figure 1.5).

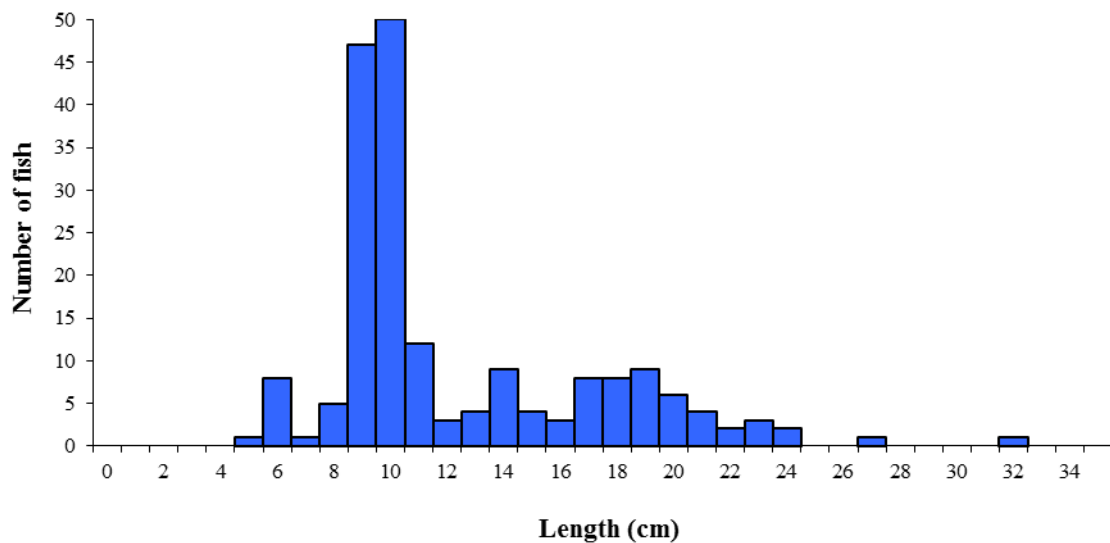


Fig. 1.4. Length frequency of roach captured on Ballyquirke Lough in September 2016

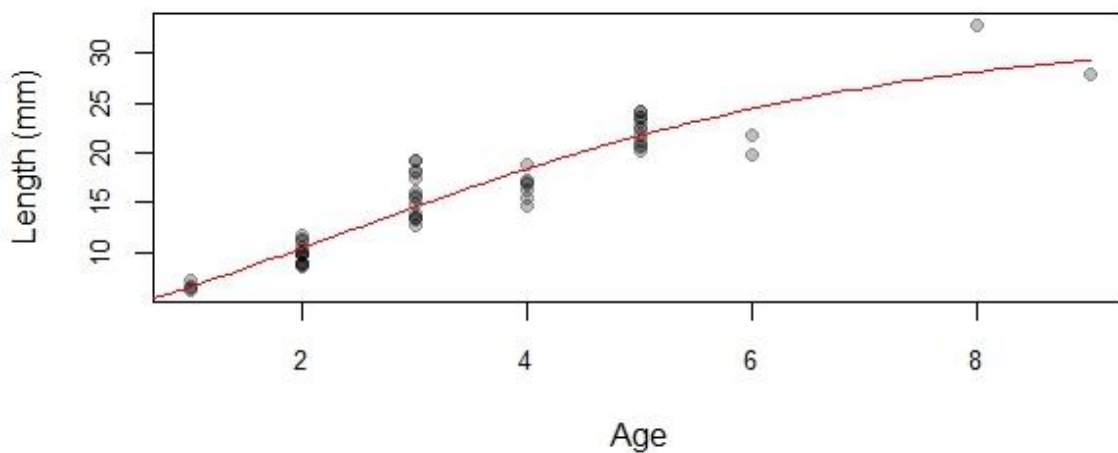


Fig. 1.5. Length at age of roach captured on Ballyquirke Lough in September 2016



Perch

Perch captured during the 2016 survey ranged in length from 4.5cm to 35.4 (mean = 10.9cm) (Fig.1.6). Perch were aged from 0+ to 9+ years old. Young fish dominated the population and the dominant age class was 0+. Indeed, one fish - an individual aged at 9+ - was the only perch older than 4+ recorded during the survey (Fig. 1.7).

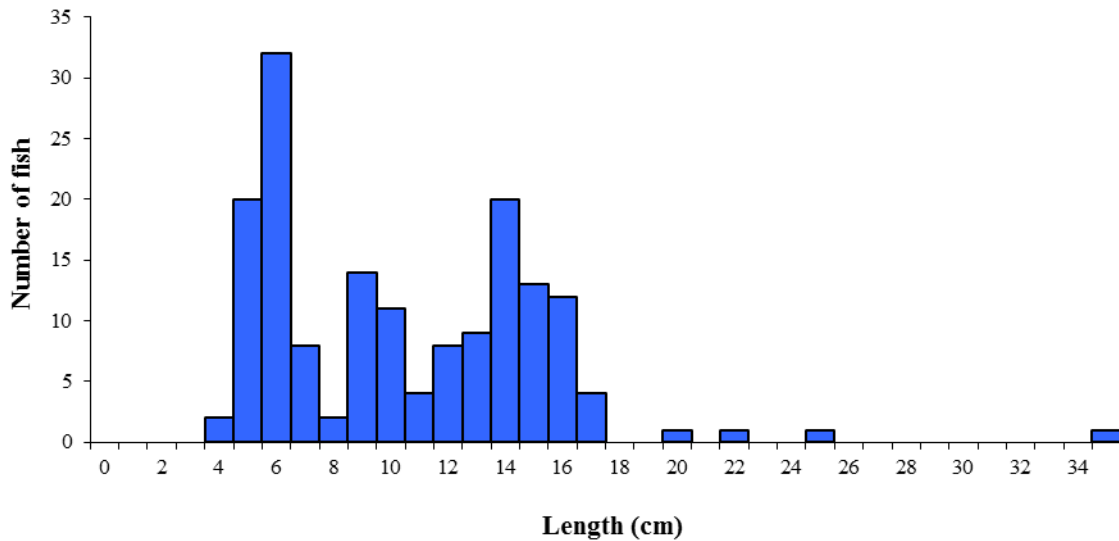


Fig. 1.6. Length frequency of perch captured on Ballyquirke Lough in September 2016

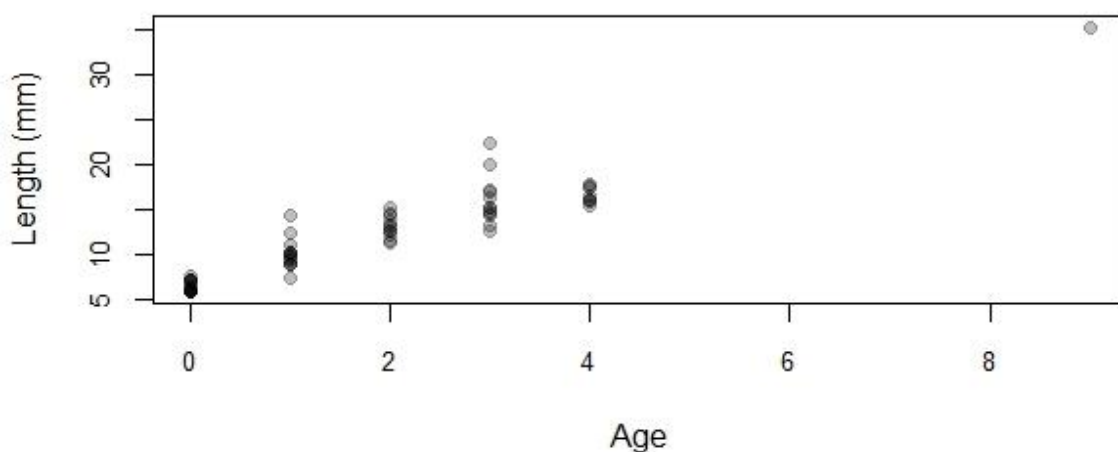


Fig. 1.7. Length at age of perch captured on Ballyquirke Lough in September 2016

Roach x bream hybrids

Roach x bream hybrids captured during the survey ranged from 7.7cm to 47.3cm (mean = 31.0cm) (Figure 1.8). Roach x bream hybrids were aged from 1+ to 21+ years old (Fig. 1.9). With the exception of 2+ aged fish (spawned in 2014) all intervening year classes were represented in the aged sample. Larger and older fish dominated this population (Fig. 1.8 and Fig. 1.9).

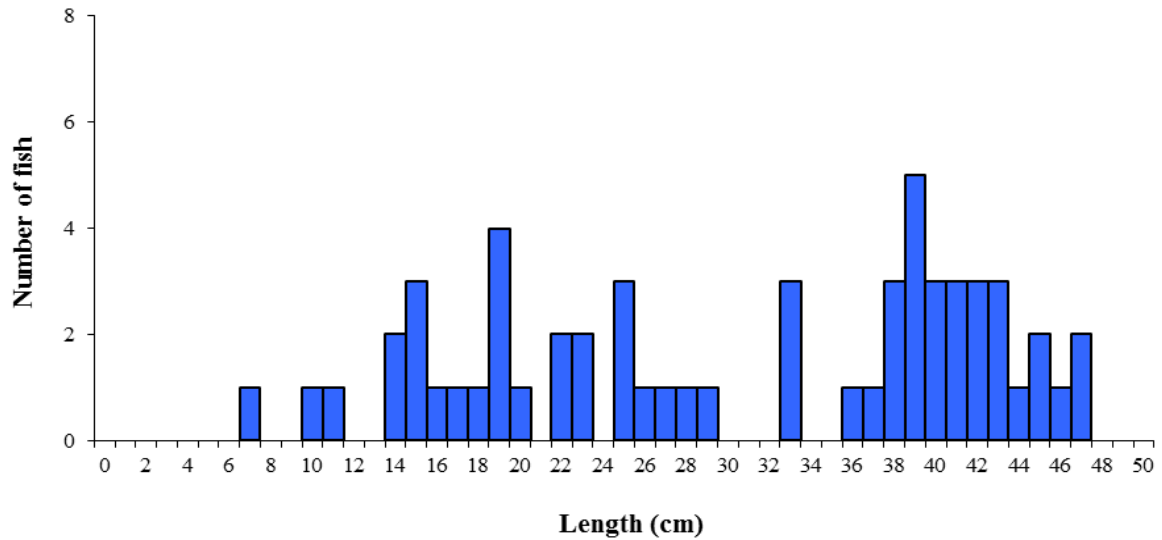


Fig. 1.8. Length frequency of roach x bream hybrids captured on Ballyquirke Lough in September 2016

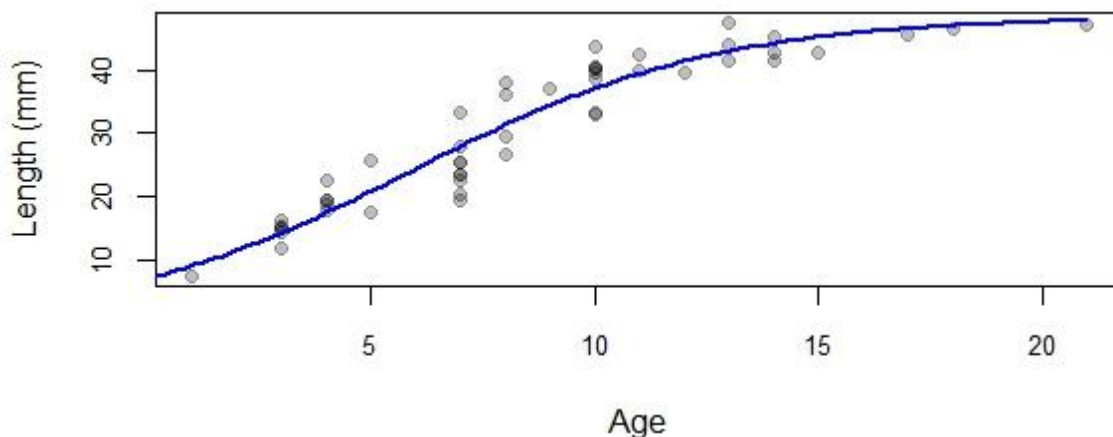


Fig. 1.9. Length at age of roach x bream hybrids captured on Ballyquirke Lough in September 2016



Pike

Seven pike were captured during the 2016 survey. These ranged in length from 19.9cm to 94cm (mean = 56.7cm). The youngest fish was aged at 0+, while two 6+ pike were recorded (Figure 1.10).

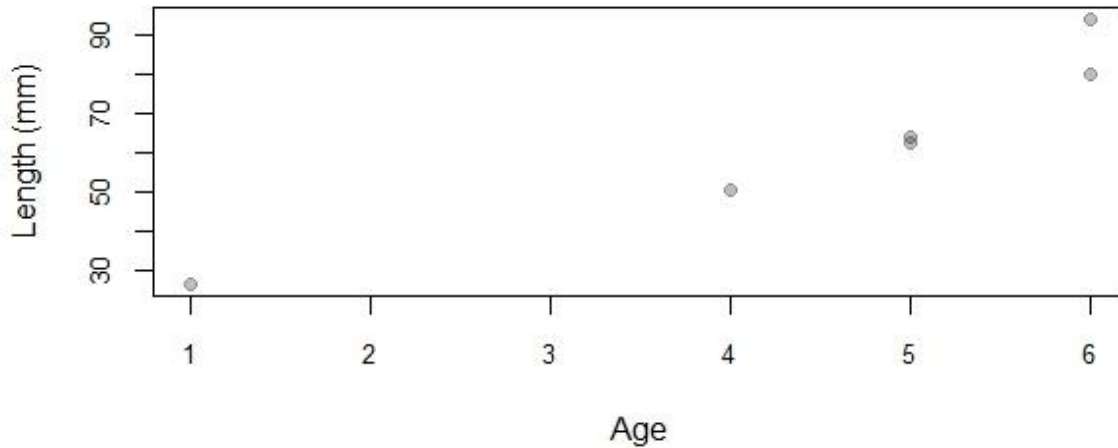


Fig. 1.10. Length at age of roach x bream hybrids captured on Ballyquirke Lough in September 2016

Bream

Three bream were captured during the 2016 survey. These ranged in length from 23.9cm to 46.1cm (mean = 33.3cm). These fish were aged at 4+, 8+ and 9+ years old (Fig 1.11).

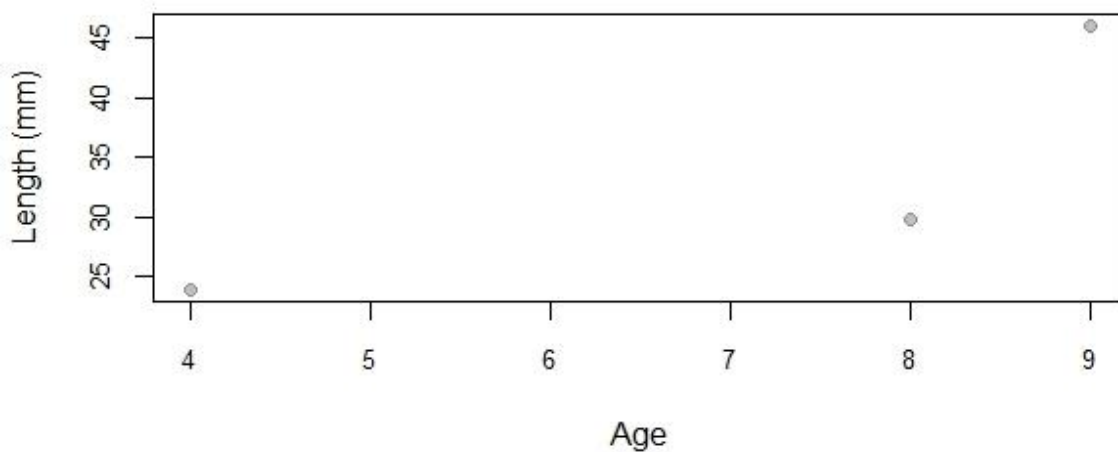


Fig. 1.11. Length at age of bream captured on Ballyquirke Lough in September 2016

Eel

Two eels were recorded in the fyke nets. These measured 52cm and 56cm.

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

A total of 50 perch stomachs were examined. Of these 14 were found to contain no prey items. Of the 36 stomachs containing food, two (6%) were feeding on fish, five (14%) contained invertebrates and fifteen (42%) contained unidentified digested material. Zooplankton were recorded in 14 (39%) of the stomachs which contained food (Fig. 1.12).

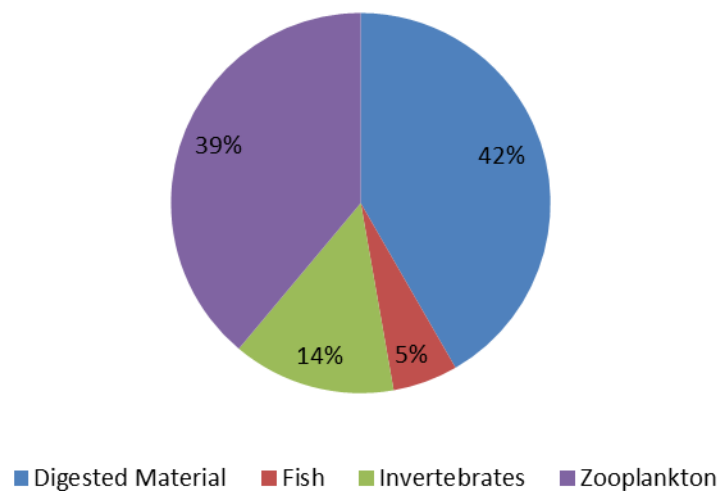


Fig. 1.12 Diet of perch captured on Ballyquirke Lough in September 2016 (% occurrence) n=36.

Fourteen empty stomachs are not presented.



1.4 Summary and ecological status

Five fish species were recorded during the 2016 survey of Ballyquirke Lough. These were; roach, perch, roach x bream hybrids, bream, pike and eel. A similar species mix was recorded when the lake was last surveyed in 1996, although very small numbers of rudd and rudd x bream hybrids were reported on that occasion (CFB, 1997).

Roach and perch dominated catches with respect to CPUE. While recruitment appears to be occurring regularly for both species, it is noteworthy that few older perch were recorded in the nets. Whether this reflects the natural life history strategy for this species, or reflects a degree of anthropogenic disturbance is unclear.

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). During the survey the main dietary components were zooplankton and invertebrates. A small proportion of the sample had fish present in their diet (5%).

Roach x bream hybrids were the third most abundant species recorded in the survey nets and was the dominant fish group with respect to biomass. This group was dominated by larger (>30cm) and older individuals. Indeed, several very old fish were recorded with the oldest individual aged at 21+ years old. Interestingly this fish would have been present when the last survey was conducted in 1996 when it was 1+. Roach x bream hybrid recruitment requires spawning between both parent species (Hayden *et al.*, 2010) and this hybrid occurs in large numbers in many Irish Lakes (Hayden *et al.*, 2014). The presence of a small population of older bream in the lake may indicate that recruitment is limited.

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 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.*, 2012b). Using the FIL2 classification tool, Ballyquirke Lough has been assigned an ecological status of Bad in 2016 based on the fish populations present.



In the 2010 to 2015 surveillance monitoring reporting period, the EPA assigned Ballyquirke Lough an overall ecological status of Good.

1.5 References

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