

National Research Survey Programme

Lakes 2016

Bunerky Lough

IFI/2017/1-4369



Iascach Intíre Éireann
Inland Fisheries Ireland



Inland Fisheries Ireland

National Research Survey Programme - Coarse Fish and Pike

Fish Stock Survey of Bunerky Lough,

September 2016

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

CITATION: McLoone, P., Connor, L., Coyne, J., Morrissey, E., Corcoran, W., Cierpial, D., Delanty, K., Matson, R., Gordon, P., O' Briain, R., Rocks, K., O' Reilly, S., Puttharee, D., McWeeney, D., Robson S., Buckley, S. and Kelly, F.L. (2017) Fish Stock Survey of Bunerky Lough, September 2016. National Research Survey Programme - Coarse Fish and Pike, Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

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

© Inland Fisheries Ireland 2018



ACKNOWLEDGEMENTS

The authors wish to gratefully acknowledge the help and co-operation of all their colleagues in Inland Fisheries Ireland.

The authors would also like to acknowledge the funding provided for the project from the Department of Communications, Climate Action and Environment for 2016.

The report includes Ordnance Survey Ireland data reproduced under OSi Copyright Permit No. MP 007508.

Unauthorised reproduction infringes Ordnance Survey Ireland and Government of Ireland copyright.

© Ordnance Survey Ireland, 2016.

1.1 Introduction

Bunerky Lough is located three kilometres south west of Bawnboy, Co. Cavan in the Erne Catchment (Fig. 1.1). The lake is situated at an altitude of 53 m.a.s.l., has a surface area of 75ha, mean depth of 4.3m and maximum depth of 10.7m. The geology of the area is predominantly carboniferous limestone. The lake is categorised as typology class 8 for the purposes of Water Framework Directive (WFD) monitoring, i.e. deep (>4m), greater than 50ha and moderately alkaline (20-100mg/l CaCO₃). The lake has been assigned a moderate ecological status for the period 2010-2012 (EPA, 2014).

Bunerky Lough was first surveyed in 1979 by the Inland Fisheries Trust; pike, roach, perch and roach x bream hybrids were reported to be present at that time (IFT, unpublished data). The lake was surveyed in 2006 by Inland Fisheries Ireland (IFI) as part of the Interreg funded North South Share Project. At that time, the lake was found to contain stocks of roach, bream, roach x bream hybrids, pike and perch (Kelly *et al.*, 2007). It was subsequently surveyed in 2011 as part of the Interreg funded DOLMANT project by the Agri Food and Biosciences Institute (AFBI) in Northern Ireland. On the latter occasion rudd and rudd x roach hybrids were also recorded (K. Gallagher, AFBI, *pers. comm*).

The lake supports an important coarse fish and pike fishery and is utilised as a match (competition) angling venue. The lake was a venue for the World Pairs Match held in September 2016 just prior to the survey.



Plate 1.1 Bunerky Lough

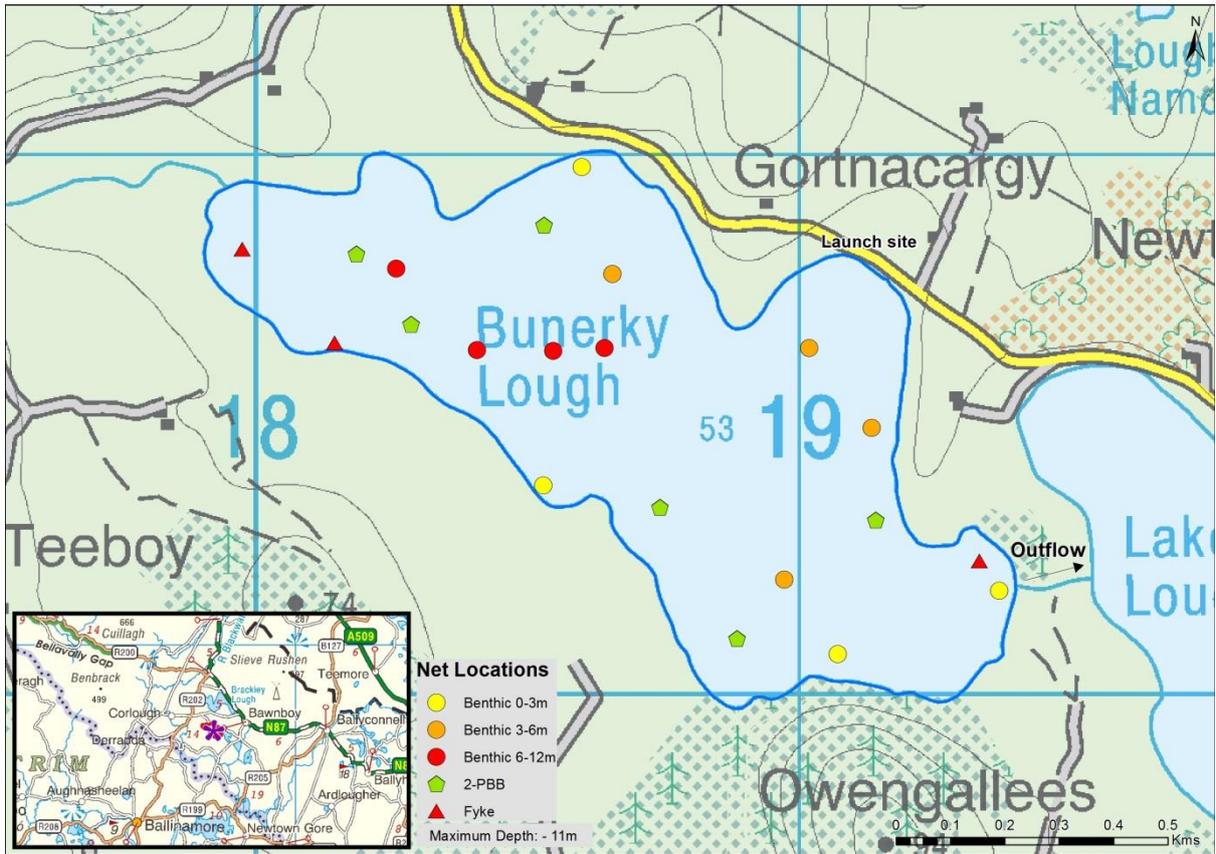


Fig. 1.1. Location map of Bunerky Lough showing net locations and depths of each net (outflow is indicated on map)



Plate 1.2 Releasing a bream on Bunerky Lough in September 2016



1.2 Methods

1.2.1 Netting methods

Bunerky Lough was surveyed over two nights from the 20th to the 22nd 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) (BM CEN) were deployed in the lake (15 sites) (Fig. 1.1). 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) (Fig. 1.1).

Eight benthic monofilament multi-mesh survey gill nets and fyke nets were deployed in the same locations as were randomly selected in the 2006 survey. Four additional benthic monofilament survey gill nets were deployed (two each in the 3-6m and 6-12m depth zones). 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, roach, roach x bream hybrids 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 seven fish species and two hybrid varieties were recorded in Bunerky Lough in September 2016, with 502 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Perch were the most common fish species recorded, followed by roach and roach x bream hybrids respectively. Bream and rudd were also captured during the 2016 survey. A similar species mix was recorded during the 2006 survey (Kelly *et al*, 2007).

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

Scientific name	Common name	Number of fish captured			
		2-PBB	BM CEN	Fyke	Total
<i>Perca fluviatilis</i>	Perch	0	237	0	237
<i>Rutilus rutilus</i>	Roach	0	172	2	174
<i>Rutilus rutilus x Abramis brama</i>	Roach x bream hybrid	0	47	2	49
<i>Abramis brama</i>	Bream	1	12	1	14
<i>Scardinius erythrophthalmus</i>	Rudd	0	9	0	9
<i>Esox lucius</i>	Pike	0	6	0	6
<i>Rutilus rutilus x Scardinius erythrophthalmus</i>	Roach x rudd	0	1	0	1
<i>Tinca tinca</i>	Tench	1	0	0	1
<i>Anguilla anguilla</i>	European eel	0	0	11	11

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 during the 2016 survey are summarised in Table 1.2 and illustrated in Figures 1.2 and 1.3.

Perch and roach were the two most dominant fish species in terms of abundance (CPUE) respectively, while roach, followed by bream and perch were the dominant species with respect to biomass (BPUE) (Table 1.2; Figs. 1.2 and 1.3).



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

Scientific name	Common name	Mean CPUE (\pm S.E.)	Mean BPUE (\pm S.E.)
<i>Perca fluviatilis</i>	Perch	0.376 (0.109)	10.526 (3.303)
<i>Rutilus rutilus</i>	Roach	0.275 (0.080)	12.854 (3.671)
<i>Rutilus rutilus x Abramis brama</i>	Roach x bream hybrid	0.075 (0.024)	8.574 (3.676)
<i>Abramis brama</i>	Bream	0.076 (0.024)	10.546 (3.708)
<i>Scardinius erythrophthalmus</i>	Rudd	0.014 (0.011)	0.412 (0.284)
<i>Rutilus rutilus x Scardinius erythrophthalmus</i>	Roach x rudd hybrid	0.002 (0.002)	0.038 (0.038)
<i>Esox lucius</i>	Pike	0.010 (0.005)	8.277 (5.404)
<i>Tinca tinca</i>	Tench	0.001 (0.001)	1.190 (1.190)
<i>Anguilla anguilla</i> *	European eel*	0.061 (0.015)*	15.892 (2.973)*

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

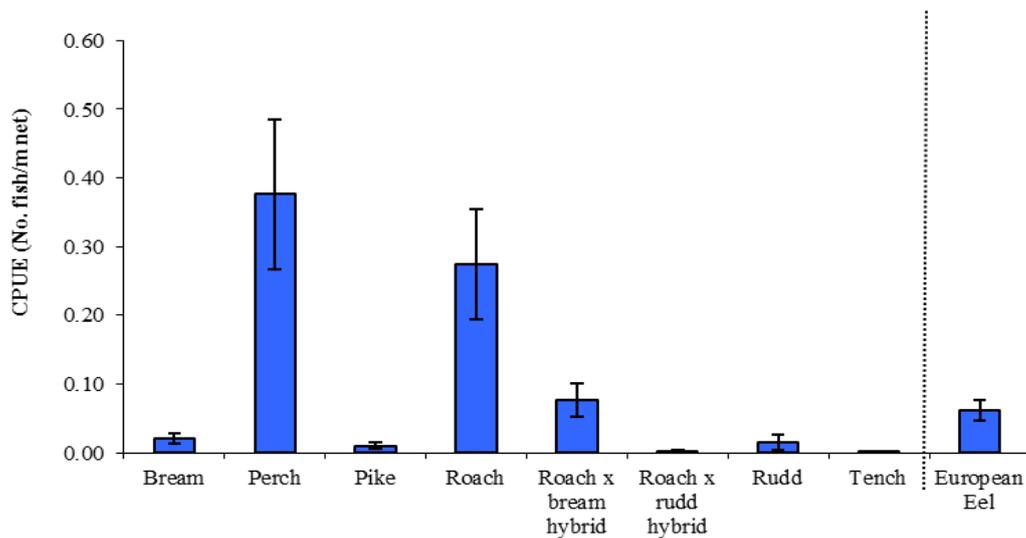


Fig. 1.2. Mean (\pm S.E.) CPUE for all fish species captured in Bunerky Lough in September 2016 (Eel CPUE based on fyke nets only)

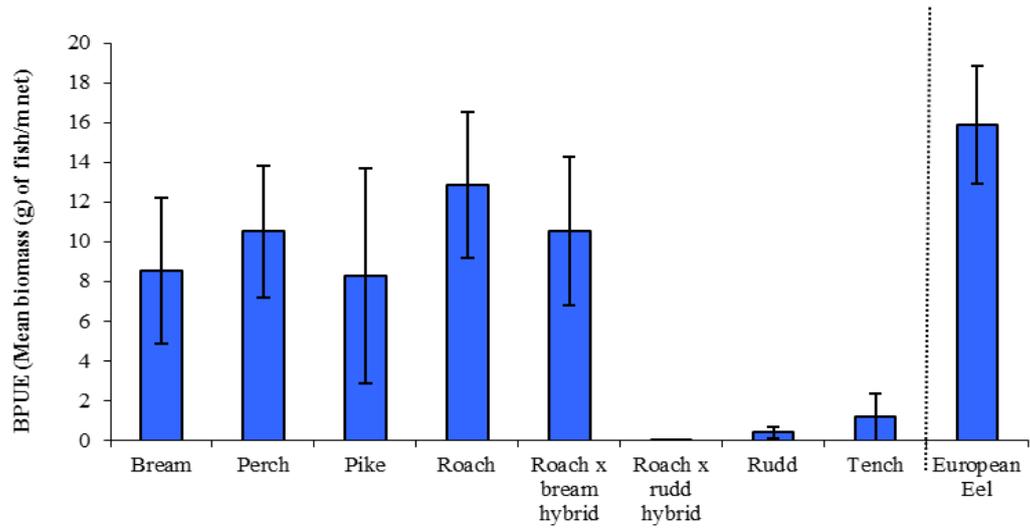


Fig. 1.3. Mean (\pm S.E.) BPUE for all fish species captured in Bunerky Lough in September 2016 (Eel BPUE based on fyke nets only)

1.3.3 Length frequency distributions, age and growth

Roach

Roach captured during the 2016 survey ranged in length from 7.4 to 25.6cm (mean = 15.7cm) (Figure 1.4). Roach aged from 2+ to 9+ years old, and all intervening year classes were represented in the sample; however no 1+ fish were recorded. Roach measuring between 12 and 14cm in length represented a significant proportion of the fish captured in the nets. Fish of this size are typically 3+ in the lake (Figure 1.5)

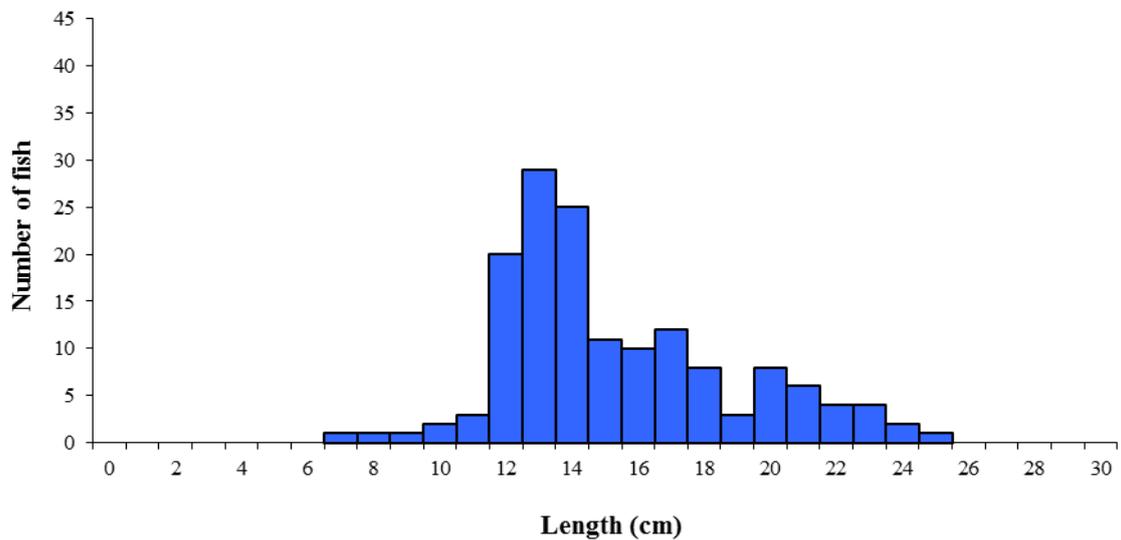


Fig. 1.4. Length frequency of roach captured on Bunerky Lough in September 2016

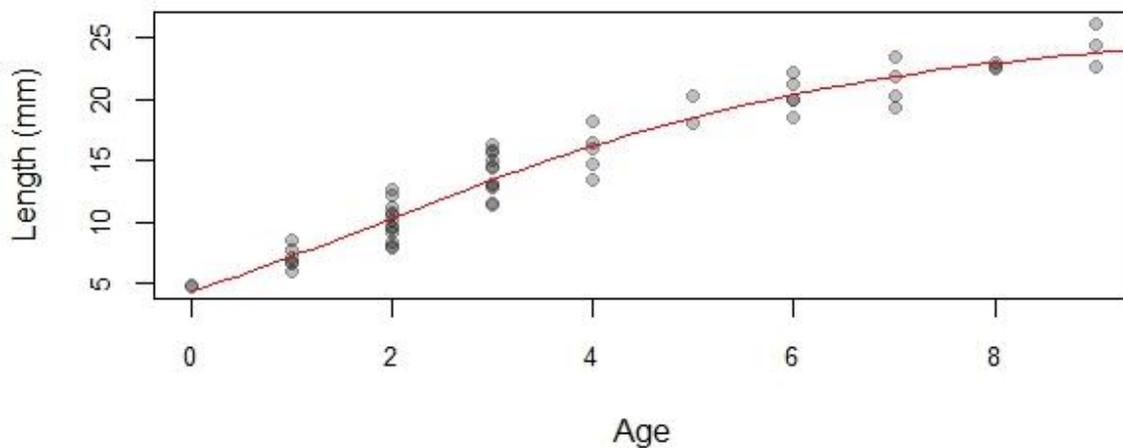


Fig. 1.5. Length at age of roach captured on Bunerky Lough in September 2016

Perch

Perch captured during the 2016 survey ranged in length from 5.5cm to 35.5cm (mean = 10.4cm) (Fig.1.6). Perch were aged from 2 to 10+ years old, and all intervening year classes were represented in the sample. Young fish dominated the population and the dominant age class was 0+ (Figure 1.6). Relatively few fish greater than 20cm or 4+ years old were recorded (Fig. 1.6 and 1.7).

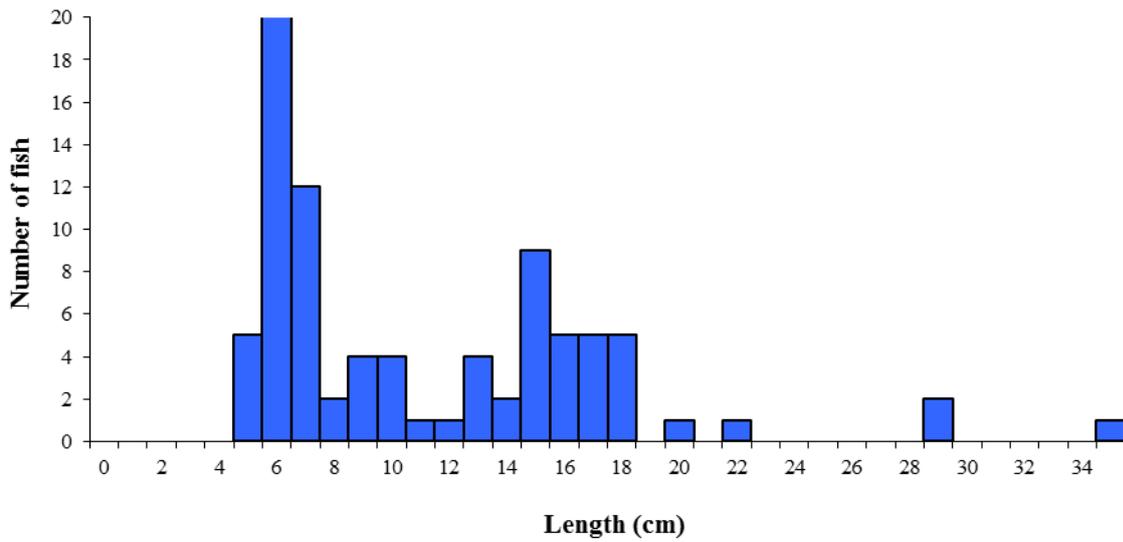


Fig. 1.6. Length frequency of perch captured on Bunerky Lough in September 2016

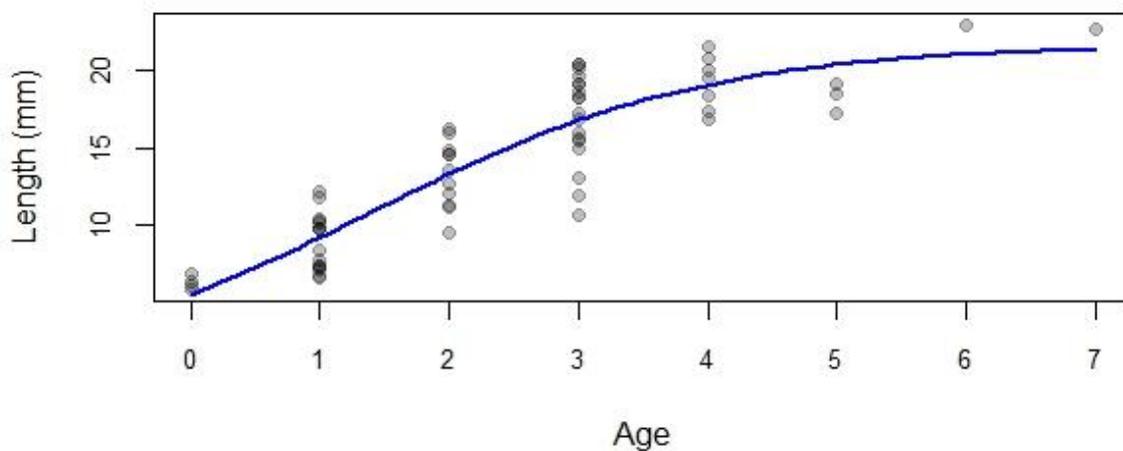


Fig. 1.7. Length at age of perch captured on Bunerky Lough in September 2016



Roach x bream hybrids

Roach x bream hybrids captured during the survey ranged from 6.6cm to 29.9cm (mean = 18.0cm) (Figure 1.8). Roach x bream hybrids were aged from 1+ to 11+ years old. All intervening year classes were represented in the sample and no one year class dominated the population (Fig. 1.9).

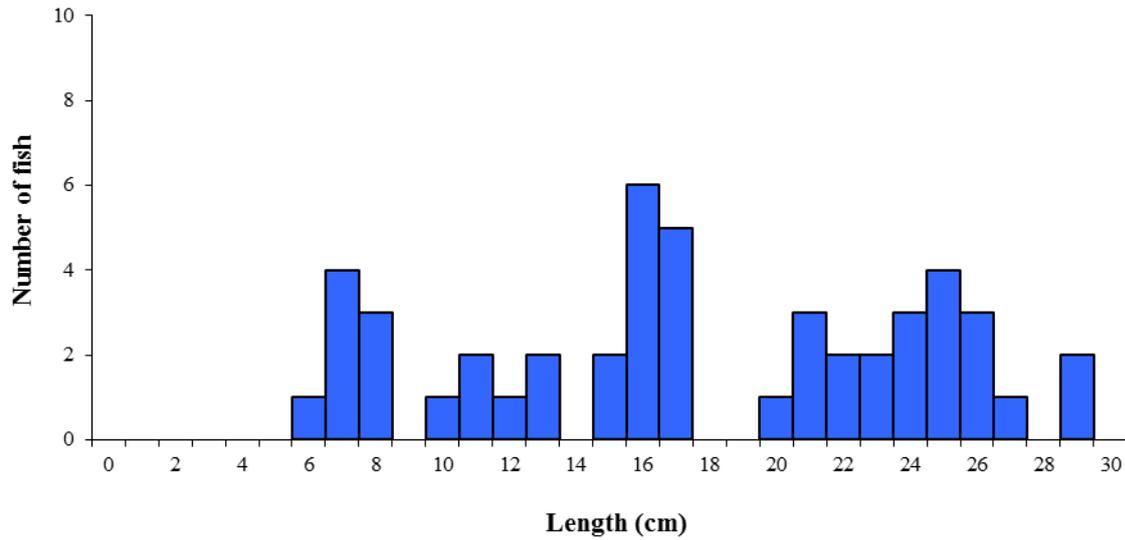


Fig. 1.8 Length frequency of roach x bream hybrids captured on Bunerky Lough in September 2016

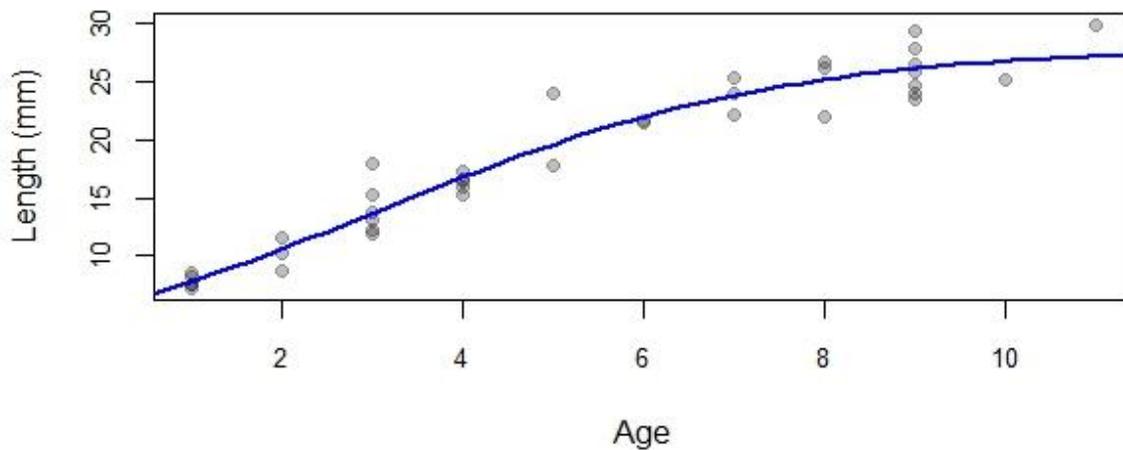


Fig. 1.9 Length frequency of roach x bream hybrids captured on Bunerky Lough in September 2016

Bream

Bream captured during the survey ranged from 4.7cm to 45.1cm (mean = 18.0cm) (Figure 1.10). Bream were aged from 0+ to 12+ years old, with seven year classes represented in the sample. Two 0+ fish were recorded in the nets. However, the majority of the fish sampled were aged at greater than 8 + years old (Figure 1.11).

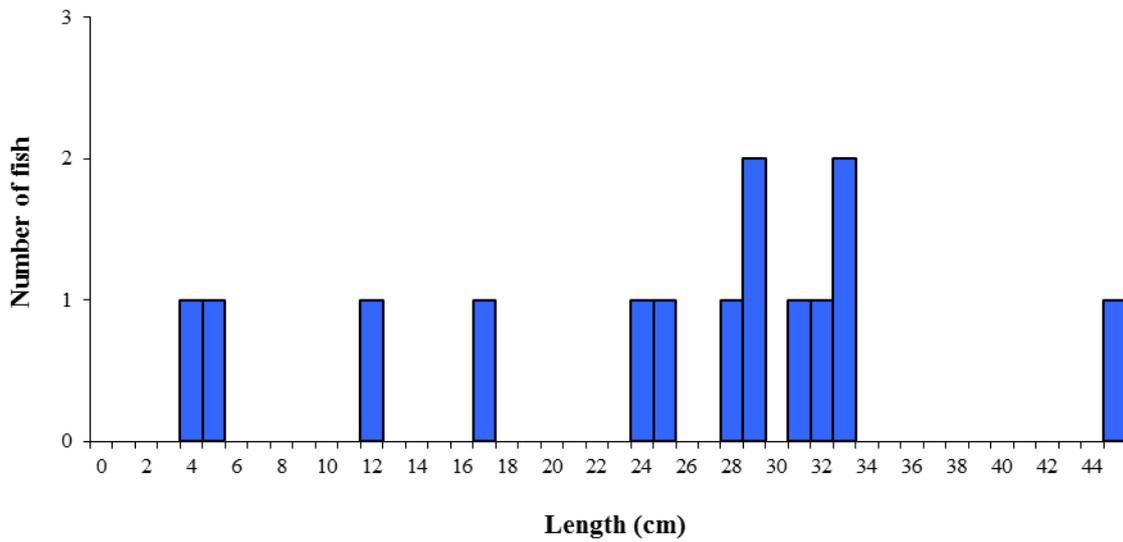


Fig. 1.10 Length frequency of bream captured on Bunerky Lough in September 2016

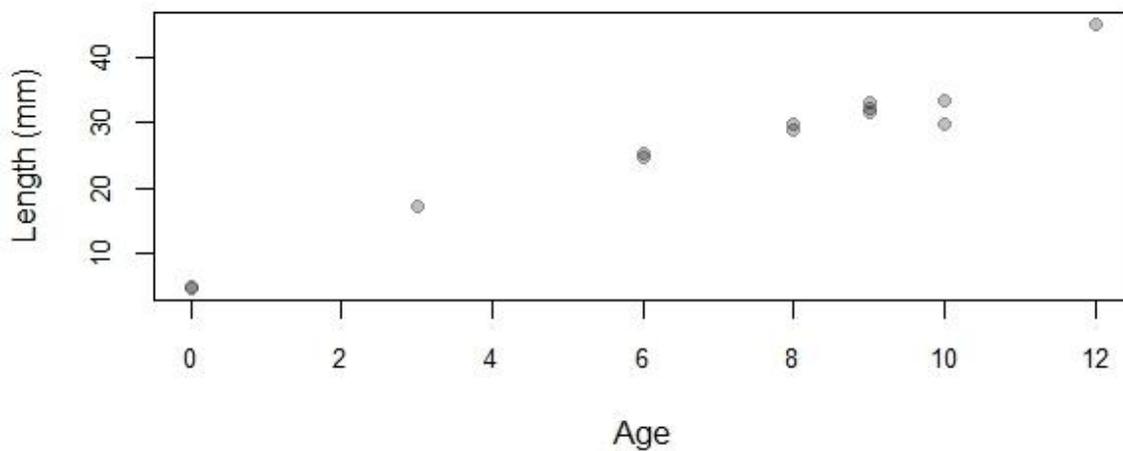


Fig. 1.11 Length at age of bream captured on Bunerky Lough in September 2016



Rudd

Nine samples of rudd were captured during the survey. These ranged in length from 10 to 16.8cm (mean = 11.7cm). Rudd were aged from 2+ to 4+ years old, with 2+ fish dominating the sample (Fig. 1.12).

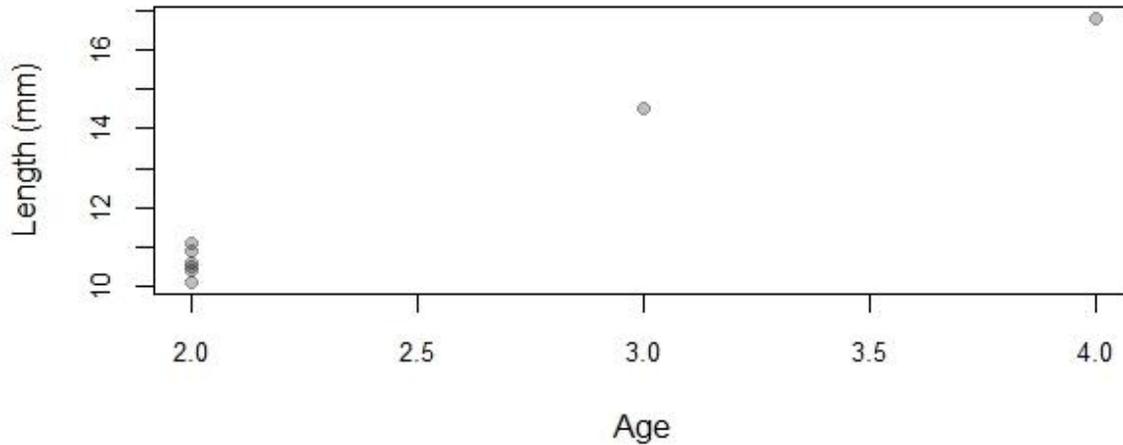


Fig. 1.12. Length at age of rudd captured on Bunerky Lough in September 2016

Pike

Six pike were captured during the 2016 survey. These ranged in length from 29.0cm to 65.2cm (mean = 48.0cm). Pike were aged from 2+ to 4+ years old (Fig. 1.13).

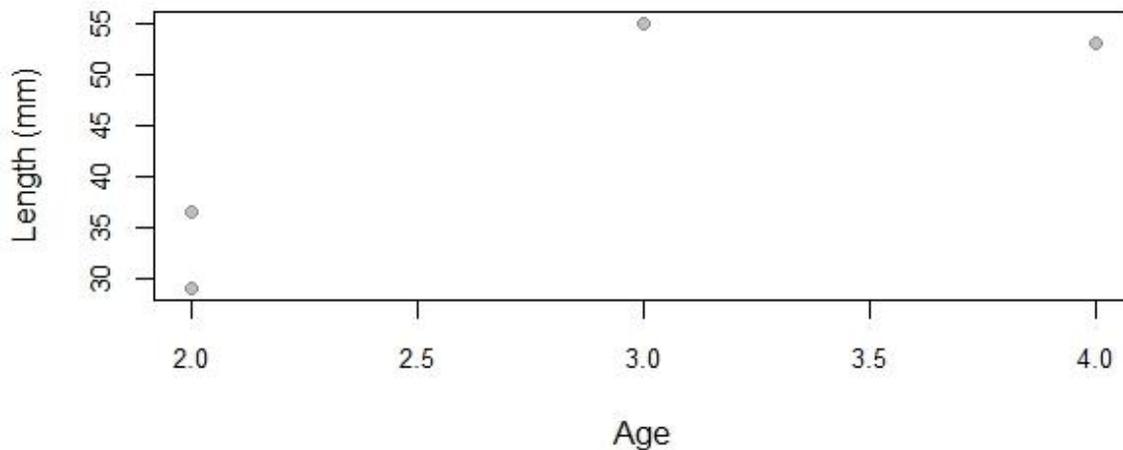


Fig. 1.13. Length at age of pike captured on Bunerky Lough in September 2016



Eel

Eleven eels were recorded in the fyke nets. These ranged in length from 45.0cm to 63.0 (mean = 51.5cm).

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

A total of 59 perch stomachs were examined. Of these 34 were found to contain no prey items. Of the 25 stomachs containing food, 14 (56%) were feeding on fish, three (12%) contained invertebrates and eight (32%) contained unidentified digested material (Fig. 1.14).

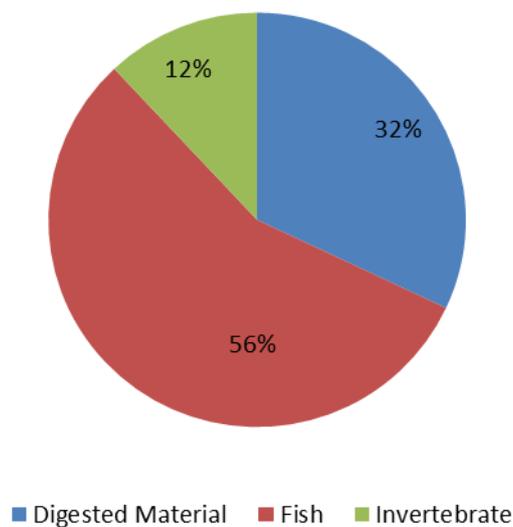


Fig. 1.14 Diet of perch captured on Bunerky Lough in September 2016 (% occurrence) n=25. Thirty-four empty stomachs are not presented.



1.4 Summary and ecological status

A total of seven fish species and two hybrid varieties were recorded in Bunerky Lough in September 2016. Perch and roach dominated catches in the survey gill nets deployed with respect to both CPUE and BPUE (eels were captured in fyke nets only). Both species exhibit regular recruitment in the lake and both species were dominated by small (<25cm) individuals, with few older fish captured in the survey.

Roach x bream hybrids were the third most abundant species recorded in the nets. Roach x bream hybrid recruitment requires spawning between both parent species (Hayden *et al.*, 2010) and this hybrid species occurs in large numbers in many Irish Lakes (Hayden *et al.*, 2014). Eleven year classes of roach x bream hybrid were recorded in Bunerky Lough in 2016.

While several year classes were not recorded in the bream samples, evidence of recent recruitment to the population is evident, with several younger fish recorded. Indeed, the presence of 0+ fish indicates that some successful spawning of bream occurred in the lake in 2016.

Nine rudd were recorded during the 2016 survey. This species was not recorded in the 2006 survey (Kelly *et al.*, 2007), but several rudd were captured during the AFBI NI survey conducted in 2011 (Kevin Gallagher *pers. comm.*). Numbers of this species typically decline in lakes following colonisation with roach, as a result of competition and hybridisation (Cragg-Hine, 1973). While, the capture of one rudd x roach hybrid is evidence that hybridisation between the two species is occurring in the lake the presence of rudd in the two most recent surveys indicates that this species is reproducing successfully in the lake.

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 fish and invertebrates.

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.*, 2012). Using the FIL2



classification tool, Bunerky Lough has been assigned an ecological status of Moderate for 2016 based on the fish populations present.

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



1.5 References

- Caffrey, J. (2010) IFI Biosecurity Protocol for Field Survey Work. Inland Fisheries Ireland.
- CFB (1997) Central Fisheries Board TOP Lake Survey Report. Bunerky Lough.
- EPA (2006) A reference based typology and ecological assessment system for Irish lakes.
- Cragg-Hine, D. (1973) Coarse fish and fishery management in Northern Ireland. In: Proceedings of the Sixth British Freshwater Fish conference, pp. 52-59. Department of Zoology, University of Liverpool.
- EPA (2014) *Integrated Water Quality Assessment for the North Western and Neagh Bann River Basin Districts 2013*. Published by the Environmental Protection Agency, Ireland October 2014 Edited by Ray Smith
- Kelly, F., Connor, L. and Champ, W.S.T. (2007) *A Survey of the Fish Populations in 46 Lakes in the Northern Regional Fisheries Board, June to September 2005 and 2006. North South Shared Aquatic Resource (NS Share) Lakes Project*. Unpublished report, Central Fisheries Board.
- 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, NSSHARE project.
- Kelly, F.L., Harrison, A.J., Allen, M., Connor, L. and Rosell, R. (2012) Development and application of an ecological classification tool for fish in lakes in Ireland. *Ecological Indicators*, **18**, 608-619
- Hayden, B., Pulcini, D., Kelly-Quinn, M., O'Grady, M., Caffrey, J., McGrath, A., and Mariani, S. (2010) Hybridisation between two cyprinid fishes in a novel habitat: genetics, morphology and life-history traits. *BMC Evolutionary Biology*, **10 (1)**, 169.
- Hayden, B., McLoone, P., Coyne, J., and Caffrey, J. M. (2014) Extensive hybridisation between roach, *Rutilus rutilus* L., and common bream, *Abramis brama* L., in Irish lakes and rivers. *Biology and Environment: Proceedings of the Royal Irish Academy*, **114 (1)**, 35-39).

**Inland Fisheries Ireland
3044 Lake Drive,
Citywest Business Campus,
Dublin 24,
Ireland.
D24 Y265**

**www.fisheriesireland.ie
info@fisheriesireland.ie**

+353 1 8842 600

