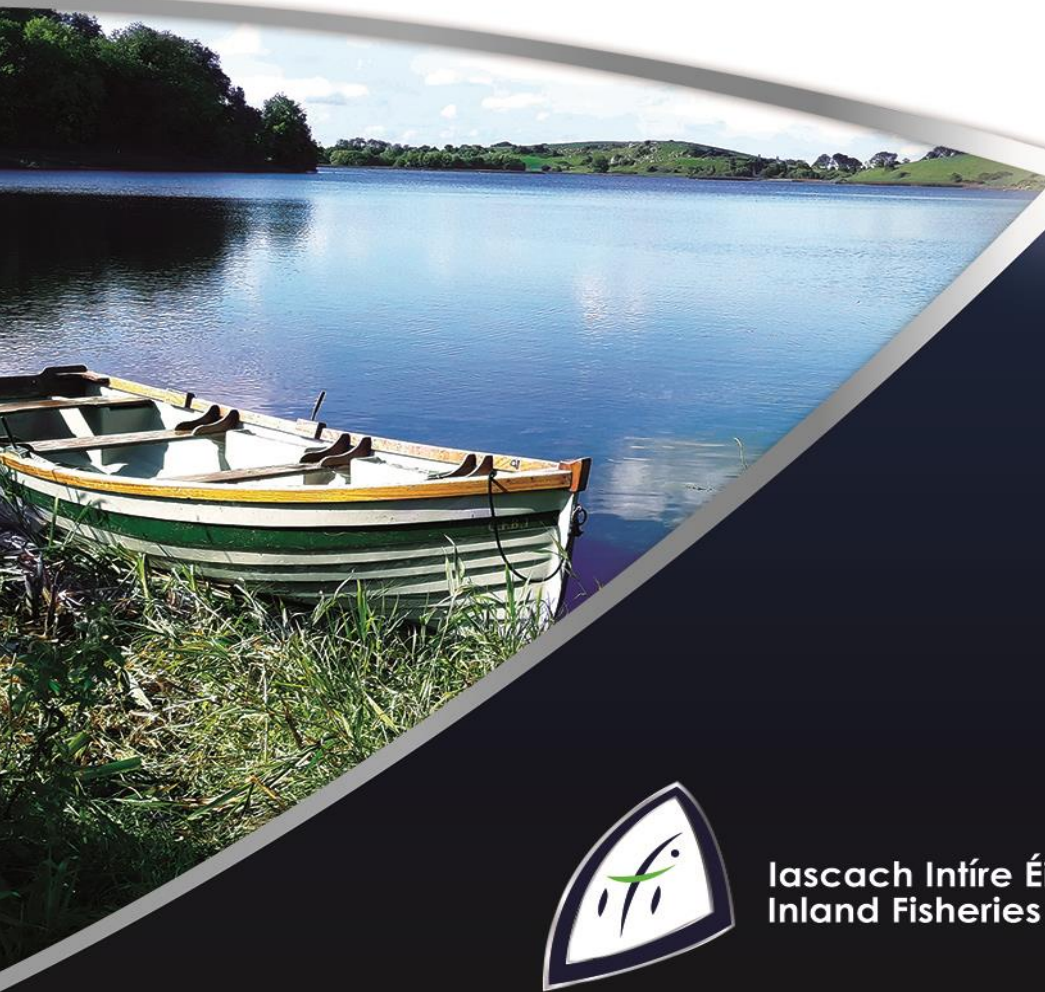


National Research Survey Programme

Lakes 2018

Bawn Lough

IFI/2019/1-4456



Iascach Iníre Éireann
Inland Fisheries Ireland



Inland Fisheries Ireland

National Research Survey Programme

**Fish Stock Survey of Bawn Lough,
September 2018**

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

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

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1.1 Introduction

Bawn Lough is situated in the Erne catchment, Co. Cavan in the town of Killeshandra. It is associated with the Lough Oughter Complex, and is connected to Disert Lough and the Cullies River via a stream at its northern shore (Fig. 1.1). The lake is situated at an altitude of 50 m.a.s.l., has a surface area of 17ha, mean depth of 2.1m and maximum depth of 6.6m. Information on depths was abstracted from Inland Fisheries Ireland (IFI) archival material and a bathymetry map was produced. The lake is categorised as typology class 9 for the purposes of WFD (as designated by the EPA), i.e. shallow (<4m), less than 50ha and high alkalinity (>100mg/l CaCO₃). The geology of the area is predominantly Lower Carboniferous limestone. In the 2010 to 2015 surveillance monitoring reporting period, the EPA assigned Bawn Lough an overall ecological status of Moderate.

This lake is known to hold a good stock of coarse fish species, with angling for roach, perch, bream, pike, bream and hybrids (IFI, 2019). IFI undertook a fish stock survey of Bawn Lough in September 2005. Perch, pike, roach, tench, bream, bream hybrids and eels were recorded (Kelly *et al.*, 2007).

This report summarises the results of the 2018 fish stock survey (e.g. species composition, abundance and age structure) on the lake.



Plate 1.1. Bawn Lough looking northwest across the lake.

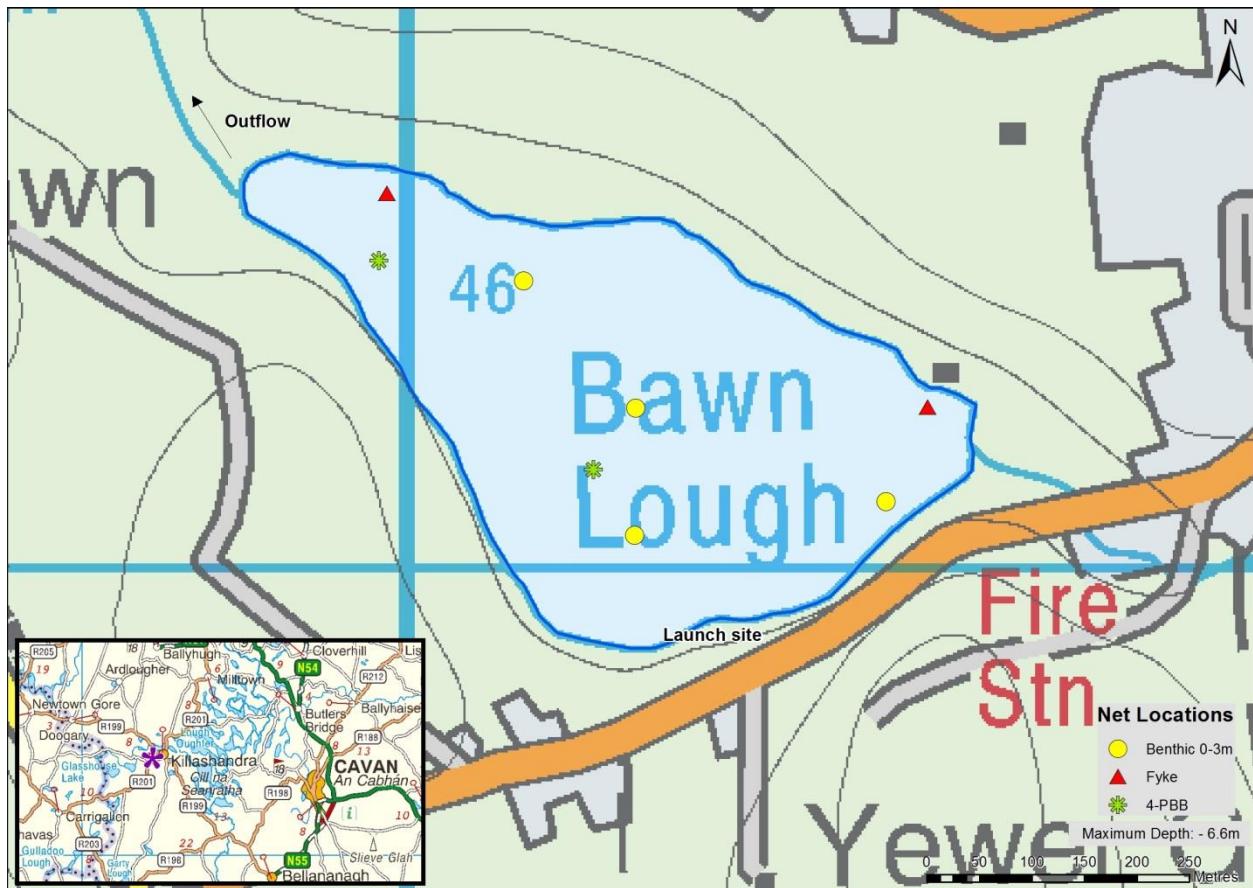


Fig. 1.1. Location map of Bawn Lough showing locations and depths of each net (outflow is indicated on map)



1.2 Methods

1.2.1 Netting methods

Bawn Lough was surveyed over one night from the 17th to the 18th of September 2018. A total of two sets of Dutch fyke nets (Fyke), and four benthic monofilament multi-mesh (BM CEN) (12 panel, 5-55mm mesh size) CEN standard survey gill nets (4 @ 0-2.9m) were deployed in the lake (6 sites). The netting effort was supplemented using four-panel benthic braided survey gill nets (4-PBB) at two additional sites. The 4-PBB nets are composed of four 27.5m long panels each a different mesh size (55mm, 60mm, 70mm and 90mm knot to knot). CEN survey gill nets and fyke nets were deployed in the same locations as were randomly deployed on the previous occasion. The 4-PBB nets were not used previously and were also deployed at random locations in 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 roach, tench, hybrids and bream. Live fish were returned to the water whenever practical or 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 transported back to the IFI laboratory for later dissection.

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 were calculated to identify key prey items (Amundsen *et al.*, 1996).

$$FO_i = \left(\frac{N_i}{N} \right) * 100$$

Where:

FO_i is the percentage frequency of prey item i ,

N_i is the number of pike with prey i in their stomach,

N is total number of pike 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 in IFI when moving between water bodies.

1.3 Results

1.3.1 Species Richness

A total of five fish species and one type of hybrid were recorded on Bawn Lough in September 2018, with 656 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 roach. Roach x bream hybrids, bream, tench and eels were also recorded in smaller numbers. During the previous survey in 2005 a similar species composition was recorded. However, no pike, or roach x rudd hybrids were captured during the 2018 survey.

Table 1.1. Number of each fish species captured by each method during the survey on Bawn Lough, September 2018

Scientific name	Common name	Number of fish captured			
		BM CEN	4-PBB	Fyke	Total
<i>Perca fluviatilis</i>	Perch	470	0	3	473
<i>Rutilus rutilus</i>	Roach	151	2	2	155
<i>Rutilus rutilus x Abramis brama</i>	Roach x bream hybrid	5	4	0	9
<i>Tinca tinca</i>	Tench	0	9	0	9
<i>Abramis brama</i>	Bream	4	1	0	5
<i>Anguilla anguilla</i>	European eel	0	0	5	5

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. Eel



CPUE/BPUE is based on fyke nets only. Mean CPUE and BPUE for all fish species captured in the 2018 survey are summarised in Table 1.2 (Fig. 1.2 and 1.3).

Overall perch was the dominant species in terms of CPUE and roach was the dominant species in terms of biomass (BPUE) (Fig. 1.2 and 1.3).

Table 1.2. Mean (S.E.) CPUE and BPUE (per metre of net) for all fish species captured on Bawn Lough, September 2018

Scientific name	Common name	Mean CPUE (\pm S.E)	Mean BPUE (\pm S.E)
<i>Perca fluviatilis</i>	Perch	1.965 (1.045)	24.62 (12.87)
<i>Rutilus rutilus</i>	Roach	0.636 (0.283)	38.08 (15.93)
<i>Rutilus rutilus x Abramis brama</i>	Roach x bream hybrid	0.025 (0.011)	18.42 (9.15)
<i>Abramis brama</i>	Bream	0.018 (0.017)	1.87 (1.85)
<i>Tinca tinca</i>	Tench	0.010 (0.010)	20.14 (20.14)
<i>Anguilla anguilla</i> *	European eel*	0.042 (0.042)*	18.34 (18.34)*

Note: Where biomass data was unavailable for an individual fish, this was determined from a length/weight regression for that species (Connor *et al.*, 2017).

*Eel CPUE and BPUE based on fyke nets only.

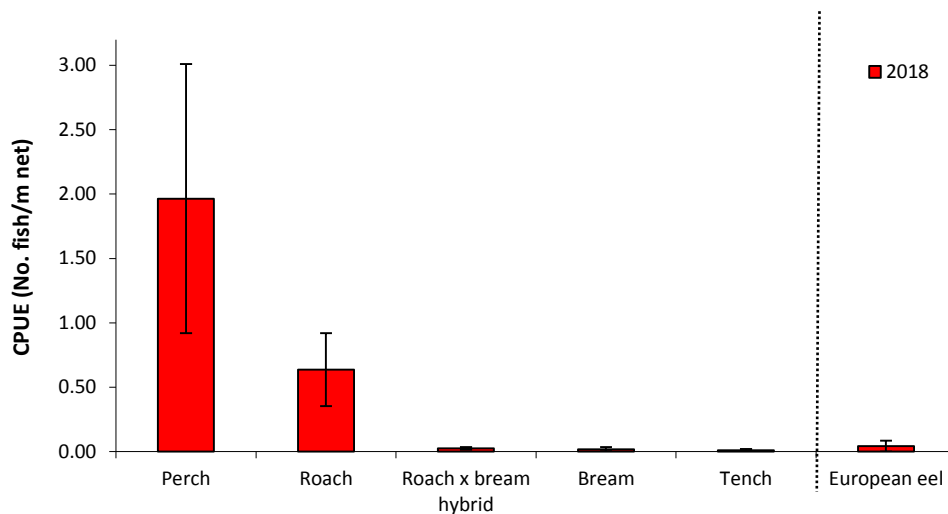


Fig. 1.2. Mean (\pm S.E.) CPUE for all fish species captured in Bawn Lough, September 2018 (Eel CPUE based on fyke nets only).

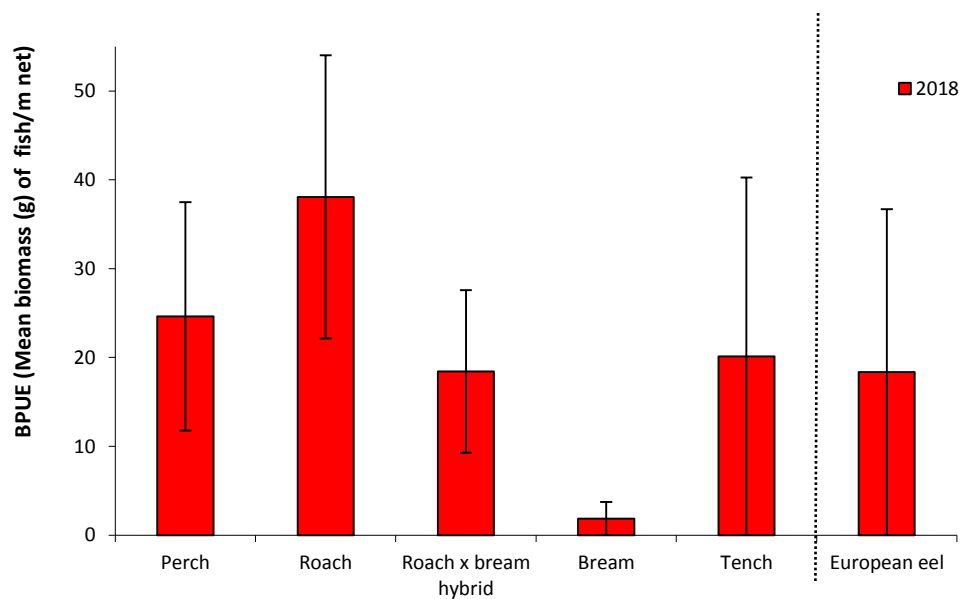


Fig. 1.3. Mean (\pm S.E.) BPUE for all fish species captured in Bawn Lough, September 2018 (Eel BPUE based on fyke nets only).

1.3.3 Length frequency distributions and growth

Perch

Perch captured during the 2018 survey ranged in length from 5.5cm to 27cm (mean = 7.8cm). Lengths were similar to those sampled in 2005 (Fig.1.4). Mean L1 was 5.7cm (Table 1.3). Perch were aged from 0+ to 7+. While all intervening age classes were recorded, few larger or older fish were captured. Approximately 79% of the perch were aged 2+ or younger.

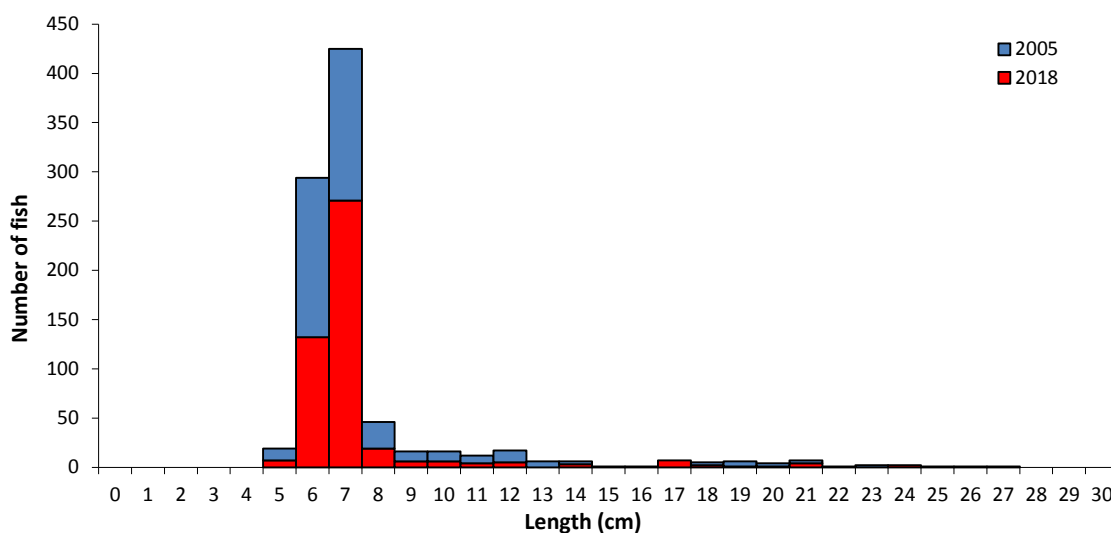


Fig. 1.4. Length frequency of perch captured on Bawn Lough, 2005 and 2018.

Table 1.3. Mean (\pm S.E.) perch length (cm) at age for Bawn Lough, September 2018

	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇
Mean (\pm S.E.)	5.7 (0.1)	10.5 (0.4)	12.6 (0.6)	15.3 (0.5)	20.6 (0.7)	23.1 (0.7)	25.3
N	45	23	8	6	5	3	1
Range (cm)	4.1-7.2	7.8-13.3	10.9-15.2	14.1-17.0	18.1-22.1	21.7-23.9	25.3-25.3



Roach

Roach captured during the 2018 survey ranged in length from 5cm to 30.1cm (mean = 12.7cm). The length range of roach sampled in 2018 was similar to that recorded in 2005, however, several larger fish (> 25cm) were captured on the latter occasion (Fig.1.5). Roach were aged from 1+ to 11+, and several year classes (5+, 9+, 11+) were missing. Two year old fish dominated the population (Table 1.4). A strong cohort of 7+ fish were captured (Table 1.4), corresponding to fish of c. 25 cm (Figure 1.5).

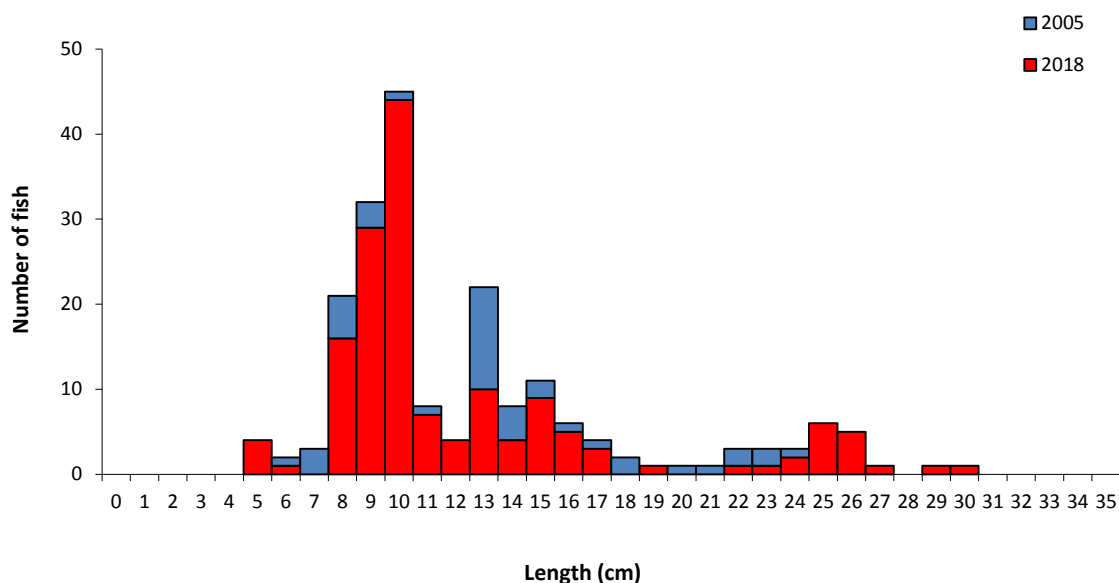


Fig. 1.5. Length frequency of roach captured on Bawn Lough, 2005 and 2018

Table 1.4. Summary age data from a sub-sample of roach captured on Bawn Lough, September 2018. Number of fish and length ranges of all fish aged in the sample is presented

	Age class											
	0+	1+	2+	3+	4+	5+	6+	7+	8+	9+	10+	11+
Mean (cm)	-	8.5	13	15.3	15.8	-	25.8	25.9	26.7	-	-	30.1
N	-	5	21	5	1	-	3	6	1	-	-	1
Range (cm)	-	6.7- 9.6	8.0- 17.7	10.1- 19.1	15.8	-	25.4- 26.2	24.3- 27.5	26.7	-	-	30.1

Bream

Bream captured during the 2018 survey ranged in length from 4.5cm to 51.2cm (mean = 14.0cm) (Fig. 1.6). Of the five fish captured, four measured between 4 and 5cm (0+). The large fish was aged at 11+. On the previous sampling occasion, a broader size range of bream were recorded in the lake (Fig 1.6).

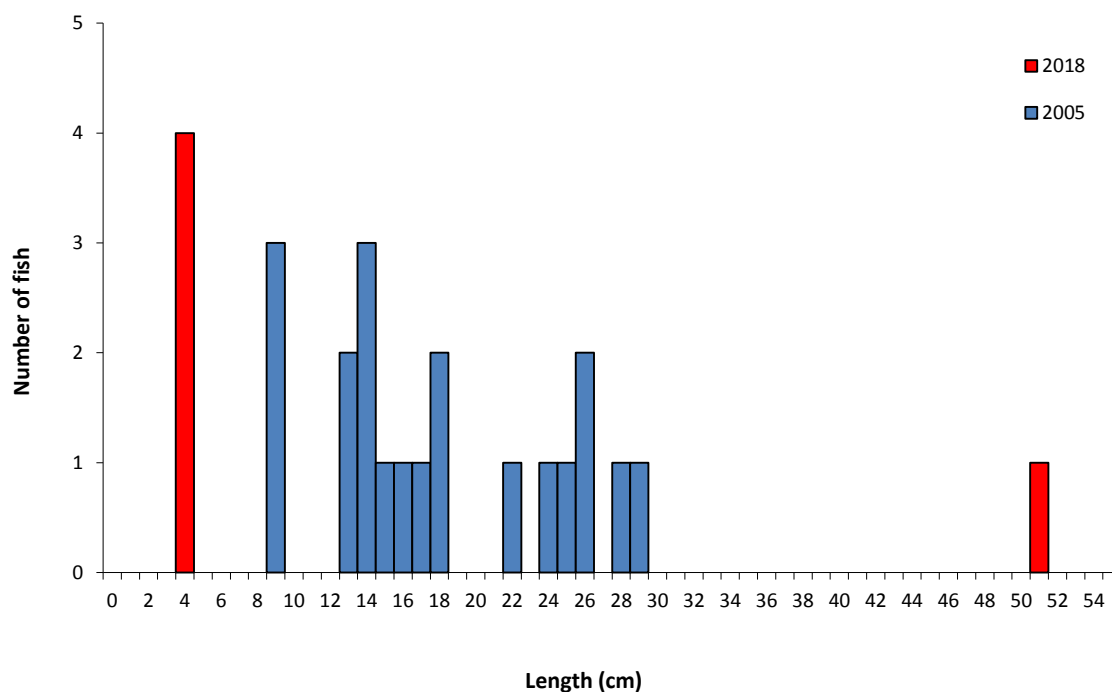


Fig. 1.6. Length frequency of bream captured on Bawn Lough, 2005 and 2018



Roach x bream hybrids

Roach x bream hybrids (n = 9) captured during the 2018 survey ranged in length from 5.1cm to 42.9cm (mean 29.1cm) (Figure 1.7). Fish were aged between 1+ and 16+, with six year classes (1+, 2+, 8+, 13+, 15+ and 16+) recorded.

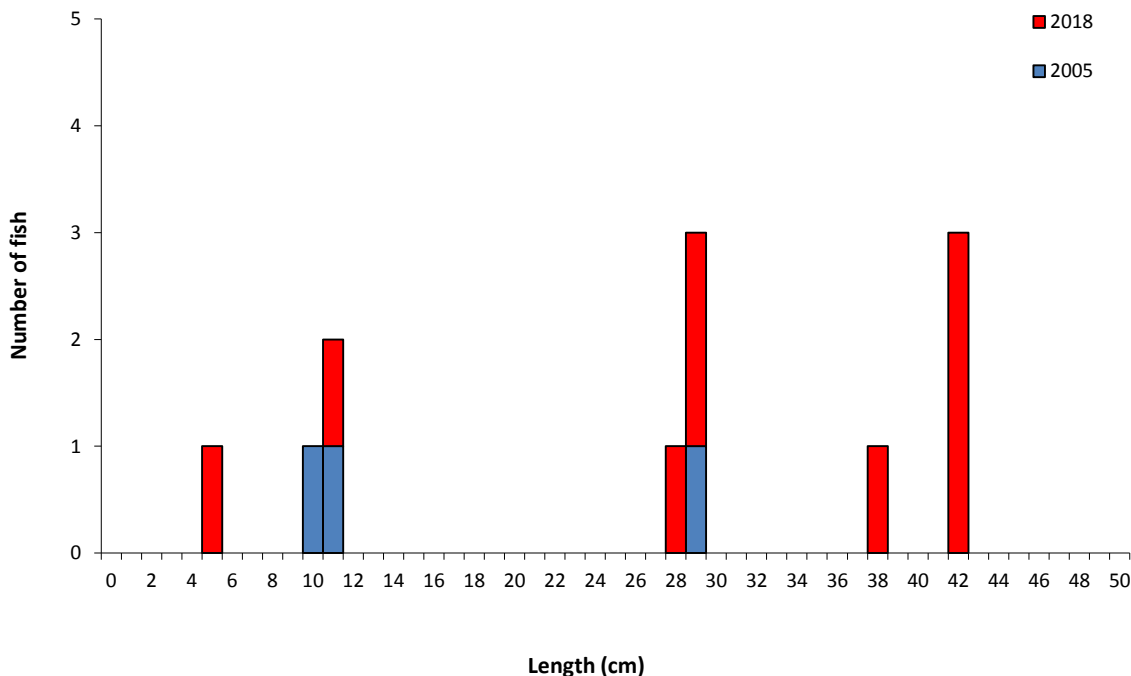


Fig. 1.7. Length frequency of roach x bream hybrids captured on Bawn Lough, 2005 and 2018

Other fish

Eels (n = 5) recorded during the 2018 survey ranged in length from 55.5cm to 76.0cm (mean = 63.8). A total of nine tench were captured during the survey of Bawn Lough in 2018. They ranged in length from 44.4 to 50.6 cm (mean = 47.8cm). All tench were captured in 4-PBB nets, so comparisons with earlier surveys cannot be readily inferred.

1.3.4 Stomach and diet analysis

Perch

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). A total of 50 stomachs were examined. Eighteen stomachs were empty. Of the 32 stomachs containing food, 25 (78%) contained unidentified digested material, five (16%) contained zooplankton and two (6%) had fish (Fig. 1.8).

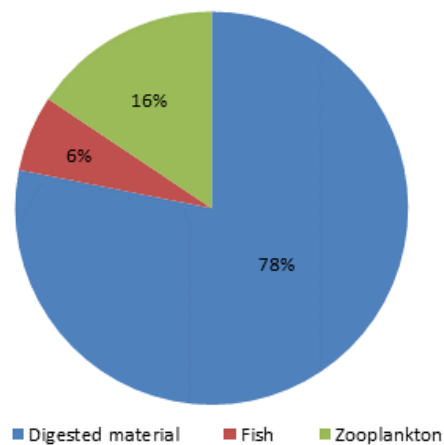


Fig 1.8. Diet of perch (n=32) captured on Bawn Lough, 2018 (% FO)



1.4 Summary and ecological status

A total of five fish species and one type of hybrid were recorded on Bawn Lough in the September 2018 survey. Perch was the dominant fish species in terms of abundance (CPUE) and roach was the dominant fish species in terms of biomass (BPUE) captured in the survey nets during the 2018 survey.

A similar species composition was recorded when the lake was last surveyed in 2005 (Kelly *et al.*, 2007). However, no benthic braided survey gill nets were used in the previous survey, and thus comparisons between surveys are difficult. The current suite of nets used combines standard CEN surveys nets and the four largest panels (55mm, 60mm, 70mm, and 90mm) of the 8 panel benthic braided survey gill nets that were used in Irish lake fisheries previously. This method has been adopted as the standard method for sampling all coarse and large trout and mixed fisheries.

The two most abundant species captured (i.e. perch and roach) have each been recruiting regularly in the lake. Both species were dominated by younger individuals and with the exception of one relatively strong cohort of older (7+) roach, few older fish were captured in either population. Both bream, and roach bream hybrids were captured in relatively small numbers, despite a broad length and age range apparent for both species. While several young of year bream were captured, the only other bream recorded measured in excess of 50cm and was aged at 11+. Similarly, only six year classes were recorded in the roach x bream hybrid population, which was dominated by older fish. Roach x bream hybrids are common and typically abundant in Irish lakes where both species occur, and may threaten bream populations (Hayden *et al.*, 2014). Successful recruitment requires spawning between both parent species (Hayden *et al.*, 2010). Recruitment of both bream and roach x bream hybrids appears to be limited in the lake.

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, Bawn



Lough has been assigned an ecological status of Moderate for 2018 based on the fish populations present.

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

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

+353 1 8842 600

