

National Research Survey Programme

Lakes 2018

Rinn Lough

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National Research Survey Programme

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

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

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1.1 Introduction

Rinn Lough is situated in the Upper Shannon Catchment. It is located approximately 2km south of Mohill, Co. Leitrim (Fig. 1.1). The main inflow (Lurga River) enters on the eastern shore of the lake, and is connected to Loughs Errew and Clooncoe, and Lough Sallagh and Creenagh, all of which lie to the east of the lake. Rinn Lough is drained *via* the Rinn River which joins the Shannon at Lough Forbes (Fig. 1.1). The lake is situated at an altitude of 37 m.a.s.l., has a surface area of 165ha, mean depth of 1.7m and maximum depth of 9.2m.

The lake is categorised as typology class 10 for the purposes of WFD (as designated by the EPA), i.e. shallow (<4m), greater than 50ha and high alkalinity (>100mg/l CaCO₃). The geology of the area is predominantly limestone. In the 2010 to 2015 surveillance monitoring reporting period, the EPA assigned Rinn Lough an overall ecological status of Bad.

Surrounding land is predominantly agricultural pasture, with tracts of broadleaf and mixed forestry. The lake forms the Rinn Lough proposed Natural Heritage Area (pNHA) and is bounded by the Clooncoe Wood and Lough and the Lough Errew pNHAs. The lake has been developed as a rowing facility, with 2km of marked lanes occupying the northern portion of the lake (Plate 1.1).

Parking and access is available at the northern shore of the lake, where much of the shore angling is concentrated. The lake is regarded as an excellent fishery for bream, hybrids, roach, rudd and tench (IFI, 2019).

Surveys of Rinn Lough were conducted in 1968, 1980 and 1995 by Inland Fisheries Ireland. The latter survey recorded roach, perch, bream, roach x bream hybrids, rudd, tench, pike and eels. Roach were first recorded in the lake in the 1980 survey.

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. Aerial image of Rinn Lough, looking north along the Lake

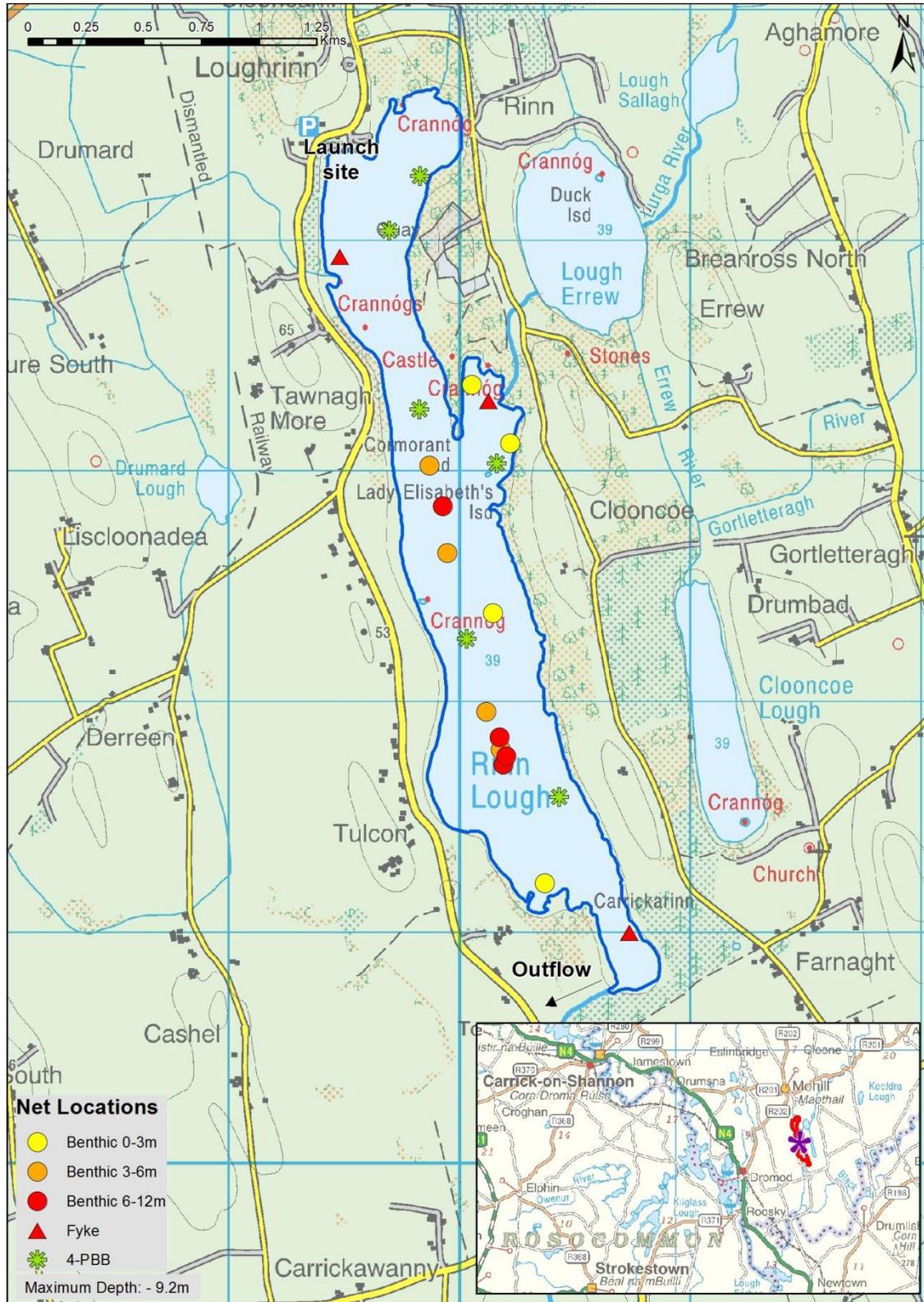


Fig. 1.1. Location map of Rinn Lough showing locations and depths of each net (outflow is indicated on map)



1.2 Methods

1.2.1 Netting methods

Rinn Lough was surveyed over two nights from the 3rd to the 5th of September 2018. A total of three sets of Dutch fyke nets (Fyke) and 12 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (BM CEN) (4 @ 0-2.9m, 4 @ 3-5.9m and 4 @ 6-11.9m) were deployed in the lake (15 sites). The site locations for the benthic monofilament multi-mesh gill nets (BM CEN) were chosen randomly within fixed depth zones (0-2.9m, 3-5.9m, 6-11.9m, 12-19.9m), using lake bathymetry. The netting effort was supplemented using four-panel benthic braided survey gill nets (4-PBB) at six additional randomly selected sites. The 4-PBB nets are composed of four 27.5m long panels each a different mesh size (55mm, 60mm, 70mm and 90mm) tied together randomly. The angle of each survey gill net in relation to the shoreline was randomised. A handheld GPS was used to mark the precise location of each net.

All fish were measured and weighed on site and scales were removed from all species except perch and eel. 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 eight fish species and three types of hybrid were recorded on Rinn Lough in September 2018. 850 fish were captured in total. 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. Bream, roach x bream hybrids, tench, rudd, pike, roach x rudd hybrids, rudd x bream hybrids and eels were also captured.

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

Scientific name	Common name	Number of fish captured			
		BM CEN	4-PBB	Fyke	Total
<i>Rutilus rutilus</i>	Roach	332	-	-	332
<i>Perca fluviatilis</i>	Perch	256	-	1	257
<i>Abramis brama</i>	Bream	70	59	-	129
<i>Rutilus rutilus x Abramis brama</i>	Roach x bream hybrid	75	22	-	97
<i>Tinca tinca</i>	Tench	-	6	2	8
<i>Scardinius erythrophthalmus</i>	Rudd	7	-	-	7
<i>Esox lucius</i>	Pike	-	5	-	5
<i>Rutilus rutilus x Scardinius erythrophthalmus</i>	Roach x rudd hybrid	3	-	-	3
<i>Gobio gobio</i>	Gudgeon	4	-	-	4
<i>Scardinius erythrophthalmus x Abramis brama</i>	Rudd x bream hybrid	2	-	-	2
<i>Anguilla anguilla</i>	European eel	-	-	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. 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 2018 survey are summarised in Table 1.2 (Fig. 1.2 and 1.3).

Overall roach and perch were the dominant species in terms of CPUE. Bream was the dominant species in terms of biomass (BPUE), far exceeding biomasses achieved for any of the other species (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 Rinn Lough, September 2018

Scientific name	Common name	Mean CPUE (\pm S.E)	Mean BPUE (\pm S.E)
<i>Rutilus rutilus</i>	Roach	0.527 (0.159)	14.658 (5.082)
<i>Perca fluviatilis</i>	Perch	0.407 (0.141)	5.260 (2.033)
<i>Abramis brama</i>	Bream	0.137 (0.033)	47.209 (12.101)
<i>Rutilus rutilus x Abramis brama</i>	Roach x bream hybrid	0.129 (0.043)	19.552 (4.491)
<i>Tinca tinca</i>	Tench	0.004 (0.002)	0.596 (0.596)
<i>Scardinius erythrophthalmus</i>	Rudd	0.011 (0.007)	0.720 (0.440)
<i>Esox lucius</i>	Pike	0.002 (0.001)	3.933 (2.101)
<i>Rutilus rutilus x Scardinius erythrophthalmus</i>	Roach x rudd hybrid	0.005 (0.003)	1.347 (1.347)
<i>Gobio gobio</i>	Gudgeon	0.006 (0.005)	0.014 (0.010)
<i>Scardinius erythrophthalmus x Abramis brama</i>	Rudd x bream hybrid	0.003 (0.003)	0.188 (0.188)
<i>Anguilla anguilla</i> *	European eel*	0.033 (0.019)*	20.169 (11.579)*

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

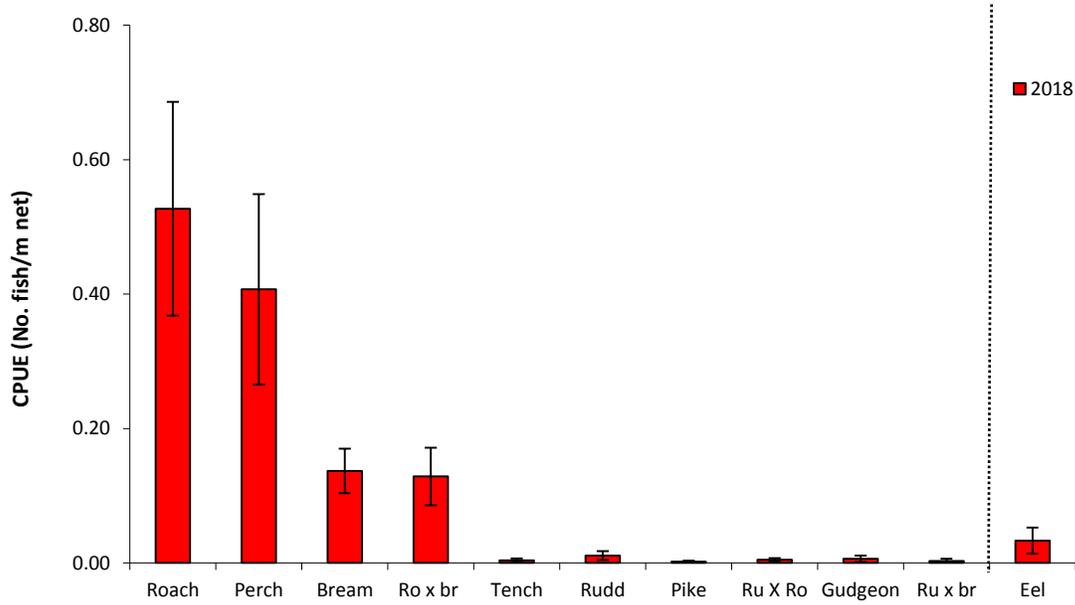


Fig. 1.2. Mean (\pm S.E.) CPUE for all fish species captured in Rinn Lough, (Eel CPUE based on fyke nets only), September 2018

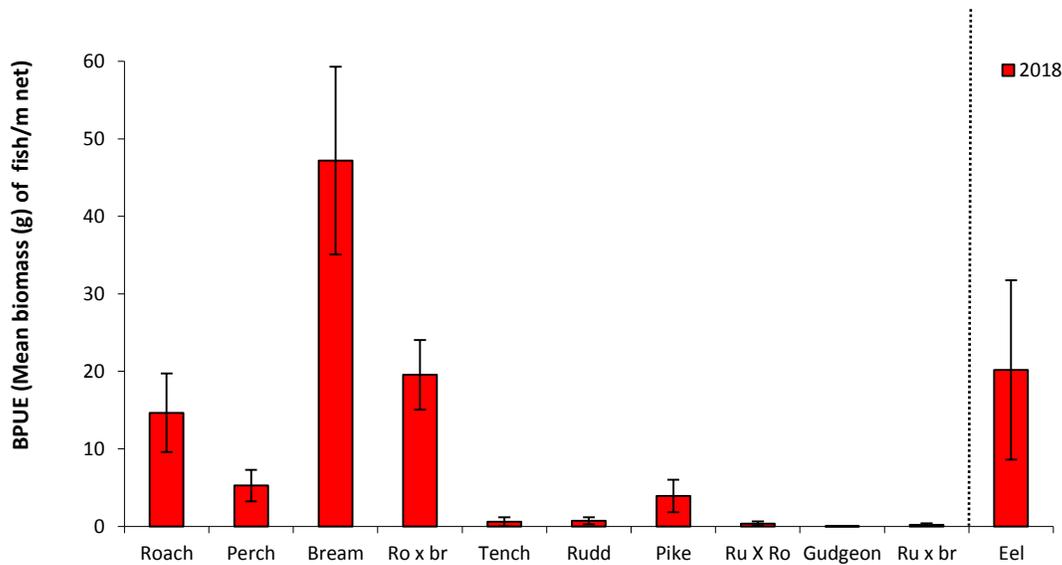


Fig. 1.3. Mean (\pm S.E.) BPUE for all fish species captured in Rinn Lough, (Eel BPUE based on fyke nets only), September 2018



1.3.3 Length frequency distributions and growth

Roach

Roach captured during the 2018 survey ranged in length from 3.8cm to 27.7cm (mean = 10.4cm) (Fig.1.4). Roach were aged between 0+ and 8+ with all intervening years represented in the sample aged (Table 1.3). This indicates that there has been regular recruitment in recent years. Five year old fish were the largest cohort in the sample aged.

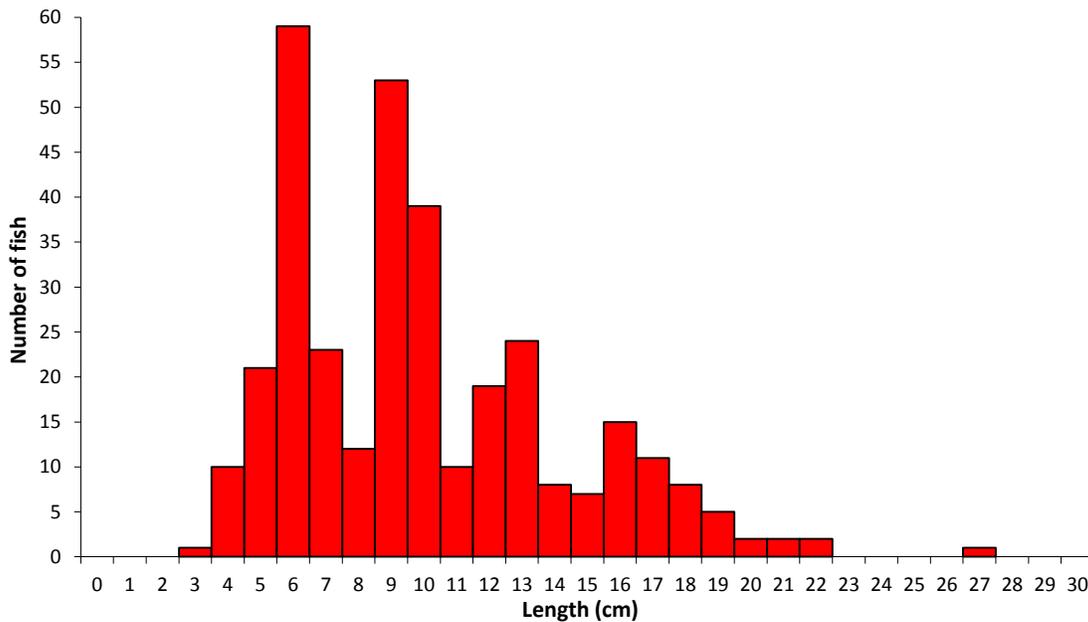


Fig. 1.4. Length frequency of roach captured on Rinn Lough, September 2018

Table 1.3. Summary age data from a sub-sample of roach captured on Rinn 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+
Mean (cm)	5.5	7.4	10.3	13	15.5	17.3	20	20	25.3
N	6	15	14	8	8	19	5	3	2
Range (cm)	4.6-6.7	4.8-10.9	7.2-12.2	8.7-15.0	12.4-18.0	13.2-20.0	17.3-22.0	18.1-21.5	22.8-27.7



Perch

Perch captured during the 2018 survey ranged in length from 5.5cm to 24.7cm (mean = 8.3cm) (Fig.1.5) Six age classes ranging from 0+ to 5+ were recorded, with no missing cohorts. Mean L1 was 5.9cm (Table 1.4). The dominant age class was 0+ (< c 8cm) which made up approximately 75% of the sampled population (Fig. 1.5). In contrast, relatively few fish older than 3+ were recorded during the survey (Table 1.4).

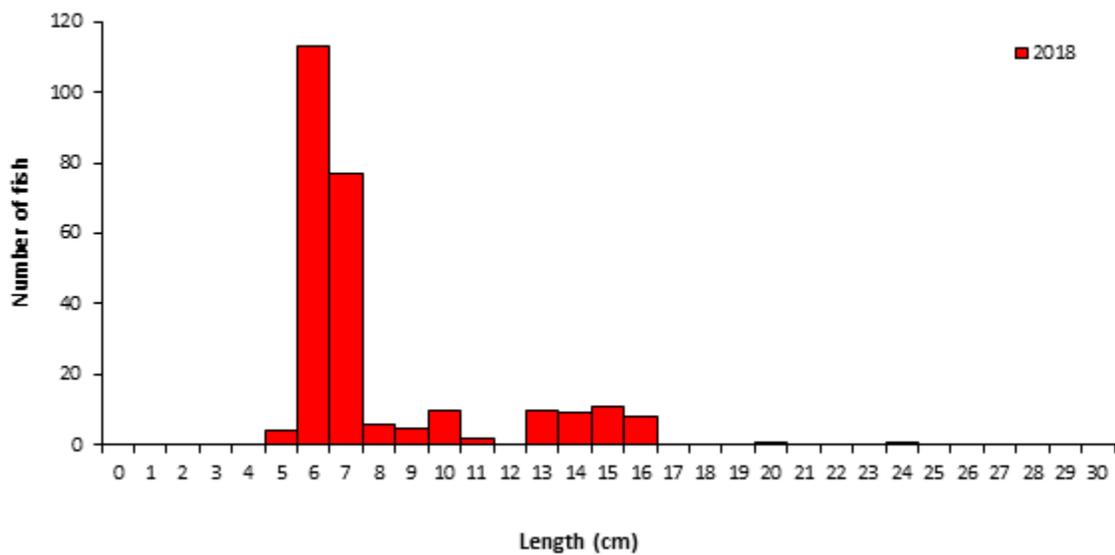


Fig. 1.5. Length frequency of perch captured on Rinn Lough, 2018

Table 1.4. Mean (\pm S.E.) perch length (cm) at age for Rinn Lough, September 2018

	L ₁	L ₂	L ₃	L ₄	L ₅
Mean (\pm S.E.)	5.9 (0.1)	10.2 (0.2)	12.8 (0.4)	15.1 (0.7)	18.7 (2.1)
N	41	26	12	7	3
Range	4.8-7.4	8.2-12.8	11.0-15.8	13.8-19.0	15.4-22.5



Bream

Bream captured during the 2018 survey ranged in length from 11.1cm to 40.3cm (mean 27.1cm) (Fig. 1.6) and ranged in age from 2+ to 12+. With the exception of 11 year old fish, all intervening age classes were present in the sample, indicating that recruitment of bream has occurred regularly on the lake in recent years (Table 1.5). No single year group dominated the population. However, while younger ($\leq 3+$) fish were present in the sample, fish aged between 5+ and 8+ formed the majority of the population.

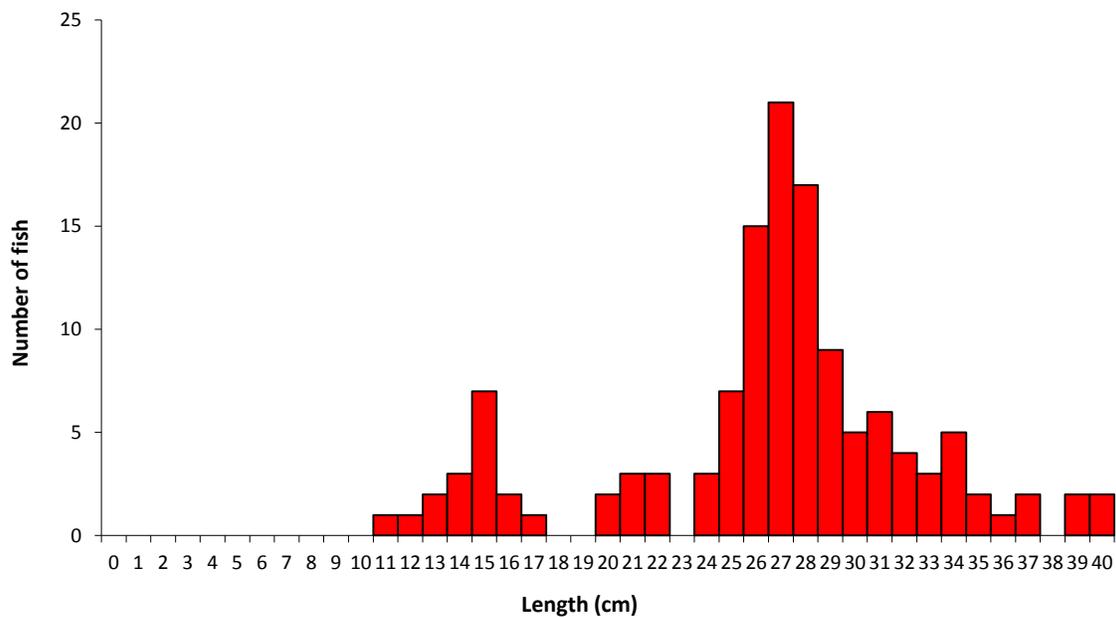


Fig. 1.6. Length frequency of bream captured on Rinn Lough, 2018

Table 1.5. Summary age data from a sub-sample of bream captured on Rinn 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+	12+
Mean (cm)	-	-	13.5	14.8	20.5	24.9	26.7	28.6	30.4	32.3	34.7	-	39.8
N	-	-	4	10	3	14	15	10	13	5	7	-	1
Range (cm)	-	-	11.1- 15.7	13.3- 15.7	17.9- 22.3	20.4- 29.2	21.3- 29.6	24.2- 32.2	25.7- 35.4	31.4- 33.5	27.8- 40.3	-	39.8



Roach x bream Hybrids

Roach x bream hybrids captured during the 2018 survey ranged in length from 5.1cm to 38.2cm (mean 20.9cm) (Fig. 1.7). Roach x bream hybrids were aged between 0+ to 13+ (Table 1.6). All intervening year classes were present, indicating regular recruitment to the hybrid population in recent years. Younger age cohorts dominated the population, with strong 2+, 3+, 4+ and 5+ age groups apparent. These year classes correspond to the c 10-20cm (Fig. 1.7, Table 1.6). Older (10+-13+) and larger (> 25cm) fish were also recorded during the survey.

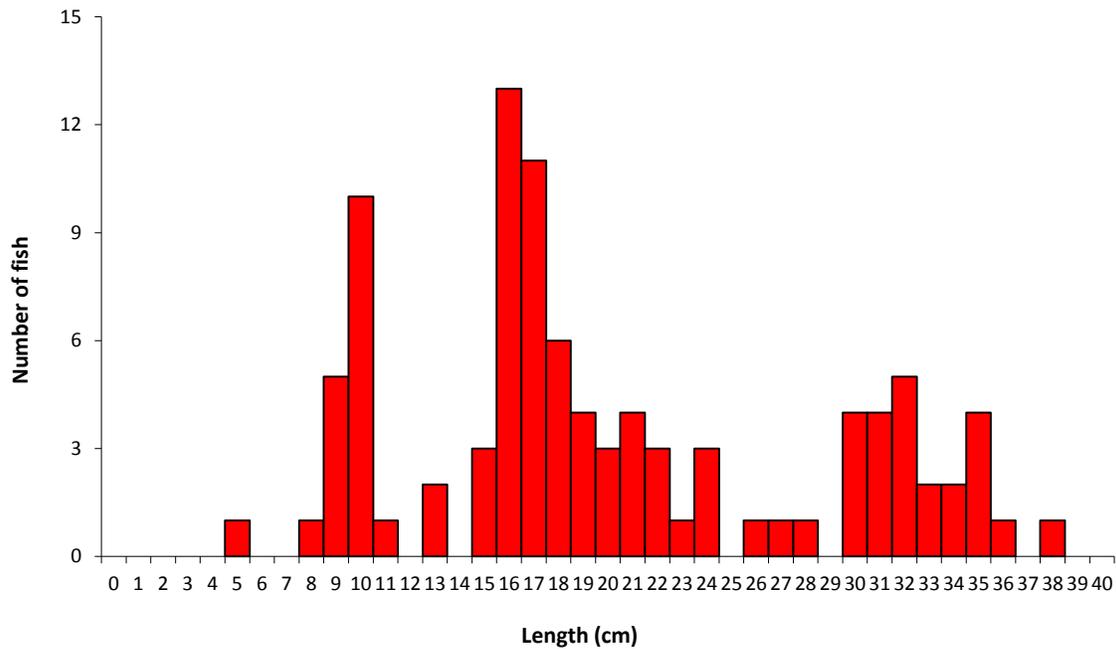


Fig. 1.7. Length frequency of roach x bream hybrids captured on Rinn Lough, September 2018

Table 1.6. Summary age data from a sub-sample of roach x bream hybrids captured on Rinn 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+	12+	13+
Mean (cm)	5.1	9.1	10.3	16.2	18.3	19.6	22.4	23.9	25.5	32.0	29.6	33.8	33.2	35.4
N	1	4	8	12	11	10	2	2	5	4	4	5	1	4
Range (cm)	-	8.3-9.7	9.3-11.1	13.3-17.5	15.8-22.4	16.7-21.3	22-22.7	23.6-24.1	20.4-31	30.8-32.8	26.4-31	31.3-36.6	-	32.4-38.2



Other fish

Eight tench, ranging in length from 9.8cm to 46.8cm (mean = 36.1cm) were recorded. Seven rudd were also captured during the survey. These measured between 9.1cm and 20.3cm (mean = 14.2cm). Eels (n = 6) recorded during the 2018 survey ranged in length from 56.5cm to 80cm (mean = 69.4cm). The five pike captured ranged in length from 58.5cm to 69.9cm (mean = 58.5cm). Three roach x rudd hybrids ranged in length from 5.1cm to 18.9cm (mean = 14.2cm) and two rudd x bream (15.2cm and 15.7cm) were also recorded. Four gudgeon were captured in the survey nets. They ranged in length from 4.1cm to 7.7cm (mean = 5.4cm).

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 46 stomachs were examined. Of these 23 were empty. Of the remaining 23 stomachs containing food, 22 (95.7%) contained unidentified digested material. One sample (4.3%) contained fish prey (Fig. 1.7).

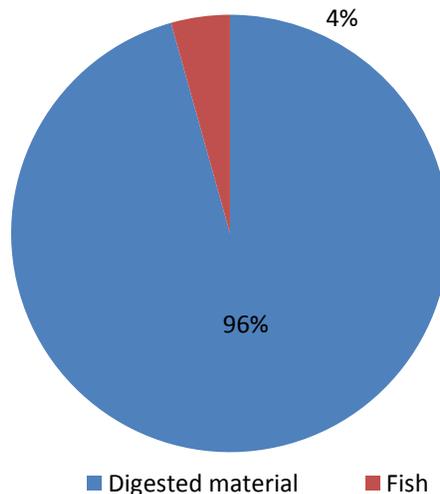


Fig 1.7. Diet of perch (n=23) captured on Rinn Lough, 2018 (% FO)



Pike

Two pike were available for dietary analysis. While one stomach was empty, fish (roach) was found in the stomach of the other pike.

1.4 Summary and ecological status

A total of eight fish species and three types of hybrid were recorded on Rinn Lough in the September 2018 survey. Roach and perch were the dominant fish species in terms of abundance (CPUE) and bream was the dominant fish species in terms of biomass (BPUE) captured in the survey gill nets during the 2018 survey.

The two most abundant species captured (i.e. roach and perch) have each been recruiting regularly in the lake. Both populations were dominated by younger individuals, with few perch greater than 3+ recorded during the survey. The roach population was also dominated by younger fish, with relatively few fish older than 5+ (c. 20cm) captured.

Bream were recorded in large numbers in the survey gill nets deployed. Bream were aged between 2+ and 12+, and most age classes were recorded in the sample. Bream, therefore, appear to be longer lived compared to roach in Rinn Lough. The population was dominated by larger and older individuals, and while smaller cohorts were captured, these were less abundant than larger fish.

Roach x bream hybrids are also relatively long lived, aged between 0+ and 13+. All age classes were recorded in the sample aged. Roach x bream hybrids are common and typically abundant in Irish lakes where both parent species occur, and may threaten bream populations (Hayden *et al.*, 2014). Successful recruitment requires spawning between both parent species, (Hayden *et al.*, 2010). Populations of both parent species (bream and roach) are apparently relatively stable, approximately 40 years after roach were first recorded in the lake.

Seven rudd were captured during the survey. Numbers of this species typically decline in lakes following colonisation with roach, as a result of competition and hybridisation (Cragg-Hine, 1973). While captured in relatively small numbers compared to other cyprinid species, this population persists in the lake approximately 40 years after the first record of roach.

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 (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, Rinn Lough has been assigned an ecological status of Poor for 2018 based on the fish populations present.



Tench captured and released on Rinn Lough, September 2018



1.5 References

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