

# National Research Survey Programme

## Lakes 2019

### Lough Ramor

IFI/2020/1-4501



Iascach Intíre Éireann  
Inland Fisheries Ireland



Inland Fisheries Ireland

National Research Survey Programme

**Fish Stock Survey of Lough Ramor,  
August 2019**

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

Lough Ramor is located just south of the town of Virginia in County Cavan and adjacent to the N3 (Plate 1.1, Fig. 1.1). Located on the Blackwater (Kells) River, Lough Ramor is the largest lake in the Boyne catchment. Lough Ramor is situated approximately 90 m.a.s.l, has a surface area of 713ha, mean depth of 3.6 and a maximum depth of 14.6m. The lake lies on a bed of sandstone and land use is predominantly rich agricultural pasture. The lake is categorised as typology class 6 for the purposes of Water Framework Directive (WFD) monitoring, i.e. shallow (<4m), greater than 50ha and moderately alkaline (>20mg/l CaCO<sub>3</sub>).

Lough Ramor is an important coarse and pike fishery, with excellent catches of bream, roach and roach x bream hybrids possible (IFI, 2020). Shore angling is available at several locations, and pike angling by boat is popular.

Lough Ramor was previously surveyed in 2005 by Inland Fisheries Ireland (previously the Central Fisheries Board (CFB, 2006). A total of eight fish species and one hybrid were captured at that time. Species captured were roach, roach x bream hybrids, perch, brown trout, pike, bream, gudgeon, rudd and tench.

The potentially invasive fish species (Round goby (*Neogobius melanostomus*)) was reportedly captured on Lough Ramor in 2018. The survey afforded an opportunity to establish if any specimens were present in the lake. This report summarises the results of the 2019 fish stock survey of Lough Ramor.



Plate 1.1. Lough Ramor

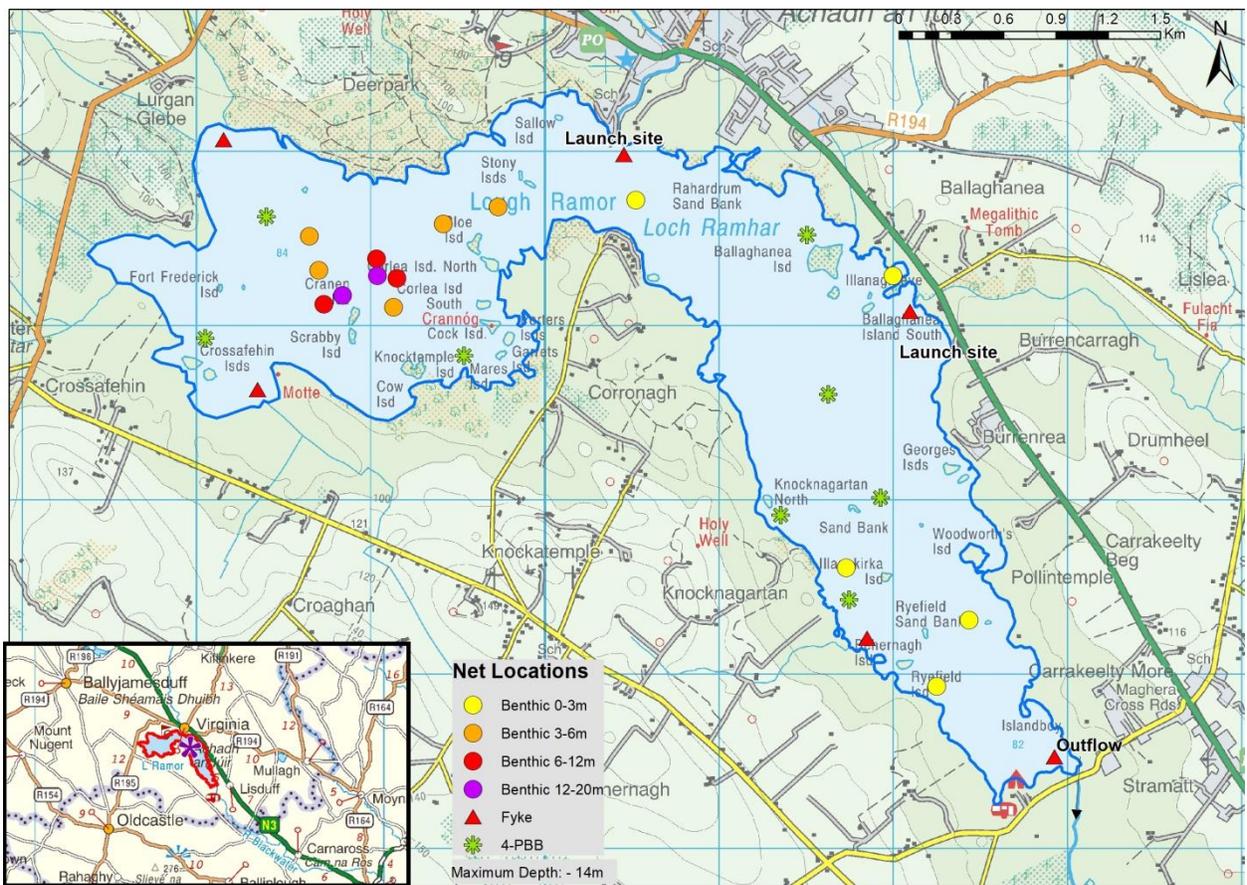


Fig. 1.1. Location map of Lough Ramor showing locations and depths of each net (outflow is indicated on map)



## 1.2 Methods

### 1.2.1 Netting methods

Lough Ramor was surveyed over three nights from the 26<sup>th</sup> to the 29<sup>th</sup> of August 2019. A total of six sets of Dutch fyke nets, 15 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (5 @ 0-2.9m, 5 @ 3-5.9m, 3 @ 6-11.9m and 2 @12-19.9m) were deployed in the lake (21 sites). The netting effort was supplemented using four-panel benthic braided survey gill nets (4-PBB) at eight additional sites. The four-panel survey gill nets are composed of four 27.5m long panels each a different mesh size (55mm, 60mm, 70mm and 90mm knot to knot). These nets were deployed in random locations throughout the lake. 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.

Strings of baited traps were set on the lake bed at each survey net location (n = 29). Each string consisted of five linked traps set at approximately 5m intervals. These traps were set specifically to target any invasive round goby that may have been present.

All fish apart from perch were measured and weighed on site and scales were removed from a sub-sample of other species except eels. 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 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 then 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 seven fish species and one type of hybrid were recorded on Lough Ramor in August 2019. A total of 1189 fish were 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 hybrid and bream. Eels, brown trout, gudgeon and pike were also recorded. The same species composition was recorded during the previous survey in 2005, with the exception of rudd and tench which were captured on the earlier survey. No round goby were captured.

**Table 1.1. Number of each fish species captured by each gear type during the survey on Lough Ramor, August 2019**

Scientific name	Common name	Number of fish captured			
		BM CEN	4-PBB	Fyke	Total
<i>Perca fluviatilis</i>	Perch	703	0	23	726
<i>Rutilus rutilus</i>	Roach	164	0	2	166
<i>Rutilus rutilus x Abramis brama</i>	Roach x bream hybrid	65	77	0	142
<i>Abramis brama</i>	Bream	21	98	0	119
<i>Salmo trutta</i>	Brown trout	2	7	0	9
<i>Gobio gobio</i>	Gudgeon	4	0	0	4
<i>Esox lucius</i>	Pike	1	2	0	3
<i>Anguilla anguilla</i>	European eel	0	0	20	20



### 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 2019 survey are summarised in Table 1.2 and illustrated in Figures 1.2 and 1.3.

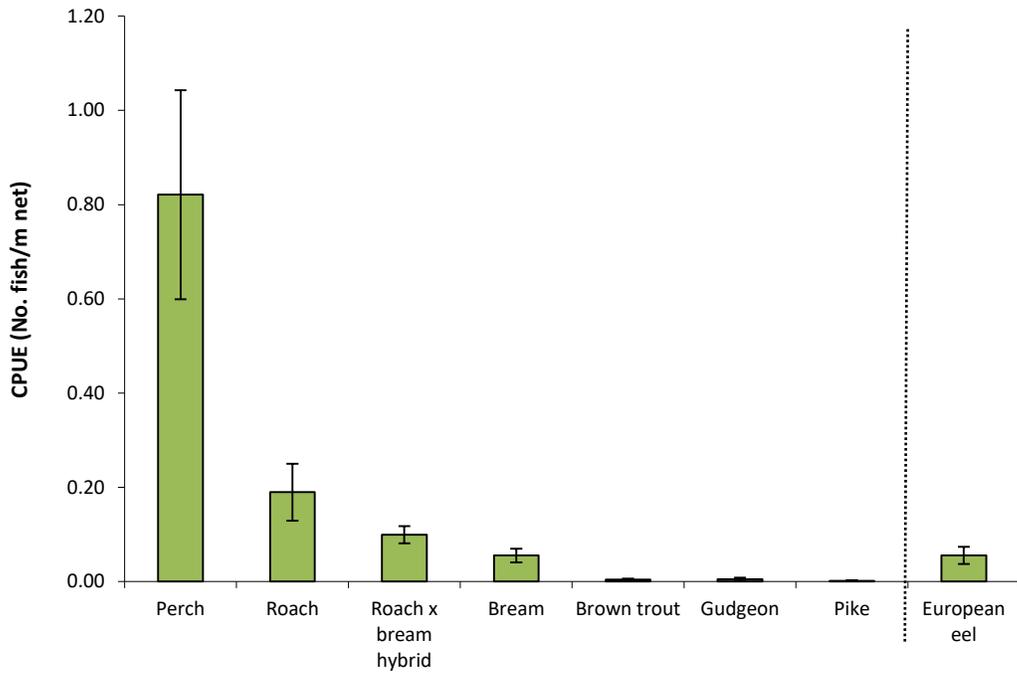
Perch was the dominant fish species captured in terms of abundance (CPUE) in the survey (Table 1.2. and Fig. 1.2.). Roach x bream hybrids were the dominant fish type by biomass (BPUE) captured in the survey (Table 1.2 and Fig 1.3.).

**Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Lough Ramor, 2019**

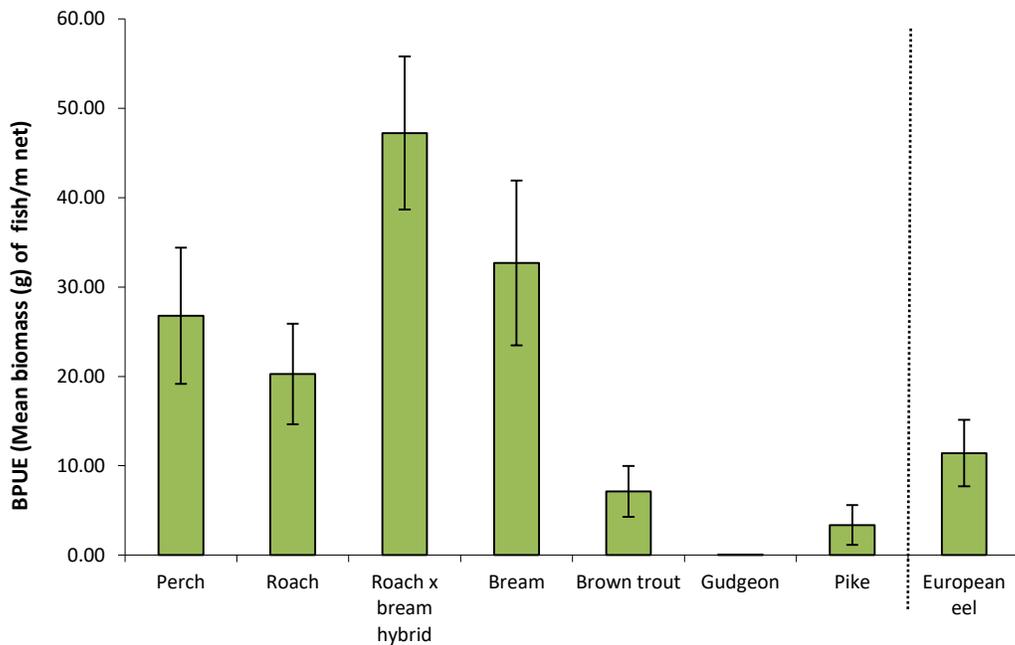
Scientific name	Common name	Mean CPUE ( $\pm$ S.E) **	Mean BPUE ( $\pm$ S.E) **
<i>Perca fluviatilis</i>	Perch	0.821 (0.222)	26.785 (7.616)
<i>Rutilus rutilus</i>	Roach	0.190 (0.060)	20.27 (5.613)
<i>Rutilus rutilus x Abramis brama</i>	Roach x bream hybrid	0.099 (0.018)	47.225 (8.566)
<i>Abramis brama</i>	Bream	0.055 (0.015)	32.687 (9.215)
<i>Salmo trutta</i>	Brown trout	0.005 (0.002)	7.137 (2.856)
<i>Gobio gobio</i>	Gudgeon	0.005 (0.004)	0.025 (0.021)
<i>Esox lucius</i>	Pike	0.002 (0.001)	3.364 (2.228)
* <i>Anguilla anguilla</i>	European eel	0.056 (0.018)	11.418 (3.707)

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 on Lough Ramor (Eel CPUE based on fyke nets only), August 2019**

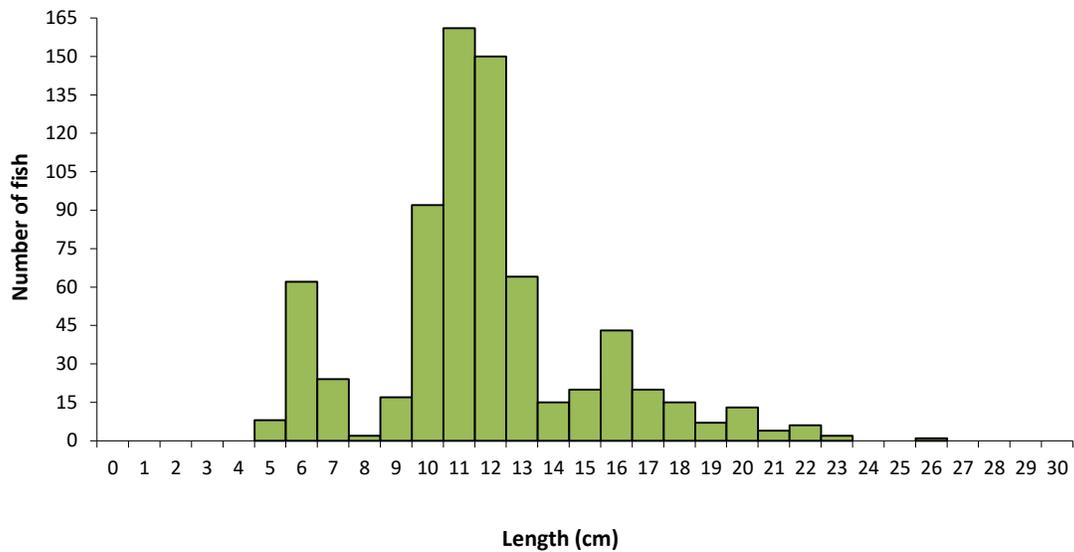


**Fig. 1.3. Mean ( $\pm$ S.E.) BPUE for all fish species captured on Lough Ramor (Eel CPUE based on fyke nets only), August 2019**

### 1.3.3 Length frequency distributions and growth

#### Perch

Perch captured during the 2019 survey ranged in length from 5.0cm to 26.3cm (mean = 12.2cm) (Fig.1.4). Six age classes were present, ranging from 0+ to 6+. Mean L1 (length at 1 year) was 6.3cm (Table 1.3). The dominant age class was 1+ corresponding with fish in the 11cm to 12cm length range (Fig.1.4).



**Fig. 1.4. Length frequency of perch captured on Lough Ramor, August 2019**

**Table 1.3. Mean ( $\pm$ S.E.) perch length (cm) at age for Lough Ramor, August 2019**

	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	L <sub>5</sub>	L <sub>6</sub>
<b>Mean (<math>\pm</math>S.E.)</b>	6.3 (0.1)	11.6 (0.2)	17.5 (0.5)	19.9 (0.7)	20.3	21.6
<b>N</b>	76	46	22	7	1	1
<b>Range</b>	3.6-9.5	8.3-14.5	12.8-23.1	17.0-22.0	-	-



## Roach

Roach captured during the 2019 survey ranged in length from 6.1cm to 31.3cm (mean = 16.2cm) (Fig.1.5). Roach were aged between 1+ to 10+ (Table 1.4). All cohorts from 2+ to 6+ were well represented in the sample aged, indicating regular and strong recruitment. However, few older fish (> 7+) were recorded.

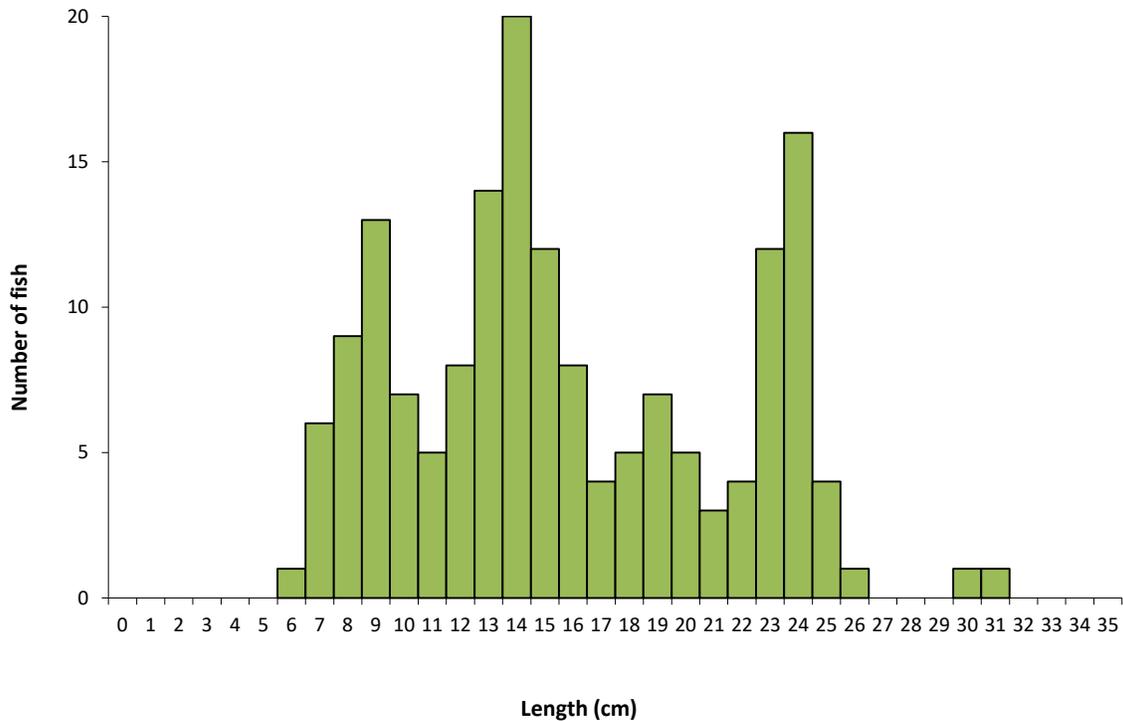


Fig. 1.5. Length frequency of roach captured on Lough Ramor, August 2019

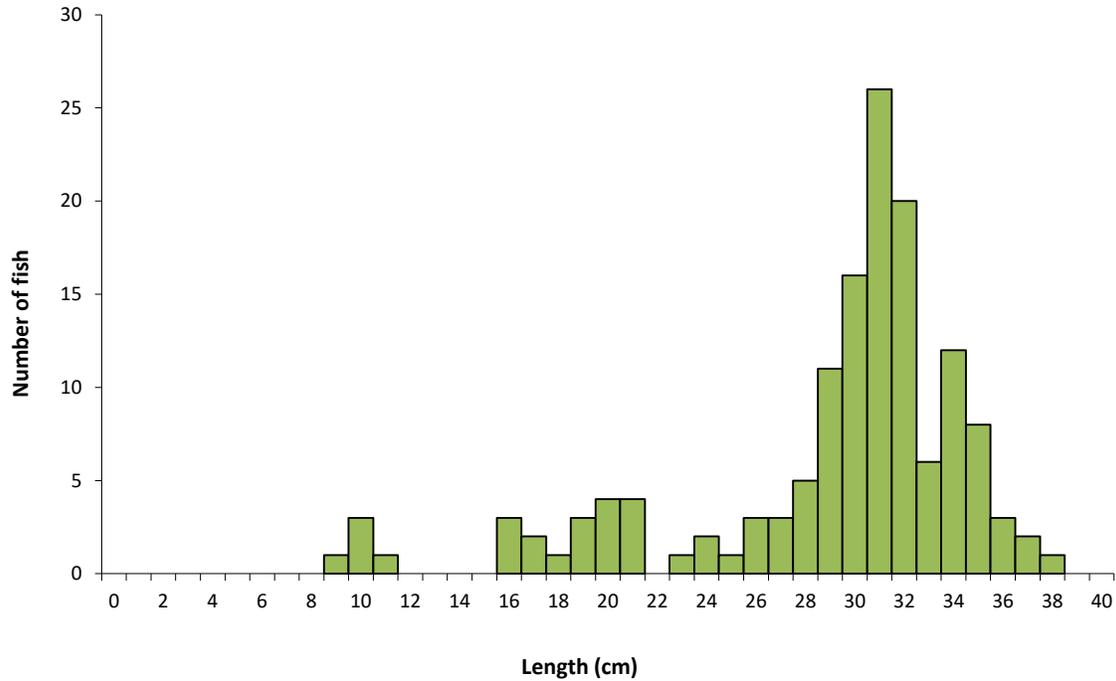
Table 1.4. Summary age data from roach captured on Lough Ramor, August 2019. Number of fish and length ranges of all fish aged in the sample is presented.

	Age Class										
	0+	1+	2+	3+	4+	5+	6+	7+	8+	9+	10+
<b>n</b>	-	3	18	27	16	11	14	3	-	-	1
<b>Mean L (cm)</b>	-	8.2	10.3	14.3	17.5	21.3	24	24.7	-	-	30.5
<b>Min L (cm)</b>	-	7.9	7.1	10.9	13.1	18.5	21.8	22.3	-	-	30.5
<b>Max L (cm)</b>	-	8.6	13.6	18.3	20.1	24.4	25.5	26.5	-	-	30.5



## Roach x bream hybrids

Roach x bream hybrids captured during the 2019 survey ranged in length from 9.5cm to 38.2cm (mean = 29.4cm) (Fig.1.6). Roach x bream hybrids in the sample were aged between 1+ and 13+. All age classes with the exception of 0+ and 7+ fish were represented, indicating regular recruitment in the lake. The most abundant age class in the sample was 5+ (Table 1.5).



**Fig. 1.6. Length frequency of roach x bream hybrids captured on Lough Ramor in 2019**

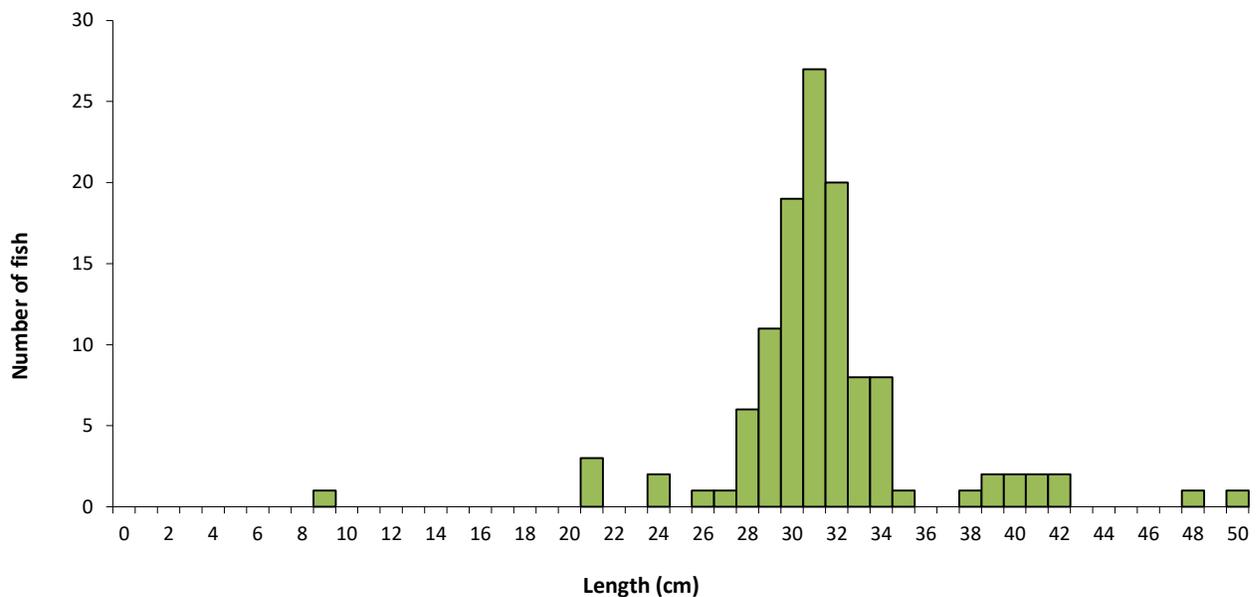
**Table 1.5. Summary age data from roach x bream hybrids, captured on Lough Ramor, August, 2019. All fish aged in the sample is presented.**

	Age Class													
	0+	1+	2+	3+	4+	5+	6+	7+	8+	9+	10+	11+	12+	13+
<b>n</b>	-	1	2	4	3	12	6	-	7	7	10	9	9	3
<b>Mean L (cm)</b>	-	9.5	10.7	15.1	18.9	21.5	27	-	29.8	30.4	32.1	33.7	35	37.6
<b>Min L (cm)</b>	-	9.5	10.7	11.3	16.2	18.8	25.7	-	28	29.4	31	31.5	33.5	37.1
<b>Max L (cm)</b>	-	9.5	10.8	17.1	20.9	26.2	28.4	-	33.1	31.9	34.8	35.2	36.2	38.2



## **Bream**

Bream captured during the 2019 survey ranged in length from 9.0cm to 50.3cm (mean = 31.9cm) (Fig.1.7). Bream in the sample were aged between 1+ and 13+. Three age cohorts were not present in the sample aged, while 6+ and 7+ bream were dominant (Table 1.6). These cohorts comprised approximately 79% of all bream aged, corresponding to those fish measuring between c. 30cm - 35cm (Fig. 1.7). This indicates that there was strong recruitment of bream in the lake in those corresponding spawning seasons (i.e. 2013 and 2014). Few younger or smaller bream were recorded.



**Fig. 1.7. Length frequency of bream captured on Lough Ramor in 2019**

**Table 1.6. Summary age data of bream captured on Lough Ramor, August, 2019. All fish aged in the sample is presented.**

	Age Class													
	0+	1+	2+	3+	4+	5+	6+	7+	8+	9+	10+	11+	12+	13+
<b>n</b>	-	1	-	1	1	2	23	25	1	3	1	2	-	1
<b>Mean L (cm)</b>	-	9	-	21.1	21.5	29.3	30.9	32.9	39.7	40.7	41.2	42.2	-	50.3
<b>Min L (cm)</b>	-	9	-	21.1	21.5	29.2	27.1	29.1	39.7	39.6	41.2	42.2	-	50.3
<b>Max L (cm)</b>	-	9	-	21.1	21.5	29.4	32.5	35.6	39.7	41.9	41.2	42.3	-	50.3



## **Other fish species**

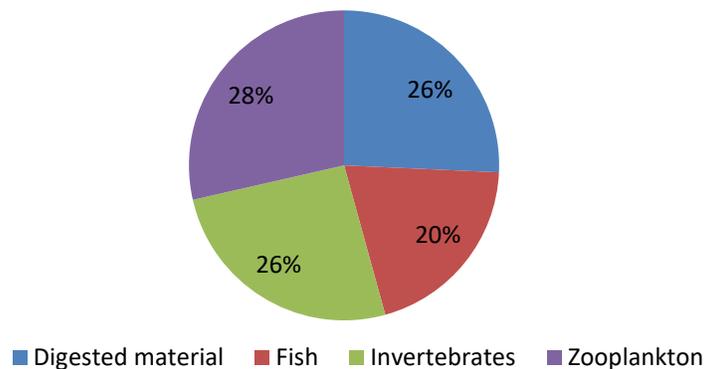
Nine brown trout measuring from 24.9cm to 65.5cm (mean 47.7cm) were captured during the survey. Five age classes (2+ to 9+) were recorded in the sample aged. Three pike were captured and measured from 35.3cm to 92.8cm. Gudgeon (n = 4) captured in 2019 ranged from 7.2cm to 8.3cm. Twenty European eels were captured ranging in length from 41.9cm to 67.5cm.

### **1.3.4 Stomach and diet analysis**

Dietary analysis 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. The stomach contents of a sub-sample of perch, brown trout and pike captured during the survey were examined and are presented below.

## **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 78 stomachs were examined. Of these 43 were found to contain no prey items. Of the remaining 35 stomachs, 10 (28%) contained zooplankton, nine (26%) stomachs had unidentified digested material and invertebrates respectively. Eight (20%) perch were found to have preyed on fish (Fig. 1.8).



**Figure 1.8. Diet of perch (n=35) captured on Lough Ramor, 2019 (% FO)**



### **Brown trout**

Two brown trout stomachs were examined. One stomach was empty, while one contained fish.

### **Pike**

Three pike were available for stomach analysis. All three stomachs were empty.

## **1.4 Summary and ecological status**

A total of seven fish species and one type of hybrid (roach x bream) were recorded on Lough Ramor in August 2019. A broadly similar species mix was recorded when the lake was last surveyed in 2005, with the exception of tench and rudd which were not captured in 2019. No round goby were recorded in any of the survey nets or traps that were deployed in the lake.

Perch was the dominant fish species in terms of abundance (CPUE). Roach x bream hybrids had the highest biomass (BPUE) captured during the 2019 survey, but relatively high biomasses of other species, notably bream, were also recorded.

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 cohorts, and few large or old fish, of either species were captured.

Relatively large numbers of bream (10% of all fish captured) were recorded during the 2019 survey. While the survey results cannot be directly compared with the 2005 survey, at that time, bream represented <0.2% of all fish captured. Bream were relatively long-lived, with fish in the sample aged ranging from 2+ to 13+. The population was dominated by two exceptionally strong year classes (6+ & 7+). However, relatively few bream <6years old were recorded in the 2019 survey, suggesting that recent recruitment has been limited.

The roach x bream hybrid population, which requires both parent species to spawn (Hayden *et al.*, 2010), exhibited relatively consistent recruitment patterns. Twelve age classes were present, ranging from 1+ to 13+. There were no 7+ fish recorded in the sample aged. There were also relatively few hybrids <5+ in the sample.



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). The tool utilises catch data from all survey nets deployed in each lake, with the exception of those fish captured in the 55mm, 70mm and 90mm meshes of the benthic braided gill nets to ensure comparability of effort between surveys. Using the FIL2 classification tool, Lough Ramor has been assigned an ecological status of Bad for 2019 based on the fish populations present.

In the 2013 to 2018 surveillance monitoring reporting period, the EPA assigned Lough Ramor an overall draft ecological status of poor, based on all monitored physico-chemical and biological elements, including fish.



## 1.5 References

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