National Research Survey Programme

Lakes 2023

Lough Scur

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Iascach Intíre Éireann
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Fish Stock Survey of Lough Scur, August 2023

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Inland Fisheries Ireland

National Research Survey Programme

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

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1. Introduction

Lough Scur is located on the watershed boundary separating the Shannon and Erne Catchments near the village of Keshcarrigan in Co. Leitrim (Figure 1.1). The lake sits at the summit of the Shannon-Erne Waterway, a navigable watercourse (canal) which links the Shannon and Erne catchments at Leitrim Village and Belturbet respectively. The canal exits the western shore of the lake and flows downstream to where it joins the Shannon at Leitrim Village. At the eastern exit, the navigation flows through a series of canal, lake and river sections, linking with the River Erne at Belturbet. The lake is situated at an altitude of 61 m.a.s.l., has a surface area of 114ha, mean depth of 2.1m and maximum depth of 9.8m. The lake is categorised as typology class 6 for the purposes of WFD (as designated by the EPA), i.e. shallow (<4m), greater than 50ha and medium alkalinity (20-100mg/l $CaCO_3$). Surrounding land is primarily agricultural, with significant amounts of natural vegetation and an area of transitional woodland to the North-west. The geology of the area is predominantly limestone and calcareous shale.

The ecological status of the lake has deteriorated in recent years (Trodd and O' Boyle, 2018).

Lough Scur is regarded as an excellent coarse fish and pike fishery and has been developed as such. Angling, with parking is available at the Southern (Pumphouse) shore and from an area known as 'The Rocks' on the northern shore. Several prestigious national and international angling competitions are held on the lake on an annual basis.

Since the mid 1990s, Inland Fisheries Ireland (previously the Central Fisheries Board) have undertaken relatively frequent fish stock surveys on the lake, the most recent of which was conducted in 2010. Roach, bream, roach x bream hybrids, perch, and pike were recorded at that time (IFI, 2011). The lake has also been surveyed in 2018 using IFIs lake monitoring protocol (Connor *et al.,* 2018). On that occasion, tench, rudd, and European eel were captured as well as the aforementioned species.

This report summarises the results of the 2023 fish stock survey carried out on the lake using Inland Fisheries Ireland's fish in lakes monitoring protocol. The protocol is WFD compliant and provides insight into fish stock status in the lake.

Plate 1.1. Aerial view of Lough Scur, looking east toward Keshcarrigan, August 2023

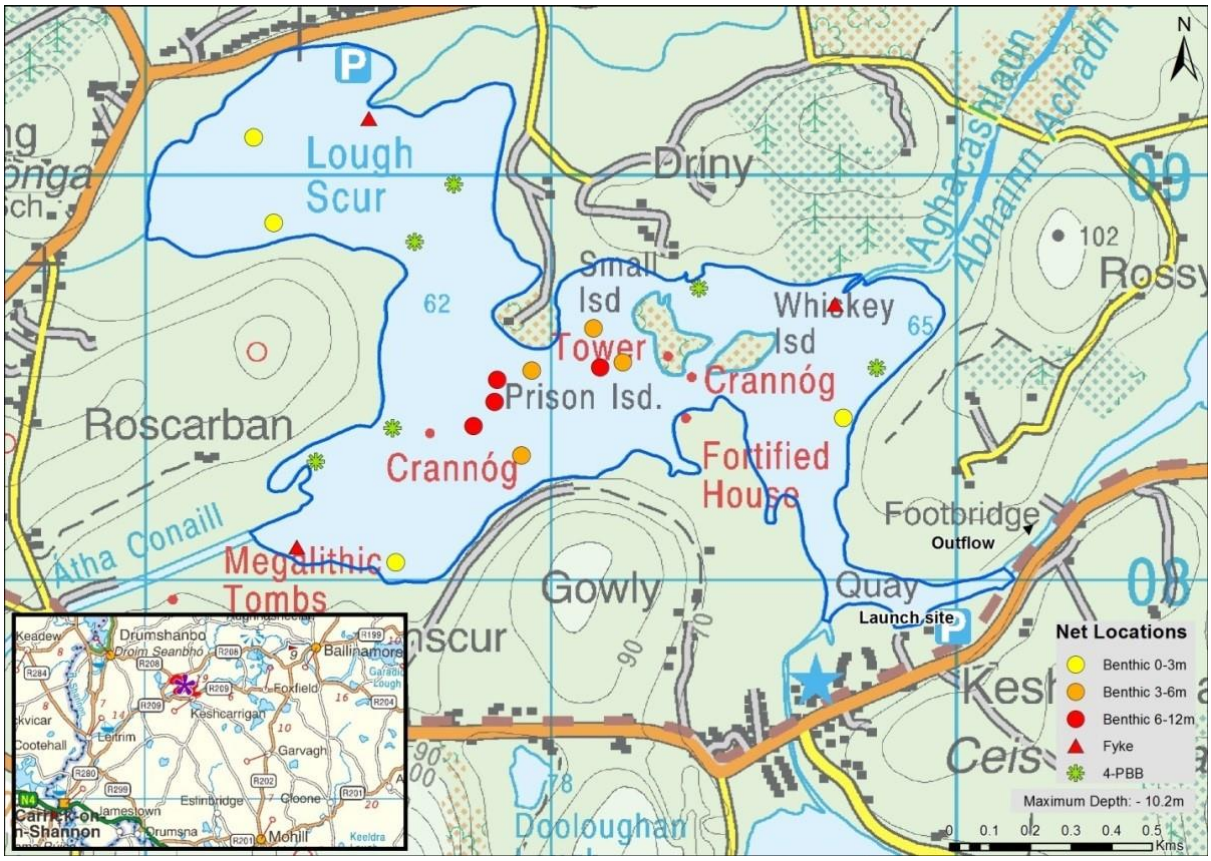

Figure 1.1. Location map of Lough Scur showing net locations and depths of each net (outflow is indicated on map).

2. Methods

2.1. Netting methods

Lough Scur was surveyed over three nights from the 14th to the 17th of August 2023. A total of three sets of Dutch fyke nets 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 netting effort was supplemented using four-panel benthic braided survey gill nets (4-PBB) at six 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). Nets were deployed in the same locations as were randomly selected in the previous surveys. 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 a sub-sample of other species. 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.

2.2. Fish diet

Total stomach contents were inspected, and individual items were 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).

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

Where:
$\mathbf{FO_i}$ is the percentage frequency of prey item i,
$\boldsymbol{N_i}$ is the number of fish with prey i in their stomach,
$\boldsymbol{N}$ is total number of fish with stomach contents.

2.3. Biosecurity - disinfection and decontamination procedures

Procedures are required for disinfection of equipment 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.

3. Results

3.1. Species Richness

A total of seven fish species and one type of hybrid were recorded on Lough Scur in August 2023. A total of 328 fish were captured (Table 3.1). Perch was the most numerous fish species recorded, representing *c*. 55% of all fish captured in the survey. Roach x bream hybrids, roach, bream, pike, tench, brown trout and European eels were also captured. A similar species composition was recorded on the last survey of the lake in 2018. However, rudd was captured on that occasion but not on this survey, while brown trout was present during this survey and not the last (Connor *et al.,* 2018).

Table 3.1. Number of each fish species captured by each gear type during the survey on Lough Scur, August 2023.

Scientific name	Common name	Number of fish captured			
		BM CEN	4-PBB	Fyke	Total
Perca fluviatilis	Perch	174	3	3	180
Rutilus rutilus x Abramis brama	Roach x bream hybrid	74	2	0	76
Rutilus rutilus	Roach	35	2	0	37
Abramis brama	Bream	10	9	0	19
Esox lucius	Pike	4	1	2	7
Tinca tinca	Tench	0	2	0	2
Salmo trutta	Brown trout	0	1	0	1
Anguilla anguilla	European eel	0	0	6	6

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. Perch was the dominant species with respect to abundance (CPUE) and biomass (BPUE) in survey gill nets. Eel also had a relatively high biomass although this species was only recorded in fyke nets (Table 3.2).

Table 3.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Lough Scur, August 2023.

Scientific name	Common name	Mean CPUE (± S.E)	Mean BPUE (± S.E)
Perca fluviatilis	Perch	0.280 (0.105)	9.635 (3.157)
Rutilus rutilus x Abramis brama	Roach x bream hybrid	0.118 (0.040)	6.974 (2.120)
Rutilus rutilus	Roach	0.057 (0.027)	1.735 (1.012)
Abramis brama	Bream	0.020 (0.006)	3.558 (1.200)
Esox lucius	Pike	0.008 (0.004)	8.857 (4.749)
Tinca tinca	Tench	0.001 (0.001)	1.227 (0.908)
Salmo trutta	Brown trout	0.000 (0.000)	0.348 (0.348)
*Anguilla anguilla**	European eel	0.033 (0)	19.825 (4.712)

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.

Plate 2.1. Recording data on Lough Scur, August 2023

3.3 Species Profiles

Perch

Perch captured during the 2023 survey ranged in length from 4.1cm to 37.8cm (mean 8.8cm) (Figure 3.1). Overall length range was similar in both surveys. While small perch (i.e. < 10cm) were the most prominent size in both surveys, this was much less pronounced in 2023. Perch measuring 10cm to 15cm were also less prevalent in 2023 compared to the previous survey. Perch were aged between 0+ and 9+ and all intervening age classes were represented in the sampled aged (Table 3.3). 0+ (5cm – 7cm) fish were the most abundant age group in the sample aged (Figure 3.1).

While the large numbers of 0+ juveniles captured in 2018 was not recorded in 2023, this has not resulted in a significant change in median perch abundance (CPUE) or biomass (BPUE) between the two sampling occasions (Figure 3.2).

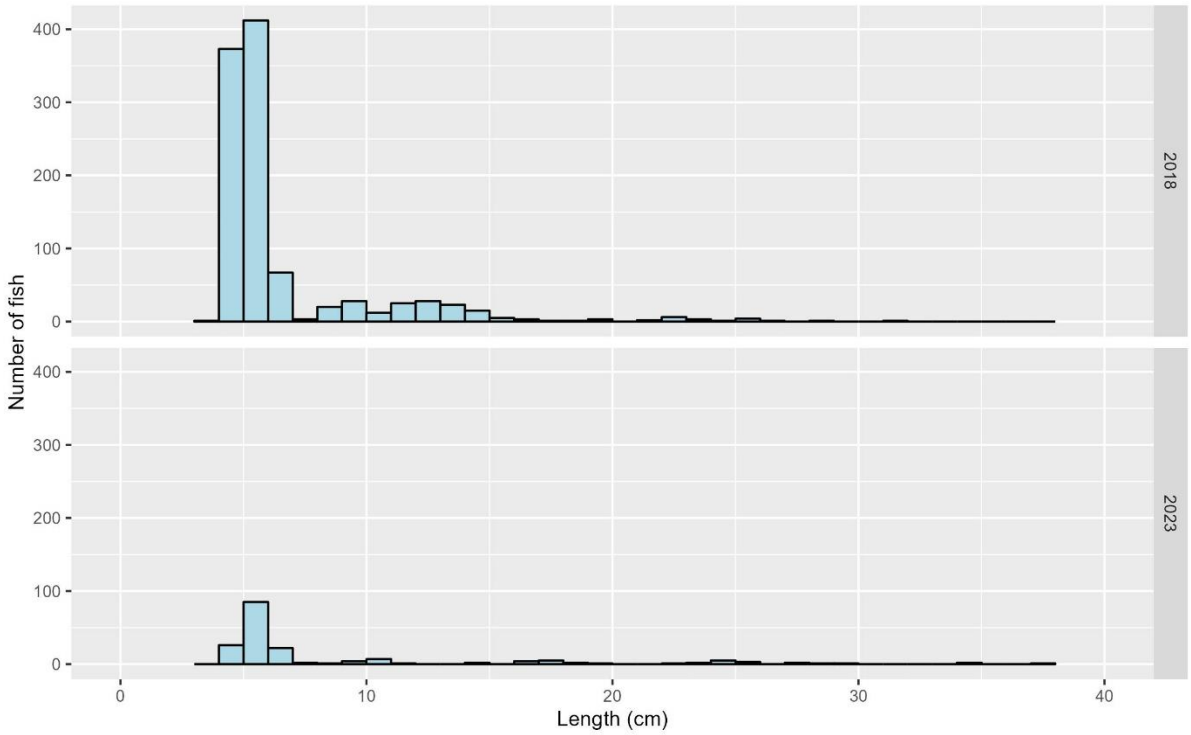

Figure 3.1. Length frequency of perch captured on Lough Scur in 2018 and 2023.

Table 3.3. Mean (±S.E.) perch length (cm) at age for Lough Scur, August 2023

Length (cm)	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8	L_9
Mean (±S.E.)	5.9 (0.20)	10.8 (0.37)	15.8 (0.58)	19.5 (0.75)	22.4 (1.01)	24.3 (2.37)	25.3 (3.05)	26.0 (4.30)	28.2 (5.40)
N	27	21	12	10	8	4	3	2	2
Range	4.4-8.5	7.5-14.0	12.6-19.2	13.8-22.5	15.4-24.3	17.4-27.5	19.3-29.0	21.7-30.3	22.8-33.6

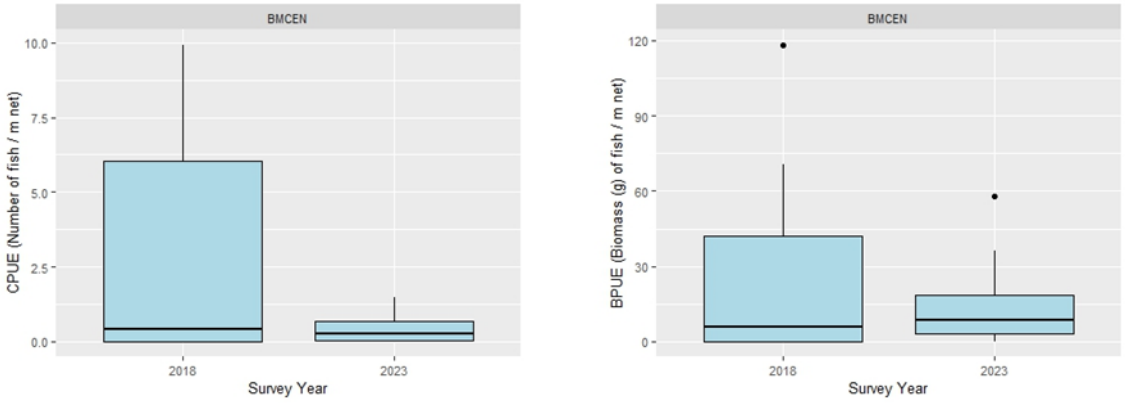

Figure 3.2. CPUE and BPUE of perch captured during surveys of Lough Scur in 2018 and 2023. Figures are expressed as numbers of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots.

Plate 3.1. Surveyi boat on Lough Scur in August 2023

Roach x bream hybrids

Roach x bream hybrids captured during the 2023 survey ranged in length from 7.2cm to 34.7cm (mean 14.9cm). Length range was relatively similar in both surveys, and fish less than 20cm dominated the population on both survey occasions. However, smaller (i.e. < 15cm) roach x bream hybrids were less prominent in 2023 compared to the earlier survey. Roach x bream hybrids were aged between 2+ and 13+ (Table 3.4). Fish younger than 6+ (16cm – 18cm) dominated the population (Figure 3.3 and Table 3.4).

Relative abundance (CPUE) and biomass (BPUE) of roach x bream hybrids were similar in both surveys (Figure 3.4).

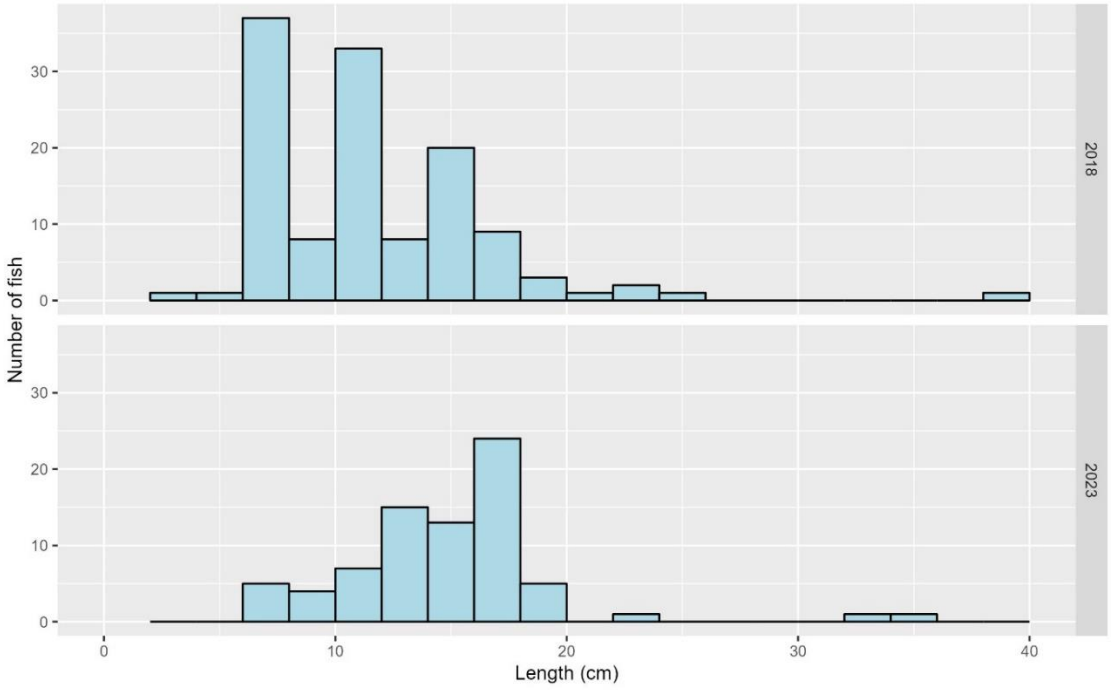

Figure 3.3. Length frequency of roach x bream hybrids captured on Lough Scur in 2018 and 2023

Table 3.4. Summary age data from roach x bream hybrids captured on Lough Scur, August 2023. Number of fish and length ranges of all fish aged in the sample is presented.

Length (cm)	Age class													
	0+	1+	2+	3+	4+	5+	6+	7+	8+	9+	10+	11+	12+	13+
N	-	1	6	4	6	3	7	4	1	-	-	1	-	1
Mean	-	7.8	9.4	12.2	14.7	14.9	17.4	19.0	22.2	-	-	34.7	-	33.6
Min	-	7.8	7.6	10.9	13.3	13.7	16.7	17.8	22.2	-	-	34.7	-	33.6
Max	-	7.8	11.8	12.9	15.7	16.2	18.5	19.8	22.2	-	-	34.7	-	33.6

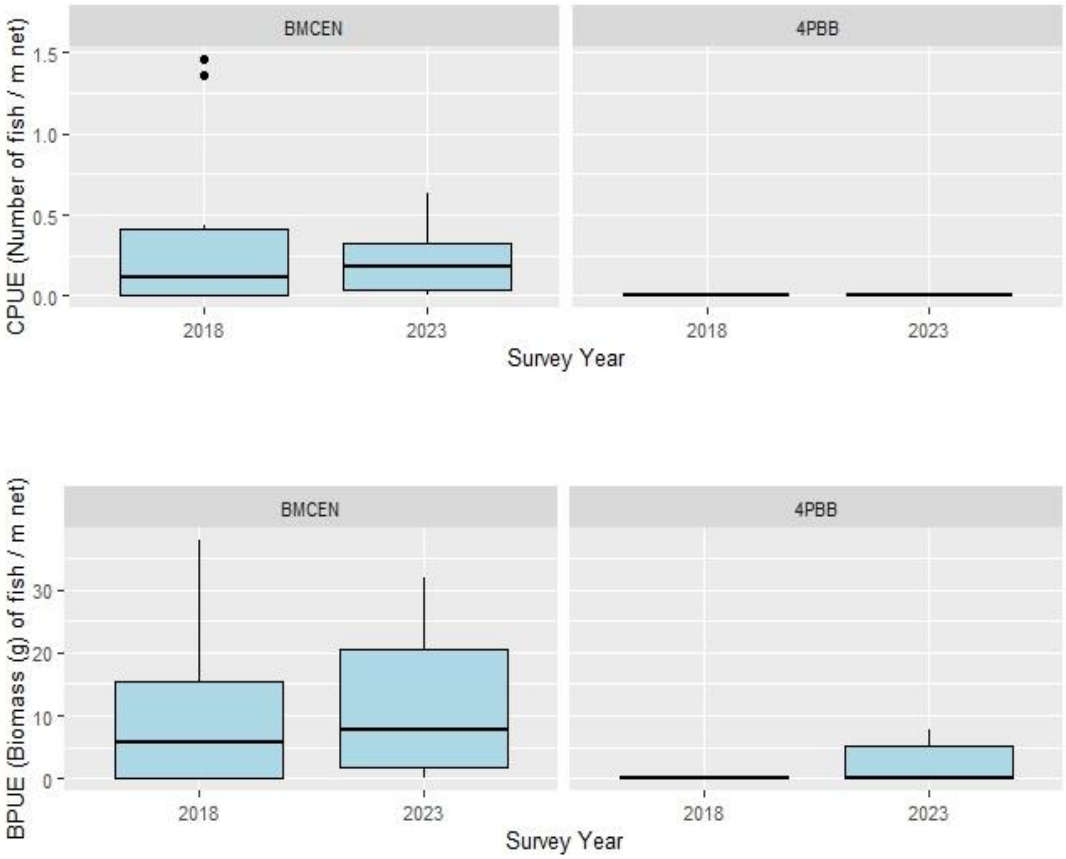

Figure 3.4. CPUE and BPUE of roach x bream hybrids captured during surveys of Lough Scur in 2018 and 2023. Figures are expressed as numbers of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots.

Roach

Roach captured during the 2023 survey ranged in length from 4.1cm to 24.1cm (mean 10.9cm). While the overall length range of roach captured was similar in 2018 and 2023, fish of all size classes were less abundant in 2023 (Figure 3.5). Roach in the population were aged between 1+ (e.g. 6cm) and 9+ (e.g.44cm) (Table 3.5). Several year classes were absent, and two and three year old fish (9cm – 13cm) were the most abundant cohorts (Figure 3.5 and Table 3.5).

There was a large decrease in abundance (CPUE) and biomass (BPUE) of roach between 2023 and 2016 (Figure 3.6).

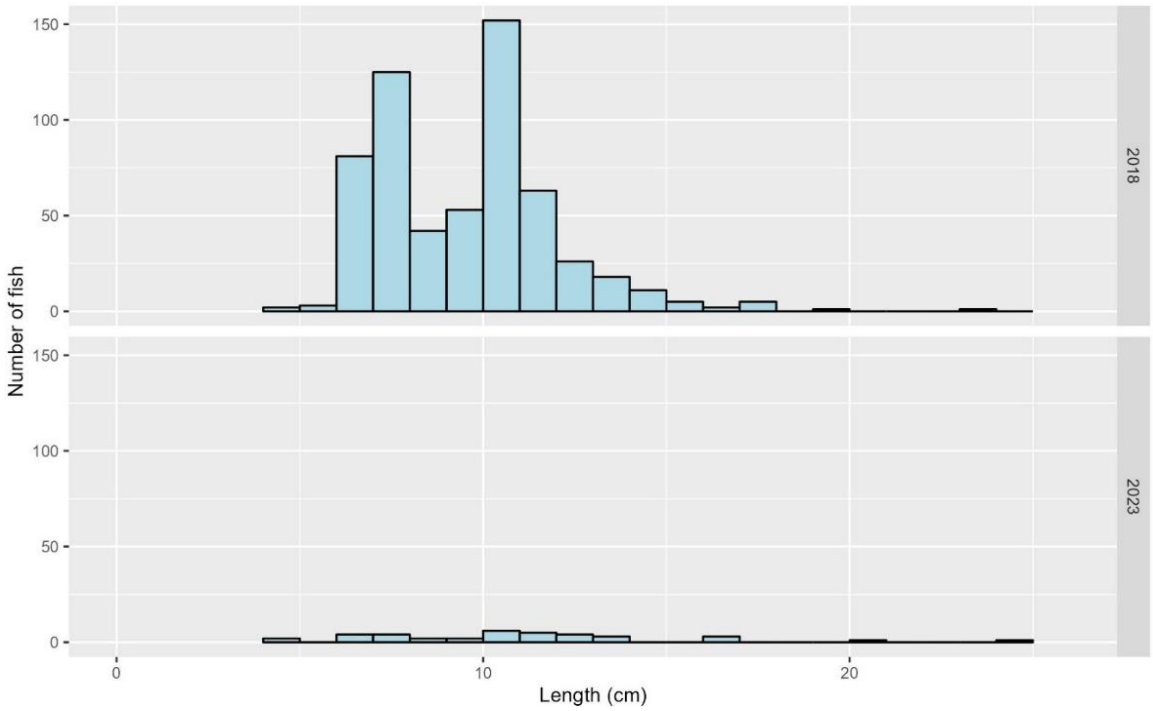

Figure 3.5. Length frequency of roach captured on Lough Scur in 2018 and 2023

Table 3.5. Summary age data from roach captured on Lough Scur, August 2023. Number of fish and length ranges of all fish aged in the sample is presented.

Length (cm)	Age class									
	0+	1+	2+	3+	4+	5+	6+	7+	8+	9+
N	-	1	5	7	-	3	-	1	-	1
Mean	-	6.5	9.14	12.7	-	16.4	-	20	-	24.1
Min	-	6.5	6.6	11.8	-	16.3	-	20	-	24.1
Max	-	6.5	10.2	13.8	-	16.6	-	20	-	24.1

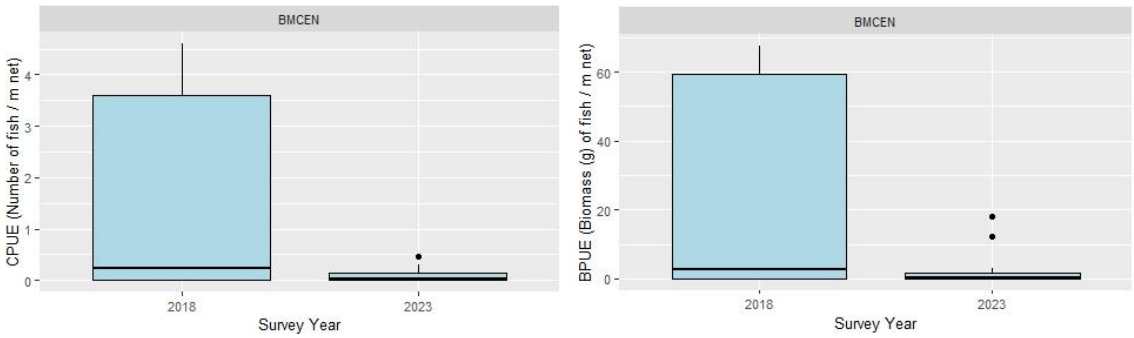

Figure 3.6. CPUE and BPUE of roach captured during surveys of Lough Scur in 2018 and 2023. Figures are expressed as numbers of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots.

Bream

Bream captured during the 2023 survey ranged in length from 10.3cm to 38.4cm (mean 22.7cm) (figure 3.7). While the overall length range was similar on both sampling occasions, fish measuring between 15cm and 25cm which were prominent in 2018 were largely missing or captured in only small numbers in 2023. Bream in the sample were aged between 3+ and 11+ (Table 3.5). Most year classes were represented by just one or two individuals and several cohorts were not recorded. 11+ fish were the most abundant cohort (30-32cm) (Figure 3.7, Table 3.5).

While the abundance (CPUE) of bream recorded declined between 2018 and 2023, biomass (BPUE) was similar in both surveys (Figure 3.8).

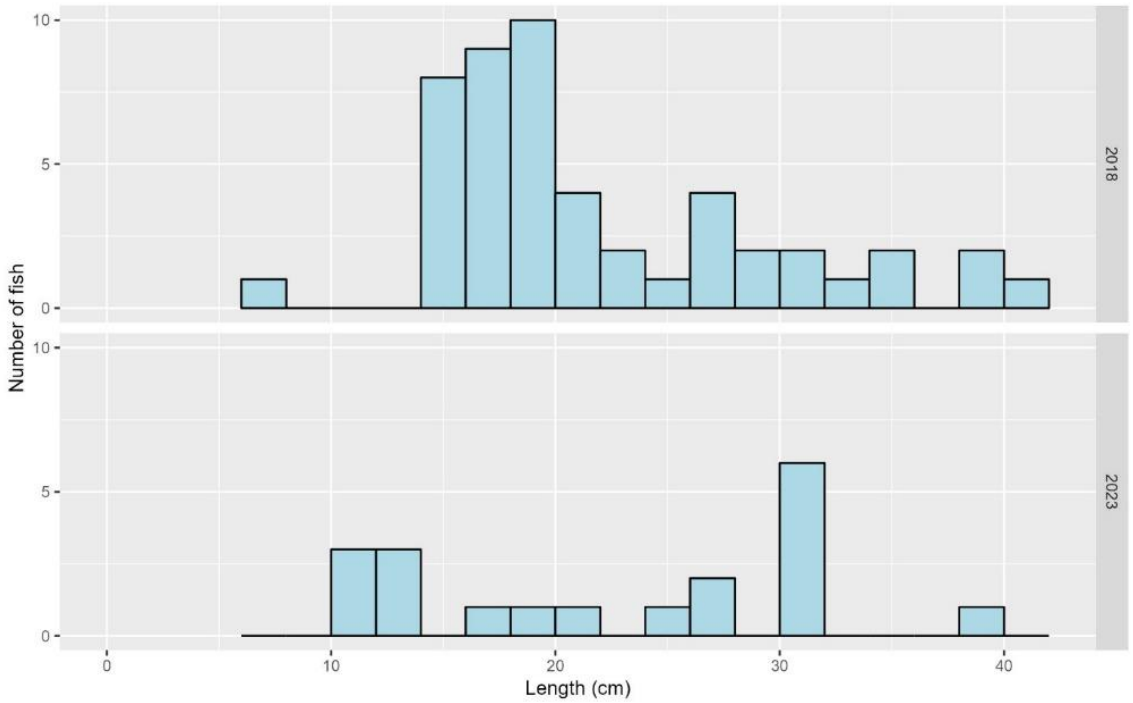

Figure 3.7. Length frequency of bream captured on Lough Scur in 2018 and 2023.

Table 3.6. Summary age data from bream captured on Lough Scur, August 2023. Number of fish and length ranges of all fish aged in the sample is presented.

Length (cm)	Age class											
	0+	1+	2+	3+	4+	5+	6+	7+	8+	9+	10+	11+
N	-	-	-	1	1	1	-	-	2	1	2	4
Mean	-	-	-	13.2	17.4	19.3	-	-	25.5	30.3	29.6	31.2
Min	-	-	-	13.2	17.4	19.3	-	-	24.7	30.3	27.7	30.5
Max	-	-	-	13.2	17.4	19.3	-	-	26.3	30.3	31.5	31.5

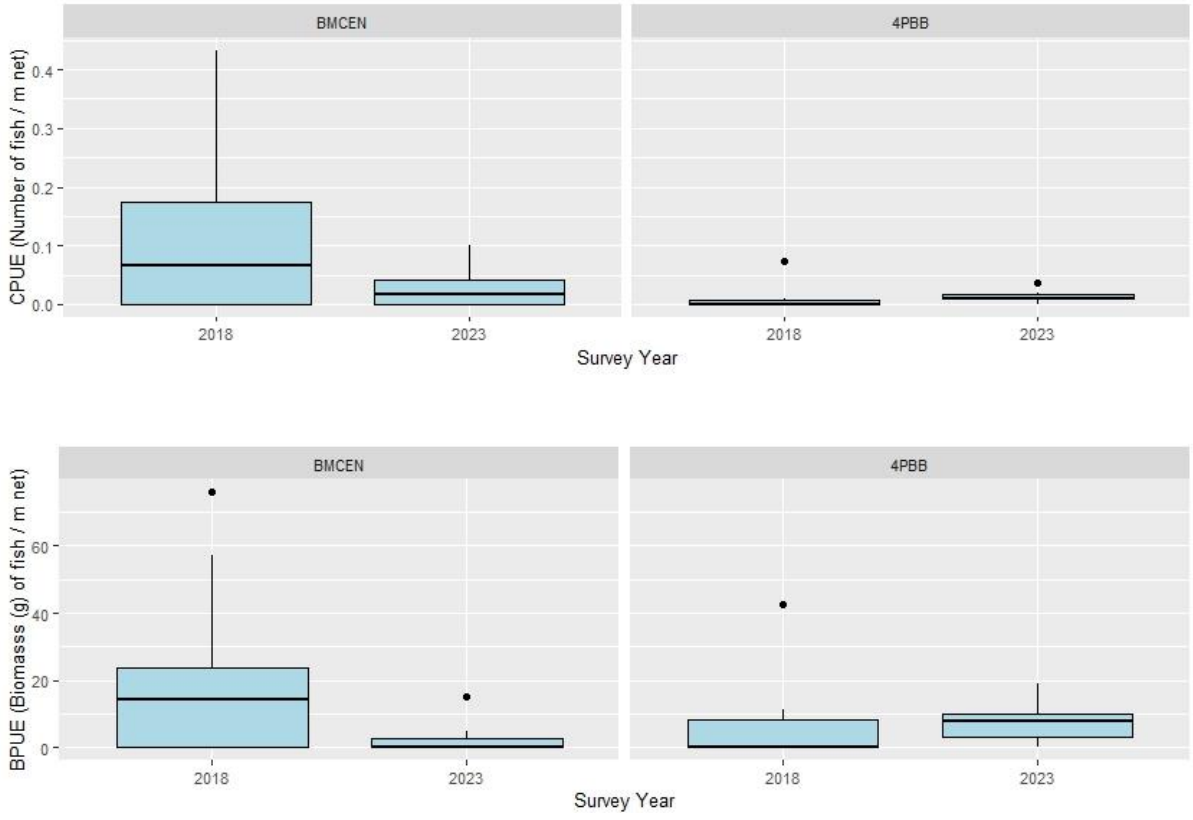

Figure 3.8. CPUE and BPUE of bream captured during surveys of Lough Scur in 2018 and 2023. Figures are expressed as numbers of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots.

Other species

Pike captured during the 2023 survey ranged in length from 15.2cm to 75.8cm (mean = 46.9cm). Pike were aged between 1+ and 7+. Two tench captured measured 36.5cm and 47.4cm. The larger tench was aged 9+. One brown trout captured measured 37.4cm and was aged 5+.

European eel captured during the 2023 survey ranged in length from 61.3cm to 82.0cm (mean 71.2cm) (Figure 3.9). While captured in small numbers overall, there were fewer European eels captured in 2023 compared to 2018. Median biomass, however, increased slightly (Figure 3.10).

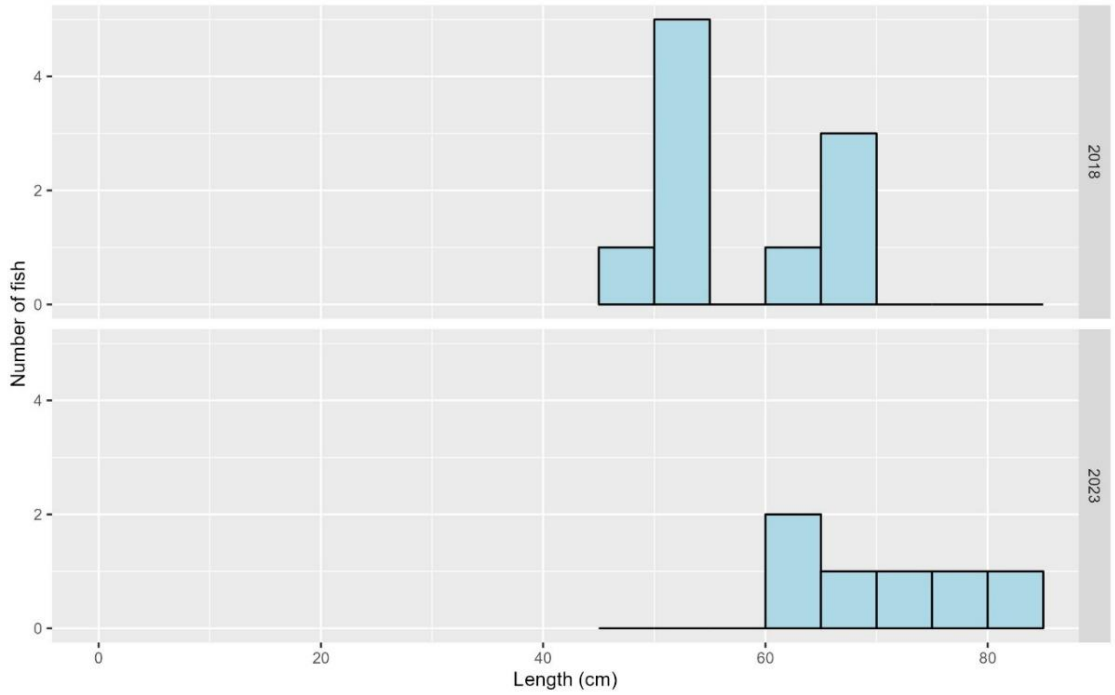

Figure 3.9. Length frequency of European eel captured on Lough Scur in 2018 and 2023

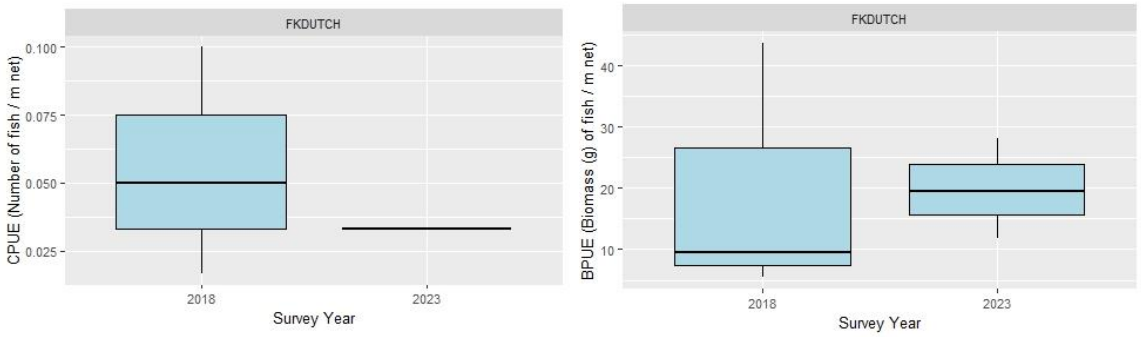

Figure 3.10. CPUE and BPUE of European eel captured during surveys of Lough Scur in 2018 and 2023. Figures are expressed as numbers of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots.

3.4. Stomach and diet analysis

The dietary analysis conducted provides insight to the prey of examined fish immediately prior to capture. Longer term and seasonal studies provide a more robust assessment of fish diet. The stomach contents of a subsample of perch, pike and brown trout captured during the survey were examined and are presented below.

Perch

A total of 38 perch stomachs were examined. Fourteen (37%) were empty. Twenty-four stomachs contained food. Invertebrates were the sole prey type recorded in 12 (50%) stomachs and were found together with zooplankton in one (4%) stomach . Zooplankton was the sole prey type recorded in four (17%) stomachs. The stomach contents of six (25%) perch stomachs consisted of fish, while unidentified digested material was recorded in one (4%) stomach (Figure 3.11).

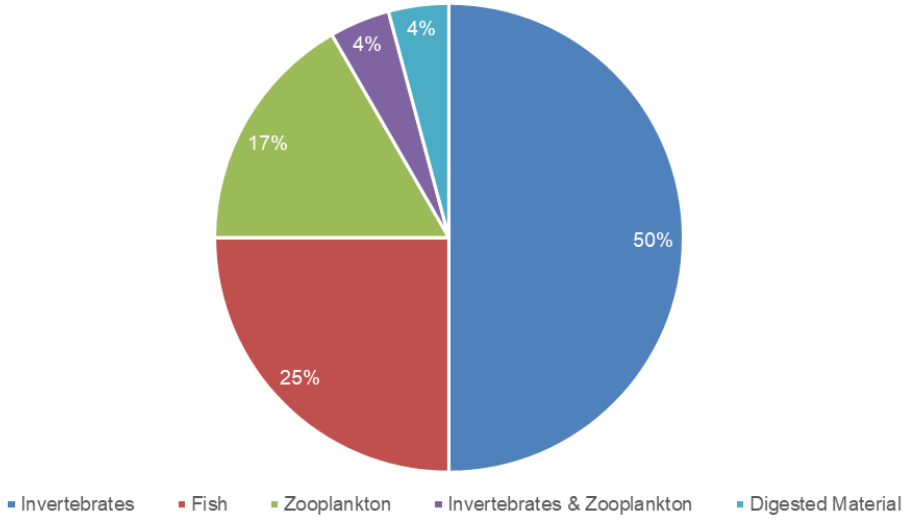

Figure 3.11. Diet of perch (N = 24) captured on Lough Scur, August 2023 (% FO).

Pike

Two pike stomachs were available for analysis. One stomach contained invertebrates. Detritus was noted in the second pike stomach.

Brown trout

One brown trout stomach was examined. It contained fish.

4. Summary and fish ecological status

A total of seven fish species and one cyprinid hybrid were recorded in Lough Scur in August 2023. Perch was the dominant species with respect to abundance (CPUE) and biomass (BPUE) in survey gill nets.

Perch are recruiting regularly in the lake and all year classes were present (albeit in relatively small numbers) in the sample. In the previous survey, roach abundance (CPUE) and biomass (BPUE) were comparable to other species captured (Connor *et al*., 2019). However, in 2023, roach abundance (CPUE) and biomass (BPUE) was lower, and several year classes were missing from the population sampled. This may suggest that recruitment in this species has been limited in recent years.

The bream sample was dominated by older age cohorts. While the roach x bream hybrid population (which requires spawning populations of both parent species (Hayden *et al*., 2010) was dominated by younger individuals, the proportion of younger cohorts was less pronounced than in the previous survey. This may suggest that recruitment of bream and its hybrid has been limited in recent years.

Classification and assigning lakes with an ecological status is a critical part of the WFD monitoring programme. It allows for the identification and prioritisation of 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 (Ecological Quality Ratio) values for each lake and associated confidence in classification (Kelly *et al*., 2012).

Using the FIL2 classification tool, Lough Scur has been assigned an ecological status of Poor for 2023 based on the fish populations present. Lough Scur was also assigned a status of Poor following the previous fish stock survey in 2018 (Connor *et al*., 2019).

In the 2016 to 2021 surveillance monitoring reporting period, the EPA assigned Lough Scur an overall ecological status of Moderate, based on all monitored physio-chemical and biological elements, including fish (EPA 2021).

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Inland Fisheries Ireland
3044 Lake Drive,
Citywest Business Campus,
Dublin 24,
Ireland.
D24 CK66

www.fisheriesireland.ie
info@fisheriesireland.ie

+353 1 8842 600