

National Research Survey Programme

Lakes 2021

Urlaur Lough

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Iascach Intíre Éireann
Inland Fisheries Ireland

Fish Stock Survey of Urlaur Lough, August 2021



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National Research Survey Programme

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1. Introduction

Urlaur Lough is located approximately 11km south of Ballaghaderreen, Co. Mayo (Plate 1.1, Figure 1.1). It has an area of 114.9ha, a mean depth of <4m and a maximum depth of 11m. The lake is categorised as typology class 10 (as designated by the EPA for the Water Framework Directive), i.e. shallow (<4m), greater than 50ha and high alkalinity (>100mg/l CaCO₃).

The underlying geology of the lake is made up of carboniferous limestone. The river Lung rises in Urlaur Lough, flows through the Lung valley until it enters Lough Gara, approximately 22km north-east (ShIRBD, 2010). Urlaur Lough, along with Lough Nanoge and Lough Roe, makes up the Urlaur lakes Special Area of Conservation (SAC) (NPWS, 2021). Urlaur Lough is a hard water marl lake, a habitat listed on Annex I of the EU Habitats Directive. The aquatic flora of the lake is dominated by stoneworts (*Chara* spp.). Other aquatic species occurring in the lake include Canadian pondweed (*Elodea canadensis*), yellow and white water-lilies (*Nuphar lutea* and *Nymphaea alba*), pondweeds (*Potamogeton* spp.) and common duckweed (*Lemna minor*). Land use practices within the site boundary are of low-intensity. These include land use for pasture and limited mechanical turf-cutting to the south-east of Urlaur Lough (NPWS, 2021).

The lake is an important angling and recreational amenity. It was previously stocked with bream in 1961 but these fish failed to establish a population at that time (IFT, unpublished data). The lake was historically known to contain a moderate stock of pike, perch and eels (IFT, unpublished data).

Urlaur Lough was previously surveyed in 2010 and 2013 as part of the WFD surveillance monitoring programme (Kelly *et al.*, 2011, 2014). During these surveys perch and roach were found to be the dominant species present in the lake. Pike, roach x bream hybrids, eels and nine-spined stickleback were also captured.

This report summarises the results of the 2021 fish stock survey carried out on the lake using Inland Fisheries Ireland's fish in lakes monitoring protocol. The methodology is WFD compliant and enables determination of ecological status based upon fish communities. It also provides insight into current fish stock status in assessed lakes, facilitating comparison within and between lakes.

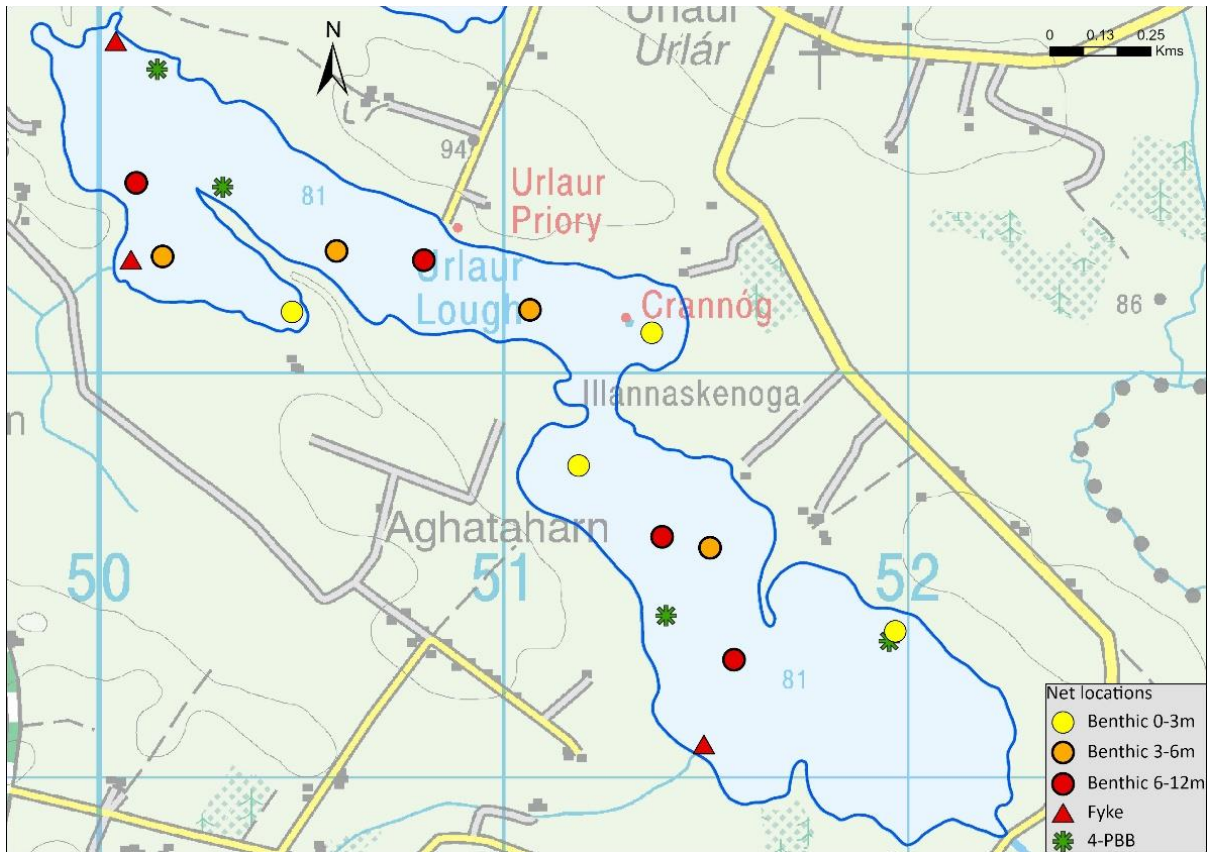


Figure 1.1. Location map of Urlaur Lough and depths of each net



Plate 1.1. Urlaur Lough near Urlaur Abbey, August 2021

2. Methods

2.1. Netting methods

Urlaur Lough was surveyed over two nights from the 25th to the 27th of August 2021. 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 (4 @ 0-2.9m, 4 @ 3-5.9m and 4 @ 6-11.9m) were deployed randomly in the lake (15 sites). The netting effort was supplemented using four-panel benthic braided survey gill nets (4-PBB) at four 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.

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.

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 fish with prey i in their stomach,

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

Three fish species were recorded in Urlaur Lough in August 2021. A total of 1,023 fish were captured. The number of each species captured by each gear type is shown in Table 3.1. Perch and roach were the most abundant fish species recorded accounting for 64% and 35% respectively of all fish captured. Pike were the only other species captured in 2021. No eels, nine-spined stickleback or roach x bream hybrids were captured in this survey.

Table 3.1. Number of each fish species captured by each gear type during the survey on Urlaur Lough, August 2021

Scientific name	Common name	Number of fish captured			
		BM CEN	4-PBB	Fyke	Total
<i>Perca fluviatilis</i>	Perch	656	0	3	659
<i>Rutilus rutilus</i>	Roach	352	0	10	362
<i>Esox lucius</i>	Pike	2	0	0	2

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. The CPUE and BPUE for each species captured in the 2021 survey is summarised in Table 3.2. In 2021 perch was the dominant species in terms of abundance (CPUE) and roach was the dominant species in terms of biomass (BPUE) (Table 3.2).

Table 3.2. Mean (S.E.) CPUE and BPUE for all fish species captured Urlaur Lough, August 2021

Scientific name	Common name	Mean CPUE (\pm S.E) **	Mean BPUE (\pm S.E) **
<i>Perca fluviatilis</i>	Perch	1.132 (0.399)	6.978 (2.283)
<i>Rutilus rutilus</i>	Roach	0.626 (0.260)	35.901 (11.364)
<i>Esox lucius</i>	Pike	0.004 (0.002)	7.384 (5.891)

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).

For comparison purposes the CPUE and BPUE for each species captured, per survey net type, in all surveys between 2010 and 2021 are illustrated in Figures 3.1, to 3.2, respectively and illustrates fish community change over time. Perch and roach have dominated the fish community in the lake in previous surveys, and populations of both species appear stable; however there is an apparent downward trend in roach and perch biomass (Figure 3.1 and 3.2).

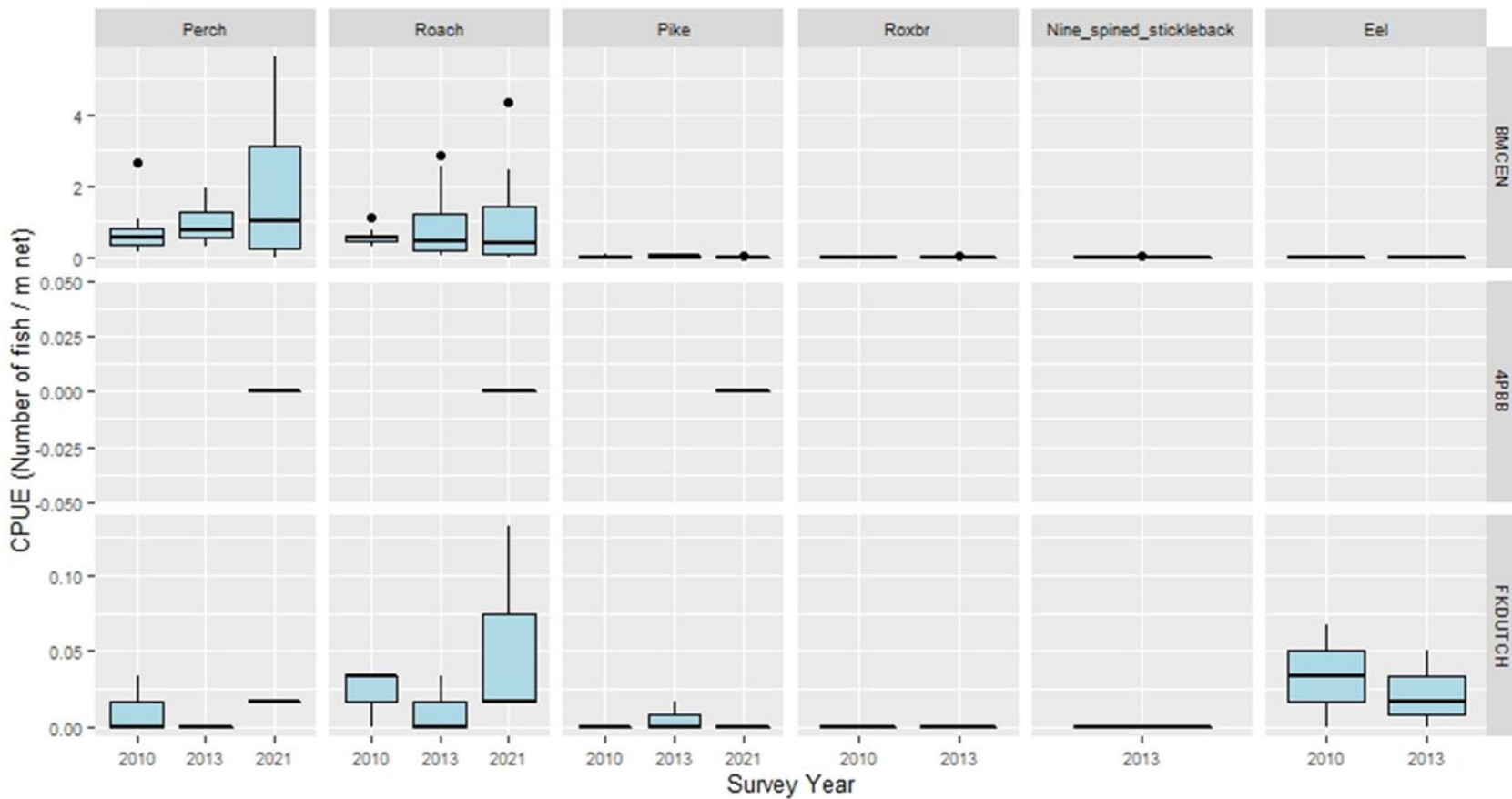


Figure 3.1. CPUE of all fish species captured in each net type during surveys of Urlaur Lough between 2010 and 2021. Figures are expressed as number of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots. The y axis (BPUE) is unique for each net type.

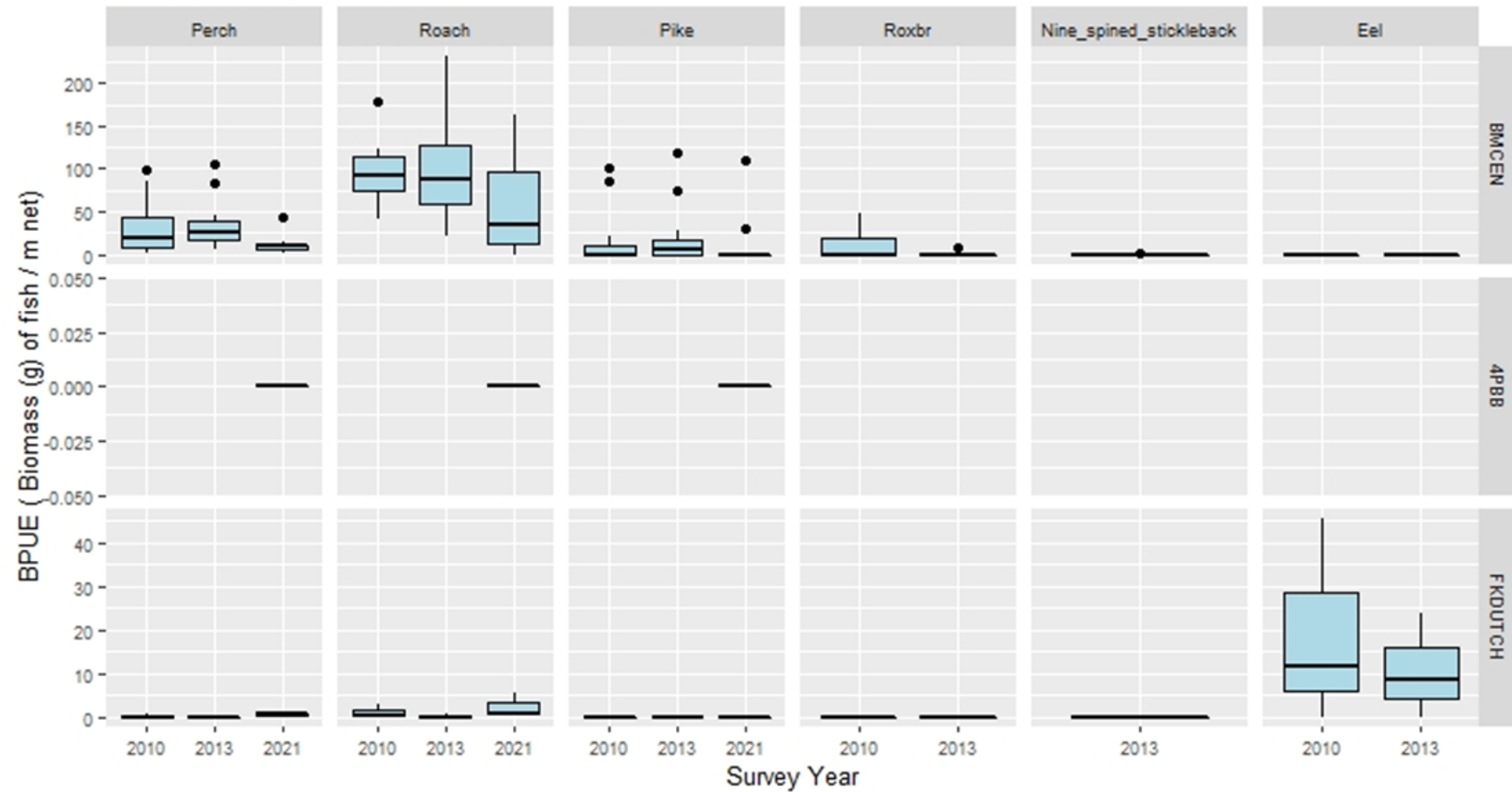


Figure 3.2. BPUE of all fish species captured in each net type during surveys of Urlaur Lough between 2010 and 2021. Figures are expressed as biomass (g) of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots. The y axis (BPUE) is unique for each net type.

3.3. Length frequency distributions and growth

Perch

Perch captured during the 2021 survey ranged in length from 3.2cm to 19.4cm (mean = 6.8cm) (Figure 3.3). Five age classes were present, ranging from 0+ to 4+. Mean L1 (length at 1 year) was 6.8cm (Table 3.3). 0+ juveniles (i.e., fish spawned in 2021) dominated the population. This corresponds with the large modal peak of fish of 5.0cm-7.0cm in length. The largest perch captured in the survey nets was 19.4cm. Fewer larger or older perch were recorded in 2021 compared to previous surveys. (Figure 3.3).

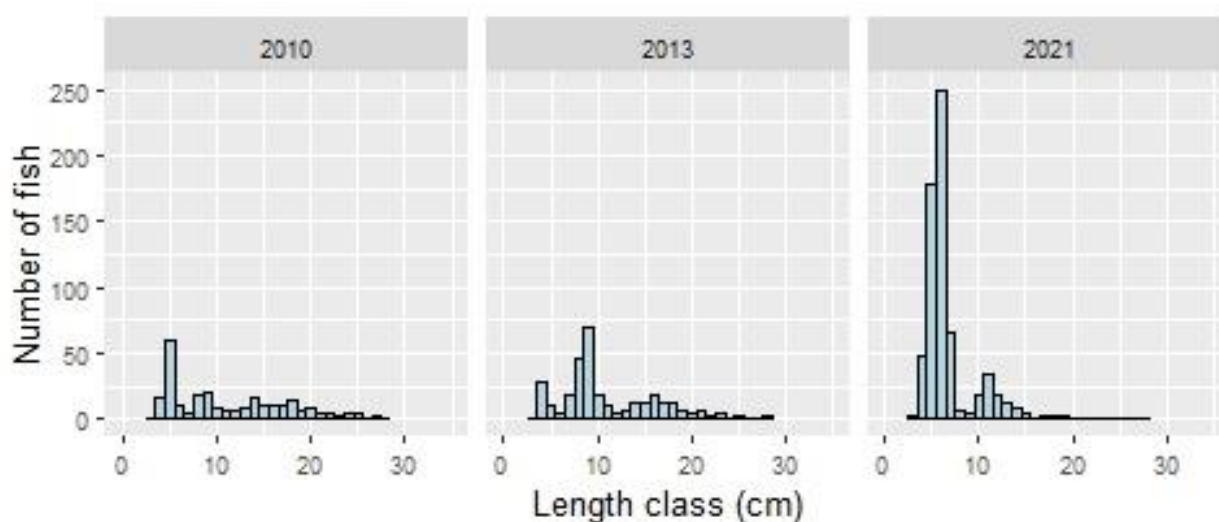


Figure 3.3. Length frequency of perch captured on Urlaur Lough, 2010, 2013 and 2021

Table 3.3. Mean (\pm S.E.) perch length (cm) at age for Urlaur Lough, September 2021

	L ₁	L ₂	L ₃	L ₄
Mean	6.8 (0.2)	11 (0.3)	14.5 (0.8)	-
N	50	26	6	1
Range	4.4-9.4	8.8-13.4	11.4-16.4	18.6

Roach

Roach captured during the 2021 survey ranged in length from 4.6cm to 29.0cm (mean = 12.6cm) (Figure 3.4). Roach were aged between 0+ to 8+ (Table 3.4). All intervening age classes were recorded in the sample aged, indicating regular and strong recruitment to the roach population. Several modal peaks also suggest good survival of individual year classes. However, few older fish (> 7+) were recorded (Figure 3.4).

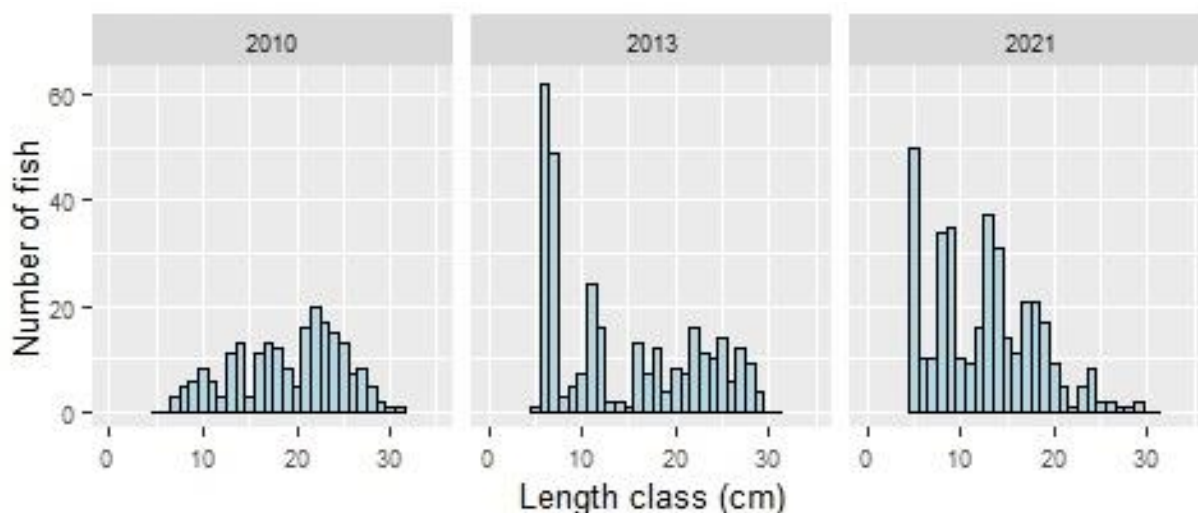


Figure 3.4. Length frequency of roach captured on Urlaur Lough, 2010, 2013 and 2021

Table 3.4. Summary age data from roach captured on Urlaur Lough, September 2021. 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+
N	1	7	20	17	21	16	4	3	1
Mean L (cm)	-	7.9	10.3	13.6	17.4	21.7	24.7	27.5	-
Min L (cm)	4.9	6.6	7.9	11.2	15	19.2	24.2	25.4	27.4
Max L (cm)	4.9	9.8	12.8	15.6	21	23.8	25.7	29	27.4

Other fish

Two pike measuring 50.0cm and 75.5cm were captured during the 2021 survey. The larger pike was aged at 5+.

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 and pike captured during the survey were examined and are presented below.

Perch

A total of 39 stomachs were examined. Of these 15 (38%) were found to contain no prey items. Of the remaining 24 stomachs, 16 (67%) contained invertebrates. Zooplankton was the sole prey item in three (13%) of the stomachs examined and was found together with invertebrates in two (8%) stomachs. Fish and invertebrates were found in the stomach of one perch (8%) while unidentified digested material was recorded in two fish (Figure 3.5).

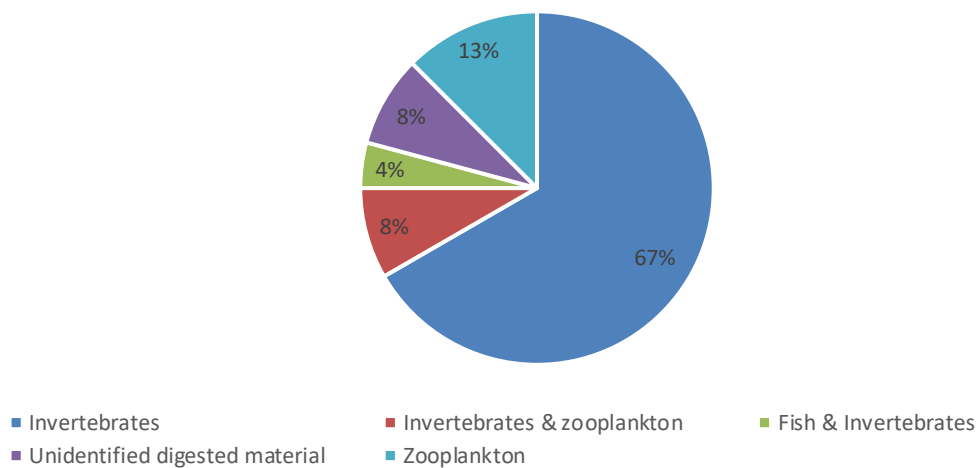


Figure 3.5. Diet of perch (n = 24) captured on Urlaur Lough, August 2021

Pike

One pike stomach was available for analysis. This fish, which measured 75.5cm had been feeding on roach.

4. Summary and ecological status

Three species were recorded in the survey, namely, perch, roach and pike. Perch and roach represented 64% and 35 % of fish caught.

Perch was the dominant species in terms of abundance (CPUE) and roach was the dominant species in terms of biomass (BPUE) during the 2021 survey.

Stocks of both species have remained relatively stable over time, with regular and strong recruitment evident in both. Both the perch and roach populations are currently dominated by younger and smaller individuals.

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, Urlaur Lough has been assigned an ecological status of Moderate for 2021 based on the fish populations present. In previous years the lake was assigned Bad fish ecological status (Figure 4.1).

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

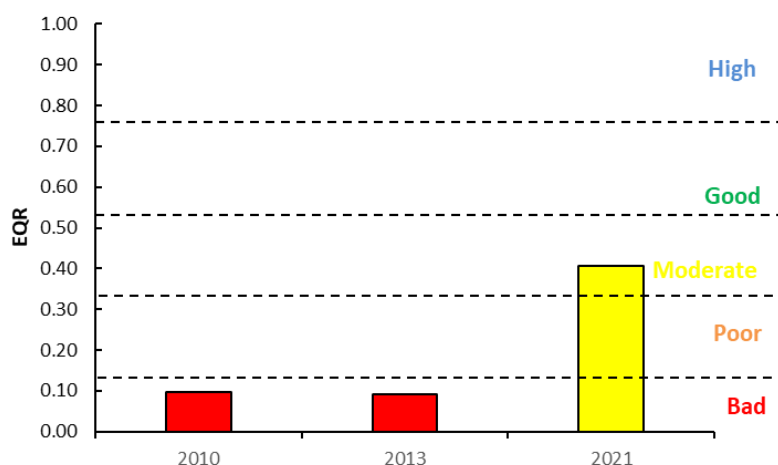


Figure 4.1. Fish ecological status, Urlaur Lough, 2010 to 2021.

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