National Research Survey Programme

Lakes 2023

Lough Talt

IFI/2024/1-4733

Iascach Intíre Éireann
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Fish Stock Survey of Lough Talt, July 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 Talt is situated in Co. Mayo in the Ox Mountains, between Tobercurry and Ballina in the Moy catchment (Plate 1.1 and Figure 1.1). The lake has a surface area of 97ha and a maximum depth of approximately 40m. The lake is categorised as typology class 8 (as designated by the EPA for the Water Framework Directive), i.e. deep (mean depth >4m), greater than 50ha and moderate alkalinity (20-100mg/l $CaCO_3$).

Lough Talt forms part of the Lough Hoe Bog Special Area of Conservation (NPWS, 2013). The shores of the lake are home to the rare semi aquatic snail *Vertigo geyeri*. This endangered species is found at very few sites around Ireland and is listed on Annex II of the EU Habitats Directive. This lake is also home to a population of white-clawed crayfish (*Austropotamobius pallipes*), a species also listed on Annex II of the EU Habitats Directive (NPWS, 2013). Lough Talt is recognised historically as a good brown trout fishery and also holds a population of Arctic char, a rare and threatened species listed in the Irish Red Data Book for fish as vulnerable (NPWS, 2013; O' Reilly, 1998; King *et al*., 2011).

Inland Fisheries Ireland (previously the North-Western Regional Fisheries Board) undertook a fish stock survey of Lough Talt during 1986. Relatively good numbers of small trout (up to 540g in weight; average 226g), small numbers of perch (up to 880g in weight; average weight 510g) and two Arctic char (average weight 255g) were recorded (IFI, unpublished data). A fish stock survey carried out in November 2003, by the Irish Char Conservation Group (ICCG), found Arctic char still to be present in the lake (Western People Press release, 2004). However, substantial algal growths were noted on the gravels used by Arctic char for spawning and therefore the lake was resurveyed in 2004. In 2004 high levels of algae were again noted and a substantial number of dead Arctic char eggs were found where they had spawned. Despite this algal growth, Arctic char did spawn and a number of age classes were present in the lake (Western People Press release, 2004). Lough Talt contains the sole remaining population of Arctic char in the Moy catchment.

Lough Talt has been surveyed on five occasions since 2008 (2008, 2011, 2014, 2017 and 2020) as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al*., 2009, 2012a, 2015; Connor *et al*., 2018; Corcoran *et al.,* 2021*).* In the most recent survey, brown trout was found to be the dominant species present in the lake. Arctic char, perch, three-spined stickleback and a European eel were also captured.

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. Lough Talt, July 2023, looking east along the lake.

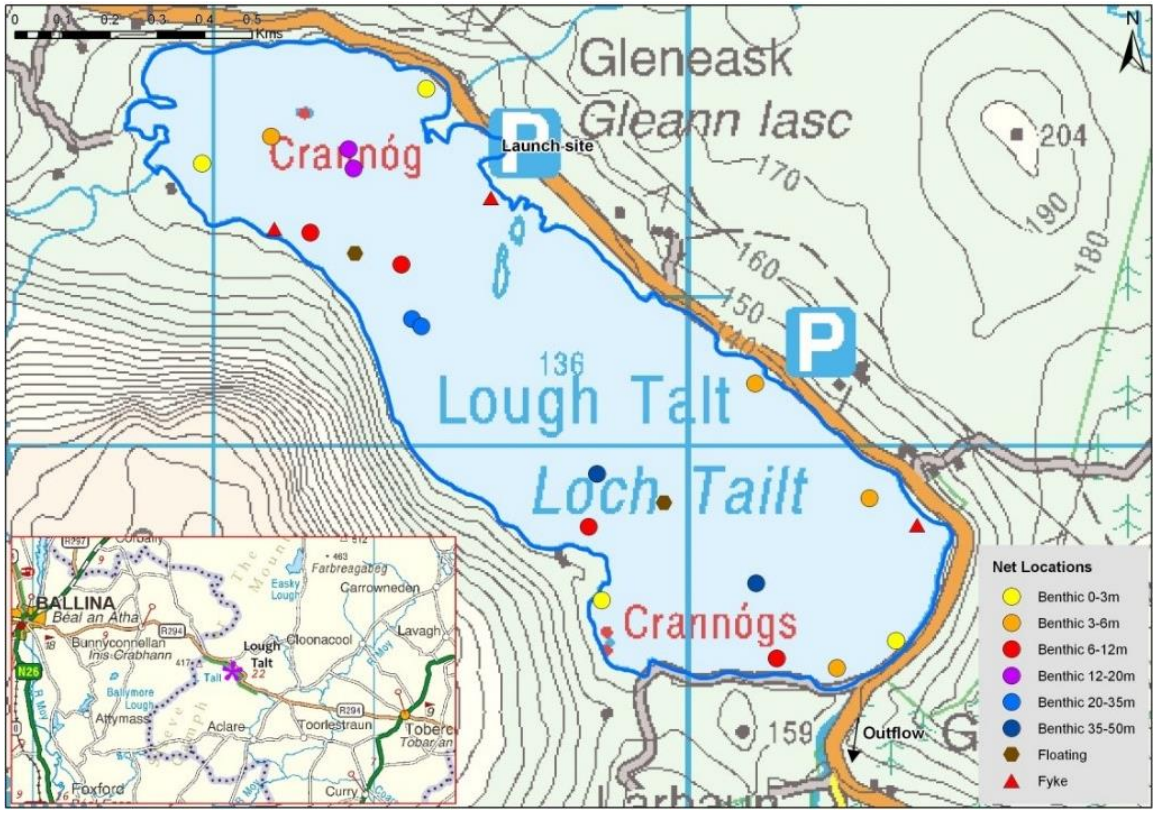

Figure 1.1. Location map of Lough Talt showing net locations and depths of each net (outflow is indicated on map).

2. Methods

2.1. Netting methods

Lough Talt was surveyed over two nights from the 24th to the 26th of July 2023. A total of three sets of Dutch fyke nets, 18 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, 4 @ 6-11.9m, 2 @ 12-19.9, 2 @ 20-34.9m and 2 @ 35-49.9m) and two floating monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (FM CEN) were deployed in the lake (23 sites). 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

Five fish species were recorded in Lough Talt in July 2023. A total of 233 fish were captured (Table 3.1). Brown trout was the most numerous fish species recorded. Arctic char, perch, three-spined stickleback and European eel were also captured. The same species composition was recorded during all surveys of the lake conducted between 2008 and 2020 (Kelly *et al*., 2009, 2012a, 2015; Connor *et al.,* 2018 and Corcoran *et al.*, 2021)

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

Scientific name	Common name	Number of fish captured			
		BM CEN	FMCEN	Fyke	Total
Salmo trutta	Brown trout	89	20	0	109
Gasterosteus aculeatus	Three-spined stickleback	30	0	58	88
Perca fluviatilis	Perch	27	0	2	29
Salvelinus alpinus	Arctic char	5	0	0	5
Anguilla anguilla	European eel	0	0	2	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. Brown trout was the dominant species with respect to both abundance (CPUE) and biomass (BPUE) (Table 3.2).

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

Scientific name	Common name	Mean CPUE (± S.E)	Mean BPUE (± S.E)
Salmo trutta	Brown trout	0.158 (0.031)	21.611 (4.172)
Gasterosteus aculeatus	Three-spined stickleback	0.086 (0.035)	0.058 (0.029)
Perca fluviatilis	Perch	0.041 (0.014)	9.841 (4.691)
Salvelinus alpinus	Arctic char	0.007 (0.007)	0.627 (0.672)
*Anguilla anguilla**	European eel	0.011 (0.006)	2.117 (1.078)

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.

3.3 Species Profiles

Brown trout

Brown trout captured during the 2023 survey ranged in length from 14.2cm to 31.5cm (mean 22.3cm). Brown trout captured in previous surveys had similar length ranges (Figure 3.1). Brown trout were aged between 1+ and 4+ and all intervening age classes were present in the sample aged. No one age class dominated the population, and *c*. 90% of the sample were aged between 1+ and 3+. Mean L1 (i.e. length at the end of the 1st year) was 7.0cm (Table 3.3).

Brown trout abundance (CPUE) and biomass (BPUE) have remained relatively stable across all surveys of the lake (Figure 3.2).

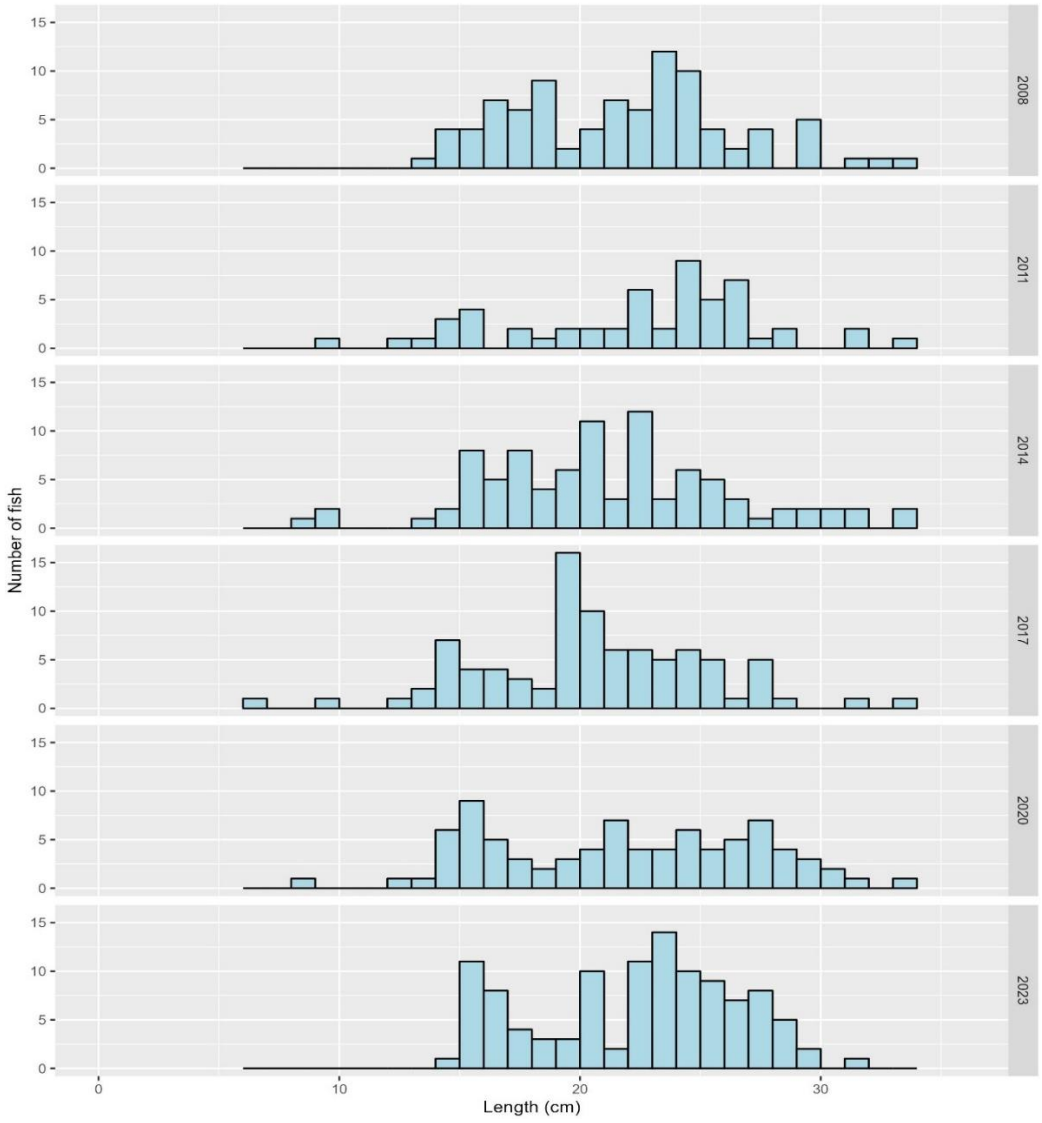

Figure 3.1. Length frequency of brown trout captured on Lough Talt between 2008 and 2023.

Table 3.3. Mean (±S.E.) brown trout length (cm) at age for Lough Talt, July 2023

Length (cm)	L_1	L_2	L_3	L_4
Mean (±S.E.)	7.0 (0.09)	14.7 (0.11)	21.4 (0.25)	24.9 (0.43)
N	58	45	24	6
Range	5.5-8.7	12.7-16.8	18.9-24.3	23.3-26.2

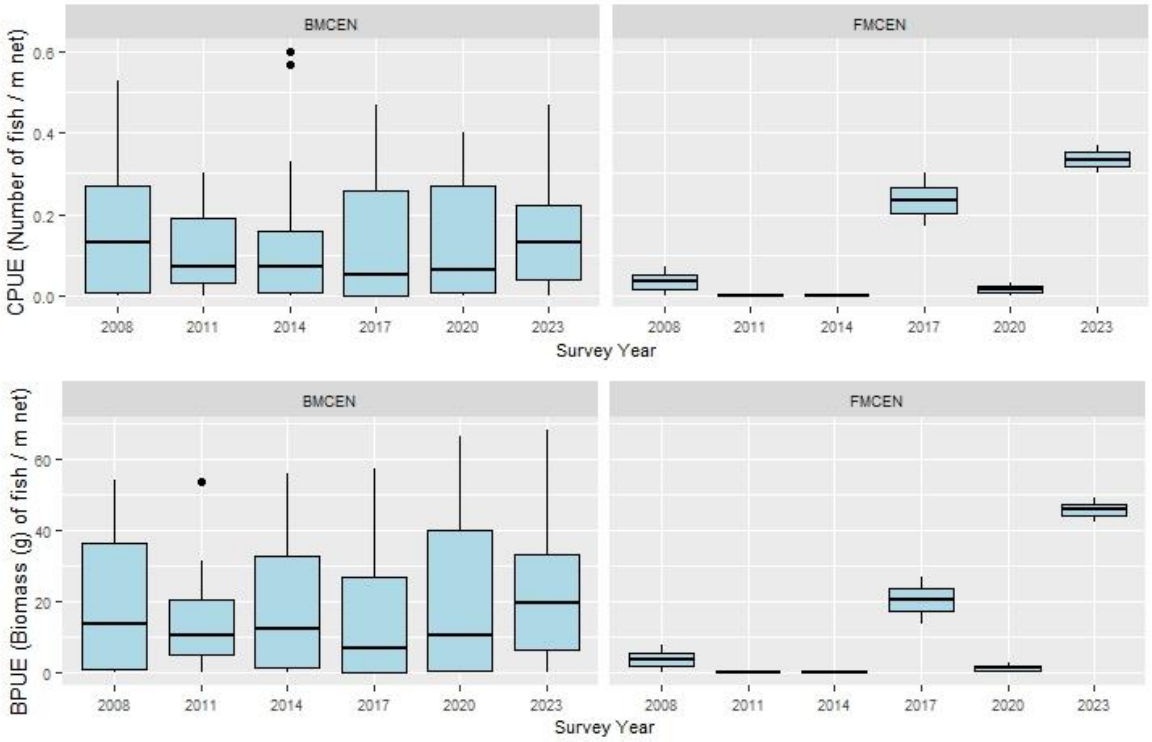

Figure 3.2. CPUE and BPUE of brown trout captured during surveys of Lough Talt between 2008 and 2023. Figures are expressed as numbers of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots.

Perch

Perch captured during the 2023 survey ranged in length from 5.2cm to 39.7cm (mean 21.0cm) (Figure 3.3). Perch in the sample were aged between 1+ and 11+. The most abundant age class was 1+. All age groups between 1+ and 5+ were present but in relatively small numbers (13cm – 31cm) (Figure 3.3). Small numbers of older and larger fish were also recorded. Mean L1 (i.e. length at the end of the 1st year) was 6.6cm (Table 3.4).

Perch populations (CPUE and BPUE) have remained relatively stable across all surveys of the lake although the median CPUE was higher in 2023 than previous surveys (Figure 3.4).

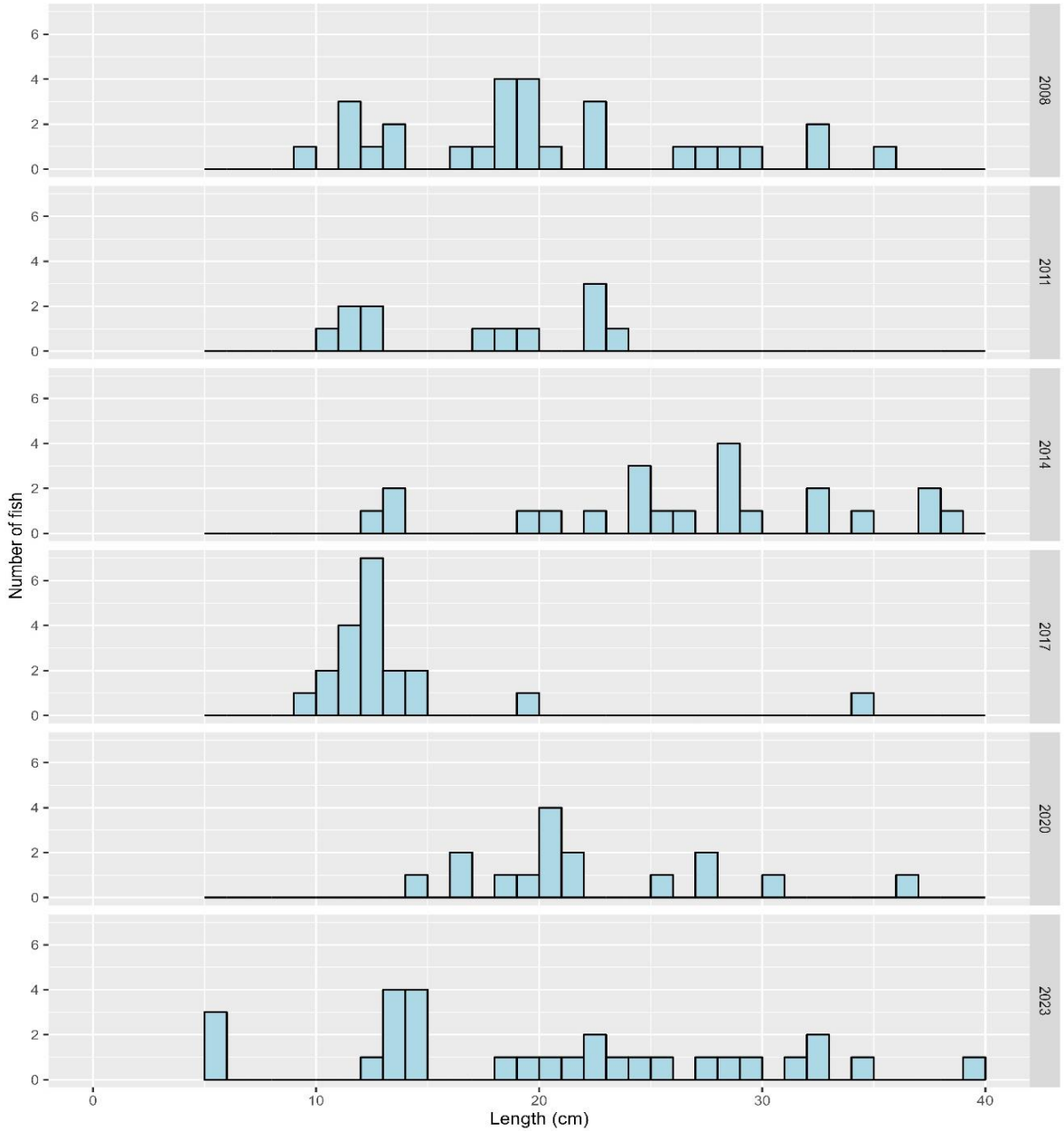

Figure 3.3. Length frequency of perch captured on Lough Talt between 2008 and 2023.

Table 3.4. Mean (±S.E.) perch length (cm) at age for Lough Talt, July 2023

	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8	L_9	L_{10}	L_{11}
Mean (±S.E.)	6.6 (0.21)	14.2 (0.43)	20.3 (0.79)	24.2 (0.76)	27.3 (0.60)	29.4 (0.23)	31.6 (0.17)	33.2 (0.57)	-	-	-
N	22	15	10	6	5	3	3	3	1	1	1
Range	5.2-8.8	11.0-16.8	14.5-23.2	21.2-26.2	25.9-29.6	29.0-29.8	31.3-31.9	32.1-34.0	35.4	37.7	38.8

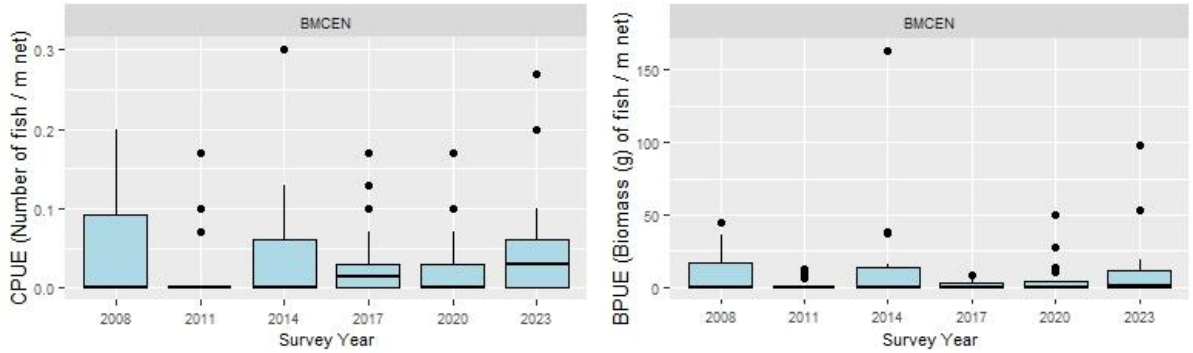

Figure 3.4. CPUE and BPUE of perch captured during surveys of Lough Talt between 2008 and 2023. Figures are expressed as numbers of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots.

Plate 3.1. Deploying survey nets on Lough Talt, July 2023.

Arctic char

Arctic char captured during the 2023 survey ranged in length from 13.7cm to 23.7cm (mean 18.9cm) (Figure 3.5). Otoliths from two Arctic char were available for age analysis. These were a 14.8cm fish aged 1+ and a 22.9cm fish aged 3+.

No obvious trend in Arctic char CPUE and BPUE was apparent (Figure 3.6). While generally captured in small numbers, fewer Arctic char were captured in 2023 compared to other surveys of the lake. Furthermore, no small fish (<=10cm) which were recorded in earlier survey were captured in 2023 (Figure 3.5).

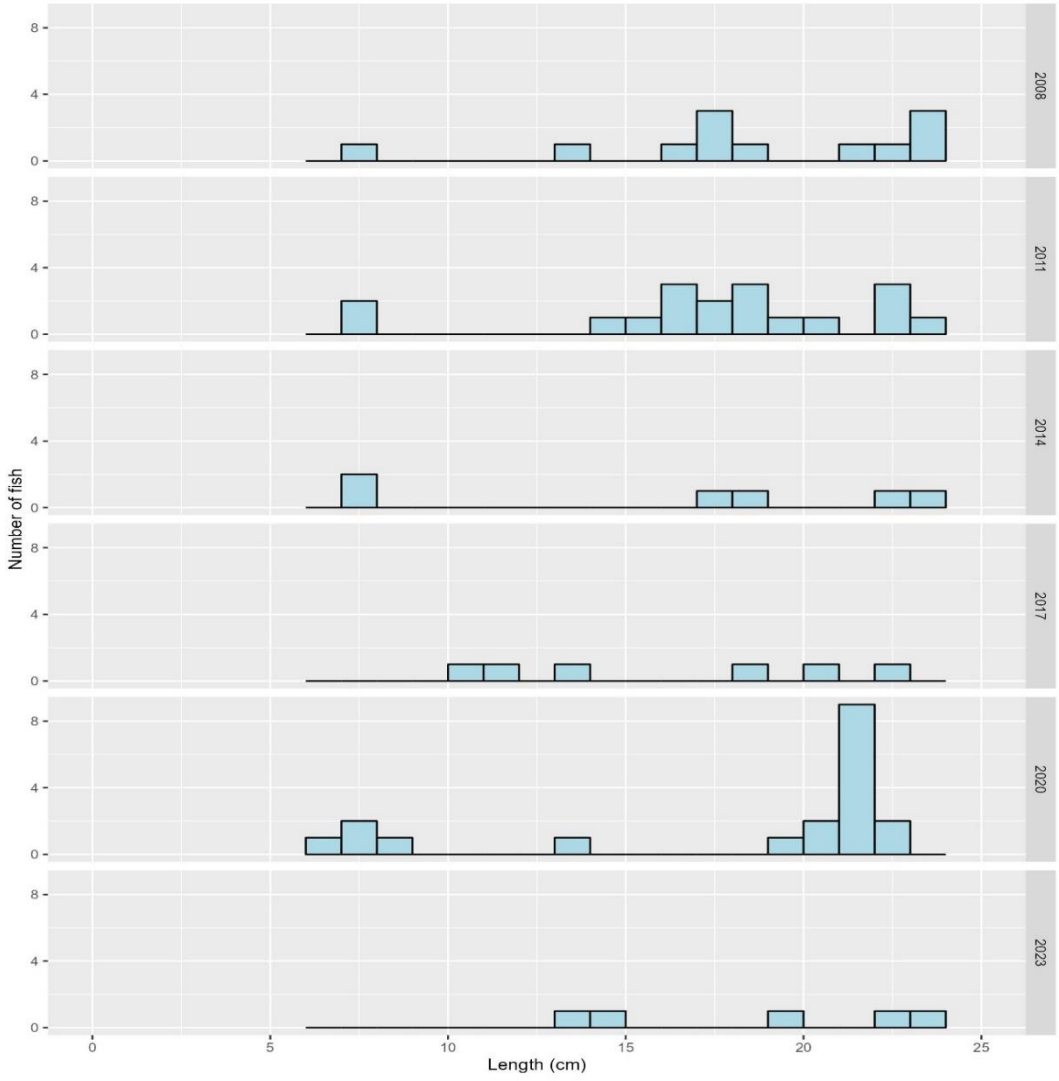

Figure 3.5. Length frequency of Arctic char captured on Lough Talt between 2008 and 2023

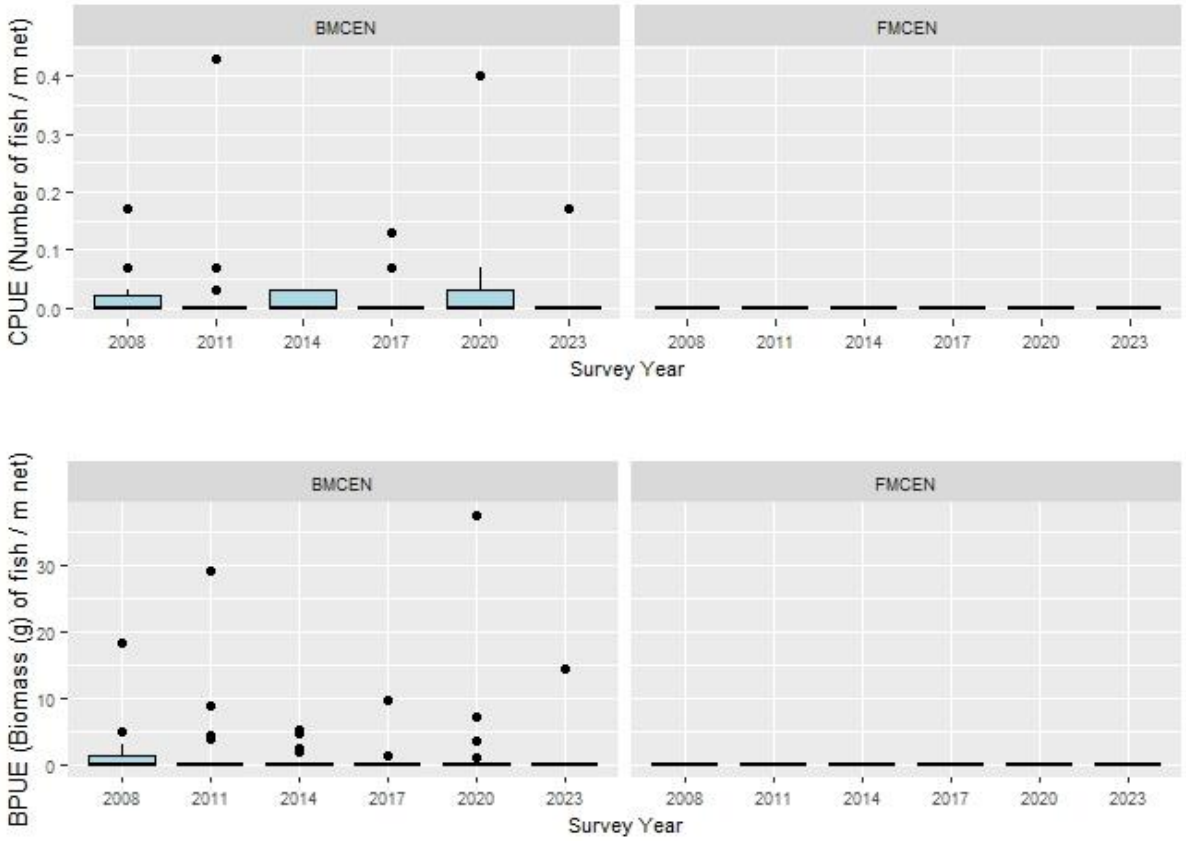

Figure 3.6. CPUE and BPUE of Arctic char captured during surveys of Lough Talt between 2008 and 2023. Figures are expressed as numbers of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots.

Other fish species

Two European eels captured during the 2023 survey measured 47.9cm and 48.1cm (Figure 3.7). European eel abundance (CPUE) and biomass (BPUE) were generally low and have fluctuated across all sampling occasions (Figure 3.8).

Three-spined sticklebacks caught during the 2023 survey ranged in length from 1.0cm to 7.5cm (mean = 3.6cm).

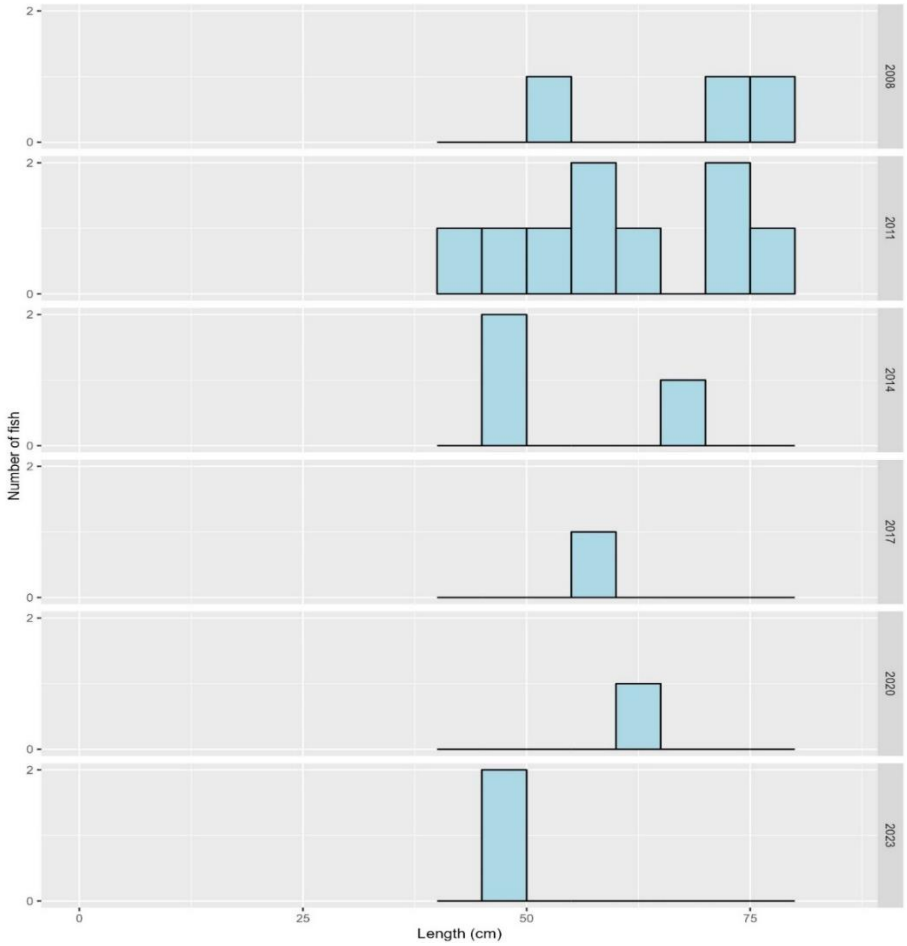

Figure 3.7. Length frequency of European eel captured on Lough Talt between 2008 and 2023

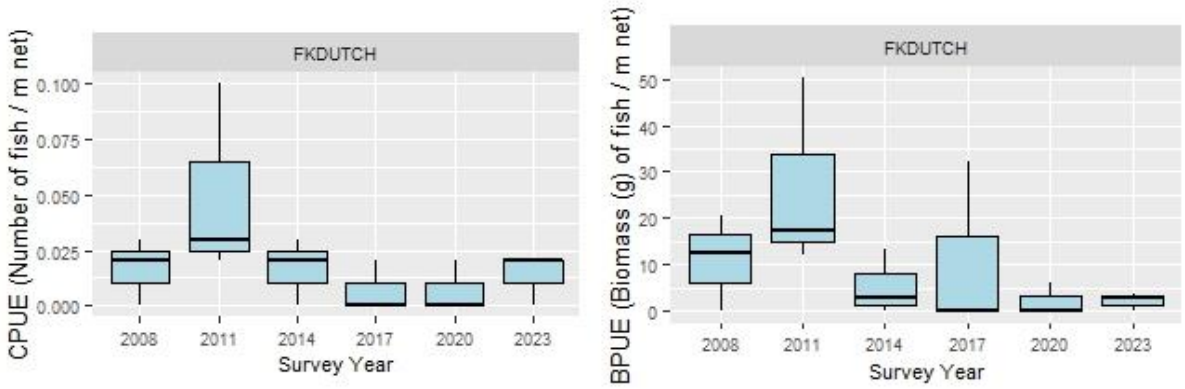

Figure 3.8. CPUE and BPUE of European eel captured during surveys of Lough Talt between 2008 and 2023. Figures are expressed as numbers of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the 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 brown trout, Arctic char and perch captured during the survey were examined and are presented below.

Brown trout

A total of 67 brown trout stomachs were examined. Fourteen (20.9%) were empty. Fifty three stomachs contained food. Invertebrates were the sole prey type recorded in 50 (94%) stomachs and were found together with fish remains in the other three (6%) stomachs that contained food (Figure 3.9).

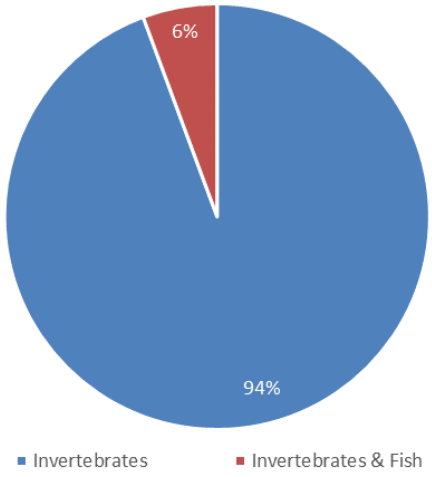

Figure 3.9. Diet of brown trout (N = 67) captured on Lough Talt, 2023 (% FO).

Arctic char

One Arctic char stomach was examined. It contained invertebrates.

Perch

A total of 20 perch stomachs were examined. Of these, nine (45%) were empty and 11 contained food. The food in five (45.5%) of the stomachs consisted solely of invertebrates. Three (27%) stomachs contained fish only, while both invertebrate and fish were recorded in two (18%) stomachs. Unidentified digested material was noted in one (9%) perch stomach (Figure 3.10).

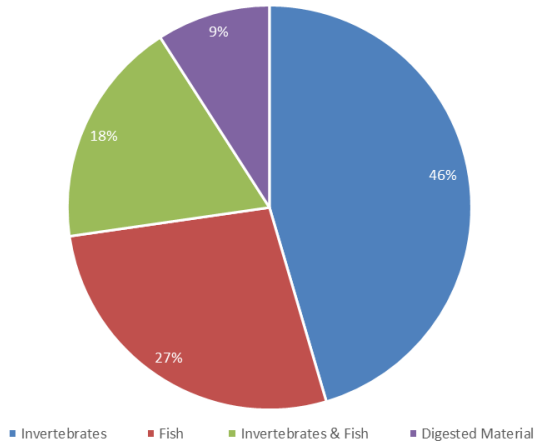

Figure 3.10. Diet of perch (N = 11) captured on Lough Talt, 2023 (% FO).

Plate 3.2. Brown trout from Lough Talt, captured angling, August 2023

4. Summary and fish ecological status

A total of five fish species were recorded in Lough Talt in July 2023. Brown trout was the dominant species in terms of abundance (CPUE) and biomass (BPUE) captured in the survey gill nets during the 2023 survey. Recruitment of brown trout is regular and the population, in common with previous surveys was dominated by younger and smaller individuals and with little evidence of persistence of larger or older individuals.

Perch have been recorded in all surveys of the lake since 2008. Population size appears to be relatively small compared to other lakes where perch have been recorded (Corcoran *et al*., 2024). In Lough Talt, the perch are relatively long lived, and the population is characterised by small numbers of fish from a broad range of length and age groups.

Arctic char is a rare species nationally and is endemic to the lake. CPUE and BPUE has fluctuated between sampling occasions. No clear population trend is apparent, and they continue to be recorded in relatively small numbers and with no obviously strong recruitment evident in 2023. In Ireland, Arctic char populations are threatened by the combined impact of several pressures including climate change and non-native species competition (Connor *et al*., 2019).

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*., 2012b).

Using the FIL2 classification tool, Lough Talt has been assigned an ecological status of High for 2023 based on the fish populations present. Lough Talt has been assigned a status of High following all other surveys of the lakes since 2008, with the exception of 2014 (Good) (Figure 4.1).

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

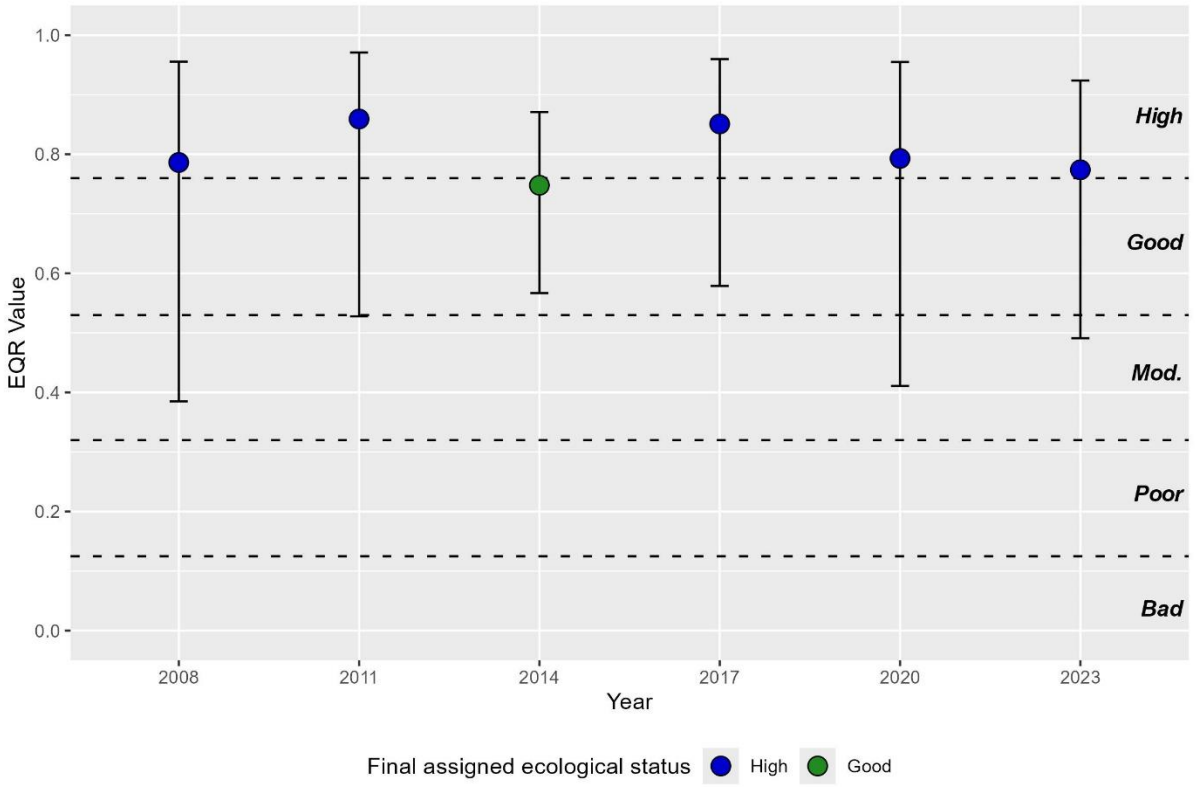

Figure 4.1. Fish ecological status of Lough Talt between 2008 and 2023 (dashed line indicates EQR status boundaries).

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