National Research Survey Programme

Lakes 2024

Lough Caum

IFI/2025/1-4767

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Fish Stock Survey of Lough Caum, September 2024

National Research Survey Programme

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

CITATION: Twomey T., McLoone, P., Corcoran, W., Cierpial, D., Flynn, E., McCarthy, O'Brien, M., McGonagle, K., Piaskowy. J., Robson, S., Szocs, A., Tavano, A., and Kelly, F.L. (2025). Fish Stock Survey of Lough Caum, September 2024. National Research Survey Programme, Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

Cover photo: Lough Caum, Co. Kerry © Inland Fisheries Ireland. Photo by Daniel Cierpial.

ACKNOWLEDGEMENTS

The authors wish to gratefully acknowledge the help and co-operation of all their colleagues in Inland Fisheries Ireland.

The authors would also like to acknowledge the funding provided for the project from the Department of Housing, Local Government and Heritage and Department of Communications, Climate Action and Environment / Department of Climate, Energy and the Environment for 2024.

1. Introduction

Lough Caum is a corrie lake situated in the Brandon Mountains in north County Kerry near Castlegregory (Plate 1.1, Fig. 1.1). The lake is located in the "Mount Brandon" SAC (Special Area of Conservation) which occupies the central and north-western parts of the Dingle peninsula. The geology of the area comprises old red sandstone and Dingle beds (the oldest Devonian rocks in Ireland) (NPWS, 2002).

The lake has a surface area of 8ha, a mean depth of 2.7m and a maximum depth of 15m. Lough Caum is categorised as typology class 1 (as designated by the EPA for the purposes of the Water Framework Directive), i.e. shallow (<4m), less than 50ha and low alkalinity (<20mg/l $CaCO_3$). The lake holds a population of wild brown trout. Rainbow trout were stocked regularly into the lake by Inland Fisheries Ireland (O' Reilly, 2007) in the past; however all stocking has now ceased on the lake. Lough Caum is surrounded by extensive coniferous woodland (Glanteenasig Forest park) and the outflow has been modified in order to facilitate a forestry track for removing felled trees (Plate 1.1). There is also a 2km walking trail via a bog bridge encircling the lake providing access for walkers and anglers.

Peregrine falcons and chough are resident around the lake – both species feature in Annex I of the EU Habitats Directive (Burke and Witkowska, 2009). The otter (*Lutra lutra*), an Annex II species listed on the Habitats Directive, is a common sight along the shores of the lake. The common frog (*Rana temporaria*), also a protected species listed in Annex V of the Habitats Directive (NPWS 2007), is also prevalent in the area.

The lake was surveyed in 2009, 2012 and 2018 using IFI's fish in lakes monitoring protocol (Kelly *et al*., 2010 and 2013, Connor *et al*., 2018). In each of these surveys, brown trout were found to be the most abundant species present in the lake. European eel have also been captured in all previous surveys, while rainbow trout were recorded in 2009 and 2012.

This report summarises the results of the 2024 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 Caum

Plate 1.1. IFI Survey boat on Lough Caum

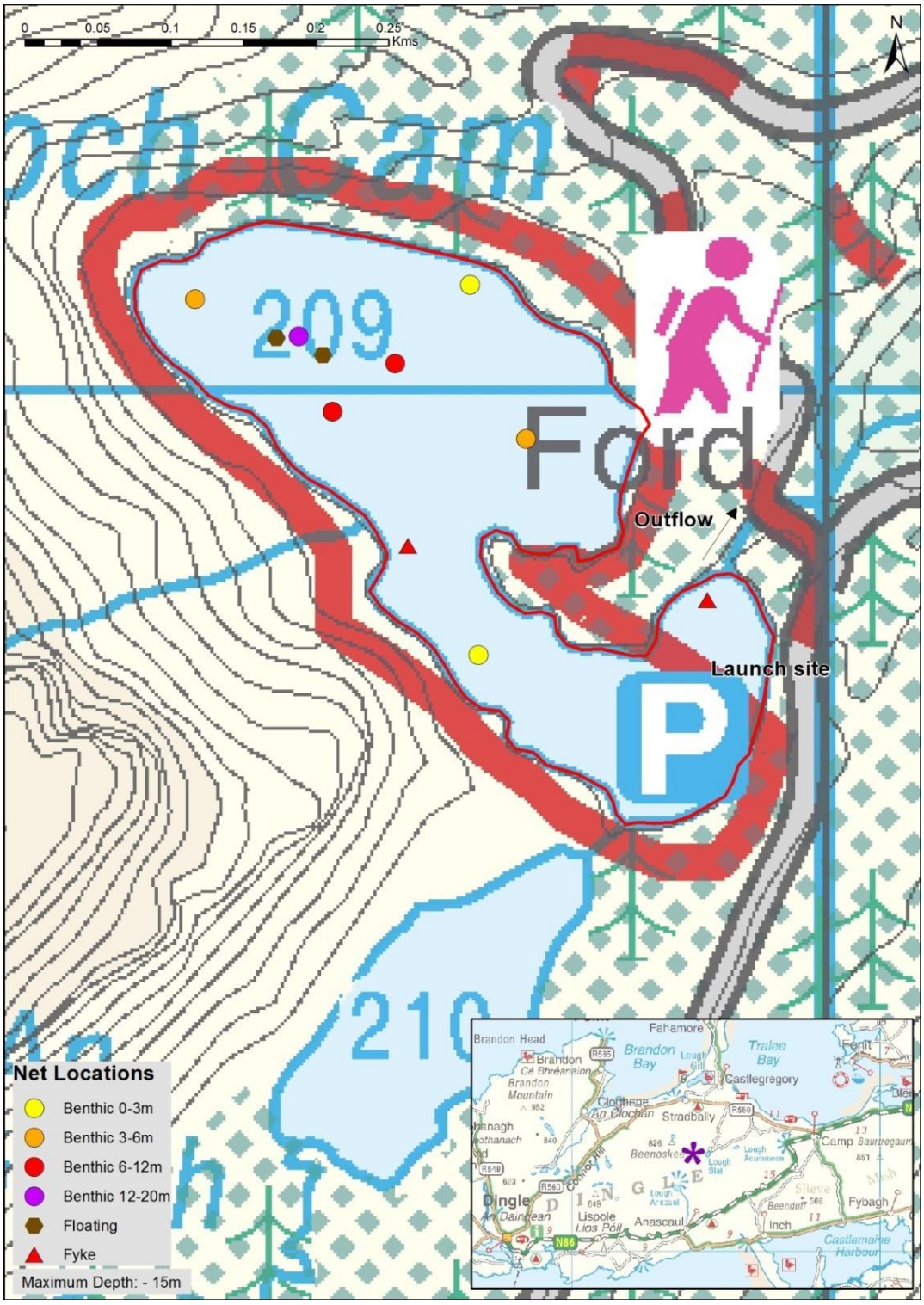

Figure 1.1. Location map of Lough Caum showing locations and depths of each survey net (outflow is indicated on the map)

2. Methods

2.1. Netting methods

Lough Caum was surveyed over one night from the 23rd to the 24th of September 2024. A total of two sets of Dutch fyke nets, seven benthic monofilament multi-mesh (BM CEN) (12 panel, 5-55mm mesh size) CEN standard survey gill nets (2 @ 0-2.9m, 2 @ 3-5.9m, 2 @ 6-11.9m and 1 @ 12-19.9m) and two floating monofilament multi-mesh (FM CEN) (12 panel, 5-55mm mesh size) CEN standard survey gill nets were deployed in the lake (11 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 were measured and weighed on site and scales were removed from a sub-sample of brown trout. 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

Two fish species were recorded in Lough Caum in September 2024. A total of 95 fish were captured (Table 3.1). Brown trout was the dominant species, representing c. 88% of all fish captured during the survey. Brown trout was the sole species recorded in survey gill nets, while European eels were captured in fyke nets only. Both species were recorded in all previous surveys of the lake ((Kelly *et al*., 2010 and 2013, Connor *et al*., 2018)).

Table 3.1. Number of each fish species captured by each gear type during the survey on Lough Caum, September 2024.

Scientific name	Common name	Number of fish captured			
		BM CEN	FMCEN	Fyke	Total
Salmo trutta	Brown trout	62	16	6	84
Anguilla anguilla	European eel	0	0	11	11

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. Bown trout was the dominant species with respect to abundance (CPUE) and biomass (BPUE). European eel, recorded in fyke nets only, had a relatively high biomass (BPUE) (Table 3.2).

Table 3.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Lough Caum, September 2024.

Scientific name	Common name	Mean CPUE (± S.E)	Mean BPUE (± S.E)
Salmo trutta	Brown trout	0.245 (0.074)	12.971 (4.561)
*Anguilla anguilla**	European eel	0.092 (0.042)	24.883 (19.808)

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 2024 survey ranged in length from 11.3cm to 21.8cm (mean = 16.2cm). Brown trout captured in the 2024 and 2021 surveys had a narrower size range than was recorded previously (Figure 3.1). On earlier surveys, individuals ranging from 7.5 to 25.8cm were captured.

Brown trout were aged between 1+ and 3+. Mean L1 (i.e. length at the end of the 1st year) was 6.6cm. (Table 3.3) The most abundant age class was 2+ (15.6 - 21.3cm) (Figure 3.1). This year class accounted for c. 63% of all the brown trout in the sample aged.

The mean brown trout abundance (CPUE) and biomass (BPUE) increased between 2009 and 2018; however some decline was apparent in 2024 for both metrics (Figure 3.2).

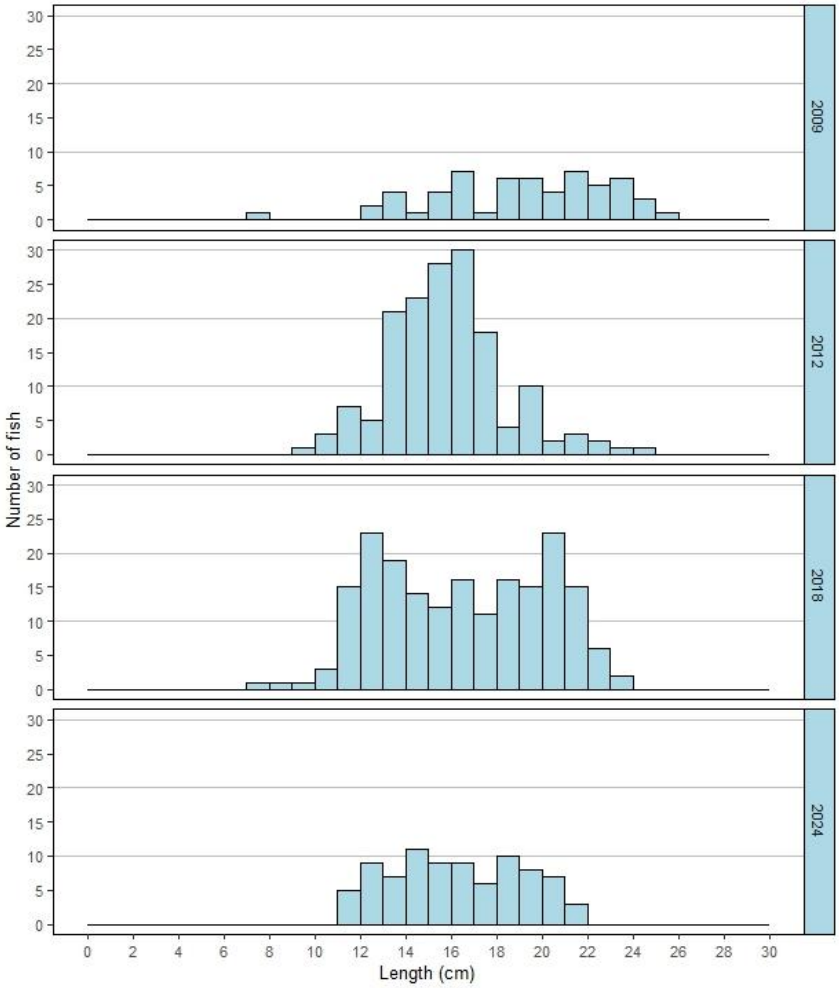

Figure 3.1. Length frequency of brown trout captured on Lough Caum between 2009 and 2024.

Table 3.3. Mean (±S.E.) brown trout length (cm) at age for Lough Caum, September 2024

Length (cm)	L_1	L_2	L_3
Mean (±S.E.)	6.6 (0.06)	14.3 (0.12)	20.7
N	57	36	1
Range	5.9-7.8	13.0-16.2	20.7

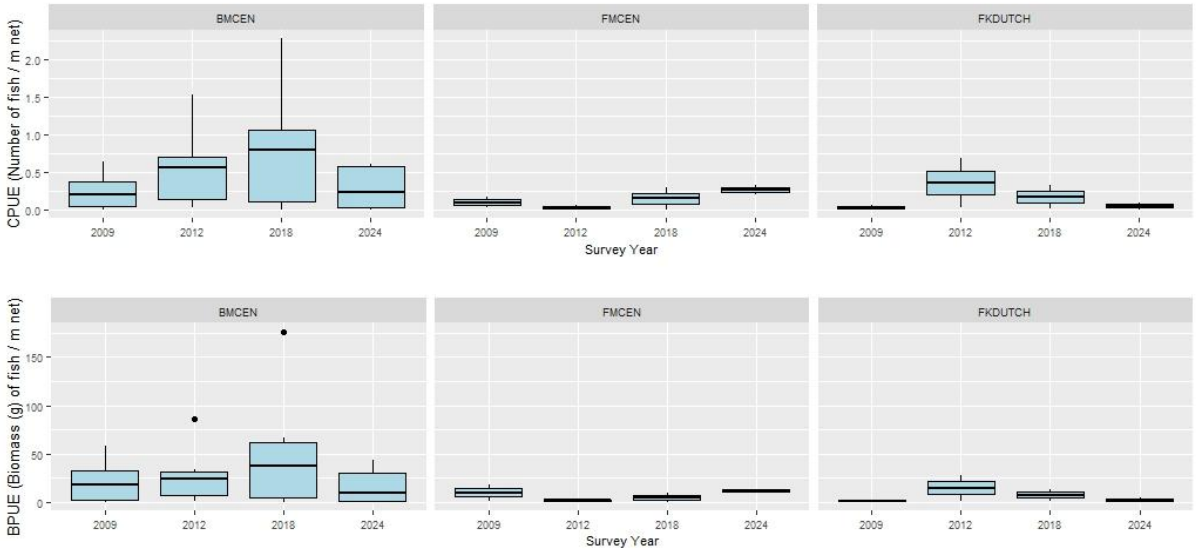

Figure 3.2. CPUE and BPUE of brown trout captured during surveys of Lough Caum between 2009 and 2024. Figures are expressed as numbers of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots.

European eel

European eel captured during the 2024 survey ranged in length from 33cm to 72.8cm (mean = 49.5). European eel captured in the 2024 survey exhibit a wider length range compared to those captured in the earlier surveys (Figure 3.3). The previous largest eel recorded was 66cm in 2009.

A positive trend was observed for abundance (CPUE) and biomass (BPUE) of European eel in 2024 when compared to all previous surveys undertaken (Figure 3.4).

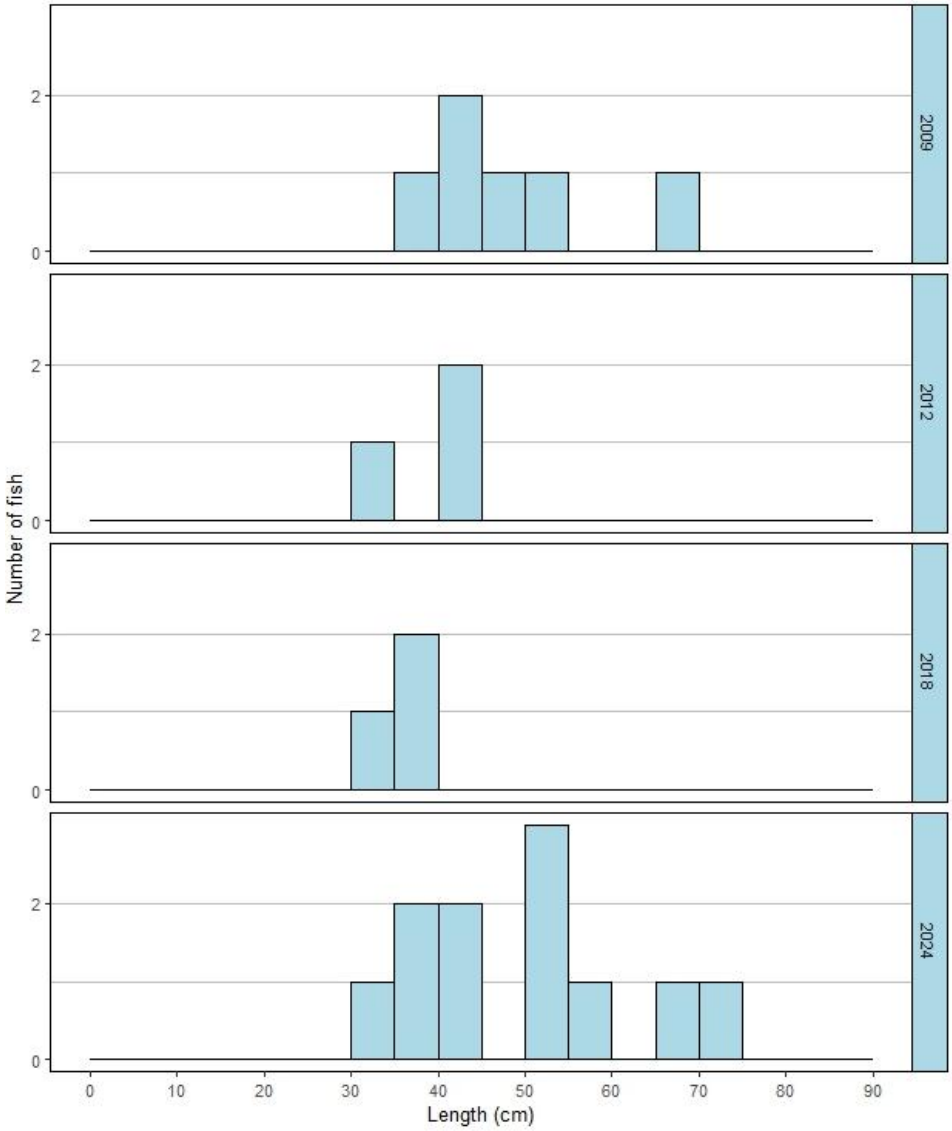

Figure 3.3. Length frequency of eel captured on Lough Caum between 2009 and 2024

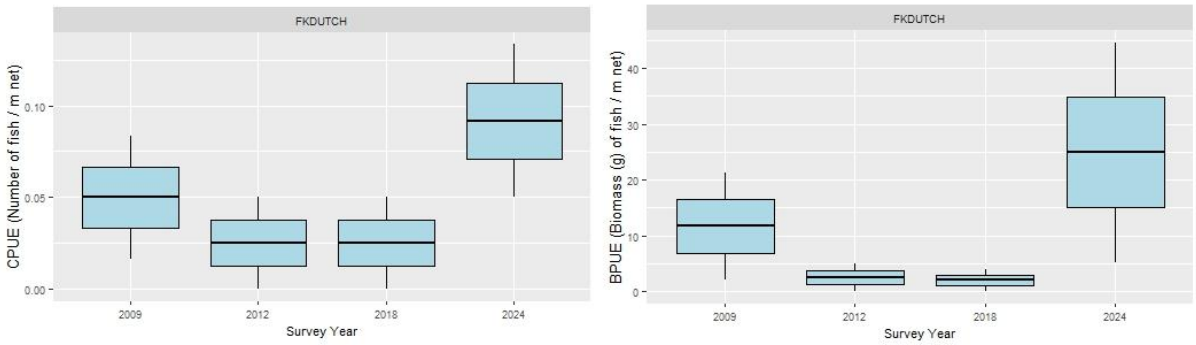

Figure 3.4. CPUE and BPUE of eel captured during surveys of Lough Caum between 2009 and 2024. Figures are expressed as numbers of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and 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 captured during the survey were examined and are presented below.

Brown trout

A total of 47 brown trout stomachs were examined. Of these, nine (19%) were empty. Of the stomachs containing food, invertebrates were the sole prey item found in 13 (34%) stomachs and were present with zooplankton in a further 16 (42%) stomachs. Zooplankton alone was observed in the remaining nine (24%) stomachs. (Figure 3.5).

Plate 3.1. Setting a fyke net on Lough Caum

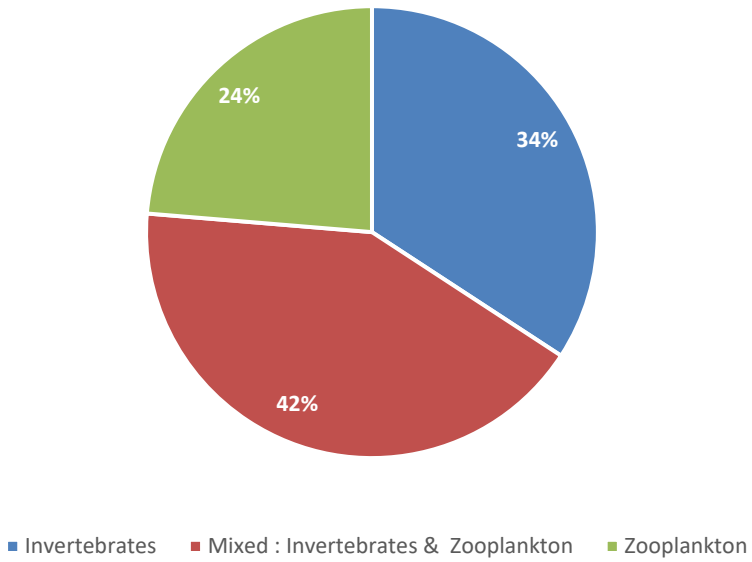

Figure 3.5. Diet of brown trout (N =38) captured on Lough Caum, 2024 (% FO).

4. Summary and fish ecological status

Two fish species were recorded in Lough Caum in September 2024. Brown trout was the dominant species in terms of abundance and biomass captured in survey gill nets. Mean brown trout abundance (CPUE) and biomass (BPUE) increased between 2009 and 2018; however some decline was apparent in 2024 for both metrics. Brown trout were aged between 1+ and 3+ indicating reproductive success in each of the previous three years.

A positive trend was observed for abundance (CPUE) and biomass (BPUE) of European eel in 2024 when compared to all previous surveys undertaken.

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) 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 Lough Caum was assigned an ecological status of high for 2024 based on the fish populations present. In previous years the lake was assigned Good and Moderate fish ecological status (Figure 4.1).

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

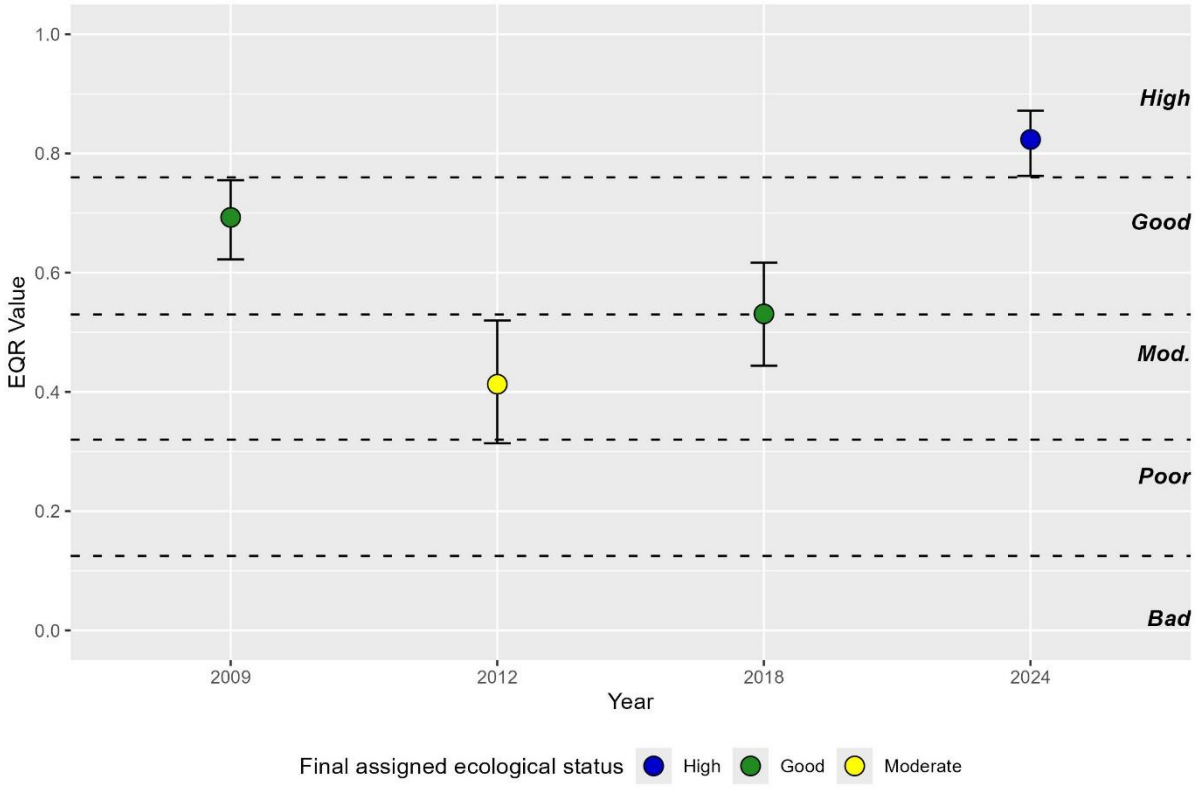

Figure 4.1. Fish ecological status, Lough Caum, between 2009 and 2024 (dashed line indicates EQR status boundaries).

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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