National Research Survey Programme

Lakes 2023

Lough Brin

IFI/2024/1-4715

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Inland Fisheries Ireland

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Fish Stock Survey of Lough Brin, September 2023

National Research Survey Programme

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

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1. Introduction

Lough Brin is located near Moll's Gap in the Macgillycuddy Reeks, Co. Kerry, six kilometres north-west of Kenmare (Plate 1.1, Fig. 1.1). The lake is approximately 600m in length and has a surface area of 24ha. The mean depth of the lake is 5.9m and it has a maximum depth of 13m. The lake is categorised as typology class 3 (as designated by the EPA for the Water Framework Directive (Council Directive 2000/60/EC)), i.e. deep (mean depth >4m), less than 50ha and low alkalinity (<20mg/l $CaCO_3$).

Lough Brin forms part of the Killarney National Park, Macgillycuddy's Reeks and Caragh River catchment Special Area of Conservation. This is a large area that encompasses a wide variety of habitats designated under Annex I of the EU Habitats Directive, including blanket bog, alluvial woodlands, alpine heath and both upland and lowland oligotrophic lakes. The site has also been selected for the following species: Killarney fern, slender naiad, freshwater pearl mussel, Kerry slug, marsh fritillary, Killarney shad, Atlantic salmon, brook lamprey, river lamprey, sea lamprey, lesser horseshoe bat and otter; all species listed in Annex II of the EU Habitats Directive (Council Directive 92/43/EEC) (NPWS, 2013).

The lake was previously surveyed by Inland Fisheries Ireland (formerly the Central Fisheries Board and South Western Regional Fisheries Board) in July 1995 (CFB, unpublished data). During this survey, brown trout and sea trout were recorded. The majority of trout captured were two and three years old with only two 4-year old fish being recorded. Lough Brin receives a run of spring salmon and sea trout. Lough Brin has been surveyed on five occasions between 2008 and 2017 (Kelly *et al*., 2009, 2012a, 2015, Connor *et al.,* 2018).

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.

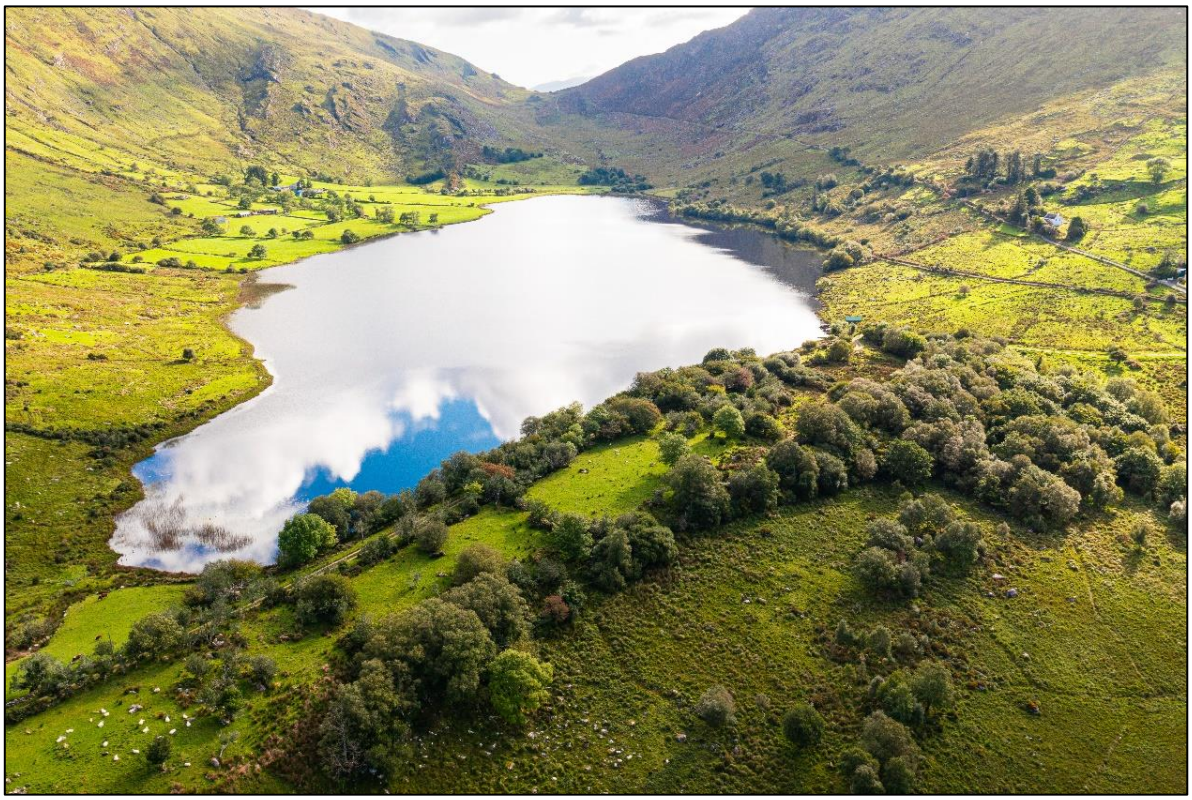

Plate 1.1. Lough Brin (looking West along the lake), September 2023

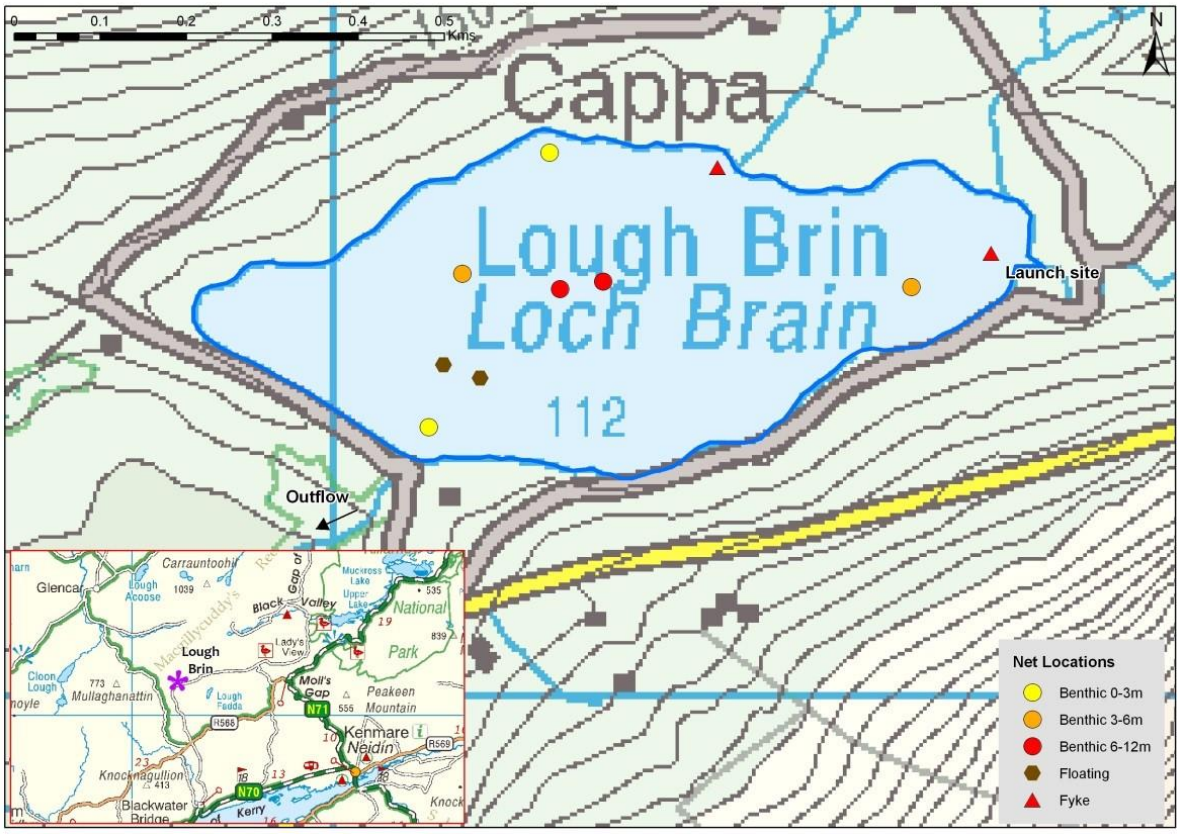

Figure 1.1. Location map of Lough Brin showing net locations and depths of each net (outflow is indicated on map).

2. Methods

2.1. Netting methods

Lough Brin was surveyed over one night from the 11th to the 12th of September 2023. A total of two sets of Dutch fyke nets, 6 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (BM CEN) (2 @ 0-2.9m, 2 @ 3-5.9m and 2 @ 6-11.9m) and two floating monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (FM CEN) were deployed in the lake (10 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 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

Three fish species were recorded in Lough Brin in September 2023. A total of 165 fish were captured (Table 3.1). Brown trout was the most prevalent fish species recorded. Minnow and European eels were also captured. During the previous surveys the same species composition was recorded with the exception of sea trout which were not recorded in either the 2017 or 2023 surveys (Kelly *et al*., 2009, 2012a, 2015, Connor *et al.*, 2018).

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

Scientific name	Common name	Number of fish captured			
		BM CEN	FM CEN	Fyke	Total
Salmo trutta	Brown trout	104	3	2	109
Phoxinus phoxinus	Minnow	46	0	1	47
Anguilla anguilla	European eel	0	0	9	9

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 were 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 Brin, September 2023.

Scientific name	Common name	Mean CPUE (± S.E)	Mean BPUE (± S.E)
Salmo trutta	Brown trout	0.360 (0.116)	38.806 (12.790)
Phoxinus phoxinus	Minnow	0.155 (0.090)	0.363 (0.217)
*Anguilla anguilla**	European eel	0.075 (0.025)	8.170 (0.462)

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 11.0cm to 38.0cm (mean 19.7cm). Brown trout captured in previous surveys had similar length ranges. While the population is dominated by smaller fish (< 25cm) trout greater than 30cm in length were recorded for the first time in the 2023 survey (Figure 3.2). Brown trout were aged between 1+ and 5+ and all intervening age classes were present in the sample aged. However, a large proportion of trout (*c*. 94%) were aged between 1+ and 3+. The most abundant age class was 2+. Mean L1 (i.e. length at the end of the 1st year) was 6.6cm (Table 3.3).

The brown trout population is relatively stable and no discernible increasing or decreasing trend in abundance (CPUE) or biomass (BPUE) is apparent (Figure 3.1).

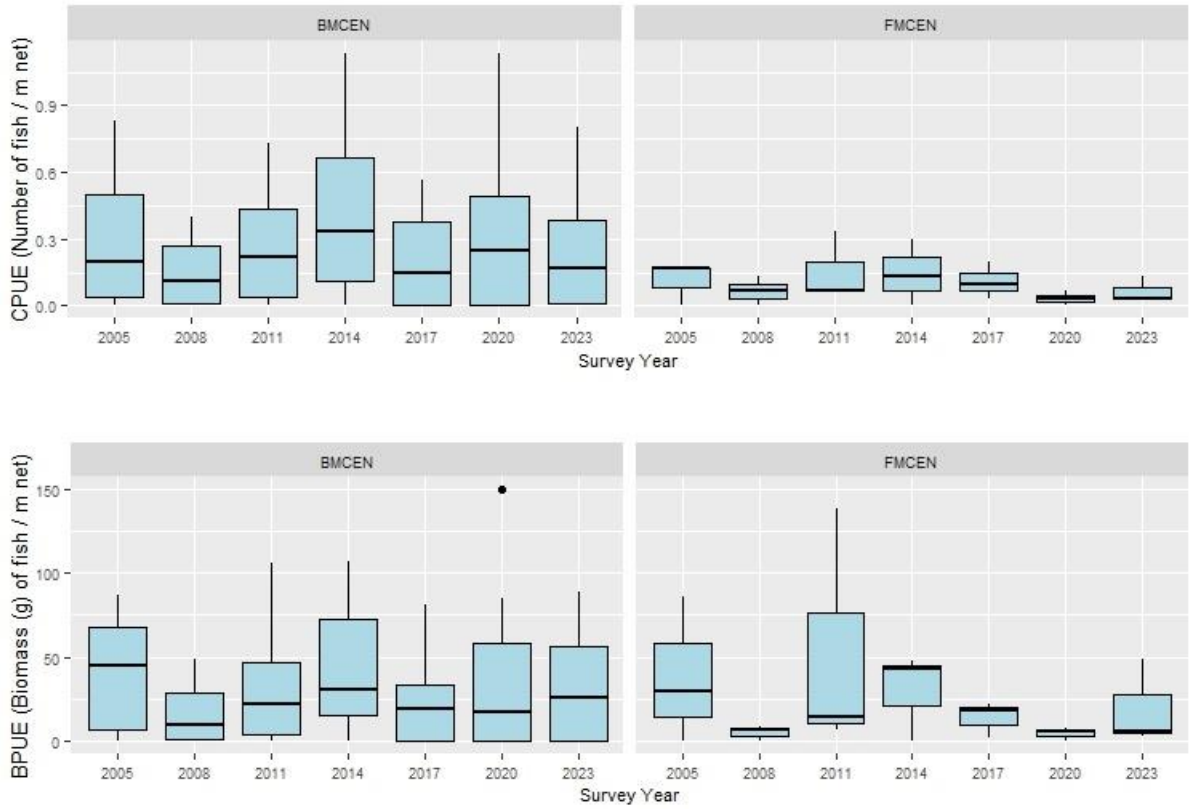

Figure 3.1. CPUE and BPUE of brown trout captured during surveys of Lough Brin between 2008 and 2023. Figures are expressed as numbers of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots.

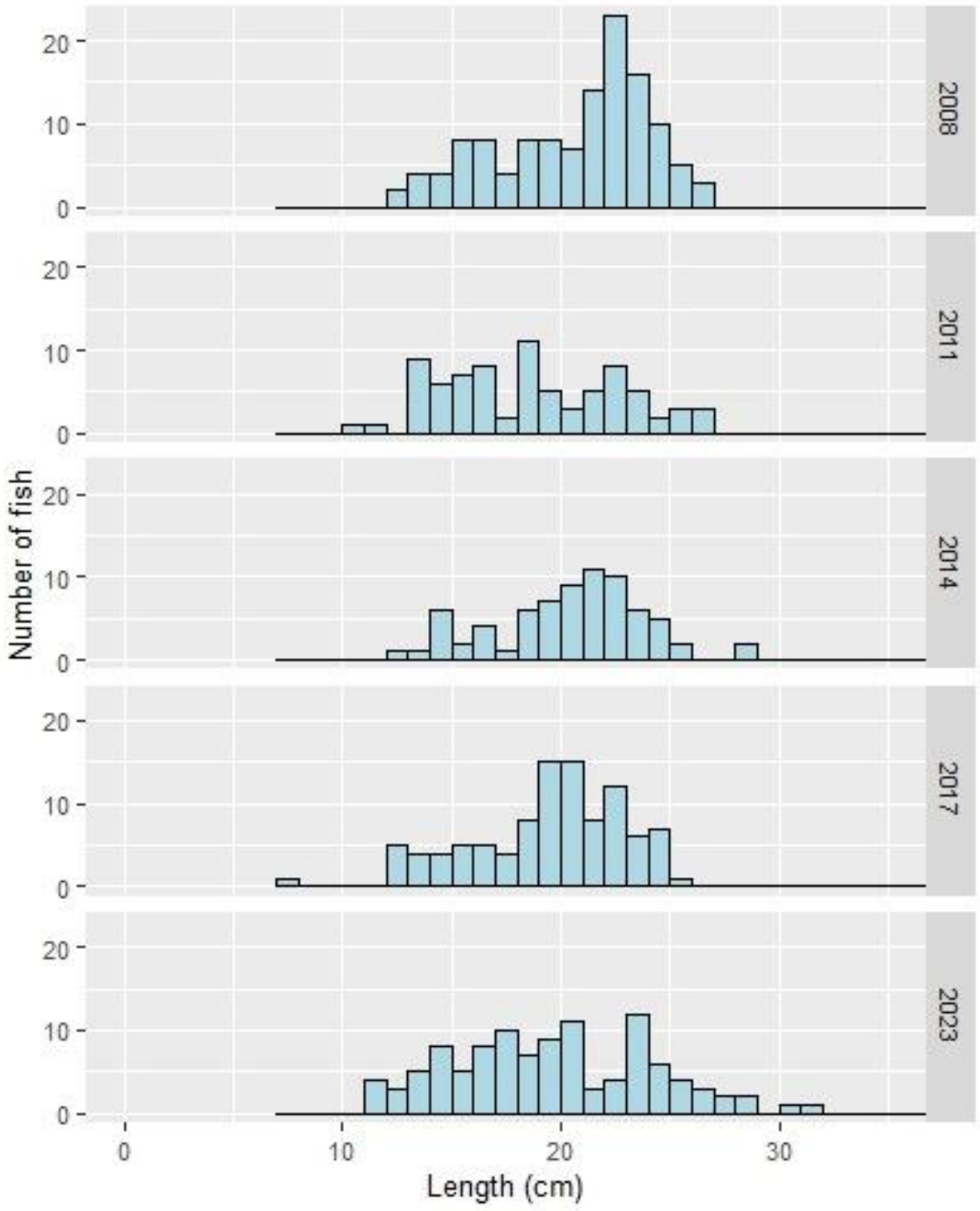

Figure 3.2. Length frequency of brown trout captured on Lough Brin between 2008 and 2023

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

Length (cm)	L_1	L_2	L_3	L_4	L_5
Mean (±S.E.)	6.6 (0.07)	13.3 (0.09)	20.6 (0.17)	24.1 (0.10)	-
N	78	54	26	5	1
Range	5.1-7.8	11.6-14.9	19.1-22.5	23.8-24.4	27.4

European eel

European eel captured during the 2023 survey ranged in length from 30.7cm to 45.0cm (mean = 39.7cm). Abundance (CPUE) and biomass (BPUE) of eel were highest in the initial survey in 2006 (Figure 3.3)

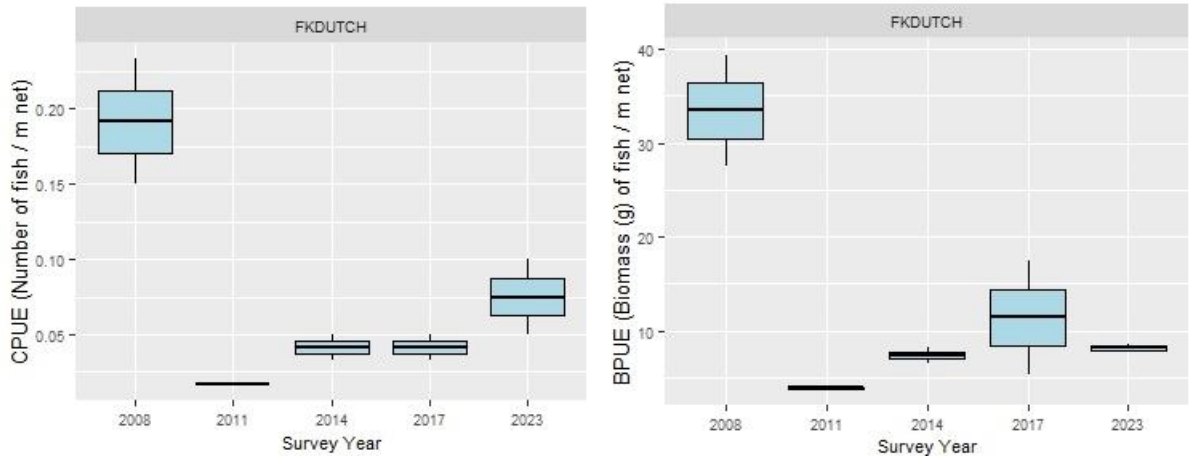

Figure 3.3. CPUE and BPUE of eel captured during surveys of Lough Brin between 2008 and 2023. Figures are expressed as numbers of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots.

Other fish species

Minnow (n = 47) captured in the 2023 survey ranged in length from 4.2cm to 7.2cm (mean = 5.6cm).

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 58 brown trout stomachs were examined. Twenty-seven (47%) were empty. Thirty-one stomachs contained food. Invertebrates were the sole prey type recorded in 22 (71%) stomachs and were found together with zooplankton in two stomachs (6%). Zooplankton was the sole prey type recorded in three (10%) stomachs. One (3%) stomach contained fish. Unidentified digested material was recorded in three (10%) brown trout stomachs (Figure 3.4).

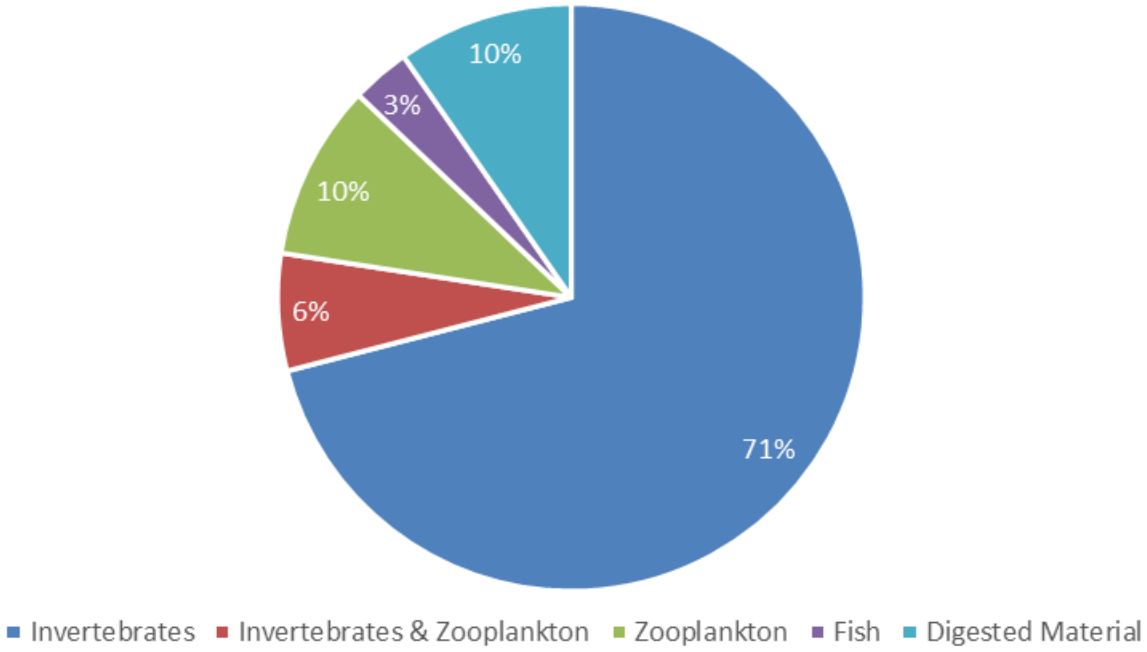

Figure 3.4. Diet of brown trout (N = 31) captured on Lough Brin, 2023 (% FO).

4. Summary and fish ecological status

A total of three fish species were recorded in Lough Brin in September 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 appears to be regular, and the population is stable. In common with previous surveys, the brown trout population was dominated by younger and smaller individuals, with few fish persisting beyond 3 years old. However, in 2023 several larger fish, greater than 30cm in length were recorded for the first time.

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 Brin has been assigned an ecological status of High for 2023 based on the fish populations present. Fish ecological status of Lough Brin has fluctuated from High to Good from 2008 to 2017 (Figure 4.1).

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

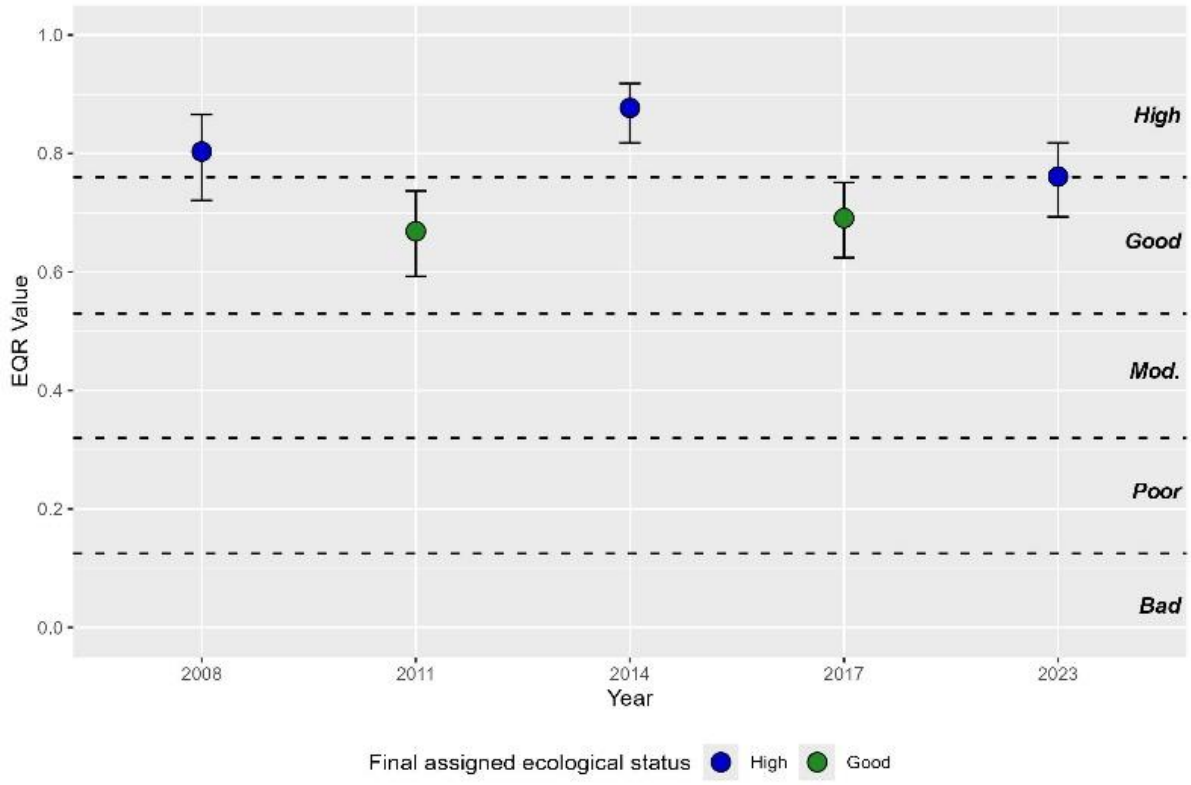

Figure 4.1. Fish ecological status, Lough Brin, between 2008 and 2023 (dashed line indicates EQR status boundaries).

5. References

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NPWS (2013) Site synopsis*: Site Name: Killarney National Park, MacGillycuddy's Reeks and Caragh River Catchment. Site code: 000365*. National Parks and Wildlife Service.

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