National Research Survey Programme

Lakes 2019

Lough Barra

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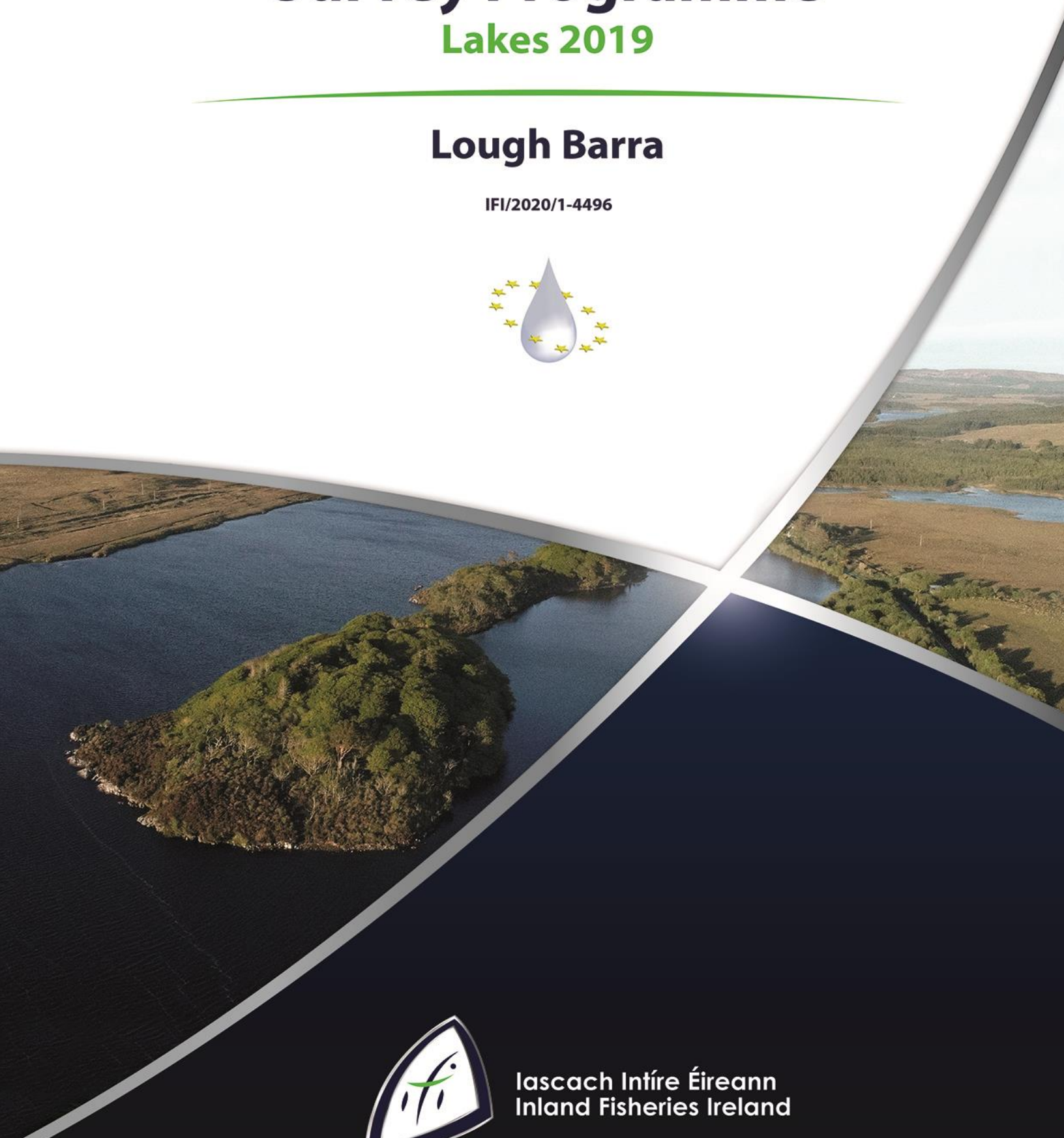

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National Research Survey Programme

Fish Stock Survey of Lough Barra, July 2019

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

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1.1 Introduction

Lough Barra is situated in the upper part of the Gweebarra River catchment close to the south-western perimeter of Glenveagh National Park in Co. Donegal. The lake is situated at an altitude of 88.6m above sea level. It has a surface area of 63ha, a mean depth of 4.4m and a maximum depth of 11.6m (Fig. 1.1). The lake is categorised as typology class 4 (as designated by the EPA for the Water Framework Directive), i.e. deep (>4m), greater than 50ha and low alkalinity (<20mg/l CaCO3).

The geology of the area is predominantly granite, felsite and other intrusive rocks rich in silica. Lough Barra Bog SPA is situated immediately to the south-west of the lake (Fig. 1.1) and part of the bog is a nature reserve (NPWS, 2005). Lough Barra itself forms part of the Cloghernagore Bog and Glenveagh National Park Special Area of Conservation. This is a particularly large SAC located in north-west Donegal. It contains many different habitats ranging from exposed rock and scree mountains to blanket bogs, lakes and rivers.

The brown trout in the lake are small and an occasional salmon and sea trout reach the lake (O' Reilly, 1998). The lake was previously surveyed in August 2005 by Inland Fisheries Ireland (previously the Central Fisheries Board and the Northern Regional Fisheries Board) as part of the NS Share "Fish in Lakes" project (Kelly *et al*., 2007). The lake was then surveyed in 2008, 2011 and 2014 as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al*., 2009, 2012a and 2015). Brown trout, salmon and eels were recorded in all surveys.

This report summarises the results of the 2019 fish stock survey carried out on the lake, as part of the Water Framework Directive surveillance monitoring programme.

Plate1.1. Lough Barra

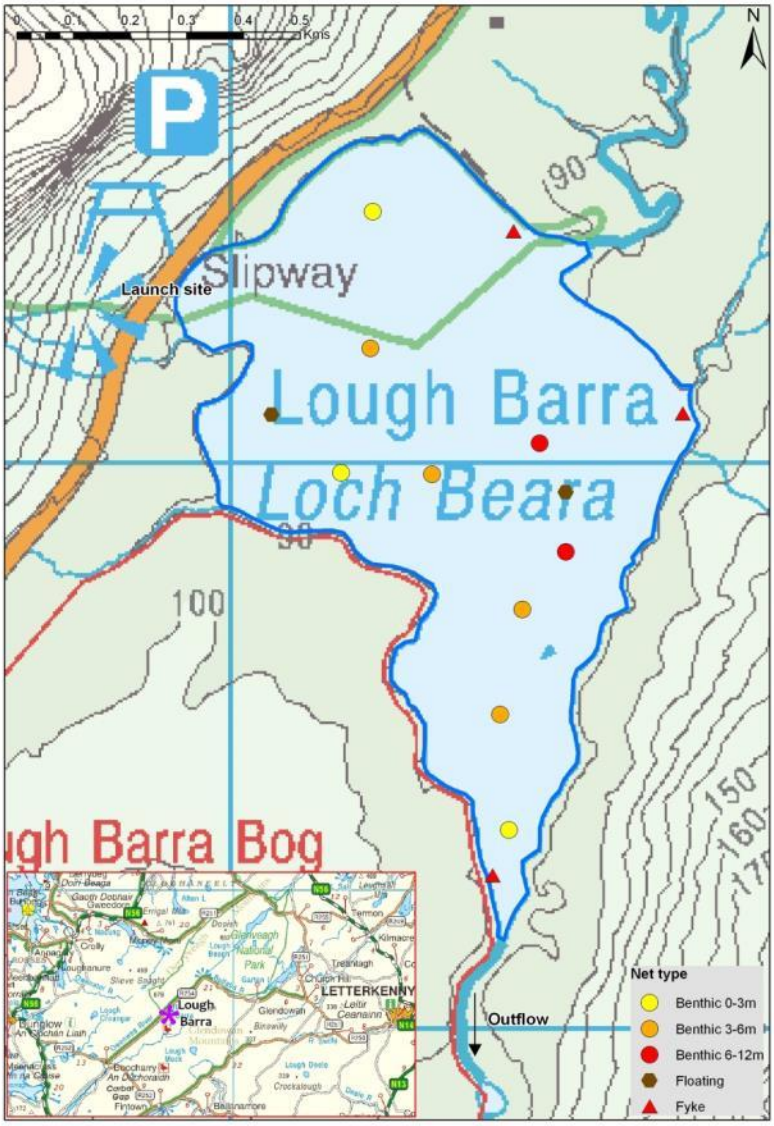

Fig 1.1 Location map of Lough Barra showing locations and depths of each net (outflow is indicated on map)

1.2 Methods

1.2.1 Netting methods

Lough Barra was surveyed over one night from the 29th to the 30th of July 2019. A total of three sets of Dutch fyke nets, nine benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (3 @ 0-2.9m, 4 @ 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 were deployed in the lake (14 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 all brown trout, sea trout and salmon. 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.

1.2.2 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).

$$\%FO_i = (N_i / N) \times 100$$

Where:

$\%FO_i$ is the percentage frequency of prey item i,
N_i is the number of a particular species with prey i in their stomach,
N is total number of a particular species with stomach contents.

1.2.3 Biosecurity - disinfection and decontamination procedures

Procedures are required for disinfection of equipment in order 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.

1.3 Results

1.3.1 Species Richness

A total of three fish species (sea trout are included as a separate 'variety' of trout) were recorded in Lough Barra in July 2019, with 151 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Brown trout was the most abundant fish species recorded, followed by European eel and salmon. During the previous surveys in 2008, 2011 and 2014 the same species composition was recorded, with the exception of sea trout which were only recorded in the 2019 survey (Kelly *et al*., 2009, 2012a and 2015c).

Table 1.1. Number of each fish species captured by each gear type during the survey on Lough Barra, July 2019

Scientific name	Common name	Number of fish captured			
		BM CEN	FM CEN	Fyke	Total
Salmo trutta	Brown trout	103	9	19	131
	Sea trout	1	0	0	1
Salmo salar	Salmon	6	0	0	6
Anguilla anguilla	European eel	1	0	12	13

1.3.2 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. Mean CPUE and BPUE for all fish species captured in the 2008, 2011, 2014 and 2019 surveys are summarised in Table 1.2 and illustrated in Figures 1.2 and 1.3.

Brown trout

Brown trout was the dominant species in terms of abundance (CPUE) and biomass (BPUE). While the mean brown trout CPUE and BPUE fluctuated over the four sampling occasions, the figures from 2019 are the lowest recorded across all four sampling occasions (Table 1.2 and Fig. 1.2 and 1.3).

Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Lough Barra, 2008, 2011, 2014 and 2019

Scientific name	Common name	2008	2011	2014	2019
			Mean CPUE		
Salmo trutta	Brown trout	0.469 (0.110)	0.334 (0.121)	0.621 (0.148)	0.289 (0.074)
	Sea trout	-	-	-	0.002 (0.002)
Salmo salar	Salmon	0.012 (0.005)	0.012 (0.005)	0.042 (0.026)	0.014 (0.010)
Anguilla anguilla	European eel	0.033 (0.009)	0.322 (0.194)	0.111 (0.028)	0.067 (0.033)
			Mean BPUE		
Salmo trutta	Brown trout	22.9107 (5.391)	18.721 (6.732)	31.048 (7.177)	16.377 (4.144)
	Sea trout	-	-	-	0.381 (0.381)
Salmo salar	Salmon	3.1 (2.977)	0.267 (0.128)	0.608 (0.361)	0.256 (0.212)
Anguilla anguilla	European eel	3.038 (1.464)	38.711 (19.421)	18.961 (10.114)	10.081 (5.186)

Note: On the rare occasion 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

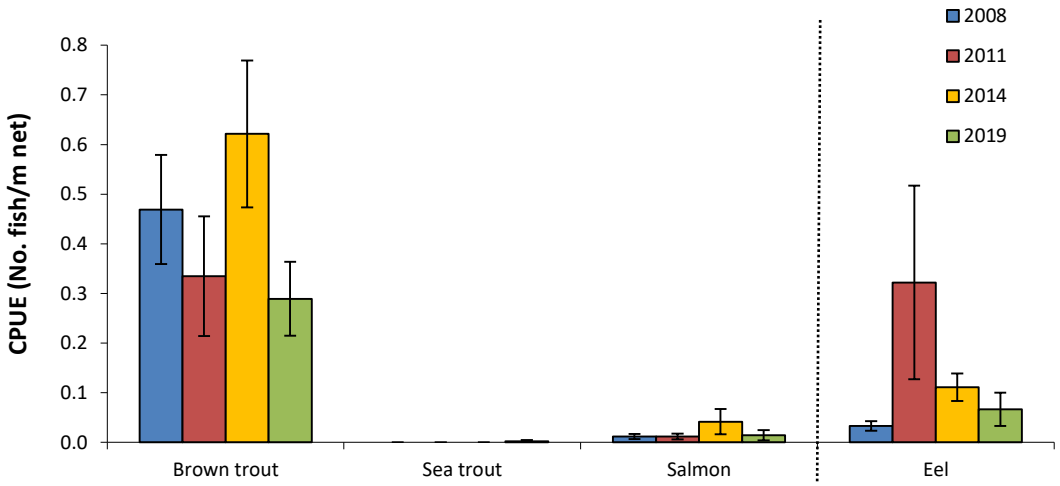

Fig. 1.2. Mean (±S.E.) CPUE for all fish species captured in Lough Barra (Eel CPUE based on fyke nets only), 2008, 2011, 2014 and 2019.

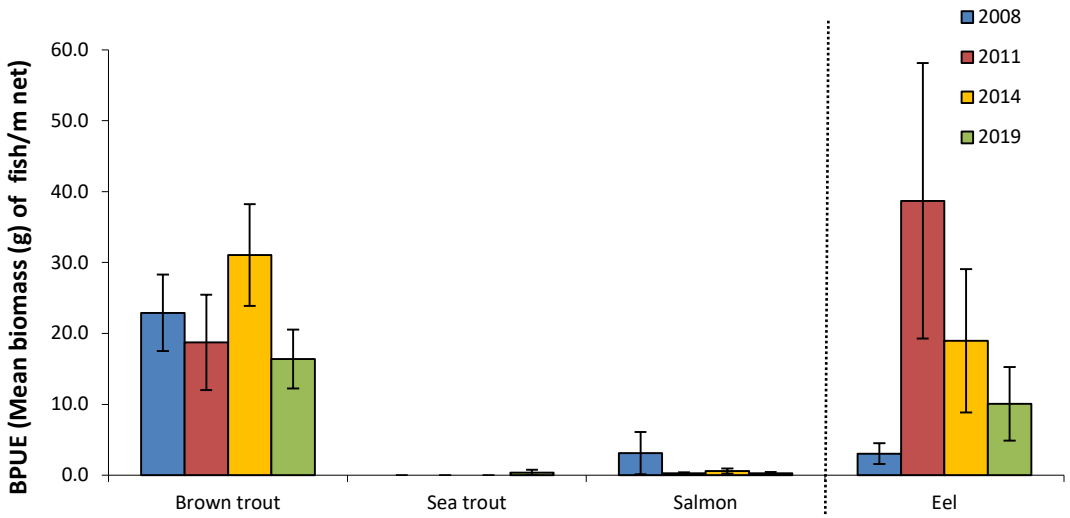

Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Lough Barra (Eel CPUE based on fyke nets only), 2008, 2011, 2014 and 2019

1.3.3 Length frequency distributions and growth

Brown trout

Brown trout captured during the 2019 survey ranged in length from 9.0cm to 21.2cm (mean = 16.5cm) (Fig. 1.4). Three age classes were present, ranging from 1+ to 3+, with a mean L1 of 6.5cm (Table 1.3). The dominant age class was 2+. Brown trout captured during the 2008, 2011 and 2014 surveys had similar length and age ranges (Fig.1.4).

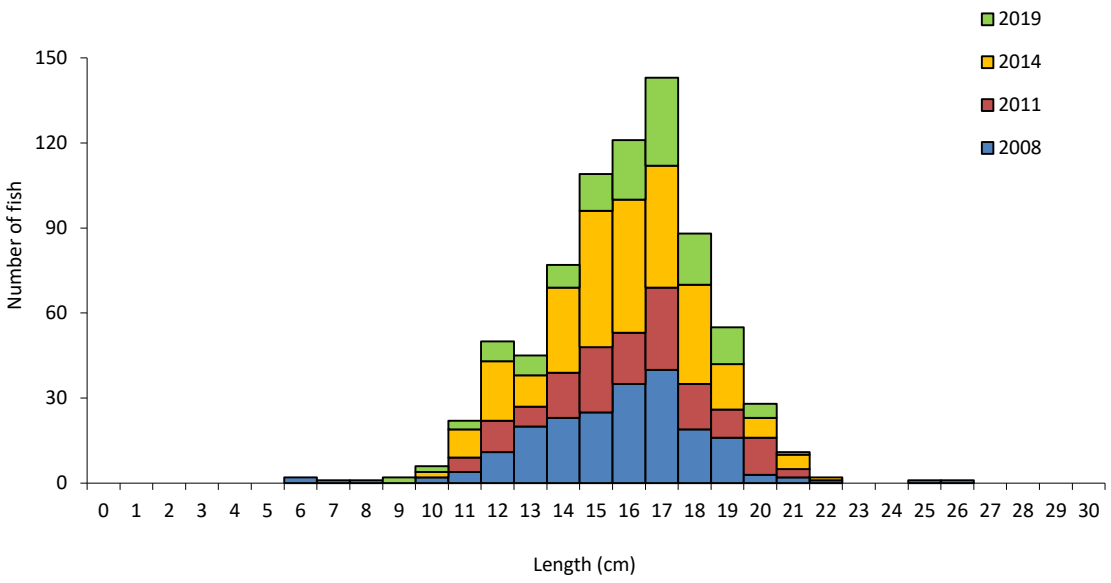

Fig. 1.4. Length frequency of brown trout captured on Lough Barra, 2008, 2011, 2014 and 2019

Table 1.3. Mean (±S.E.) brown trout length (cm) at age for Lough Barra, July 2019

	L_1	L_2	L_3
Mean (±S.E.)	6.5 (0.1)	13.2 (0.2)	19.1 (0.7)
N	33	21	3
Range	5.3-7.5	11.0-14.9	17.7-20.2

Other fish species

One sea trout measuring 23.7cm and aged at 2.0+ was recorded. Eight salmon parr ranging from 6.0cm to 12.8cm were also captured. All salmon that had an age recorded were in the 1+ class. Thirteen eels ranging from 33.0cm to 58.0cm were also captured.

1.3.4 Stomach and diet analysis

Dietary analysis studies provide a good indication of the availability of food items and the angling methods that are likely to be successful. However, the value of stomach content analysis is limited unless undertaken over a long period as diet may change on a daily basis depending on the availability of food items. The stomach contents of a subsample of brown trout captured during the survey were examined and are presented below.

Brown trout

Adult trout usually feed principally on crustaceans (*Asellus* sp. and *Gammarus* sp.), insects (principally chironomid larvae and pupae) and molluscs (snails) (Kennedy and Fitzmaurice, 1971, O'Grady, 1981). A total of 98 stomachs were examined. Of these 36 were found to contain no prey items. Of the remaining 62 stomachs containing food, 66% contained invertebrates, 22% zooplankton, 5% molluscs, 3% invertebrates/zooplankton, 2% unidentified digested material and 2% invertebrates/molluscs (Fig. 1.5).

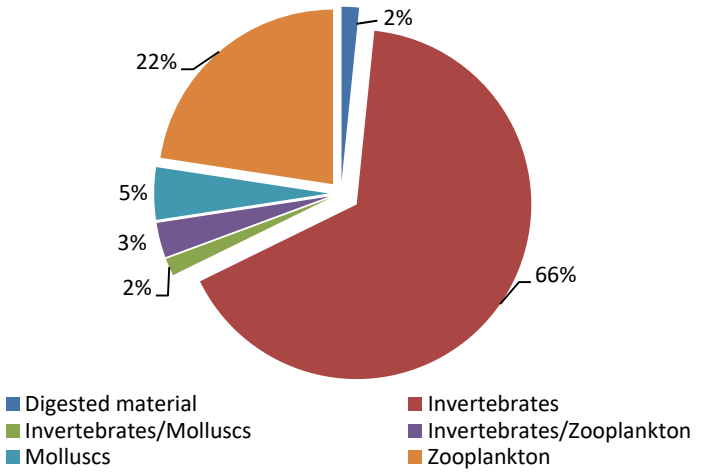

Fig 1.5. Diet of brown trout (n=62) captured on Lough Barra, 2019 (% FO)

1.4 Summary and ecological status

A total of three fish species (sea trout are included as a separate 'variety' of trout) were recorded in Lough Barra in July 2019. Brown trout was the dominant species in terms of abundance (CPUE) and biomass (BPUE) captured in the survey gill nets during the 2019 survey.

The mean brown trout CPUE and BPUE fluctuated over the four sampling occasions. The 2019 figures were lower than previous surveys. Brown trout ranged in length from 9.0cm to 21.2cm and ranged in age from 0+ to 3+, indicating reproductive success in three of the previous four years

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*., 2012b). Using the FIL2 classification tool, Lough Barra has been assigned an ecological status of Good for 2019 based on the fish populations present. In previous years the lake was also assigned a fish status of Good in 2008 and 2014 and a status of High in 2011 (Fig. 1.6).

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

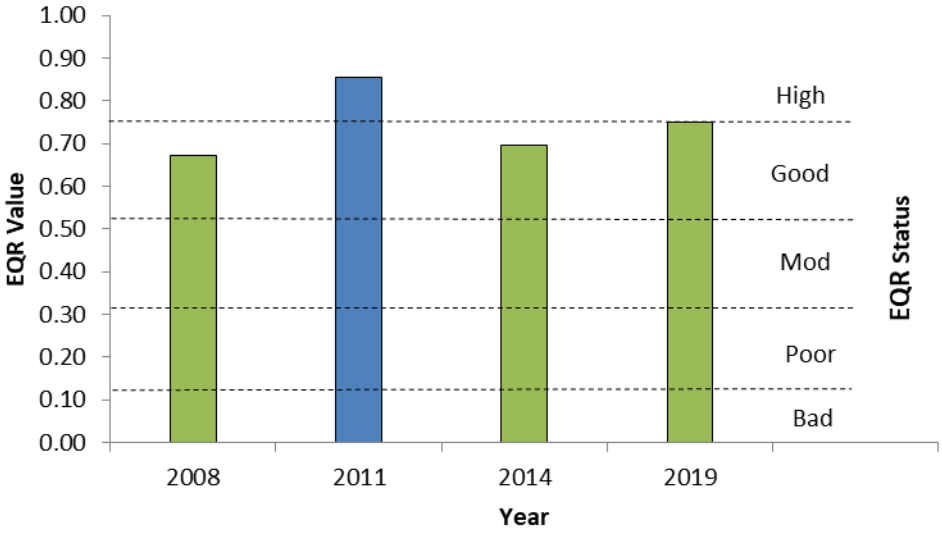

Fig. 1.6. Ecological status of Lough Barra, 2008, 2011, 2014 and 2019

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