National Research Survey Programme

Lakes 2020

Glenbeg Lough

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Fish Stock Survey of Glenbeg Lough, September 2020

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Cover photo: Netting survey on Lough Talt © Inland Fisheries Ireland

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1.1 Introduction

Glenbeg Lough is located near Ardgroom on the Beara Pennisula, Cork–Kerry county border (Plate 1.1, Fig. 1.1). The lake has a surface area of 66ha, a maximum depth of 13m and is categorised into typology class 4 (as designated by the EPA for the Water Framework Directive), i.e. deep (mean depth >4m), greater than 50ha and low alkalinity (<20mg/l $CaCO_3$). The Ownagappul River exiting Glenbeg Lough contains freshwater pearl mussels and the lake itself is known for its oligotrophic waters and associated vegetation.

Glenbeg Lough forms part of the Glanmore Bog Special Area of Conservation. The site is of particular interest as it contains active blanket bog, an EU Habitats Directive Annex I priority habitat. Glenbeg Lough is an oligotrophic lake, which is representative of another EU Habitats Directive Annex I habitat. Some of the vegetation found on this lake includes quillwort (*Isoetes lacustris*), shoreweed (*Littorella uniflora*), water lobelia (*Lobelia dortmanna*), floating bur-reed (*Sparganium angustifolium*) and six-stamened waterwort (*Elatine hexandra*) (NPWS, 2000).

Cattle graze some of the lower slopes around the lake, and recently an area of forestry west of the outflow of Glenbeg Lough has been planted. If significant additional areas were to be planted in the future, the risks of eutrophication and siltation in the catchment could increase (Ownagappul Sub-Basin Management Plan, 2009). Glenbeg Lough is also a water abstraction lake with water being utilised for public supplies.

Glenbeg Lough is known to contain large stocks of small trout, generally around 0.14kg in weight (O' Reilly, 2007), with the lake shore being readily accessible for angling.

Glenbeg Lough was previously surveyed in 2008, 2011, 2014 and 2017 as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al*., 2009, 2012a, 2015a, 2015b and Connor *et al* 2018). During the 2017 survey, brown trout were found to be the dominant species present in the lake. Eels were also captured during the survey.

This report summarises the results of the 2020 fish stock survey carried out on the lake, as part of the Water Framework Directive surveillance monitoring programme.

Plate 1.1. Glenbeg Lough

Plate 1.2. Brown trout released on Glenbeg Lough, September 2020

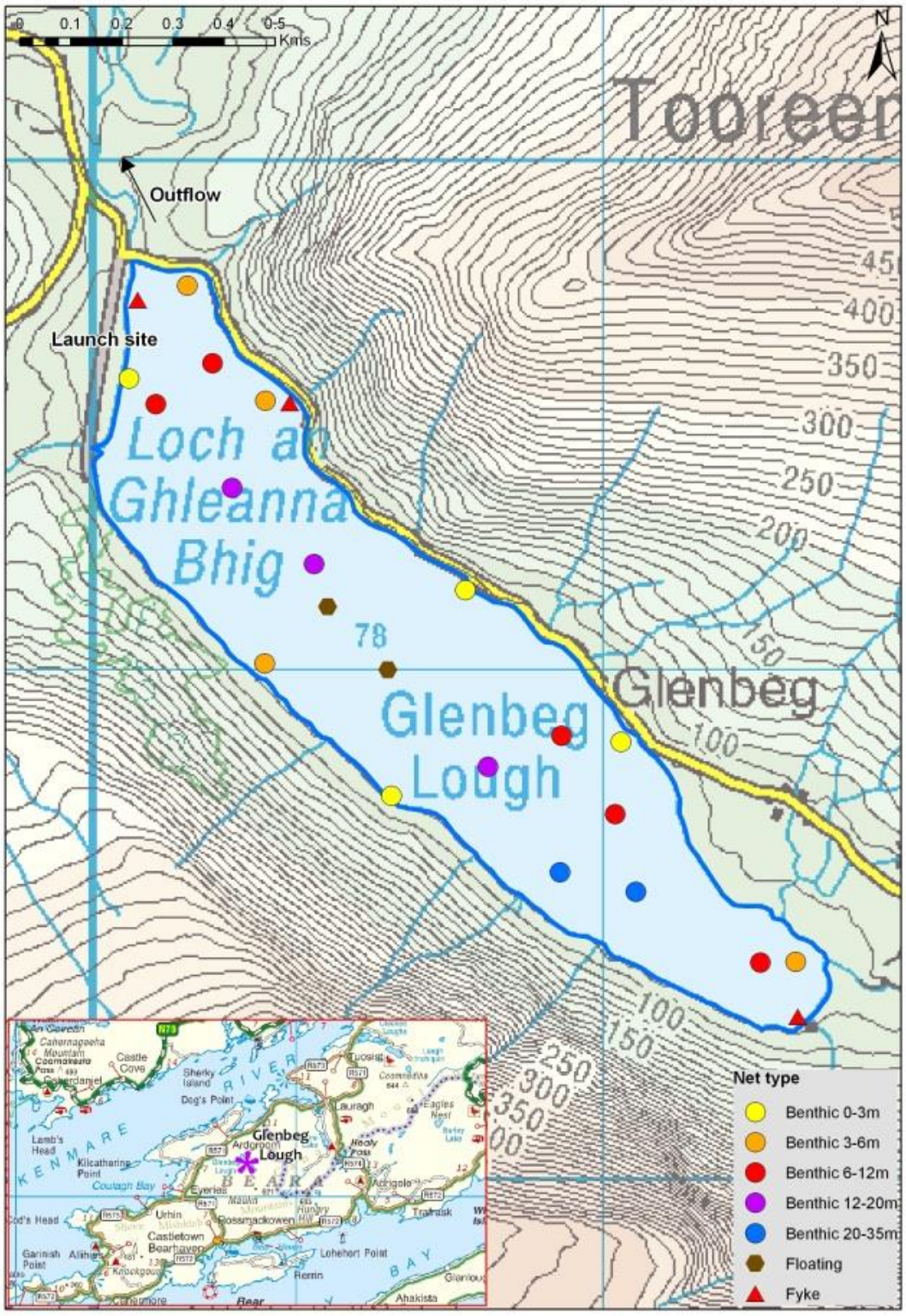

Fig. 1.1 Location map of Glenbeg Lough showing locations and depths of each net (outflow is indicated on map)

1.2 Methods

1.2.1 Netting methods

Glenbeg Lough was surveyed over two nights from the 15th to the 17th of September 2020. A total of three sets of Dutch fyke nets, 18 benthic monofilament multi-mesh (BM CEN) (12 panel, 5-55mm mesh size) CEN standard survey gill nets (4 @ 0-2.9m, 4 @ 3-5.9m, 5 @ 6-11.9m, 3 @ 12-19.9m and 2 @ 20-34.9m) and two floating monofilament multi-mesh (FM CEN) (12 panel, 5-55mm mesh size) CEN standard survey gill nets were deployed in the lake (23 sites). Nets were deployed in the same locations as were randomly selected in the previous survey. 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. 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).

$$\mathbf{FO}_i = \left(\frac{\boldsymbol{N_i}}{\boldsymbol{N}}\right) * \mathbf{100}$$

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.

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

Two fish species were recorded on Glenbeg Lough in September 2020. A total of 388 fish were 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 eels. During previous surveys in 2008, 2011, 2014 and 2017 the same species composition was recorded with the exception of salmon, which were only recorded during the 2014 survey (Kelly et al., 2009, 2012a, 2015a, 2015b and Connor *et al* 2018).

Table 1.1. Number of each fish species captured by each gear type during the survey on Glenbeg Lough, September 2020

Scientific name	Common name	Number of fish captured			
		BM CEN	FM CEN	Fyke	Total
Salmo trutta	Brown trout	321	35	22	378
Anguilla anguilla	European eel	0	0	10	10

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, 2017 and 2020 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). Mean CPUE and BPUE has fluctuated slightly across the five survey occasions but remained relatively stable overall (Table 1.2; Fig 1.2 and 1.3).

Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Glenbeg Lough, 2008, 2011, 2014, 2017 and 2020

	Brown trout (*Salmo trutta)*	Salmon *(Salmo salar)*	European Eel* *(Anguilla anguilla)*
	Mean CPUE (±S.E.)		
2008	0.355 (0.089)	-	0.183 (0.063)
2011	0.497 (0.087)	-	0.036 (0.0114)
2014	0.323 (0.057)	0.004 (0.004)	0.033 (0.019)
2017	0.658 (0.131)	-	0.072 (0.043)
2020	**0.467 (0.112))**	**-**	**0.011 (0.011)**
	Mean BPUE (±S.E.)		
2008	25.919 (7.042)	-	46.788 (25.204)
2011	33.242 (6.039)	-	11.583 (3.701)
2014	28.966 (5.101)	0.123 (0.123)	6.208 (3.112)
2017	59.440 (11.881)	-	8.775 (4.782)
2020	**45.609 (12.822)**	**-**	**15.876 (9.703)**

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

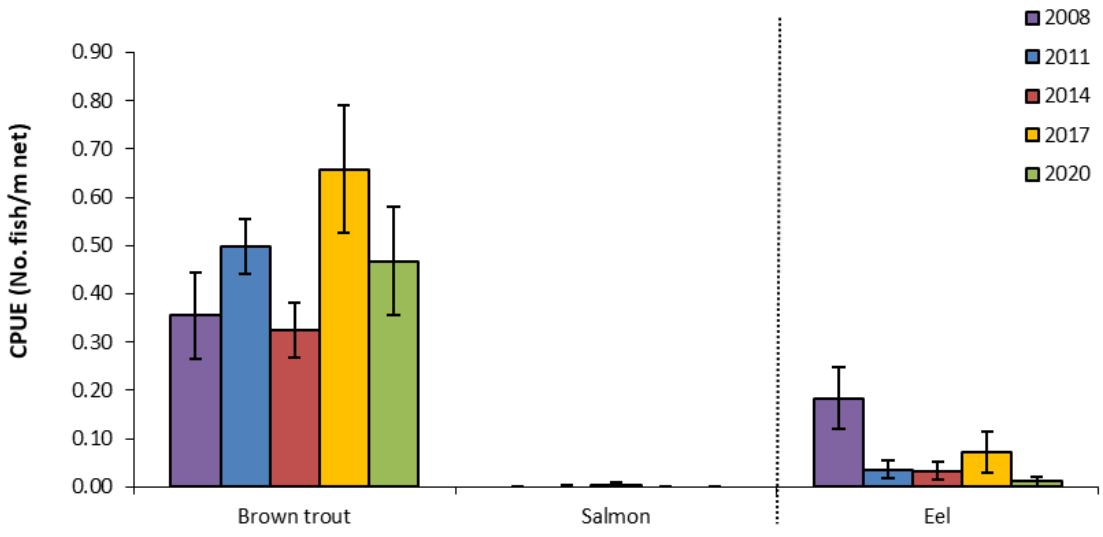

Fig. 1.2. Mean (±S.E.) CPUE for all fish species captured in Glenbeg Lough (Eel CPUE based on fyke nets only), 2008, 2011, 2014, 2017 and 2020

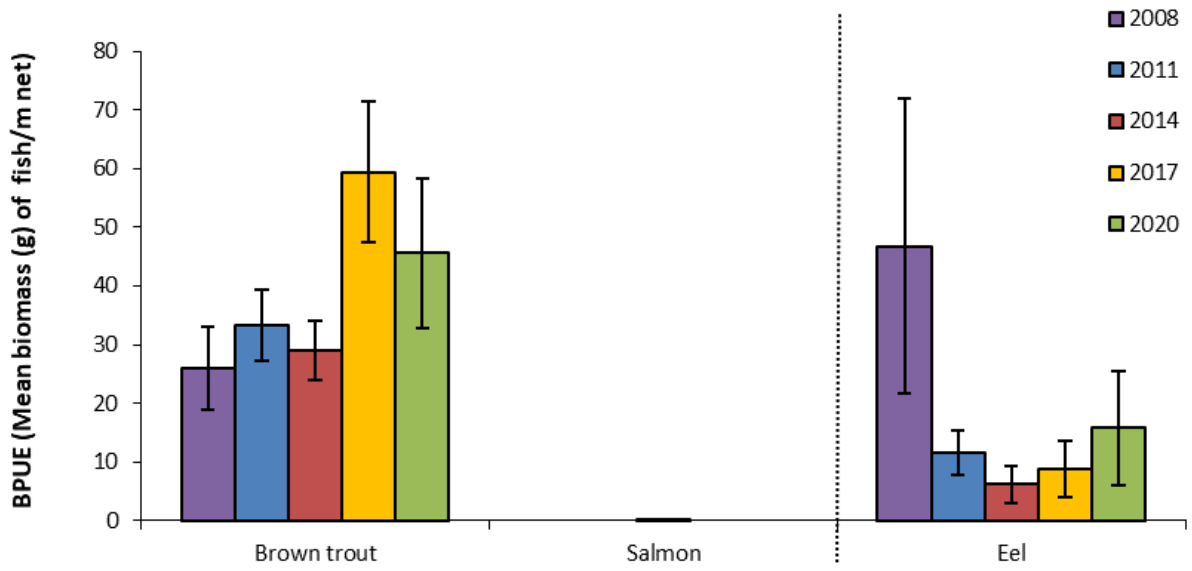

Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Glenbeg Lough (Eel BPUE based on fyke nets only), 2008, 2011, 2014, 2017 and 2020

1.3.3 Length frequency distributions and growth

Brown trout

Brown trout captured during the 2020 survey ranged in length from 7.0cm to 62.1cm (mean = 18.8cm). 99% of all brown trout captured measured less than 25cm with several much larger fish captured (Fig. 1.4). Five age classes were present, ranging from 0+ to 4+. The dominant age class was 2+ (Fig. 1.4). Mean length of trout after their first year (L1) was estimated at 7.3cm. Mean brown trout L4 in 2020 was 28.6 indicating a slow rate of growth for brown trout in this lake according to the classification scheme of Kennedy and Fitzmaurice (1971) (Table 1.3). Brown trout captured between 2008 and 2020 had broadly similar length ranges (i.e. 5-25cm). Several larger fish were captured in the 2017 and 2020 surveys (Fig.1.4).

Table 1.3. Mean (±S.E.) brown trout length (cm) at age for Glenbeg Lough, September 2020

	L_1	L_2	L_3	L_4	Growth Category
Mean (±S.E.)	7.3 (0.3)	15.4 (0.3)	19.7 (0.6)	28.6	Slow
N	46	38	16	1	
Range	3.6-13.0	11.0-19.7	17.2-23.8	28.6	

Other fish species

Eels captured during the 2020 survey ranged in length from 38.2cm to 80.0cm.

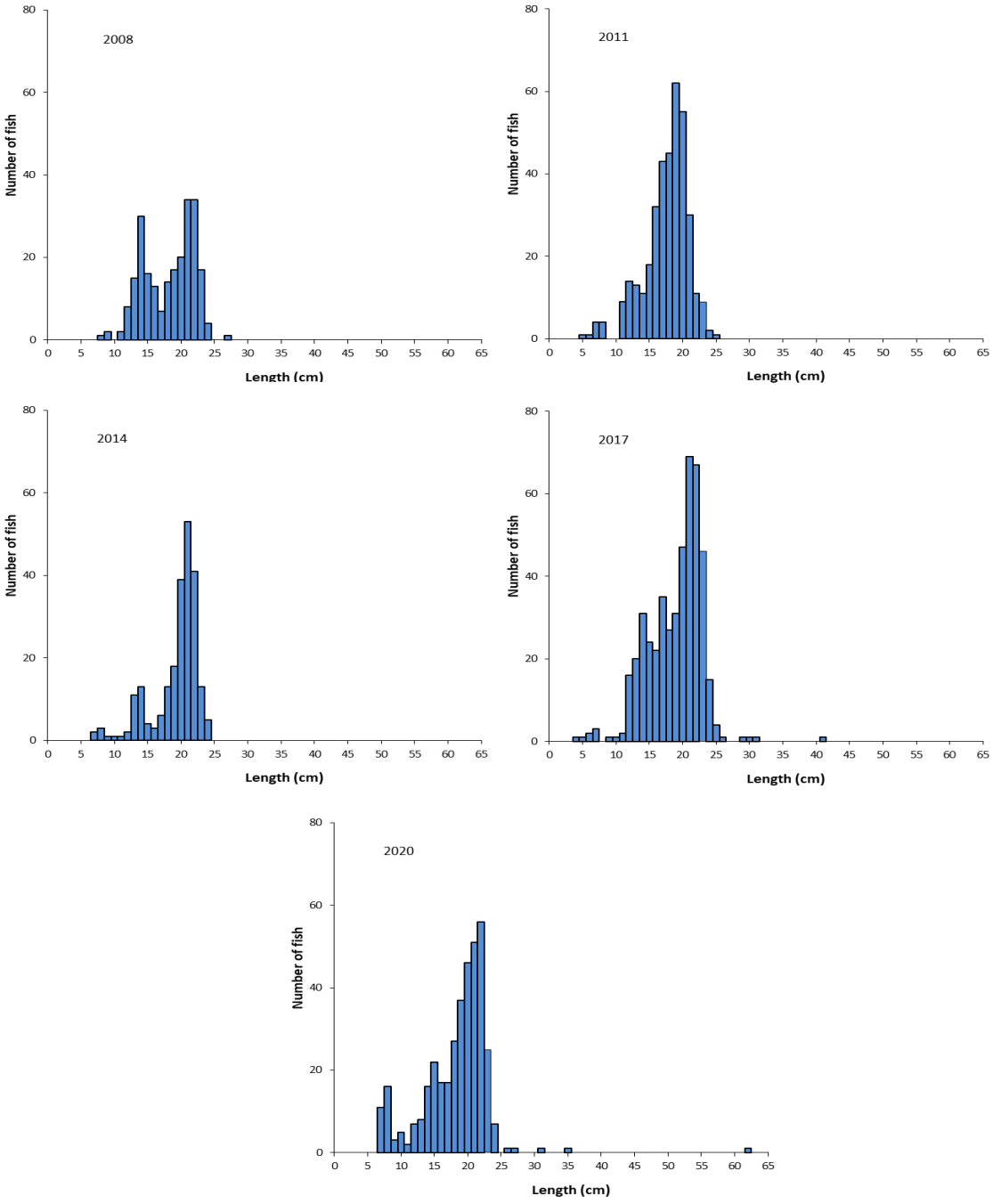

Fig. 1.4. Length frequency of brown trout captured on Glenbeg Lough, 2008, 2011, 2014, 2017 and 2020

1.3.4 Stomach and diet analysis

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 95 stomachs were examined. Of these, 39 were empty. Of the 56 stomachs which contained food, 32 (57.1%) contained invertebrates only, while both invertebrates and zooplankton were found in six (10.7%) stomachs. Zooplankton was the sole dietary item recorded in 11 (19.6%) stomachs. Fish were recorded in one (1.8%) stomach and unidentified digested material was recorded in six (10.7%) stomachs (Fig. 1.5).

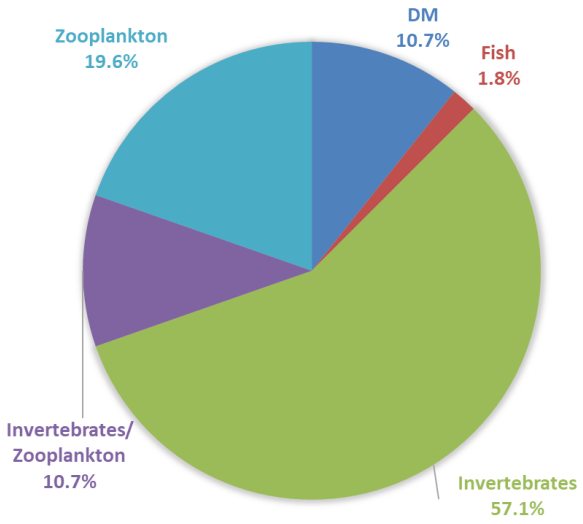

Fig 1.5. Diet of brown trout (n=56) captured on Glenbeg Lough, 2020 (% FO)

1.4 Summary and ecological status

A total of two fish species were recorded in Glenbeg Lough in September 2020.

Brown trout was the dominant species in terms of abundance (CPUE) and biomass (BPUE) captured in the survey gill nets during the 2020 survey. Both CPUE and BPE had remained relatively stable in Glenbeg Lough over the five surveys between 2008 and 2020. Brown trout ranged in age from 0+ to 4+, indicating reproductive success in each of the previous five years. The dominant age class was 2+. Length at age analyses revealed that brown trout in the lake exhibit a slow rate of growth according to the classification scheme of Kennedy and Fitzmaurice (1971).

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*., 2012b).

Using the FIL2 classification tool, Glenbeg Lough has been assigned an ecological status of Good for 2020 based on the fish populations present. Glenbeg Lough was also assigned an ecological status of Good in 2017. In previous years the lake was assigned a fish status of Good in 2008 and High in 2011 and 2014.

In the 2013 to 2018 surveillance monitoring reporting period, the EPA assigned Glenbeg Lough an overall ecological status of Good.

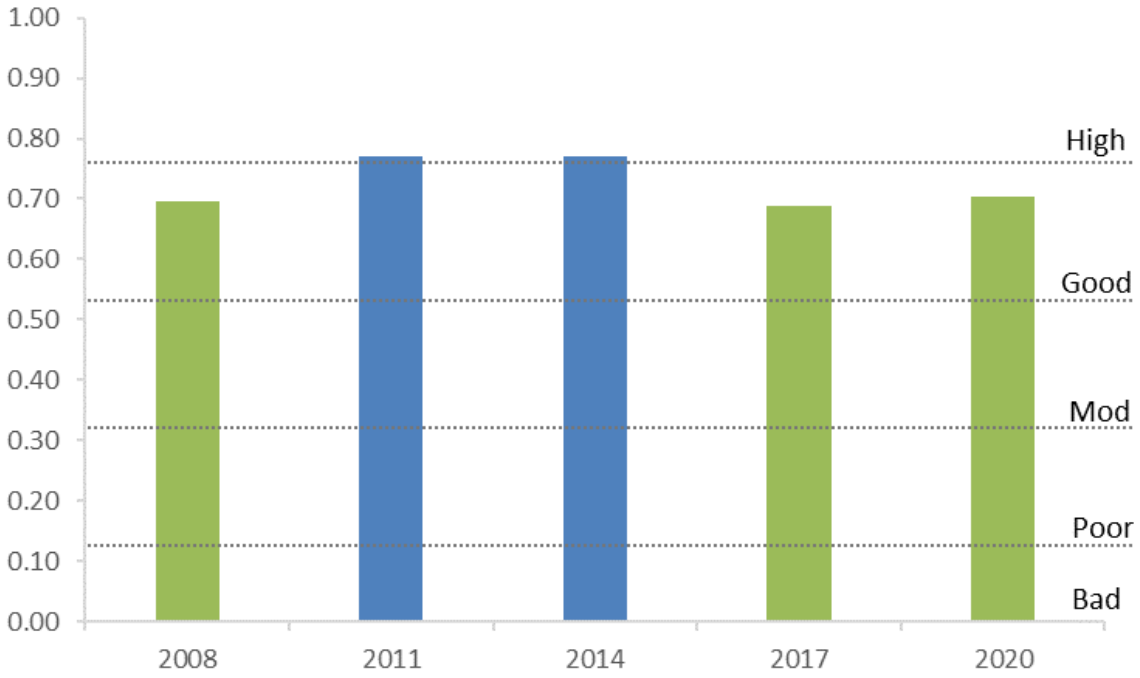

Fig. 1.6. Fish ecological status of Glenbeg Lough, 2008, 2011, 2014, 2017 and 2020

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