National Research Survey Programme

Lakes 2022

Maumwee Lough

Iascach Intíre Éireann
Inland Fisheries Ireland

Fish Stock Survey of Maumwee Lough, June 2022

Cover photo: Lough Lene, Co. Westmeath © Inland Fisheries Ireland

ACKNOWLEDGEMENTS

1.   Introduction

Maumwee Lough is situated in the Corrib catchment, approximately 2km north of Maam Cross, Co. Galway (Plate 1.1, Figure 1.1). It has a surface area of 27.5ha, mean depth of 2.1m, maximum depth of 8.8m (WRFB, 2006) and falls into typology class 1 (as designated by the EPA for the Water Framework Directive), i.e., shallow (<4m), less than 50ha and low alkalinity (<20mg/l $CaCO_3$).

Maumwee Lough is located in the Maumturk Mountains Special Area of Conservation (SAC). Most of the mountains in the SAC exceed 600m in height and the majority of the land within the site lies above an altitude of 250m. The main bedrock in the south of the SAC is made up of quartzite and in the north of the SAC the bedrock is generally comprised of shales and slates (NPWS, 2013).

The site includes blanket bog, lowland oligotrophic lakes, alpine heath, siliceous rock and Rhynchosporion, all habitats listed on Annex I of the E.U. Habitats Directive (NPWS, 2013). The SAC is also selected for containing slender naiad (*Najas flexilis*) and Atlantic salmon (*Salmo salar*), both species listed on Annex II of the same Directive. Species listed in the Red Data Book which are located in the SAC include the Irish hare (*Lepus timidus hibernicus*) and the common frog (*Rana temporaria*). Birdlife in the area includes the dipper (*C. cinclus hibernicus*), grey heron (*Ardea cinerea*), kestrel (*Falco tinnunculus*), meadow pipit (*Anthus pratensis*), raven (*Corvus corax*), snipe (*Gallinago gallinago*), stonechat (*Saxicola rubicola*), wheatear (*Oenanthe oenanthe*) and woodcock (*Scolopax rusticola*). The Peregrine falcon (*Falco peregrinus*), a species listed on Annex I of the EU Birds Directive also occurs within the SAC (NPWS, 2013).

Oligotrophic lakes are well represented within the Maumturk Mountains SAC, occurring mainly to the south-east near Maam Cross. The main lakes within the SAC are Lough Shindilla, Loughanillaun, Lough Nambrackboy, Lough Shannagrena, Maumwee Lough and Lehanagh Lough. Most of these are good quality, small to medium sized lakes that contain typical oligotrophic aquatic species, including quillwort (*Isoetes lacustris),* pipewort (*Eriocaulon aquaticum),* water lobelia *(Lobelia dortmanna),* shoreweed *(Littorella uniflora)* and water milfoil *(Myriophyllum alterniflorum).*

Damaging activities and threats to the Maumturk Mountains SAC include overgrazing, peat-cutting and afforestation. Grazing, in particular by sheep, is quite severe within the site and has resulted in the erosion of both lowland and mountain blanket bog (NPWS, 2013).

Salmon and trout (*Salmo trutta*) spawning are known to occur in Maumwee Lough. The rivers, in particular those of the Bealnabrack system flowing into the north-west corner of Lough Corrib, provide high quality spawning and nursery grounds for salmon. The lake holds a stock of small brown trout and adult salmon can be captured in the lake during July and August (O'Reilly, 2007).

Maumwee Lough was previously surveyed in 2007, 2010, and 2013 as part of the WFD surveillance monitoring programme (Kelly and Connor, 2007, Kelly *et al.*, 2011 and 2014).

This report summarises the results of the 2022 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.
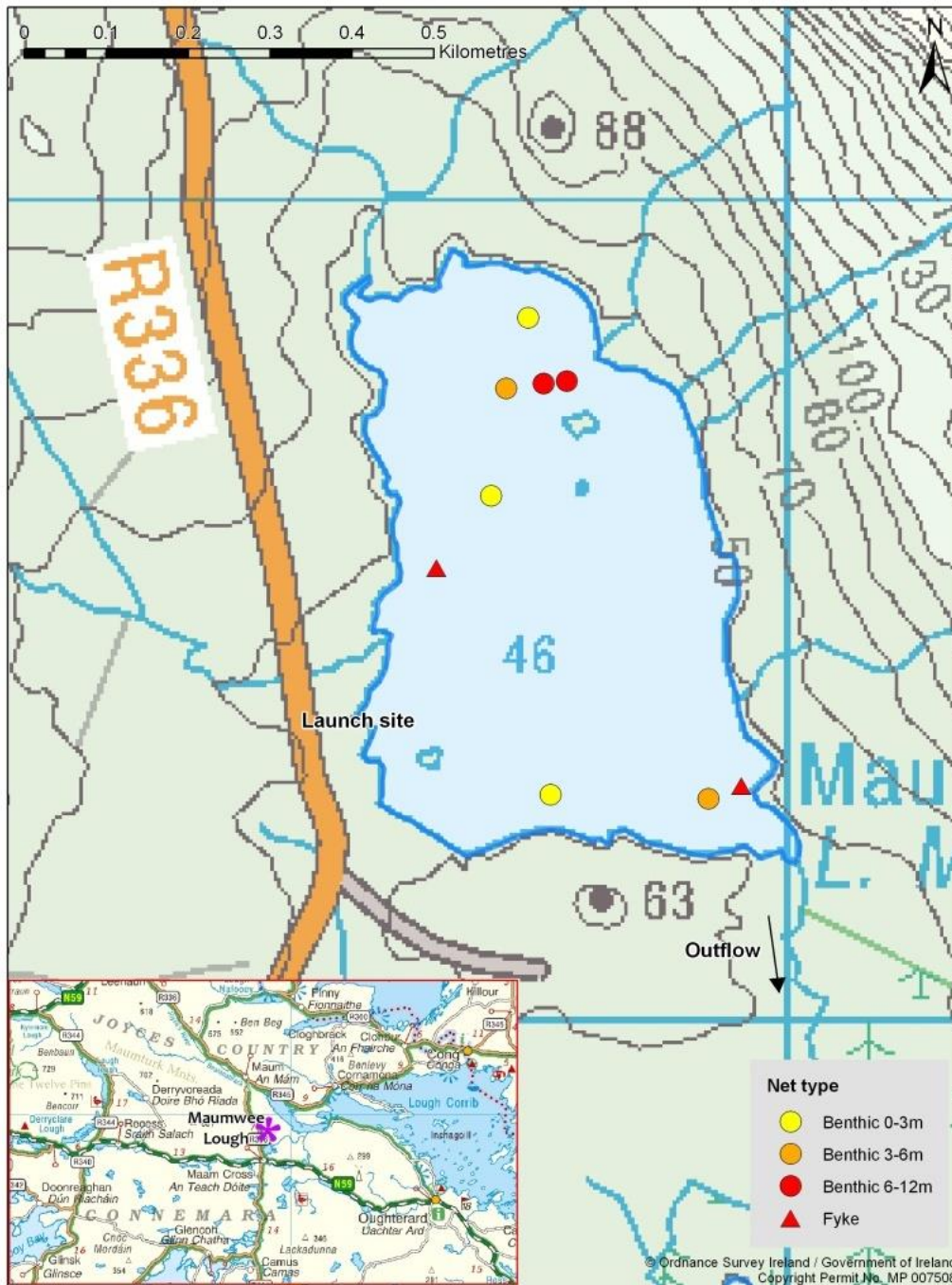

Plate 1.1. Maumwee Lough.

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

2.   Methods

2.1.   Netting methods

Maumwee Lough was surveyed over one night on the 28th of June 2022. A total of two sets of Dutch fyke nets and seven benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (3 @ 0-2.9m, 2 @ 3-5.9m and 2 @ 6-11.9m) were deployed in the lake (9 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 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.

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).

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

Where:
$\mathbf{FO}_i$ is the percentage frequency of prey item i,
$\mathbf{N}_i$ is the number of fish with prey i in their stomach,
$\mathbf{N}$ 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 Maumwee Lough in June 2022. A total of 154 fish were captured (Table 3.1). Brown trout was the most abundant fish species recorded, representing *c*. 75% of all fish captured. Minnow was also recorded in the survey. During the previous surveys (2007, 2010 and 2013) the species composition included salmon and European eels. Three-spined stickleback were recorded in the 2010 survey.

Table 3.1. Number of each fish species captured by each gear type during the survey on Maumwee Lough, June 2022.

Scientific name	Common name	Number of fish captured		
		BM CEN	Fyke	Total
Salmo trutta	Brown trout	102	13	115
Phoxinus phoxinus	Minnow	39	0	39

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. The CPUE and BPUE for each species captured in the 2022 survey is summarised in Table 3.2. Brown trout was the dominant species in terms of abundance (CPUE) and biomass (BPUE) (Table 3.2).

Table 3.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Maumwee Lough.

| Scientific name	Common name	Mean CPUE (± S.E.)	Mean BPUE (± S.E.)
Salmo trutta	Brown trout	0.402 (0.106)	28.168 (7.779)
Phoxinus phoxinus	Minnow	0.144 (0.084)	0.248 (0.144)

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.*

For comparison purposes box plots of CPUE and BPUE for each species (except three-spined stickleback) captured in all surveys per net type between 2007 and 2022 are presented in Figures 3.1 and 3.2 respectively and illustrates fish community change over time. Populations of brown trout (and minnow) have remained relatively constant across all sampling occasions. Abundance and biomass of eel have declined consistently across all surveys. No eels were captured in 2022 (Figures 3.1 and 3.2).
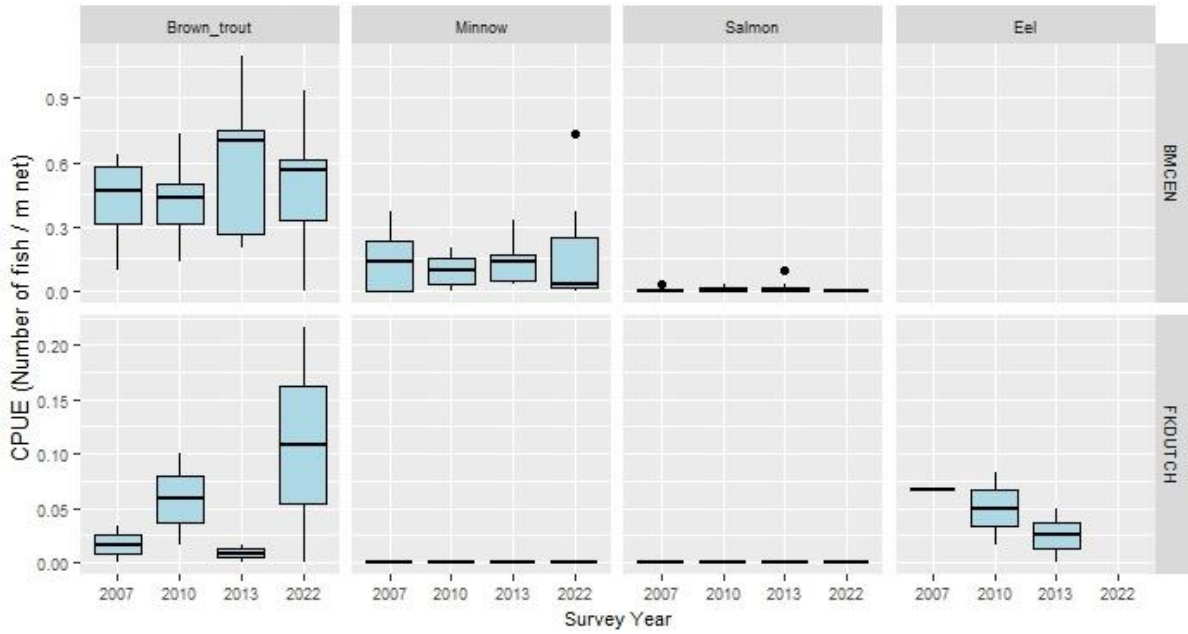
Figure 3.1. CPUE of fish species captured in each net type during surveys of Lough Maumwee between 2007 and 2022. Figures are expressed as numbers of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots. The y axis (CPUE) is unique for each net type.
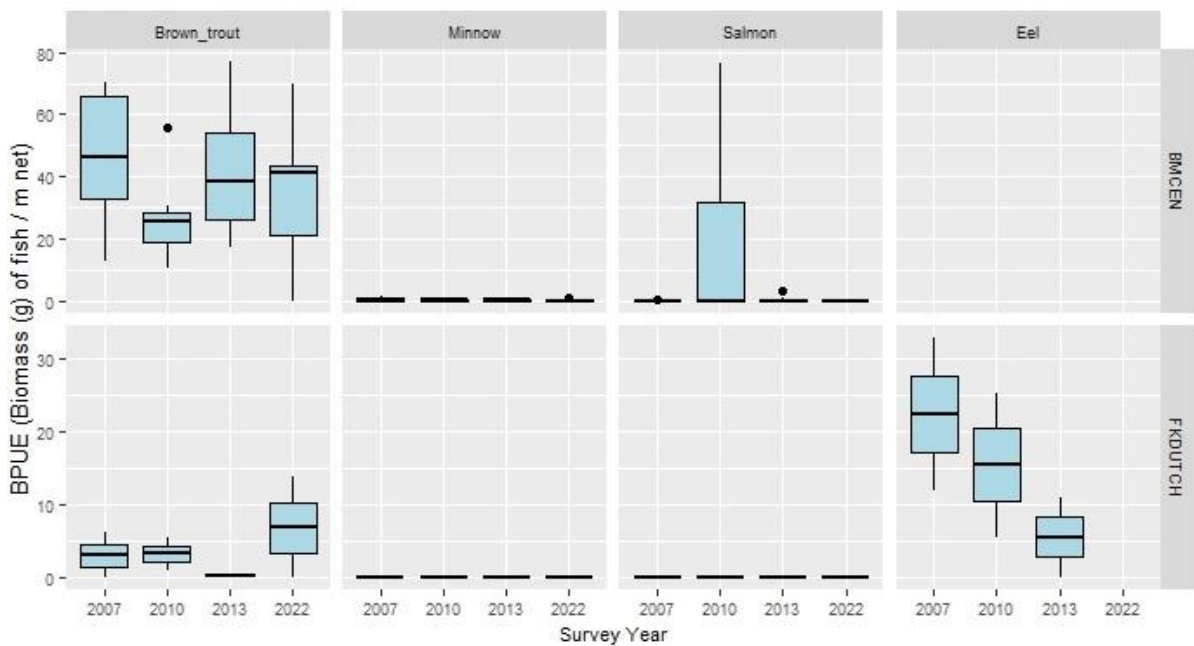

Figure 3.2. BPUE of fish species captured in each net type during surveys of Lough Maumwee from between 2007 and 2022. Figures are expressed as biomass (g) of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots. The y axis (BPUE) is unique for each net type.

3.3. Length frequency distributions and growth

Brown trout

Brown trout captured during the 2022 survey ranged in length from 11.0cm to 24.1cm (mean 18.1cm). Brown trout captured during previous surveys had similar age ranges and growth rates. Some larger specimens were, however, captured during the 2007 survey (Figure 3.3). The population was dominated by younger fish, with all fish in the sample aged ranging from 1+ to 3+ with comparatively few of the older cohort present (Table 3.3). Mean L1 (i.e. age at the end of the first year) was 6.7cm (Table 3.3).
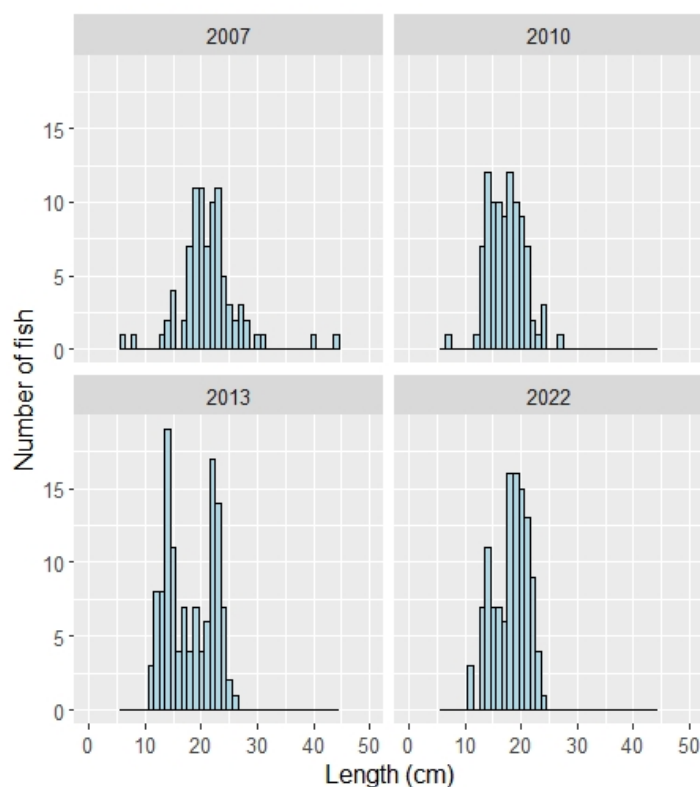
Figure 3.3. Length frequency of brown trout captured in Maumwee Lough, 2007, 2010, 2013 and 2022.

Table 3.3. Mean (±SE) brown trout length (cm) at age in Maumwee Lough, June 2022.

Length (cm)	L_1	L_2	L_3
Mean (±S.E.)	6.7 (0.1)	15.1 (0.2)	20.4 (0.6)
N	53	35	6
Range	5.1 - 8.8	13.0 - 17.7	18.1 - 22.3

<u>Minnow</u>

Minnow captured during the 2022 survey ranged in length from 4.0cm to 6.0cm (mean 4.9cm).

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.

<u>Brown trout</u>

A total of 111 brown trout stomachs were examined. Of these 76 (68.5%) were found to contain no prey items. The remaining 35 (31.5%) stomachs contained invertebrates.
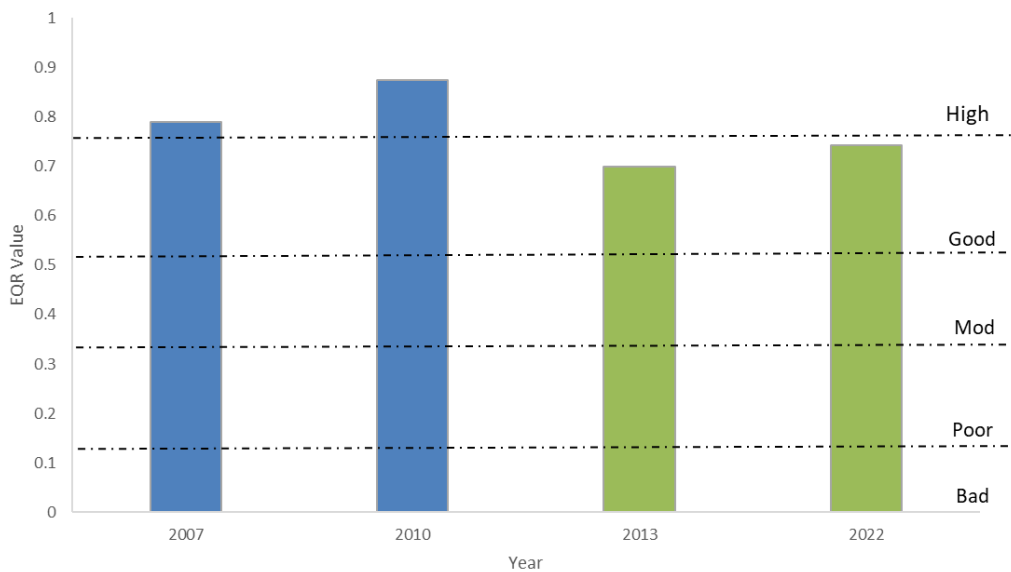
4.   Summary and fish ecological status

Brown trout was the dominant species in terms of both abundance (CPUE) and biomass (BPUE) during the 2022 survey. This species has dominated fish stocks on all previous sampling occasions. Populations of brown trout have remained relatively constant across all sampling occasions. The population was dominated by younger age cohorts (all 3+ and younger) which are recruiting regularly to the lake.

Minnow were also captured during the 2022 survey. Abundance and biomass of eel have declined consistently across all surveys. In 2022, no eels were captured.

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, Maumwee Lough has been assigned an ecological status of Good for 2022 based on the fish populations present. Maumwee Lough was assigned a status of Good in 2013. and High status in 2007 and 2010 (Figure 4.1).

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

Figure. 4.1. Fish ecological status, Maumwee Lough, 2007 2010, 2013 and 2022 (dashed line indicates EQR status boundaries).

5. References

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