



Sampling Fish for the Water Framework Directive

Lakes 2010

Maumwee Lough



Iascach Intíre Éireann
Inland Fisheries Ireland

ACKNOWLEDGEMENTS

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1.1 Introduction

Maumwee Lough (Plate 1.1, Fig. 1.1) is situated in the Corrib catchment, approximately 2km north of Maam Cross, Co. Galway. 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 CaCO₃).

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 is made up of quartzite and in the north of the SAC the bedrock is generally comprised of shales and slates (NPWS, 2006).

The site is a candidate SAC for containing blanket bog, lowland oligotrophic lakes, alpine heath, siliceous rock and Rhynchosporion, all habitats listed on Annex I of the E.U. Habitats Directive (NPWS, 2006). The SAC is also selected for containing slender naiad and Atlantic salmon, 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 and the common frog. Birdlife in the area includes dipper, heron, kestrel, meadow pipit, raven, snipe, stonechat, wheatear and woodcock. Peregrine, a species listed on Annex I of the EU Birds Directive also occur within the SAC (NPWS, 2006).

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, 2006).

Salmon and trout 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 as part of the WFD surveillance monitoring programme (Kelly and Connor, 2007). During this survey brown trout and minnow were found to be the dominant species present. Eels and juvenile salmon were also recorded.



Plate 1.1. Maumwee Lough

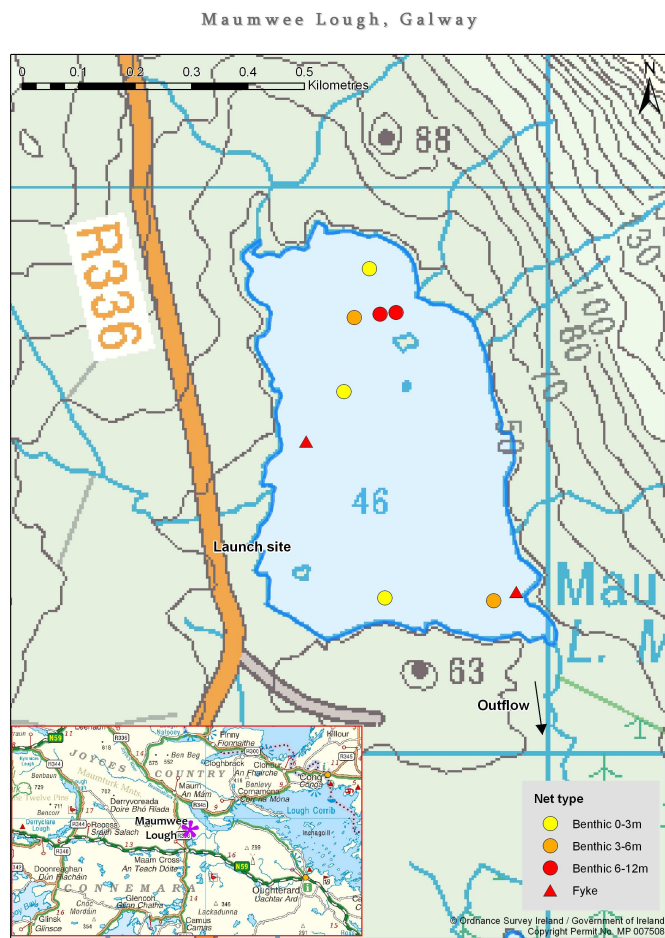


Fig. 1.1. Location map of Maumwee Lough showing net locations and depths of each net (outflow is indicated on map)

1.2 Methods

Maumwee Lough was surveyed over one night on the 30th of August 2010. 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 all brown 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.

1.3 Results

1.3.1 Species Richness

A total of five fish species were recorded in Maumwee Lough in August 2010, with 124 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 minnow, eels, salmon and three-spined stickleback. During the previous survey in 2007 the same species composition was recorded with the exception of three-spined stickleback, which were present in the current survey but were not captured in the 2007 survey.

Table 1.1. Number of each fish species captured by each gear type during the survey on Maumwee Lough, August 2010

Scientific name	Common name	Number of fish captured			
		Benthic mono nets	multimesh gill	Fyke nets	Total
<i>Salmo trutta</i>	Brown trout	88		7	95
<i>Phoxinus phoxinus</i>	Minnow	20		0	20
<i>Anguilla anguilla</i>	European eel	0		6	6
<i>Salmo salar</i>	Salmon	2		0	2
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	1		0	1

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 are summarised in Table 1.2. Mean CPUE is illustrated in Figure 1.2.

The differences in the mean brown trout CPUE between Maumwee Lough and three other similar lakes were assessed and found to be statistically significant (Kruskal-Wallis, $P < 0.001$) (Fig. 1.3). Independent-Samples Mann-Whitney U tests between each lake showed that Maumwee Lough had a significantly higher mean brown trout CPUE than Lough Nambrackmore ($z = -2.752$, $P < 0.05$), Lough Shindilla ($z = -4.254$, $P < 0.001$) and Ardderry Lough ($z = -4.196$, $P < 0.001$).

Although the mean minnow CPUE was lower in 2010 than in 2007, this was not statistically significant.

Table 1.2. Mean (S.E.) CPUE and BPUE on Maumwee Lough

Scientific name	Common name	2007	2010
Mean CPUE			
<i>Salmo trutta</i>	Brown trout	0.337 (0.084)	0.339 (0.078)
<i>Phoxinus phoxinus</i>	Minnow	0.107 (0.047)	0.074 (0.027)
<i>Salmo salar</i>	Salmon	0.004 (0.003)	0.007 (0.005)
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	-	0.004 (0.004)
<i>Anguilla anguilla</i>	European eel	0.067	0.050 (0.033)
Mean BPUE			
<i>Salmo trutta</i>	Brown trout	36.909 (9.157)	21.505 (5.441)
<i>Salmo salar</i>	Salmon	0.044 (0.044)	15.556 (10.349)
<i>Phoxinus phoxinus</i>	Minnow	0.500 (0.227)	0.167 (0.057)
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	-	0.006 (0.006)
<i>Anguilla anguilla</i>	European eel	22.366 (10.516)	15.475 (9.875)

* On the rare occasion where biomass data was unavailable for an individual fish, this was determined from a length/weight regression for that species.

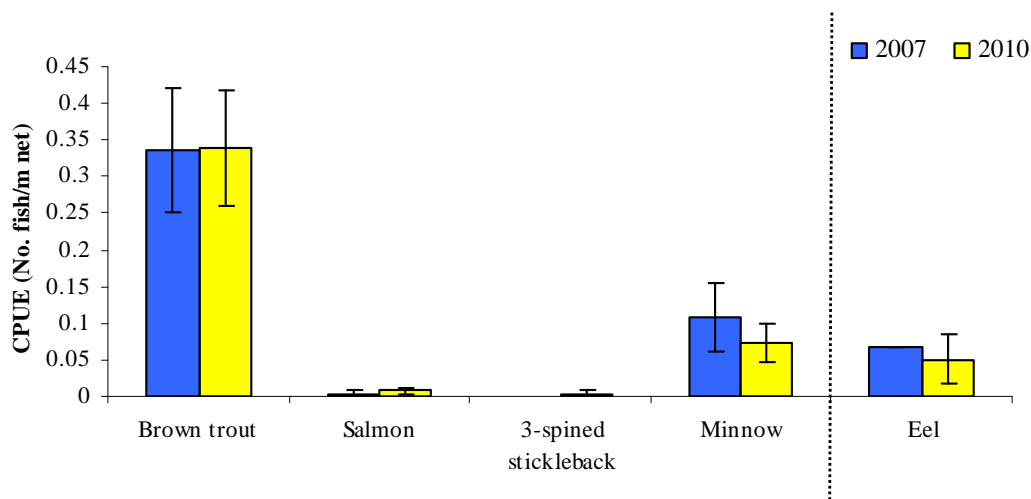


Fig. 1.2. Mean (\pm S.E.) CPUE for all fish species captured in Maumwee Lough (Eel CPUE based on fyke nets only)

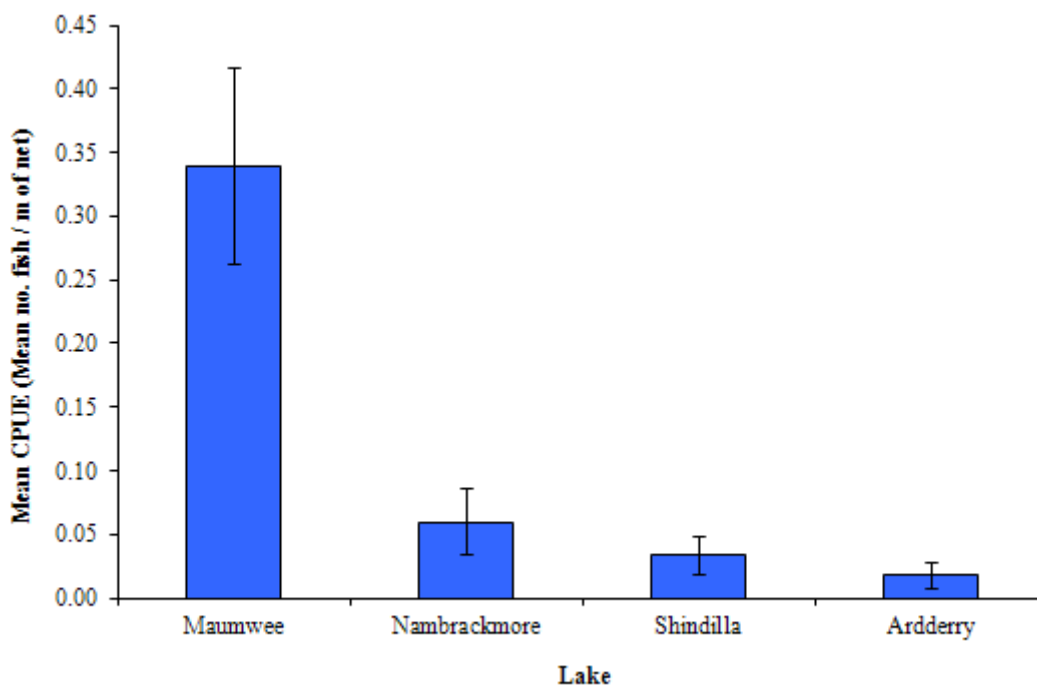


Fig. 1.3. Mean (\pm S.E.) brown trout CPUE in four lakes surveyed during 2010

1.3.3 Length frequency distributions

Brown trout captured during the 2010 survey ranged in length from 6.6cm to 27.3cm (mean = 17.2cm) (Fig. 1.4). Brown trout captured during the 2007 survey ranged in length from 6.4cm to 43.8cm (Fig. 1.4).

Eels captured during the 2010 survey ranged in length from 40.4cm to 64.8cm (mean = 55.8cm) (Fig. 1.5). Eels captured during the 2007 survey ranged in length from 40.0cm to 88.0cm (Fig. 1.4).

Minnow captured during the 2010 survey ranged in length from 4.0cm to 7.0cm and adult salmon ranged in length from 52.5cm to 64cm.

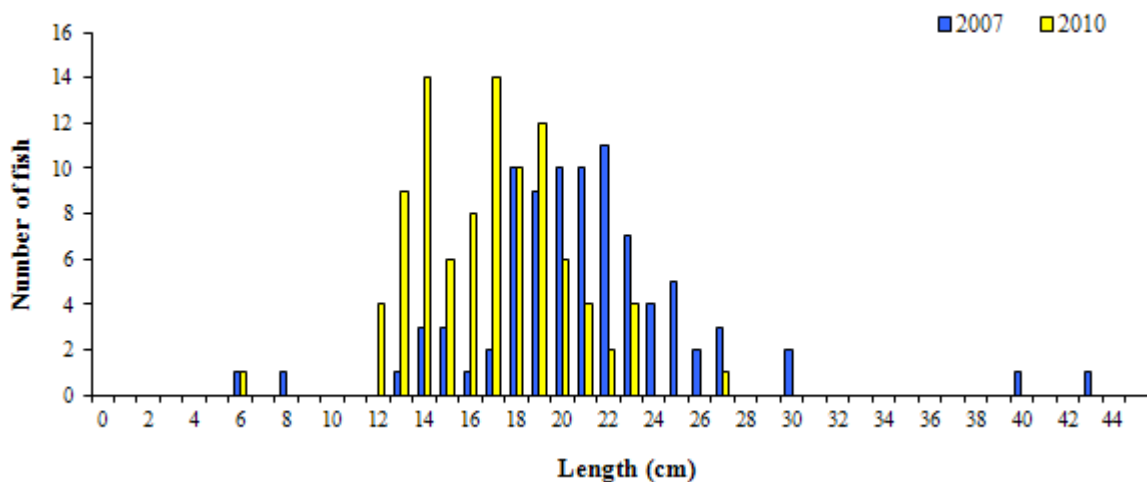


Fig. 1.4. Length frequency of brown trout captured in Maumwee Lough, 2007 and 2010

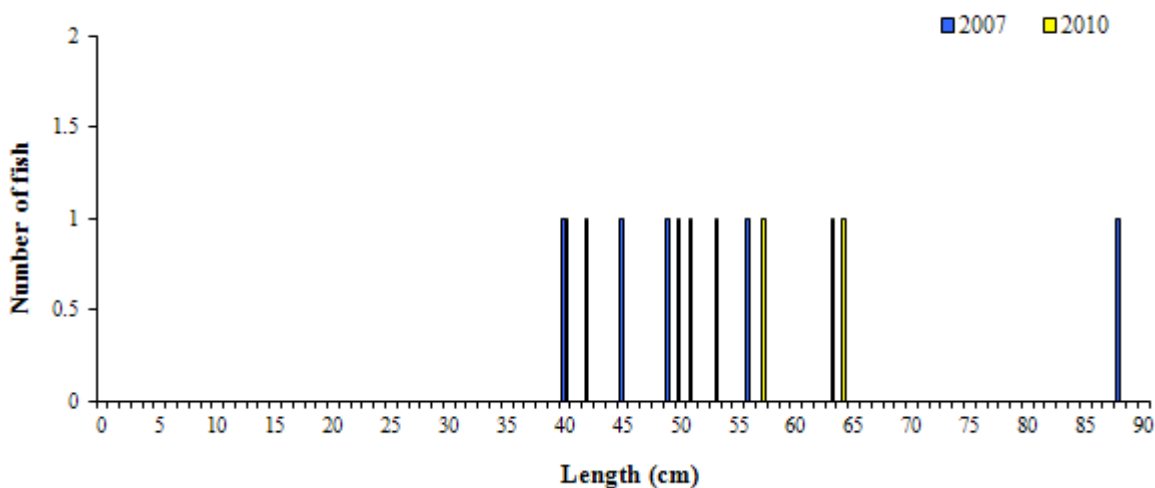


Fig. 1.5. Length frequency of eels captured in Maumwee Lough, 2007 and 2010

1.3.4 Fish age and growth

Four age classes of brown trout were present, ranging from 1+ to 4+, with a mean L1 of 6.6cm (Table 1.3). In the 2007 survey, brown trout ranged from 0+ to 5+ with a mean L1 of 6.8cm. The 1+ and 2+ age classes were dominant in 2010, whereas the 2+ and 3+ age classes were dominant in 2007. Mean brown trout L4 in 2010 was 25.6cm indicating a slow rate of growth for brown trout in this lake according to the classification scheme of Kennedy and Fitzmaurice (1971).

The two salmon captured were aged 2.1+.

Table 1.3. Mean (\pm SE) brown trout length (cm) at age in Maumwee Lough, August 2010

	L ₁	L ₂	L ₃	L ₄
Mean	6.6 (0.2)	15.1 (0.3)	20.0 (0.6)	25.6
N	55	38	9	1
Range	3.7-9.6	11.0-21.0	17.5-22.8	25.6-25.6

1.4 Summary

Brown trout was the dominant species in terms of both abundance (CPUE) and biomass (BPUE).

The mean brown trout CPUE in Maumwee Lough was significantly higher than the three other similar lakes surveyed: Lough Nambrackmore, Lough Shindilla and Ardderry Lough. Brown trout ranged in age from 1+ to 4+ indicating reproductive success in four of the previous five 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 by 2015 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. Using the FIL2 classification tool, Maumwee Lough has been assigned an ecological status of High in both 2007 and 2010 based on the fish populations present.

In the 2007 to 2009 surveillance monitoring reporting period, the EPA assigned Maumwee Lough an overall ecological status of High, based on all monitored physico-chemical and biological elements, including fish. This status classification will be revised at the end of 2012.

1.5 References

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- Kelly, F.L., Harrison, A., Connor, L., Allen, M., Rosell, R. and Champ, T. (2008) *FISH IN LAKES Task 6.9: Classification tool for Fish in Lakes. FINAL REPORT*. Central Fisheries Board, NSSHARE project.
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- WRFB (2006) Bathymetric survey of lakes in the Western Regional Fisheries Board Area. A Water Framework Directive Project, 2006

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