

# **Sampling Fish for the Water Framework Directive**

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*Lakes 2013*

**Maumwee Lough**



Iascach Intíre Éireann  
Inland Fisheries Ireland



## Water Framework Directive Fish Stock Survey of Maumwee Lough, August 2013

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## 1.1 Introduction

Maumwee Lough is situated in the Corrib catchment, approximately 2km north of Maam Cross, Co. Galway (Plate 1.1, Fig. 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<sub>3</sub>).

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, 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*).

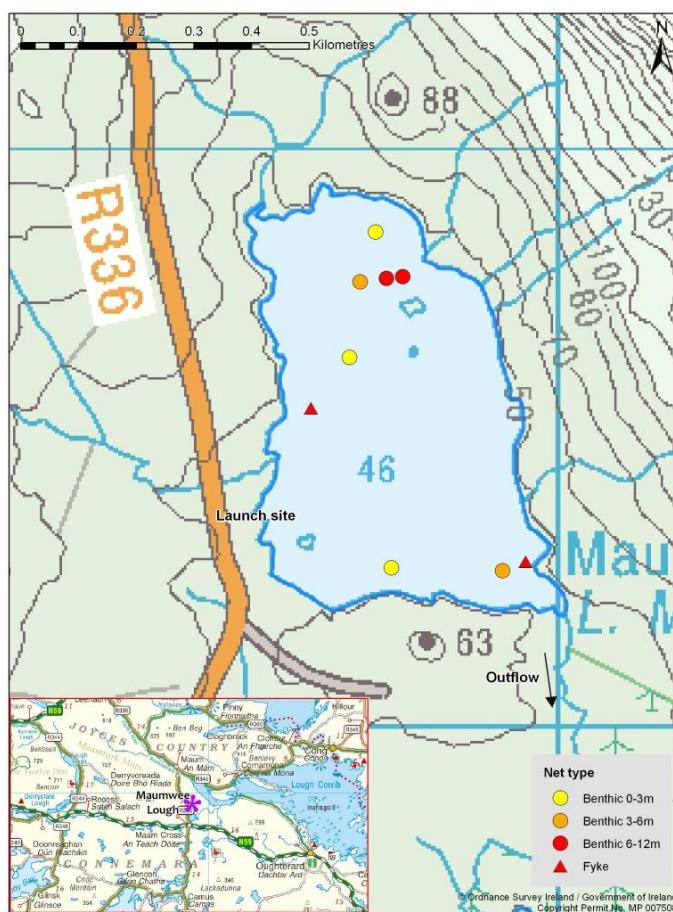
Damaging activities and threats to the Maumturk Mountains SAC include overgrazing, peat-cutting and afforestation. Grazing, in particular by sheep, is quite severe within the site and has resulted in the erosion of both lowland and mountain blanket bog (NPWS, 2006).

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 and 2010 as part of the WFD surveillance monitoring programme (Kelly and Connor, 2007 & Kelly *et al.*, 2011). During the 2010 survey brown trout were found to be the dominant species present. Minnow, 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 12<sup>th</sup> of August 2013. 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 four fish species were recorded in Maumwee Lough in August 2013, with 157 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, salmon and eels. During the previous surveys in 2010 and 2007 the same species composition was recorded with the exception of three-spined stickleback, which were recorded in the 2010 survey but were not captured in the current survey or the 2007 survey.

**Table 1.1. Number of each fish species captured by each gear type during the survey on Maumwee Lough, August 2013**

Scientific name	Common name	Number of fish captured		
		Benthic mono multimesh gill nets	Fyke nets	Total
<i>Salmo trutta</i>	Brown trout	121	1	122
<i>Phoxinus phoxinus</i>	Minnow	28	0	28
<i>Salmo salar</i>	Salmon	4	0	4
<i>Anguilla anguilla</i>	European eel	0	3	3

### 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 2010 and 2013 surveys are summarised in Table 1.2. Mean CPUE and BPUE for all species is illustrated in Figure 1.2 and 1.3.

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

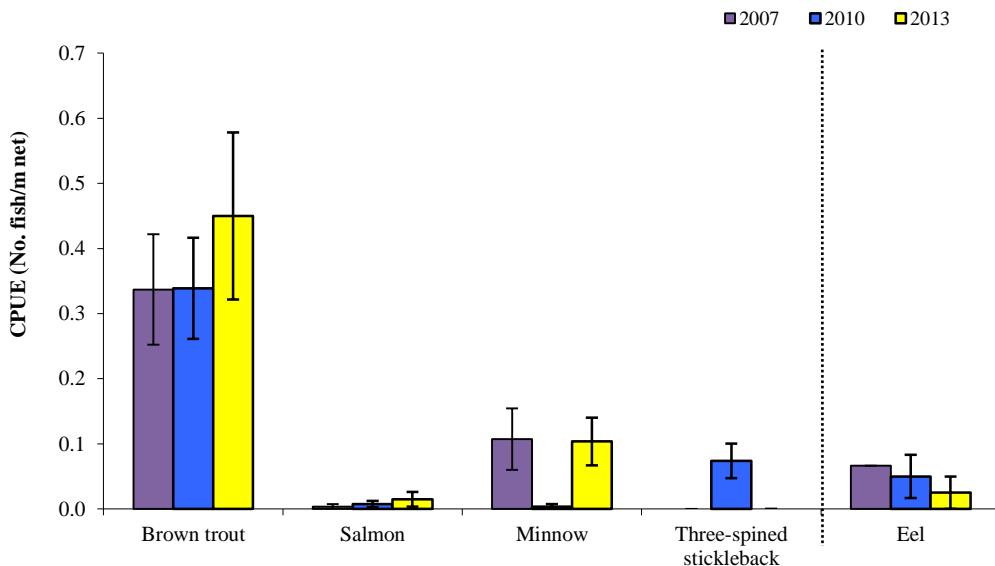
Although the mean brown trout CPUE was higher in 2013 than in 2010 and 2007, these differences were not statistically significant (Table 1.2; Fig 1.2 and 1.3). Also the mean brown trout BPUE was lower in 2010 than in 2007 and then increased in 2013, however, these differences were not statistically significant (Table 1.2; Fig 1.2 and 1.3).

**Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Maumwee Lough, 2007, 2010 and 2013**

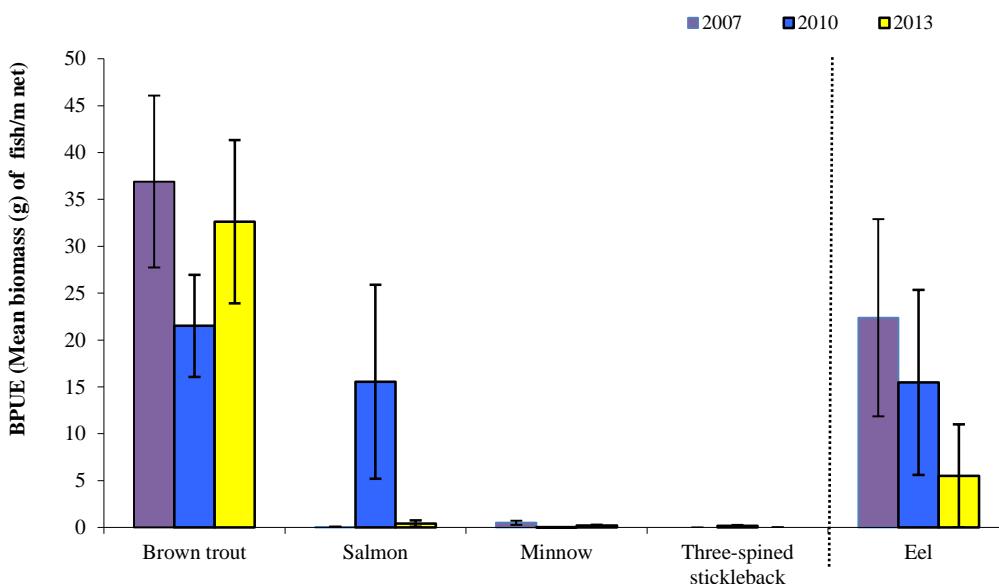
Scientific name	Common name	2007	2010	2013
<b>Mean CPUE</b>				
<i>Salmo trutta</i>	Brown trout	0.337 (0.084)	0.339 (0.078)	0.450 (0.128)
<i>Phoxinus phoxinus</i>	Minnow	0.107 (0.047)	0.074 (0.027)	0.015 (0.011)
<i>Salmo salar</i>	Salmon	0.004 (0.003)	0.007 (0.005)	0.104 (0.037)
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	-	0.004 (0.004)	-
<i>Anguilla anguilla</i>	European eel*	0.067	0.050 (0.033)	0.025 (0.025)
<b>Mean BPUE</b>				
<i>Salmo trutta</i>	Brown trout	36.909 (9.157)	21.505 (5.441)	32.622 (8.701)
<i>Salmo salar</i>	Salmon	0.044 (0.044)	15.556 (10.349)	0.419 (0.334)
<i>Phoxinus phoxinus</i>	Minnow	0.500 (0.227)	0.167 (0.057)	0.217 (0.071)
<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)	5.492 (5.492)

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.

\*Eel CPUE and BPUE based on fyke nets only



**Fig. 1.2. Mean ( $\pm$ S.E.) CPUE for all fish species captured in Maumwee Lough (Eel CPUE based on fyke nets only), 2007, 2010 and 2013**



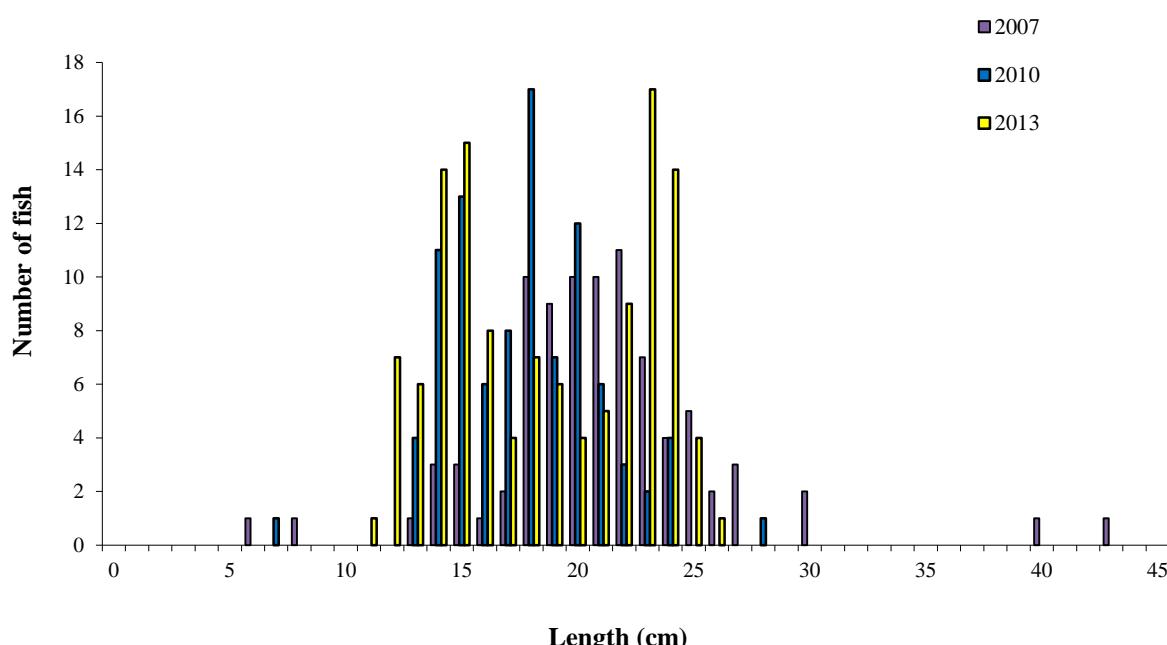
**Fig. 1.3. Mean ( $\pm$ S.E.) BPUE for all fish species captured in Maumwee Lough (Eel BPUE based on fyke nets only), 2007, 2010 and 2013**

### 1.3.3 Length frequency distributions and growth

Brown trout captured during the 2013 survey ranged in length from 11.0cm to 26.0cm (mean = 18.1cm) (Fig. 1.4) with four age classes present, ranging from 1+ to 4+, with a mean L1 of 6.4cm (Table 1.3). The dominant age class was 1+ (Fig 1.4). Mean brown trout L4 in 2013 was 23.0cm indicating a very slow rate of growth for brown trout in this lake according to the classification scheme of Kennedy and Fitzmaurice (1971). Brown trout captured during the 2010 survey ranged in length from 6.6cm to 27.3cm (Fig. 1.4) and had a similar age range and growth rate to 2013. In the 2007 survey, brown trout ranged in length from 6.4cm to 43.8cm (aged 0+ to 5+) (Fig.1.4). The 1+ and 2+ age classes were dominant in 2010, whereas the 2+ and 3+ age classes were dominant in 2007.

Minnow captured during the 2013 survey ranged in length from 4.6cm to 7.0cm (mean = 5.7cm). Minnow captured during the 2010 survey ranged in length from 4.0cm to 7.0cm.

Eels captured during the 2013 survey ranged in length from 39.5cm to 54.8cm. Juvenile salmon ranged in length from 12.1cm to 13.0cm and were aged at 1+.



**Fig. 1.4. Length frequency of brown trout captured in Maumwee Lough, 2007, 2010 and 2013**

**Table 1.3. Mean ( $\pm$ SE) brown trout length (cm) at age in Maumwee Lough, August 2013**

	<b>L<sub>1</sub></b>	<b>L<sub>2</sub></b>	<b>L<sub>3</sub></b>	<b>L<sub>4</sub></b>
Mean	6.4 (0.2)	15.7 (0.4)	20.4 (0.5)	23.0 (0.9)
N	80	46	17	3
Range	3.5-9.6	9.2-20.6	16.3-23.7	21.7-24.6

## 1.4 Summary

Brown trout was the dominant species in terms of both abundance (CPUE) and biomass (BPUE) during the 2013 survey.

Although the mean brown trout CPUE was higher in 2013 than in 2010 and 2007, these differences were not statistically significant. Also the mean brown trout BPUE was lower in 2010 than in 2007 and then increased in 2013, however, these differences were not statistically significant. Brown trout ranged in age from 1+ to 4+ indicating reproductive success in four of the previous five years. The dominant age class was 1+. Length at age analyses revealed that brown trout in the lake exhibit a very slow rate of growth according to the classification scheme of Kennedy and Fitzmaurice (1971).

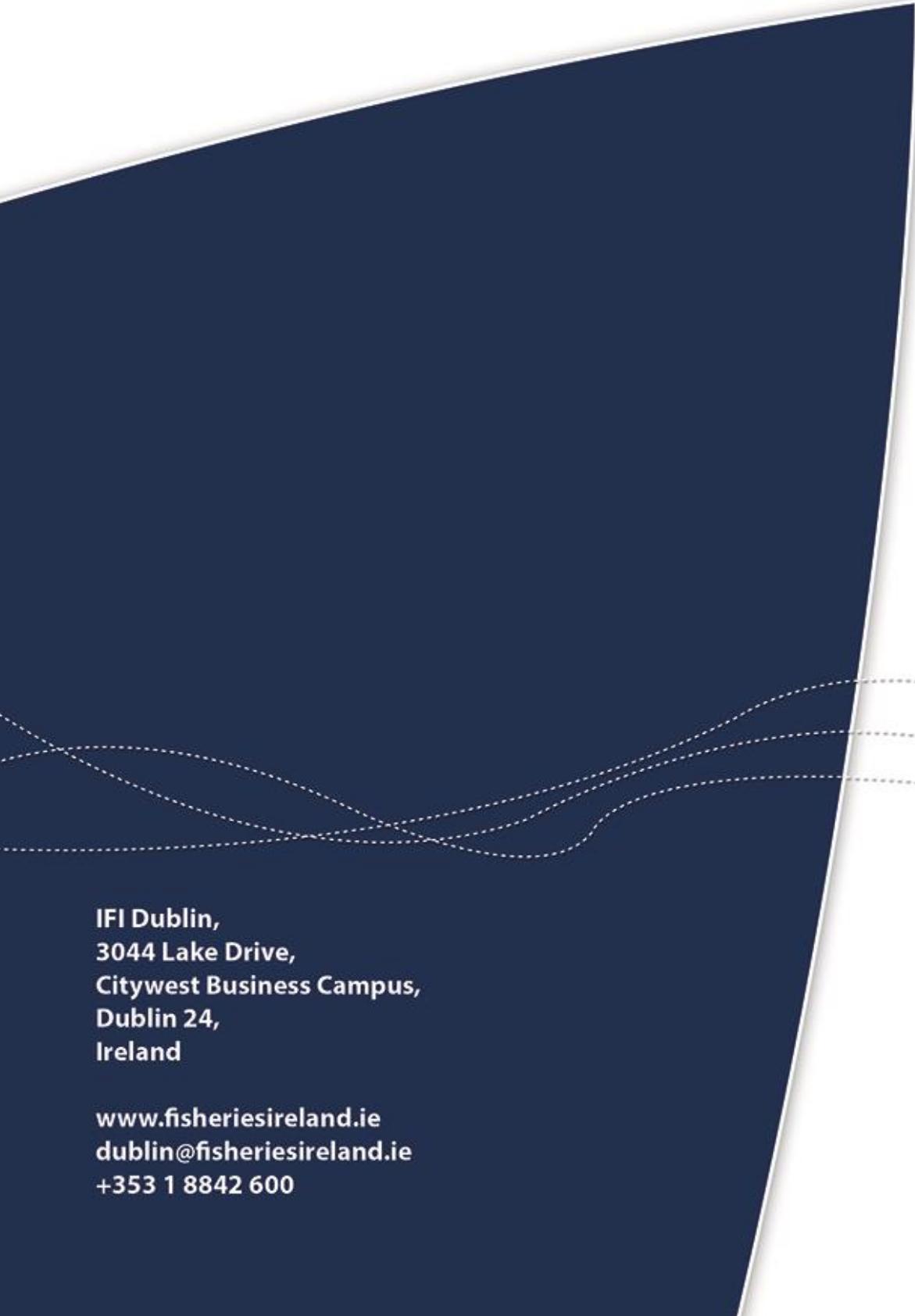
Classification and assigning lakes with an ecological status is a critical part of the WFD monitoring programme. It allows River Basin District managers to identify and prioritise lakes that currently fall short of the minimum “Good Ecological Status” that is required by 2015 if Ireland is not to incur 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 (Kelly *et al.*, 2012). Using the FIL2 classification tool, Maumwee Lough has been assigned an ecological status of Good based on the fish populations present in 2013. The ecological status assigned to the lake based on the 2007 and 2010 survey data was High.

In the 2010 to 2012 surveillance monitoring reporting period, the EPA assigned Maumwee Lough an overall draft ecological status of High, based on all monitored physico-chemical and biological elements, including fish.

## 1.5 References

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