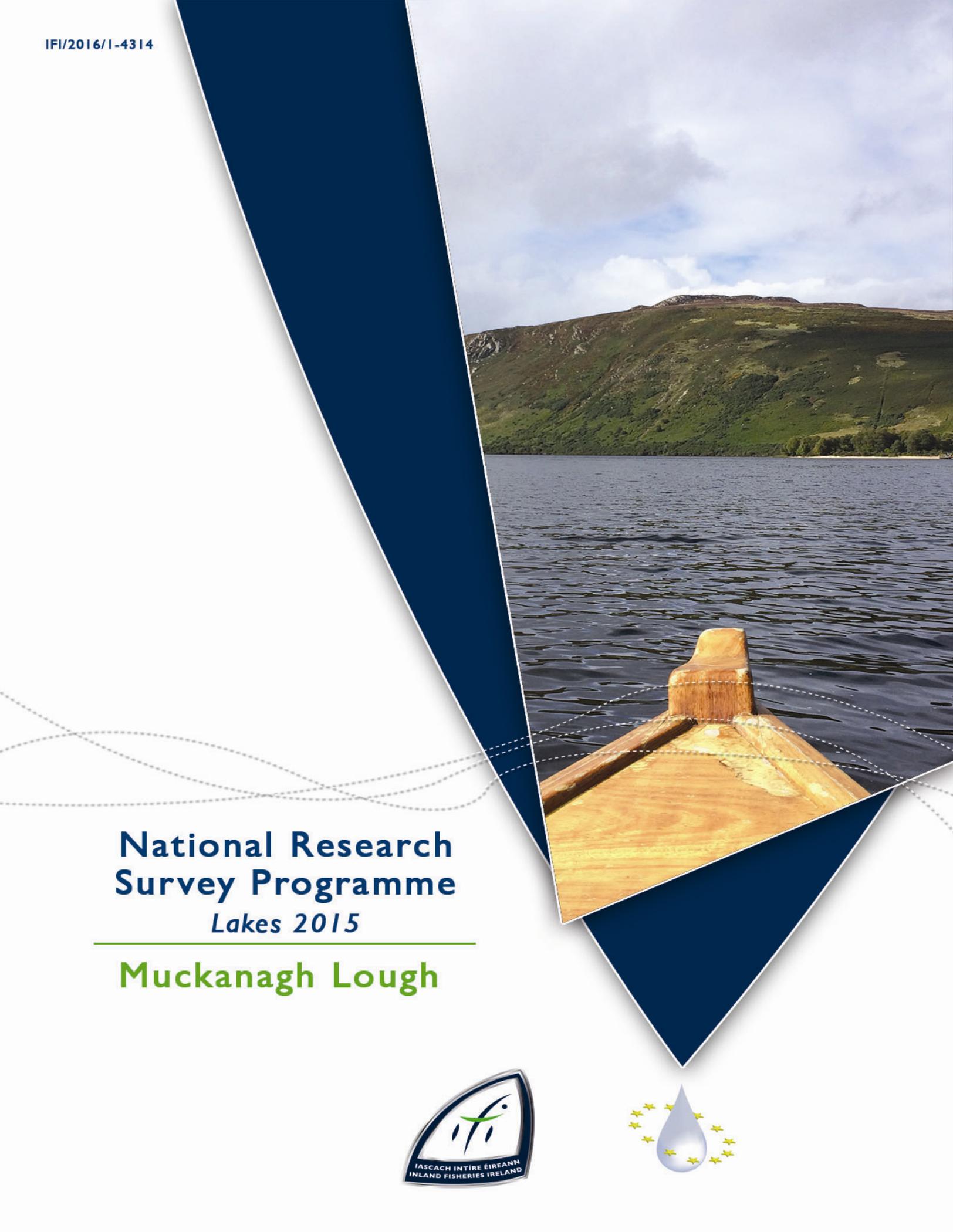


# National Research Survey Programme

*Lakes 2015*

## Muckanagh Lough





Inland Fisheries Ireland

National Research Survey Programme

**Fish Stock Survey of Muckanagh Lough,  
September 2015**

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



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## 1.1 Introduction

Muckanagh Lough is located within the Fergus catchment, approximately 10km east of the village of Corrofin, Co. Clare (Plate 1.1, Fig. 1.1). It is a shallow lake, with a mean depth of 3m, a maximum depth of 19m and a surface area of 95ha. The lake is categorised as typology class 10 (as designated by the EPA for the purposes of the Water Framework Directive), i.e. shallow (<4m), greater than 50ha and high alkalinity (>100mg/l CaCO<sub>3</sub>). The lake is located in the “East Burren Complex” Special Area of Conservation. The East Burren Complex SAC is a large area that encompasses all the high ground in the east Burren. A total of 12 different habitats listed on Annex I of the EU Habitats Directive are included within the site, including areas of limestone pavement, calcareous grasslands, heath scrub, woodlands and calcareous lakes and turloughs (NPWS, 2001). The SAC exhibits some of the best and most extensive areas of oligotrophic limestone wetlands to be found in the Burren and in Europe. Some of the most extensive calcareous swamp fen communities in the country also occur within this complex (NPWS, 2001).

Muckanagh Lough has historically held a good stock of brown trout (O’ Reilly, 1998). A survey carried out by the Inland Fisheries Trust during 1970 recorded stocks of brown trout and pike in the lake. Although perch, rudd and tench were present in the inlet canal in 1970, none of these species were recorded in the lake during this previous survey (Inland Fisheries Trust, unpublished data). The lake was previously stocked with brown trout during 1977; however test netting of the lake revealed that none of these fish survived (Inland Fisheries Trust, unpublished data).

This lake was surveyed as part of the Water Framework Directive surveillance monitoring programme in 2009 and 2012 (Kelly *et al.*, 2010 and 2013). During both of these surveys, perch were found to be the dominant species present in the lake. Rudd, brown trout, three-spined stickleback, tench, pike and eels were also captured during both surveys.



Plate 1.1. Muckanagh Lough

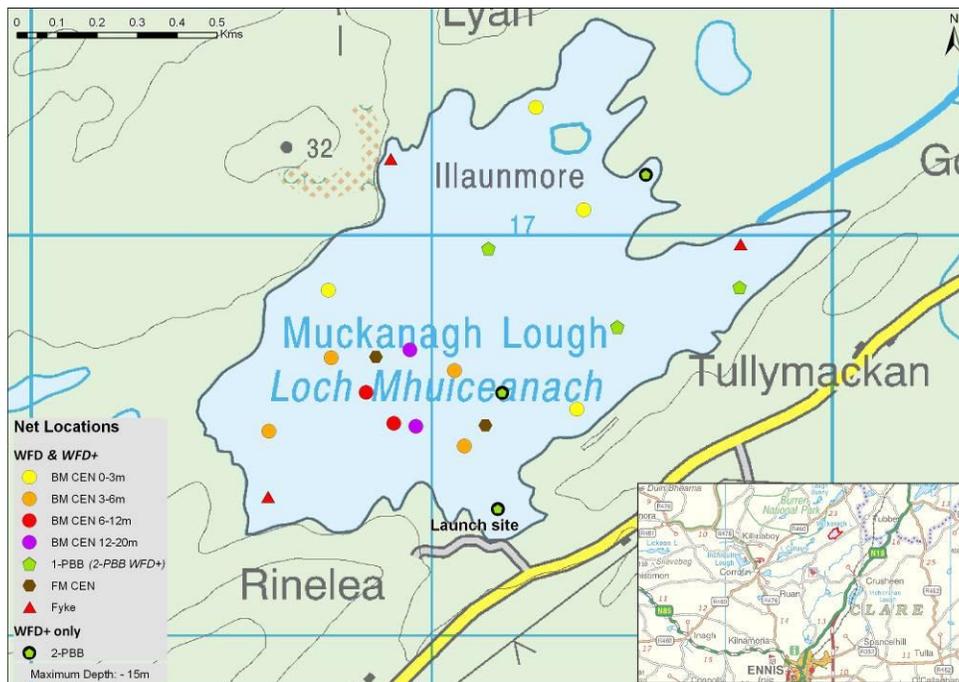


Fig. 1.1. Location map of Muckanagh Lough showing locations and depths of each net (outflow is indicated on map)



## **1.2 Methods**

### ***1.2.2 Netting methods***

Muckanagh Lough was surveyed over one night on the 28<sup>th</sup> of September 2015. A total of three Dutch fyke nets (Fyke), twelve benthic monofilament multi-mesh (12 panel, 5-55mm mesh knot to knot) CEN standard survey gill nets (BM CEN) and two surface floating monofilament multi-mesh (12 panel, 5-55mm mesh knot to knot) CEN standard survey gill nets (FM CEN) were deployed in the lake. The netting effort was supplemented using six two-panel benthic braided (63.5mm and 88.9mm mesh knot to knot) survey gill nets (2-PBB).

The nets were deployed in the same locations as randomly chosen in the previous surveys. The site locations for additional benthic braided survey gill nets (2-PBB) were chosen randomly within fixed depth zones. 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 also randomised.

All fish apart from perch were measured and weighed on site and scales were removed from all brown trout, pike and rudd. 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 returned to the laboratory for further analysis.

### ***1.2.2 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 on the IFI NRSP team when moving between water bodies.



## 1.3 Results

### 1.3.1 Species Richness

A total of four fish species were recorded on Muckanagh Lough in September 2015, with 168 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Perch was the most abundant fish species recorded, followed by rudd, pike and brown trout (Table 1.1). During the previous WFD surveys in 2009 and 2012 a similar species composition was recorded with the exception of three-spined stickleback, tench and eels, which were captured during both the 2009 and 2012 surveys but were not recorded during the 2015 survey.

**Table 1.1. Number of each fish species captured by each gear type during the survey on Muckanagh Lough, September 2015**

Scientific name	Common name	Number of fish captured				
		2-PBB	BM CEN	FM CEN	Fyke	Total
<i>Perca fluviatilis</i>	Perch	0	150	0	0	150
<i>Scardinius erythrophthalmus</i>	Rudd	0	9	2	0	11
<i>Esox lucius</i>	Pike	0	4	0	2	6
<i>Salmo trutta</i>	Brown trout	1	0	0	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 captured in the survey are summarised in Table 1.2.

Perch was the dominant fish species in terms of abundance and biomass (Table 1.2).



**Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Muckanagh Lough, 2015**

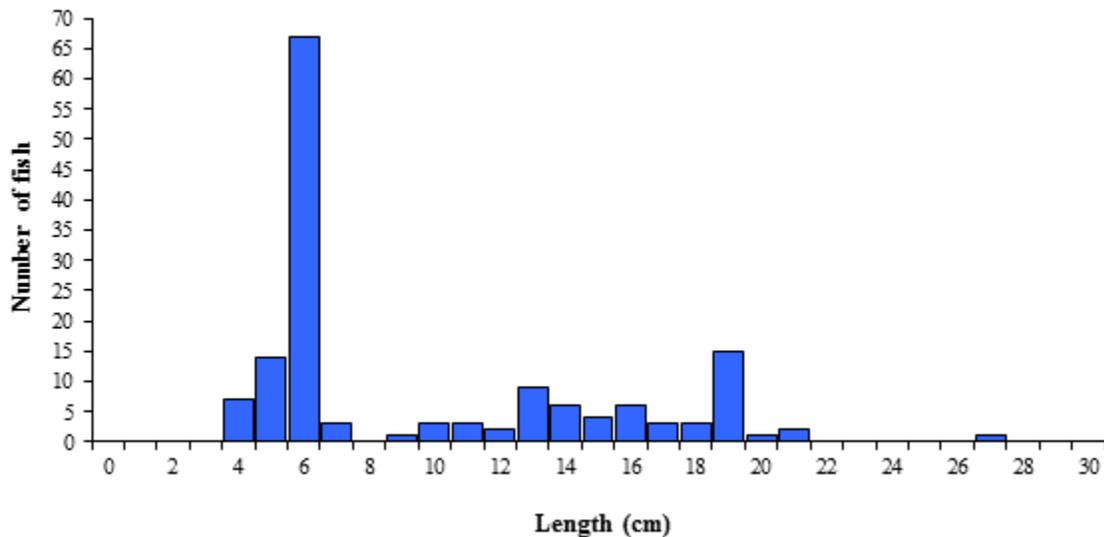
Scientific name	Common name	Mean CPUE ( $\pm$ S.E.)*
<i>Perca fluviatilis</i>	Perch	0.217 (0.099)
<i>Scardinius erythrophthalmus</i>	Rudd	0.016 (0.006)
<i>Esox lucius</i>	Pike	0.007 (0.004)
<i>Salmo trutta</i>	Brown trout	0.001 (0.001)
<b>Mean BPUE (<math>\pm</math> S.E.)*</b>		
<i>Perca fluviatilis</i>	Perch	6.719 (4.193)
<i>Scardinius erythrophthalmus</i>	Rudd	0.333 (0.160)
<i>Esox lucius</i>	Pike	3.708 (3.101)
<i>Salmo trutta</i>	Brown trout	1.494 (1.494)

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.

\*CPUE and BPUE data above for all fish species except eels are not comparable to earlier surveys as an extra panel was added to the 2-PBB to provide additional information on large coarse fish.

### 1.3.3 Length frequency distributions and growth

Perch captured during the 2015 survey ranged in length from 4.5cm to 27.1cm (mean = 10.0cm) (Fig.1.2) with five age classes present, ranging from 0+ to 5+ with a mean L1 of 7.2cm (Table 1.3). The dominant age class was 0+ (Fig.1.2).



**Fig. 1.2. Length frequency of perch captured on Muckanagh Lough, 2015**



**Table 1.3. Mean ( $\pm$ S.E.) perch length (cm) at age for Muckanagh Lough, September 2015**

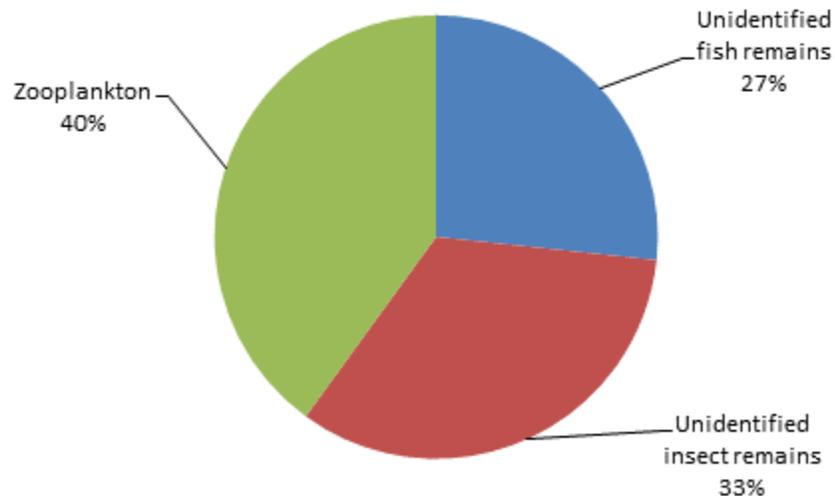
	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	L <sub>5</sub>
Mean ( $\pm$ S.E.)	7.2 (0.2)	14.4 (0.5)	18.3 (0.3)	21.5	25.3
N	32	14	3	1	1
Range	4.7	11.1	18.0-19.0	21.5-21.5	25.3-25.3

Pike captured during the 2015 survey ranged in length from 14.0cm to 64.0cm, eleven rudd were recorded and ranged in length from 6.6cm to 13.4cm and were aged from 1+ to 2+. One brown trout was captured and measured 53.0cm.

#### ***1.3.4 Stomach and diet analysis***

Feeding 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.

Perch initially start to feed on pelagic zooplankton. Once they reach an intermediate size they start feeding on benthic resources eventually moving on to feed on fish once they are large enough (Hjelm *et al.*, 2000). The food items recorded in a sub sample of perch captured during the survey were dominated by zooplankton (Fig 1.3).



**Fig. 1.3. Diet of perch captured on Muckanagh Lough 2015 (% occurrence) n=14**



#### **1.4 Summary and ecological status**

Perch was the dominant species in terms of abundance (CPUE) and biomass (BPUE) captured in the survey gill nets during the 2015 survey.

Perch ranged in length from 4.5cm to 27.1cm and ranged in age from 0+ to 5+, indicating reproductive success in each of the previous six years. The dominant age class was 0+.

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.

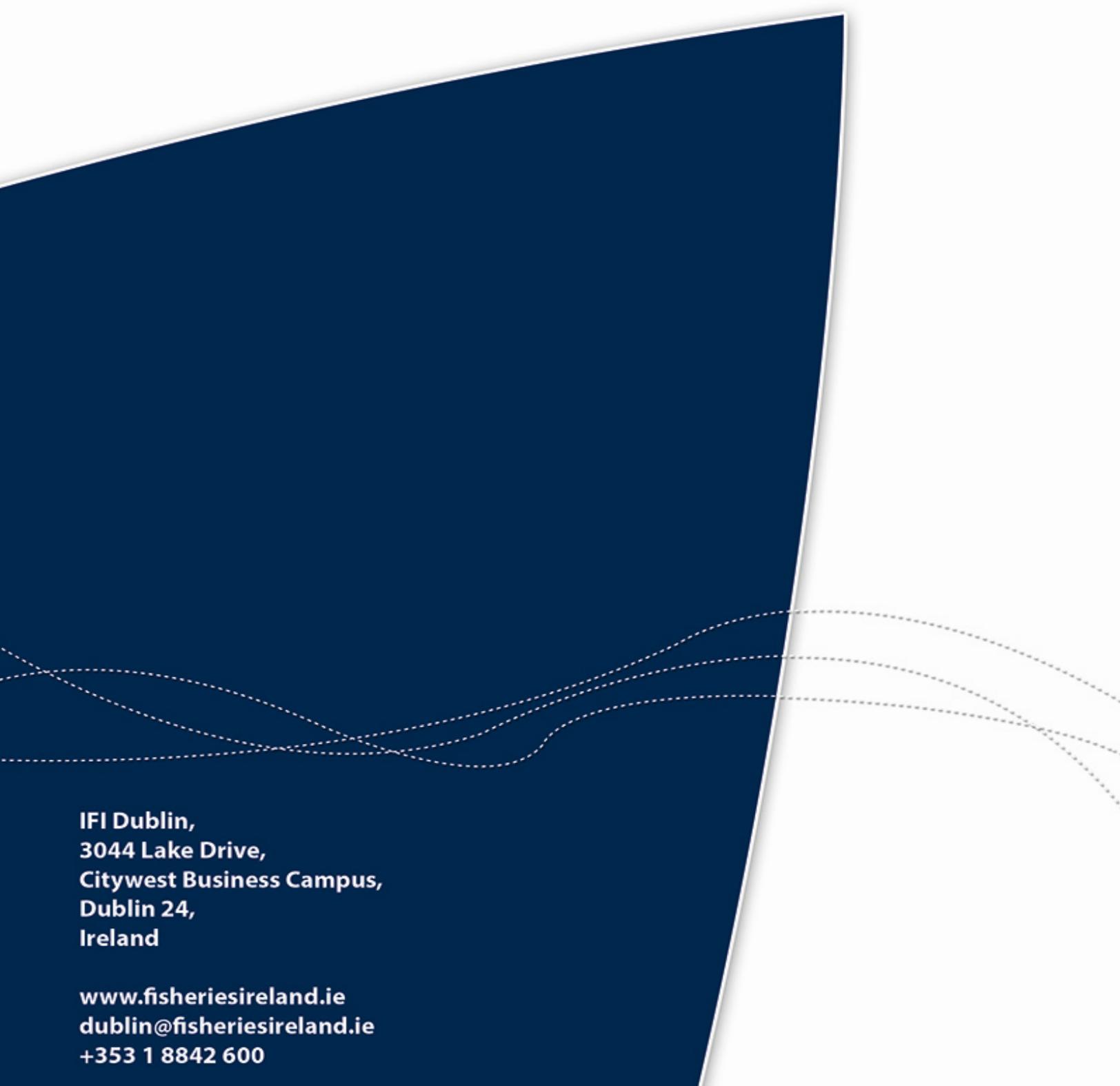
A multimetric fish ecological classification tool (Fish in Lakes – ‘FIL’) was developed for the island of Ireland (Ecoregion 17) using IFI and Agri-Food and Biosciences Institute Northern Ireland (AFBINI) data generated during the NSSHARE Fish in Lakes project (Kelly *et al.*, 2008). This tool was further 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.*, 2012b). Using the FIL2 classification tool, Muckanagh Lough has been assigned an ecological status of Good for 2009, Moderate for 2012 and High for 2015 based on the fish populations present.

In the 2010 to 2012 surveillance monitoring reporting period, the EPA assigned Muckanagh Lough an overall draft ecological status of Moderate, based on all monitored physico-chemical and biological elements, including fish. This status classification will be revised during 2016.



## 1.5 References

- Caffrey, J. (2010) *IFI Biosecurity Protocol for Field Survey Work*. Inland Fisheries Ireland.
- Hjelm, J., Persson, L., and Christensen, B. (2000) Growth, morphological variation and ontogenetic niche shifts in perch (*Perca fluviatilis*) in relation to resource availability. *Oecologia*, **122**, (2), 190-199.
- 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, NS Share project.
- Kelly, F., Harrison A., Connor, L., Matson, R., Morrissey, E., O'Callaghan, R., Wogerbauer, C., Feeney, R., Hanna, G. and Rocks, K. (2010) *Sampling Fish for the Water Framework Directive – Summary Report 2009*. The Central and Regional Fisheries Boards.
- Kelly, F.L., Harrison, A.J., Allen, M., Connor, L. and Rosell, R. (2012) Development and application of an ecological classification tool for fish in lakes in Ireland. *Ecological Indicators*, **18**, 608-619.
- Kelly, F., Connor, L., Matson, R., Feeney, R., Morrissey, E., Wogerbauer, C. and Rocks, K. (2013) *Sampling Fish for the Water Framework Directive – Summary Report 2012*. Inland Fisheries Ireland.
- NPWS (2001) Site Synopsis: East Burren Complex, Site code 001926. Site Synopsis report, National Parks and Wildlife Service.
- O' Reilly, P. (1998) *Loughs of Ireland - A Flyfisher's Guide*. 3<sup>rd</sup> Edition. Merlin Unwin Books.

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