National Research Survey Programme
Lakes 2015

Lough Gara

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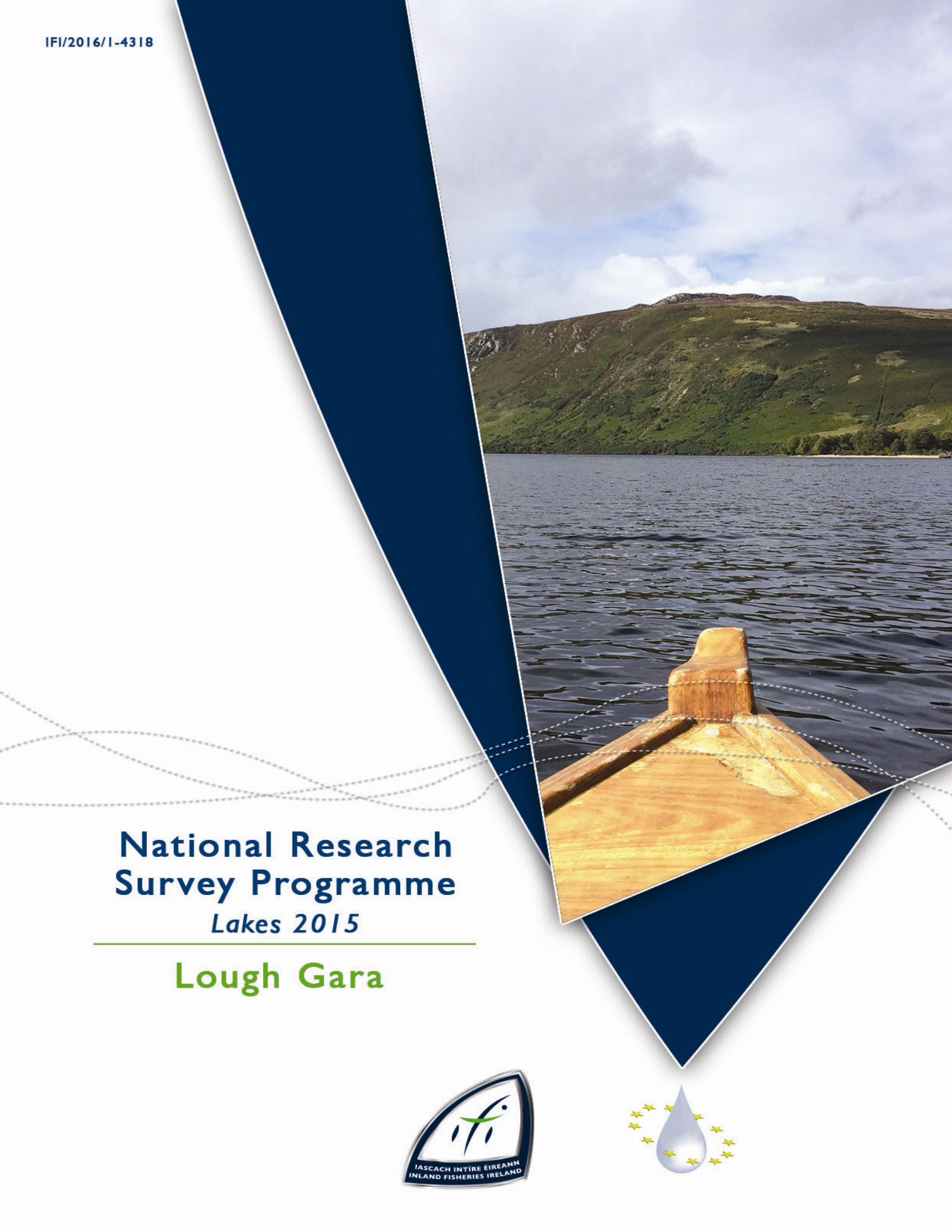
Inland Fisheries Ireland

National Research Survey Programme

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

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1.1 Introduction

Lough Gara is a small lake that lies to the south west of the Curlew Mountains in south Co. Sligo. While part of the lake reaches across the border into Co. Roscommon, it is mostly confined to Co. Sligo. The main inflowing river is the River Lung, while the main outflow is the River Boyle, (Plate 1.1, Fig. 1.1). The lake has a surface area of 1196ha, a mean depth of <4m and a maximum depth of 17.4m. 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 CaCO3).

The lake has been designated as a Special Protection Area (SPA) due to its high ornithological importance. The internationally important Greenland white-fronted goose population, the high numbers of Whooper swans and the presence of Golden Plover associated with the lake (NPWS, 2005).

There are two sections to the lake, a large northern basin and a smaller southern basin, joined by a narrow channel (Fig. 1.1). The shoreline is convoluted and has receded substantially from its original level due to various drainage schemes since the mid-19th century (NPWS, 2005). The shallow lake margins have extensive swamps dominated by reeds and sedges. The lake is used for water abstraction. The catchment lies, principally, on carboniferous limestone with seams of old red sandstone and Avonian shales/sandstone. The overlying soils are of poor quality, agriculturally, especially upstream of Lough Gara and consists of large areas of peat and gley soils (King, 1994).

The lake was surveyed in 1993 as part of a fish stock assessment by IFI's research section using seven-panel benthic braided survey gill nets (King, 1994). Brown trout, perch, pike, roach, roach x bream and roach x rudd hybrids, bream and rudd were recorded. The fish stock was dominated by a large stock of roach and bream with a significant amount of cyprinid hybrids.

The current survey had two objectives:

1. Assess the status of the fish stocks in the lake as part of IFIs national brown trout and coarse fish research programmes.

2. Undertake a method intercalibration exercise using the existing WFD multi method approach (benthic and floating multi-mesh monofilament survey gill nets, fyke nets, but adding supplementary two panel braided survey gill nets instead of one panel braided survey gill nets (WFD+)) and the method established by IFI in the late 1970s to assess the status of brown trout in lakes (seven panel braided survey gill nets), but adding an additional 88.90mm panel to these latter nets (8-PBB).

This report summarises the results of the 2015 fish stock survey (e.g. species composition, abundance and age structure) on Lough Gara using both methods above, while the method intercalibration results will be dealt with in a separate report.
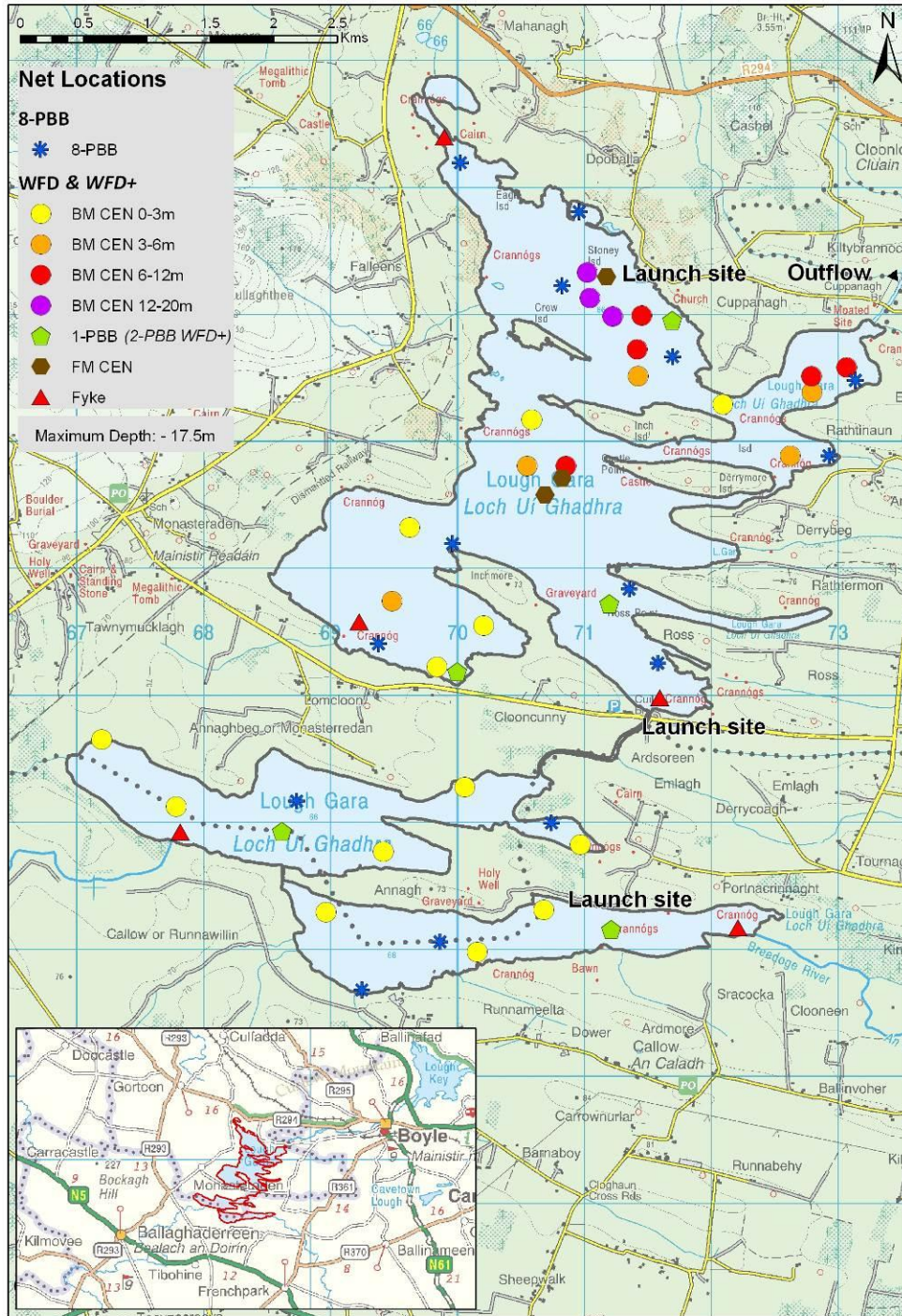

Plate 1.1. Lough Gara 2015

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

1.2 Methods

1.2.2 Netting methods

Lough Gara was surveyed over four nights between the 31st of August and the 4th of September 2015. A total of 5 Dutch fyke nets (Fyke), 26 benthic monofilament multi-mesh (12 panel, 5-55mm mesh knot to knot) CEN standard survey gill nets (BM CEN) and 3 surface floating monofilament multi-mesh (FM CEN) (12 panel, 5-55mm mesh knot to knot) CEN standard survey gill nets were deployed in the lake. The netting effort was supplemented using 5 two-panel benthic braided (63.5mm and 88.9mm mesh knot to knot) survey gill nets (1-PBB or 2-PBB).

In addition 14 eight-panel benthic braided survey gill nets (8-PBB) were deployed on the lake. The survey gill nets are composed of eight 27.5m long panels each a different mesh size, tied together randomly. The panels ranged from 2" (50.8mm stretched mesh, 25.4mm mesh knot to knot) to 5" (127mm stretched mesh, 63.5mm mesh knot to knot) in half inch (12.7mm) increments (O'Grady, 1981) with the addition of a 7" (177.8mm stretched mesh, 88.9mm mesh knot to knot) panel.

The site locations for the benthic and surface monofilament multi-mesh gill net (BM CEN and FM CEN) were chosen randomly within fixed depth zones (0-2.9m, 3-5.9m, 6-11.9m and 12-19.9m). 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, roach, bream, pike, hybrids, tench 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 eight fish species and one type of hybrid were recorded on Lough Gara in September 2015, with 1614 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Roach was the most abundant fish species recorded, followed by roach x bream hybrids, perch, pike, bream, eels, brown trout, tench and rudd (Table 1.1). During the previous survey in 1993, the same species composition was recorded with the exception of tench and eels. Roach x rudd hybrids were recorded in the 1993 survey but were not captured in the 2015 survey.

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

Scientific name	Common name	Number of fish captured					
		8-PBB	2-PBB	BM CEN	FM CEN	Fyke	Total
Rutlius Rutilus	Roach	594	0	334	25	1	954
Rutlius Rutilus x Abramis brama	Roach x bream hybrid	244	44	48	1	0	337
Perca fluviatilis	Perch	62	0	153	1	1	217
Esox lucius	Pike	45	0	6	0	2	53
Abramis brama	Bream	12	22	2	0	0	36
Salmo trutta	Brown trout	5	1	0	1	0	7
Scardinius erythropthalmus	Rudd	0	0	1	0	0	1
Tinca tinca	Tench	1	0	0	0	0	1
Anguilla anguilla	European eel	0	0	0	0	8	8

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 are summarised in Table 1.2.

Roach were the most dominant fish species in terms of abundance (CPUE) while roach x bream hybrids were the most dominant in terms of biomass (BPUE) (Table 1.2).

Table 1.2. Mean (S.E.) CPUE and BPUE)per metre of net) for all fish species captured on Lough Gara, 2015

Scientific name	Common name	8-PBB	WFD+**
		Mean CPUE (± S.E.)	
Rutlius Rutilus	Roach	0.193 (0.054)	0.307 (0.052)
Rutlius Rutilus x Abramis brama	Roach x bream hybrid	0.079 (0.013)	0.063 (0.013)
Perca fluviatilis	Perch	0.020 (0.008)	0.132 (0.033)
Esox lucius	Pike	0.015 (0.003)	0.006 (0.002)
Abramis brama	Bream	0.004 (0.001)	0.012 (0.0070
Salmo trutta	Brown trout	0.002 (0.001)	0.001 (0.001)
Scardinius erythropthalmus	Rudd	-	0.001 (0.001)
Tinca tinca	Tench	0.0003 (0.0003)	-
Anguilla anguilla	European eel	-	0.027 (0.012)*
		Mean BPUE (± S.E.)	
Rutlius Rutilus	Roach	-	38.644 (7.547)
Rutlius Rutilus x Abramis brama	Roach x bream hybrid	-	44.049 (10.990)
Perca fluviatilis	Perch	-	5.935 (1.693)
Esox lucius	Pike	-	1.601 (0.647)
Abramis brama	Bream	-	22.460 (15.303)
Salmo trutta	Brown trout	-	0.155 (0.108)
Scardinius erythropthalmus	Rudd	-	0.025 (0.025)
Tinca tinca	Tench	-	-
Anguilla anguilla	European eel	-	10.057 (5.014)*

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

**CPUE and BPUE data above for all fish species except eels are not comparable to earlier WFD 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

Roach

Roach captured during the 2015 survey ranged in length from 3.5cm to 34.1cm (mean = 20.4cm) (Fig.1.2) with eleven age classes present, ranging from 1+ to 12+ with a mean L1 of 2.6cm (Table 1.3). The dominant age class was 5+ (Fig. 1.2).
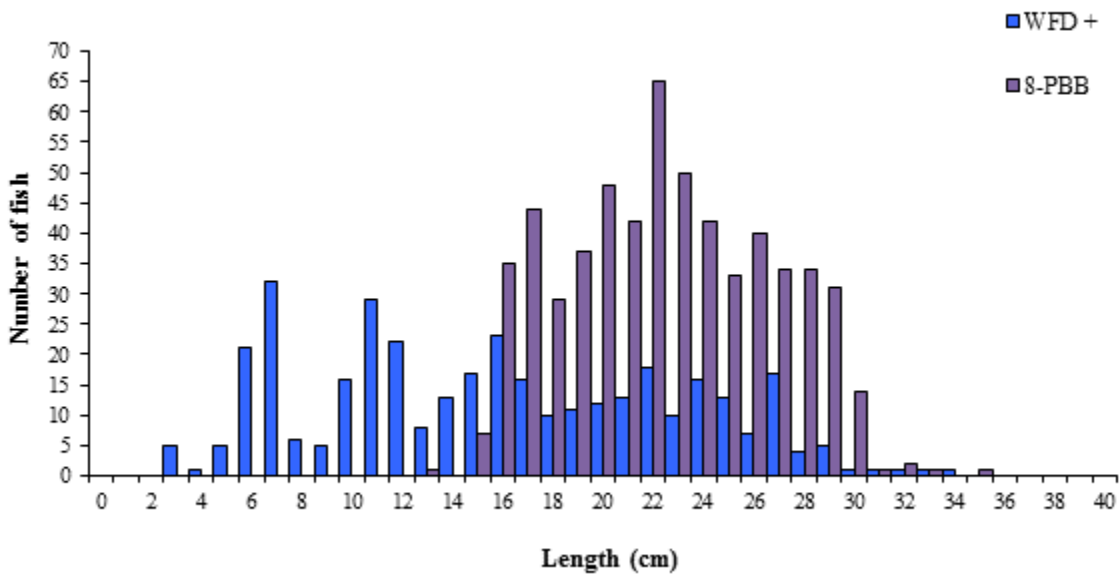

Fig. 1.2. Length frequency of roach captured on Lough Gara, 2015

Table 1.3. Mean (±S.E.) roach length (cm) at age for Lough Gara, September 2015

	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8	L_9	L_{10}	L_{11}	L_{12}
Mean	2.6	6.1	10.0	13.9	17.1	19.9	22.4	24.3	26.3	27.9	31.4	33.2
(±S.E.)	(0.1)	(0.2)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.4)	(0.6)	(0.6)	(0.8)
N	69	65	51	42	38	30	25	22	18	9	2	2
Range	1.5-4.0	3.7-9.0	5.3-14.4	10.0-18.0	12.8-20.8	16.1-23.0	19.2-25.1	20.6-26.2	21.5-28.1	24.7-29.5	30.8-32.0	32.4-34.1

Roach x bream hybrids

Roach x bream hybrids captured during the 2015 survey ranged in length from 13.7cm to 46.1cm (mean = 31.8cm) (Fig.1.3) with fifteen age classes present, ranging from 2+ to 16+ with a mean L1 of 3.0cm (Table 1.4).
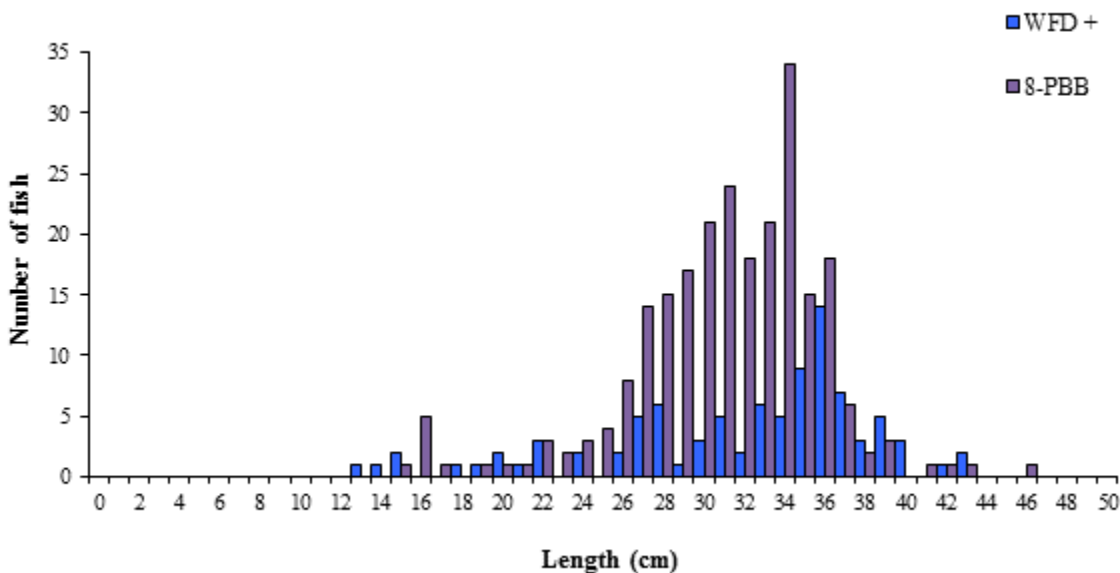

Fig. 1.3. Length frequency of roach x bream hybrids captured on Lough Gara, 2015

Table 1.4. Mean (±S.E.) roach x bream hybrids length (cm) at age for Lough Gara, September 2015

	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8	L_9	L_{10}	L_{11}	L_{12}	L_{13}	L_{14}	L_{15}
Mean	3.0	6.6	10.8	15.0	18.9	22.1	25.1	27.3	29.3	31.3	32.2	34.5	34.8	36.6	
(±S.E.)	(0.1)	(0.2)	(0.3)	(0.3)	(0.4)	(0.4)	(0.5)	(0.6)	(0.8)	(0.8)	(0.7)	(0.9)	(0.6)	(1.6)	33.7
N	48	48	47	42	41	39	35	28	20	18	12	12	7	3	1
Range	1.6- 4.5	4.3- 9.6	7.0- 16.0	10.3- 19.7	12.0- 23.6	15.4- 27.6	20.6- 31.3	19.7- 33.7	24.1- 36.1	26.2- 38.2	28.5- 36.5	30.3- 41.0	32.2- 36.4	33.5- 39.2	33.7- 33.7

Other fish

Perch captured during the 2015 survey ranged in length from 4.5cm to 31.1cm (mean = 14.8cm) and pike ranged in length from 14.8cm to 103.0cm.

Brown trout ranged in length from 20.0cm to 60.5 (mean = 37.5cm). Six age classes were present, ranging from 1+ to 6+, with a mean L1 of 7.4cm. Mean brown trout L4 in 2015 was 41.8cm indicating a

very fast rate of growth for brown trout in this lake according to the classification scheme of Kennedy and Fitzmaurice (1971).

Eels captured ranged in length from 54.0cm to 69.1cm, bream ranged in length from 21.0cm to 50.4cm, one rudd was recorded at 12.0cm and one tench at 29.2cm.

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

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 insect remains and zooplankton (Fig 1.4).
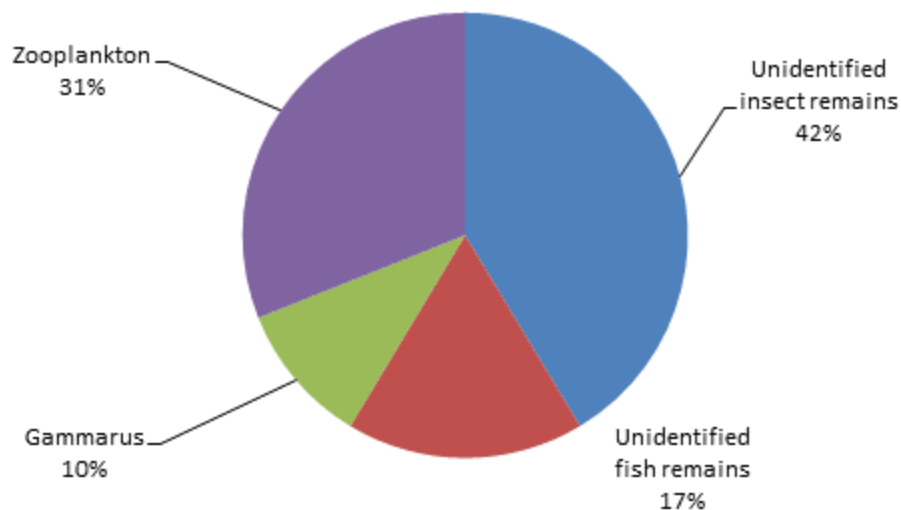

Fig. 1.4. Diet of perch captured on Lough Gara 2015 (% occurrence) n=25

1.4 Summary and ecological status

Roach was the dominant species in terms of abundance (CPUE) captured in the survey gill nets during the 2015 survey.

Roach ranged in length from 3.5cm to 34.1cm and ranged in age from 1+ to 12+, indicating reproductive success in twelve of the previous thirteen years. The dominant age class was 5+.

Roach x bream hybrids ranged in length from 13.7cm to 46.1cm with fifteen age classes present, ranging from 2+ to 16+.

Brown trout ranged in length from 20.0cm to 60.5 and ranged in age from 1+ to 6+. Length at age analyses revealed that brown trout in the lake exhibit a very fast 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.
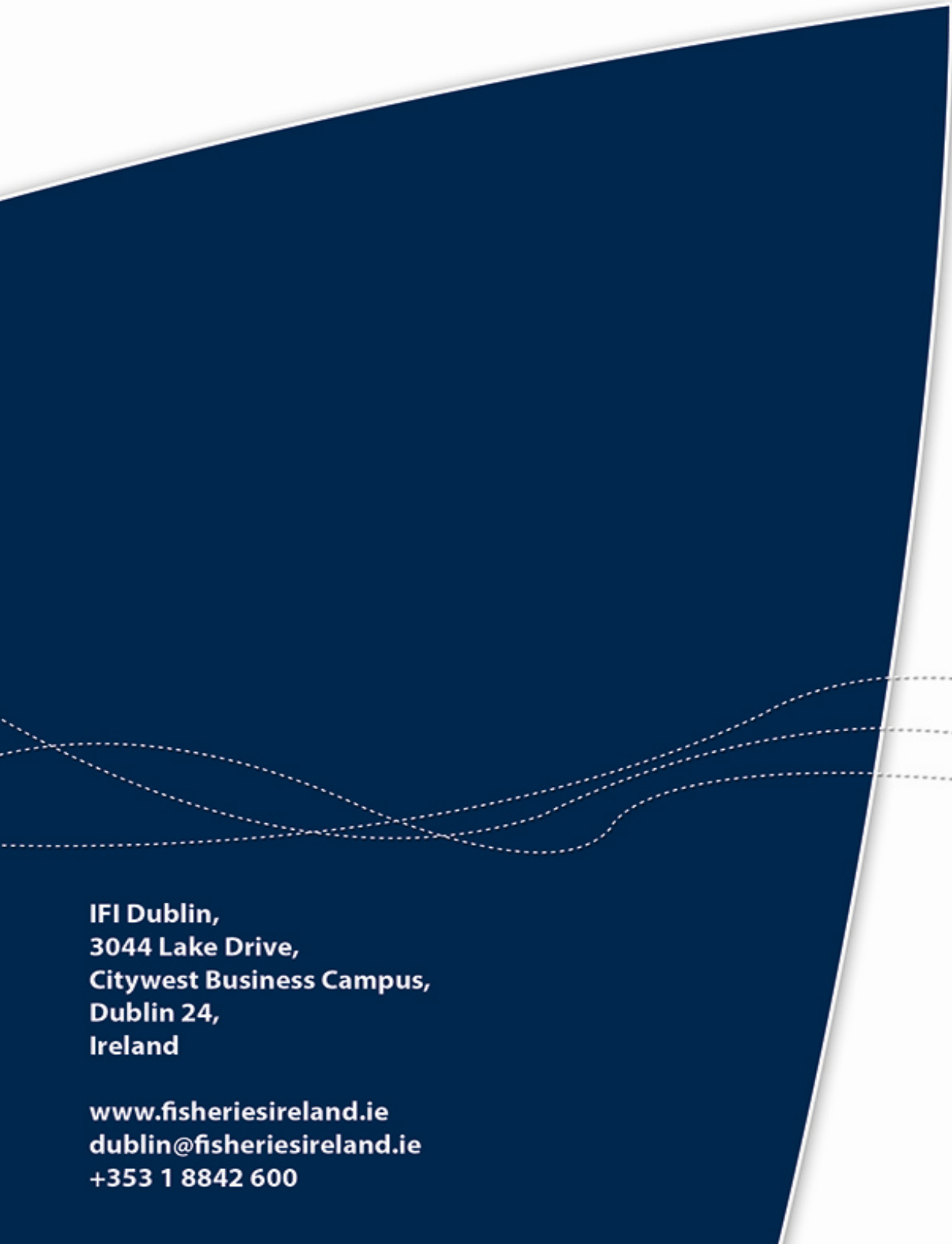
A multimetric fish ecological classification tool (Fish in Lakes – 'FIL') was developed for the island of Ireland (Ecoregion 17) using IFI and Agri-Food and Biosciences Institute Northern Ireland (AFBINI) data generated during the NSSHARE Fish in Lakes project (Kelly *et al.*, 2008). This tool was further 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, Lough Gara has been assigned an ecological status of Moderate for 2015 based on the fish populations present.

In the 2010 to 2012 surveillance monitoring reporting period, the EPA assigned Lough Gara 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

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