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Sampling Fish for the Water Framework Directive

Lakes 2012

Lough Anure

Iascach Intíre Éireann
Inland Fisheries Ireland

Water Framework Directive Fish Stock Survey of Lough Anure, July/August 2012

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

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1.1 Introduction

Lough Anure is situated adjacent to the village of Loch Anure, approximately 8km north-east of Dungloe, Co. Donegal (Plate 1.1, Fig. 1.1). The lake is the largest in the Rosses system and drains into the sea through the River Crolly (Gweedore River). Lough Anure is very rocky, with a surface area of 156ha, a mean depth of only 2m and maximum depth of 12m. The lake is categorised as typology class 2 (as designated by the EPA for the purposes of the Water Framework Directive), i.e. shallow (<4m), greater than 50ha and low alkalinity (<20mg/l CaCO3). The lake has been classed as 1a (i.e. at risk of failing to meet good status by 2015) in the WFD Characterization report (EPA, 2005). The geology of the area is predominantly granite, felsite and other intrusive rocks rich in silica.

The Rosses Anglers Association and the Electricity Supply Board both control the fishing rights to Lough Anure and it is considered to be one of the best trout fishing lakes in the area (O' Reilly, 2007) with brown trout averaging approximately 0.25kg and numerous fish weighing up to 0.5kg. The lake also gets a good run of sea trout and occasional salmon from July (O' Reilly, 2007).

The lake was previously surveyed in August 2006 and 2009 as part of the NSSHARE Fish in Lakes Project (Kelly *et al*., 2007) and as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al*., 2010). In both years brown trout was found to be the dominant species, followed by eel and minnow.

Plate 1.1. Lough Anure looking east

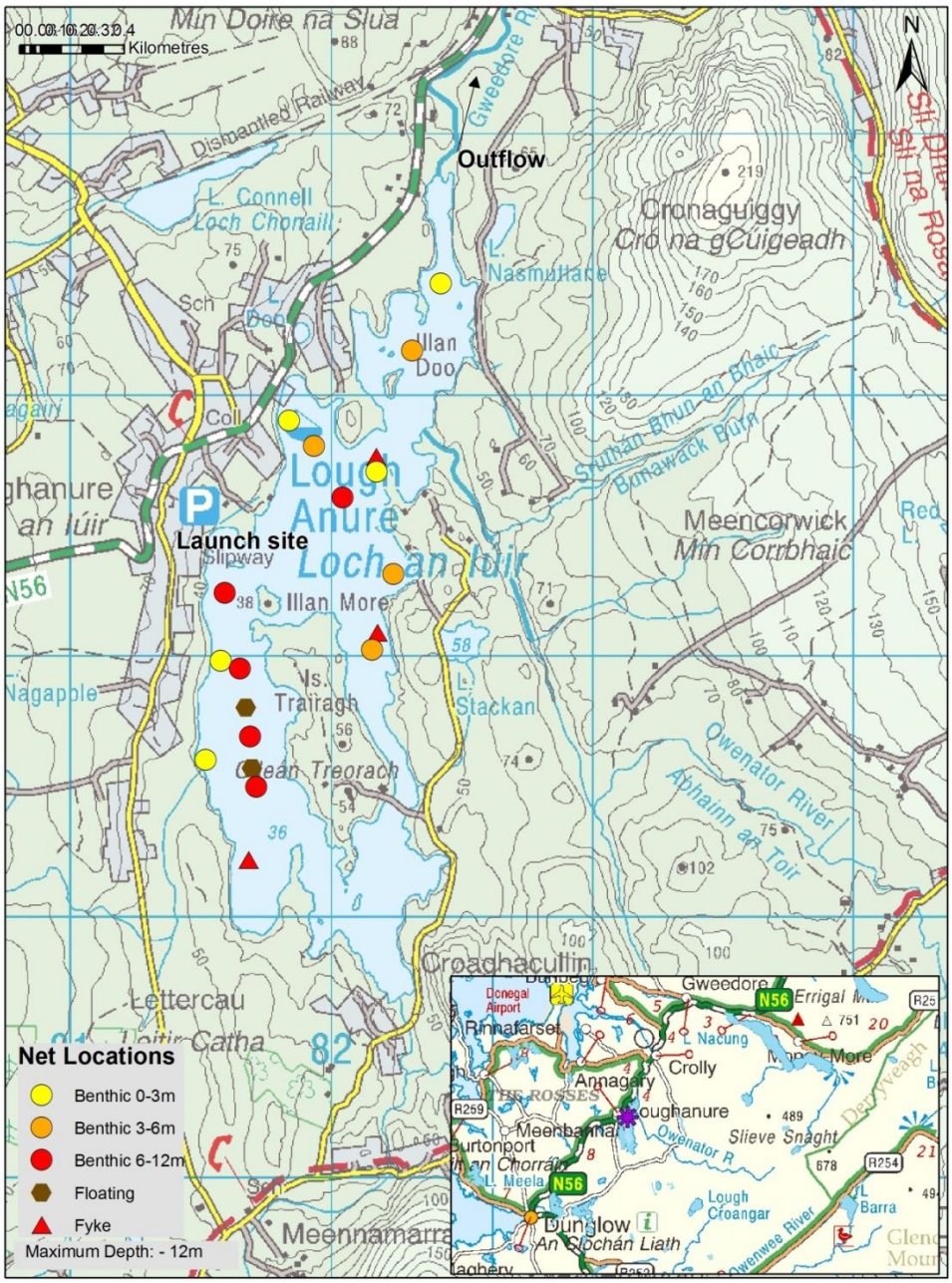

Fig. 1.1. Location map of Lough Anure showing locations and depths of each net (outflow is indicated on map)

1.2 Methods

Lough Anure was surveyed over two nights between the 30th of July and the 1st of August 2012. A total of three sets of Dutch fyke nets, 14 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (5 @ 0-2.9m, 4 @ 3-5.9m and 5 @ 6-11.9m) and two surface floating monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets were deployed in the lake (19 sites). Nets were deployed in the same locations as were randomly selected in the previous survey in 2009 and 2006. 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. 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.

1.3 Results

1.3.1 Species Richness

A total of four fish species were recorded on Lough Anure in July/August 2012, with 236 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 eels, minnow and salmon. During the previous survey in 2009 the same species composition was recorded with the exception of salmon, which were present during the 2012 survey but were not captured in 2009 (Kelly *et al.*, 2010).

Table 1.1. Number of each fish species captured by each gear type during the survey on Lough Anure, July/August 2012

Scientific name	Common name	Number of fish captured			
		Benthic mono multimesh gill nets	Surface mono multimesh gill nets	Fyke nets	Total
Salmo trutta	Brown trout	141	20	4	165
Salmo salar	Salmon	0	0	1	1
Phoxinus phoxinus	Minnow	46	0	0	46
Anguilla anguilla	European eel	1	0	23	24

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 2009 and 2012 are summarised in Table 1.2. Mean CPUE and BPUE for all fish species is illustrated in Figures 1.2 and 1.3.

The mean brown trout CPUE and BPUE was significantly higher in 2012 than in 2009 (Mann-Whitney, $P<0.05$) (Table 1.2; Figs 1.2 and 1.3).

The differences in the mean brown trout CPUE and BPUE between Lough Anure and two similar lakes were assessed, with an overall significant difference being found (Kruskal-Wallis, $P<0.05$) (Fig. 1.4 and Fig. 1.5). Independent-Samples Mann-Whitney U tests between each lake showed that Lough Anure had a significantly higher mean brown trout CPUE and BPUE than Doo Lough, Co. Mayo ($P<0.05$).

Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Lough Anure, 2009 and 2012

Scientific name	Common name	2009	2012
		Mean CPUE	
Salmo trutta	Brown trout	0.154 (0.032)	0.286 (0.047)
Salmo salar	Salmon	-	0.001 (0.001)
Phoxinus phoxinus	Minnow	0.044 (0.030)	0.081 (0.030)
Anguilla anguilla	European eel	0.206 (0.059)	0.128 (0.068)
		Mean BPUE	
Salmo trutta	Brown trout	13.509 (3.619)	31.746 (5.843)
Salmo salar	Salmon	-	0.031 (0.031)
Phoxinus phoxinus	Minnow	0.226 (0.154)	0.215 (0.080)
Anguilla anguilla	European eel	28.917 (8.298)	25.706 (14.955)

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

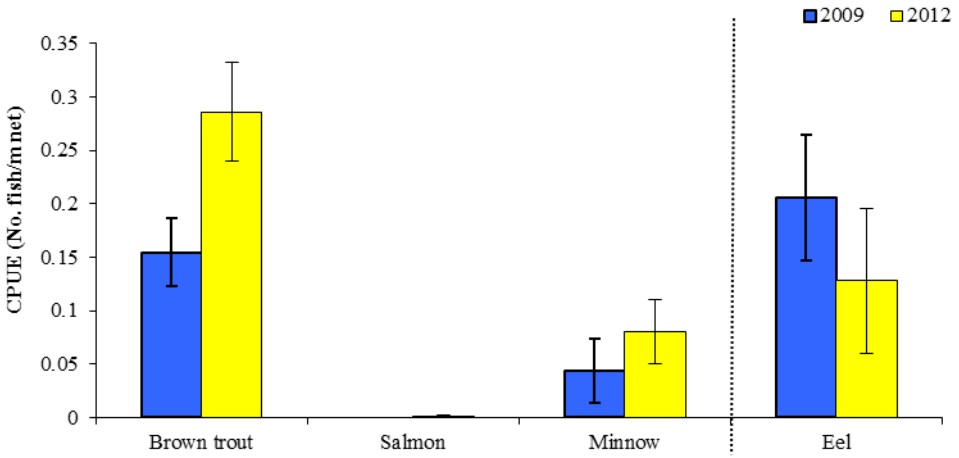

Fig. 1.2. Mean (±S.E.) CPUE for all fish species captured in Lough Anure (Eel CPUE based on fyke nets only), 2009 and 2012

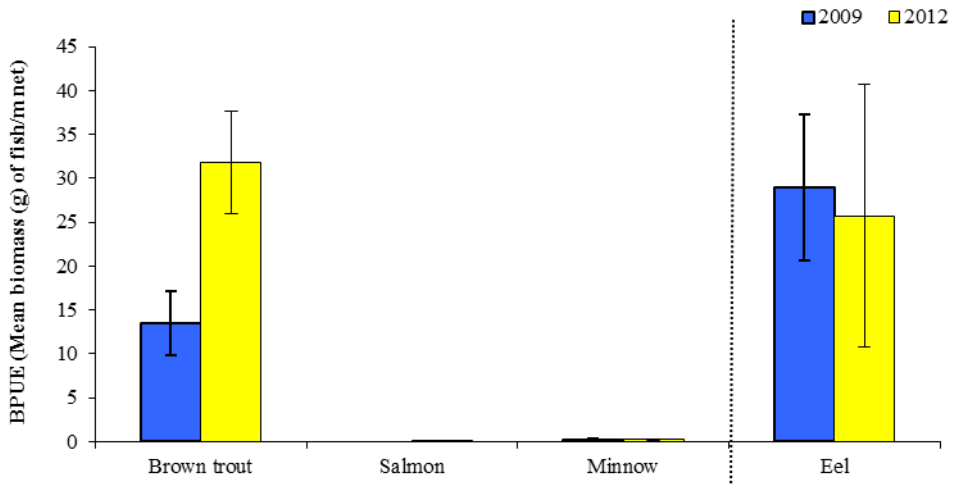

Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Lough Anure (Eel BPUE based on fyke nets only), 2009 and 2012

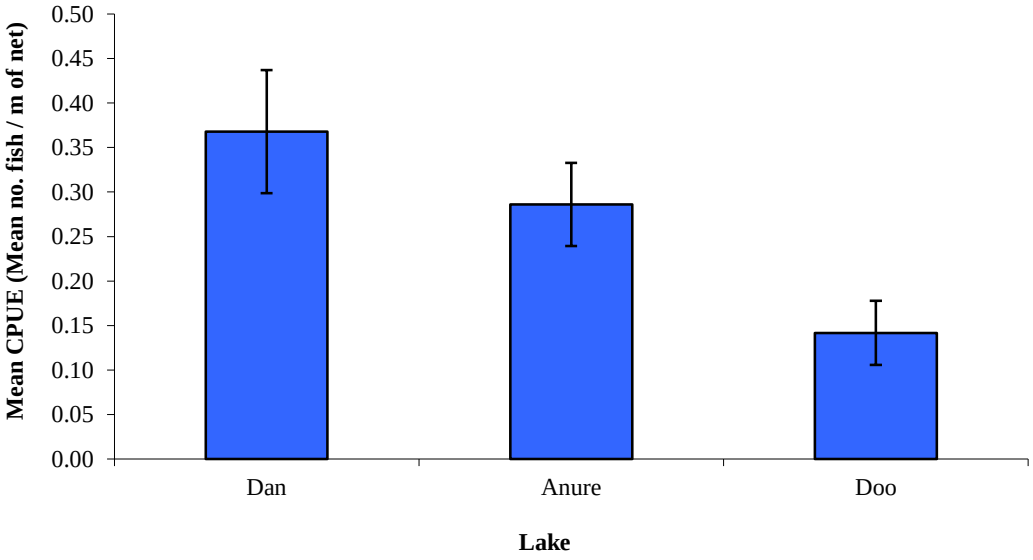

Fig. 1.4. Mean (±S.E.) brown trout CPUE in three lakes surveyed during 2012

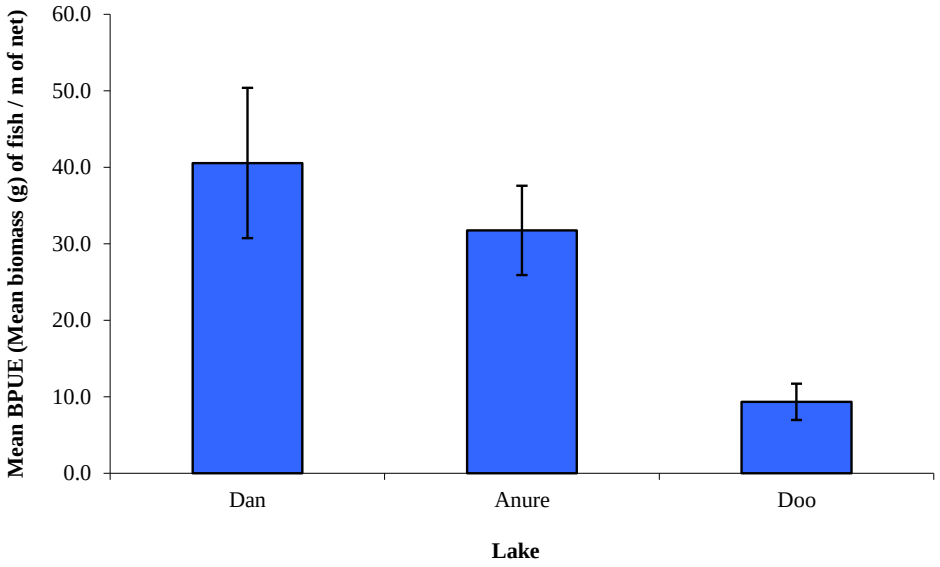

Fig. 1.5. Mean (±S.E.) brown trout BPUE in three lakes surveyed during 2012

1.3.3 Length frequency distributions

Brown trout captured during the 2012 survey ranged in length from 12.2cm to 30.5cm (mean = 20.7cm) (Fig. 1.6). Brown trout captured during the 2009 survey ranged in length from 11.8cm to 30.6cm (Fig. 1.6).

Eels captured during the 2012 survey ranged in length from 30.9cm to 70.3cm, minnow ranged in length from 5.0cm to 8.0cm and one salmon was recorded at 14.0cm.

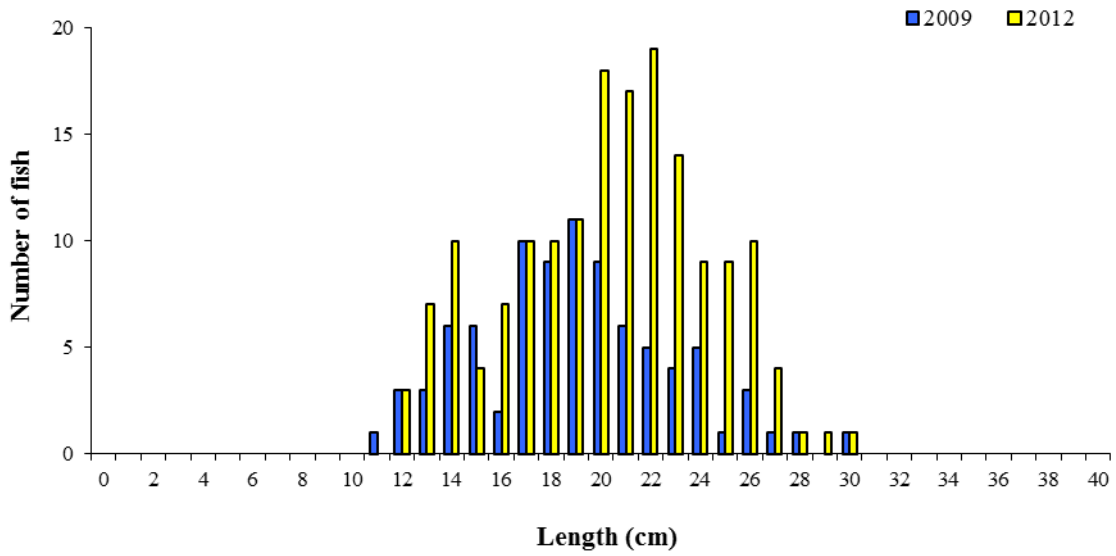

Fig. 1.6. Length frequency of brown trout captured on Lough Anure, 2009 and 2012

1.3.4 Fish age and growth

Five age classes of brown trout were present, ranging from 1+ to 5+, with a mean L1 of 6.5cm (Table 1.3). The dominant age class was 3+ (Fig 1.6). In the 2009 survey, brown trout ranged from 1+ to 5+ with a mean L1 of 5.8cm. Mean brown trout L4 in 2012 was 24.6cm indicating a very slow rate of growth for brown trout in this lake according to the classification scheme of Kennedy and Fitzmaurice (1971).

The single juvenile salmon captured was aged at 1+.

Table 1.3. Mean (±SE) brown trout length (cm) at age for Lough Anure, July/August 2012

	L_1	L_2	L_3	L_4	L_5
Mean	6.5 (0.2)	15.1 (0.3)	21.0 (0.4)	24.6 (0.9)	25.0 (0)
N	71	59	28	7	1
Range	3.5-10.1	9.0-19.3	16.2-24.4	22.2-28.6	25.0

1.4 Summary

Brown trout was the dominant species in terms of abundance (CPUE) and biomass (BPUE) captured in the survey gill nets.

The mean brown trout CPUE and BPUE was significantly higher in 2012 than in 2009. The mean brown trout CPUE and BPUE in Lough Anure was significantly higher than Doo Lough, another similar lake surveyed. Brown trout ranged in age from 1+ to 5+, indicating reproductive success in five of the previous six years. The dominant age class was 3+. 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, Lough Anure has been assigned an ecological status of High based on the fish populations present in 2012. The ecological status assigned to the lake based on the 2009 survey data was also High.

In the 2007 to 2009 surveillance monitoring reporting period, the EPA assigned Lough Anure 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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