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National Research Survey Programme

Lakes 2015

Lough Anure

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National Research Survey Programme

Fish Stock Survey of Lough Anure, July 2015

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Cover photo: Lough Dan © 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).

This lake was surveyed in 2006 as part of the NSSHARE Fish in Lakes Project (Kelly *et al*., 2007) and in 2009 and 2012 as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al*., 2010 and 2013). In all years brown trout was found to be the dominant species, followed by eels and minnow.

Plate 1.1. Lough Anure

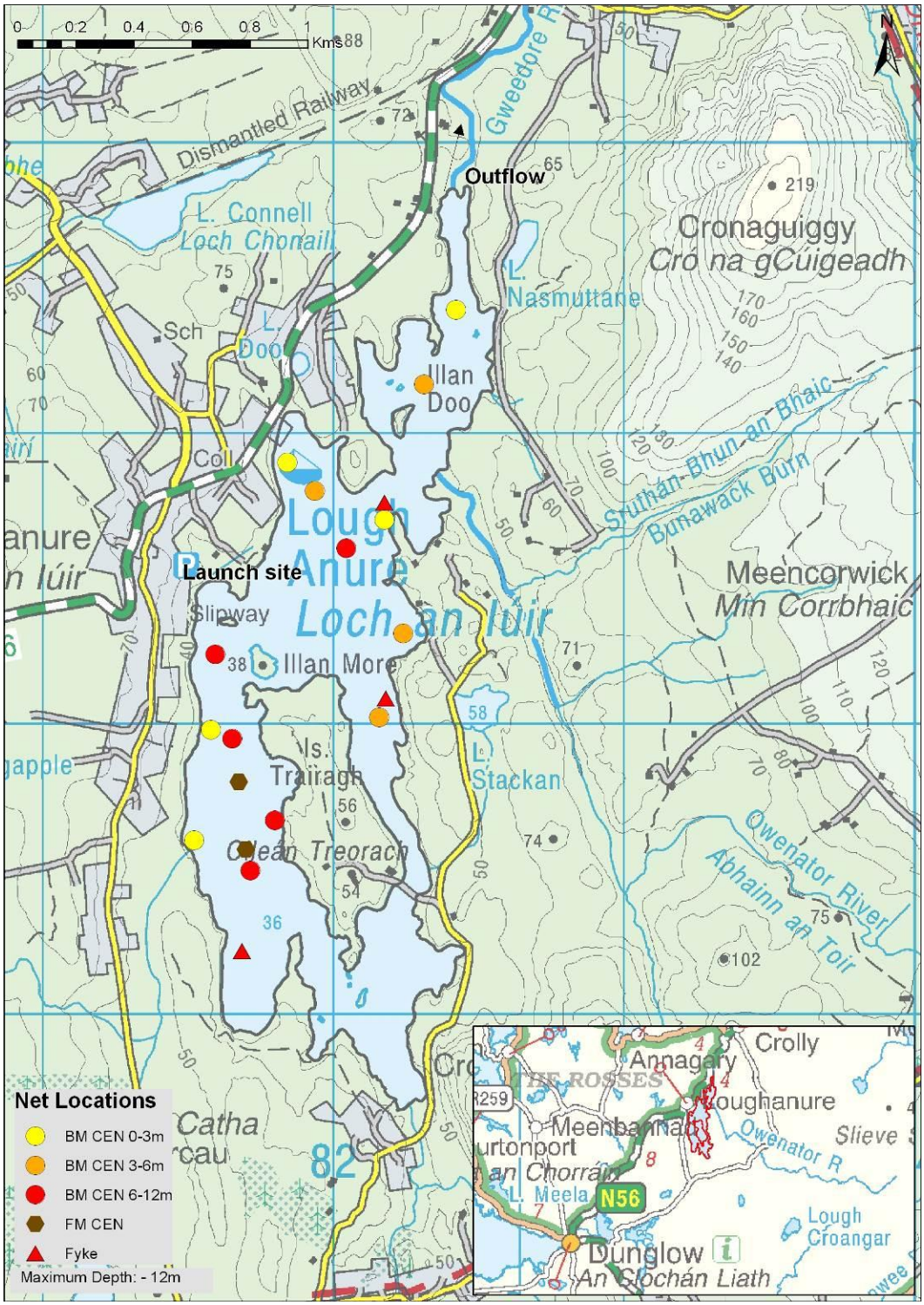

Fig. 1.1. Location map of Lough Anure showing locations and depths of each net (outflow is indicated on map)

1.2 Methods

1.2.1 Netting methods

Lough Anure was surveyed over two nights between the 20th and 22nd of July 2015. A total of three sets of Dutch fyke nets (fyke), 14 benthic monofilament multi-mesh (BM CEN) (12 panel, 5-55mm mesh knot to knot) CEN standard survey gill nets (5 @ 0-2.9m, 4 @ 3-5.9m, 5 @ 6-11.9m) and two surface monofilament multi-mesh (FM CEN) (12 panel, 5-55mm mesh knot to knot) CEN standard survey gill nets were deployed randomly in the lake (19 sites). Nets were deployed in the same locations as were randomly selected in the previous surveys in 2009 and 2012. 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.

1.2.2 *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 Lough Anure in July 2015, with 248 fish being captured (Table 1.1). Brown trout was the most abundant fish species recorded, followed by minnow, eels and salmon. During the previous surveys in 2009 and 2012 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 and 2013).

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

Scientific name	Common name	Number of fish captured			
		BM CEN	FM CEN	Fyke	Total
Salmo trutta	Brown trout	191	12	7	210
Salmo salar	Salmon	5	0	0	5
Phoxinus phoxinus	Minnow	26	1	0	27
Anguilla anguilla	European eel	0	0	6	6

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 2009, 2012 and 2015 surveys are summarised in Table 1.2. Mean CPUE and BPUE for all species is illustrated in Figures 1.2 and 1.3.

Brown trout was the dominant species in terms of abundance (CPUE) and biomass (BPUE). The mean brown trout CPUE was significantly higher in 2015 than in 2009 (Kruskal-Wallis $H=6.033$, $P<0.05$) and the mean brown trout BPUE was significantly higher in 2015 than in 2009 and 2012 (Kruskal-Wallis $H=7.8$, $P<0.05$) (Table 1.2; Fig 1.2 and 1.3).

Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Lough Anure, 2009, 2012 and 2015

Scientific name	Common name	2009	2012	2015
			Mean CPUE	
Salmo trutta	Brown trout	0.154 (0.032)	0.286 (0.047)	0.362 (0.064)
Salmo salar	Salmon	-	0.001 (0.001)	0.009 (0.006)
Phoxinus phoxinus	Minnow	0.044 (0.030)	0.081 (0.030)	0.047 (0.020
Anguilla anguilla	European eel	0.206 (0.059)	0.128 (0.068)	0.033 (0.017)
			Mean BPUE	
Salmo trutta	Brown trout	13.509 (3.619)	31.746 (5.843)	37.766 (6.857)
Salmo salar	Salmon	-	0.031 (0.031)	2.114 (2.018)
Phoxinus phoxinus	Minnow	0.226 (0.154)	0.215 (0.080)	0.134 (0.059)
Anguilla anguilla	European eel	28.917 (8.298)	25.706 (14.955)	4.839 (2.419)

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

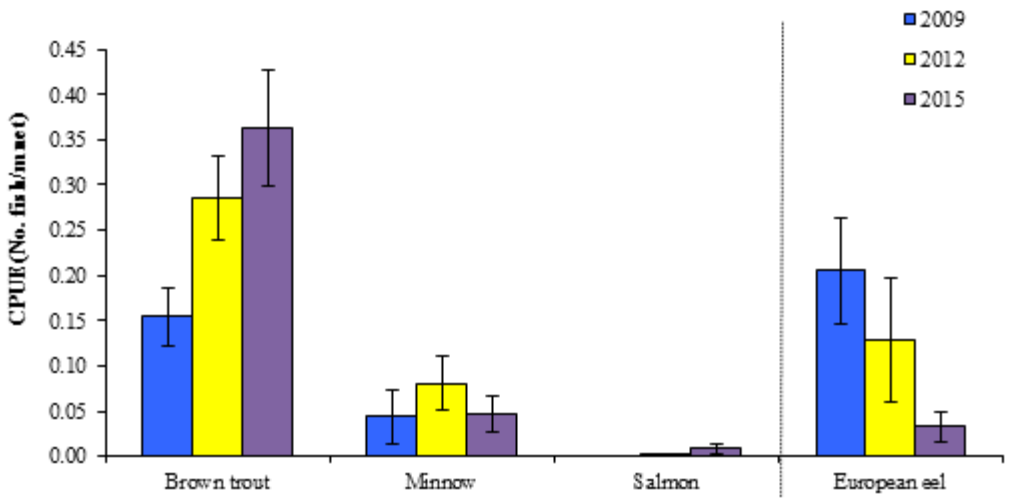

Fig. 1.2. Mean (±S.E.) CPUE for all fish species captured in Lough Anure (Eel CPUE based on fyke nets only), 2009, 2012 and 2015

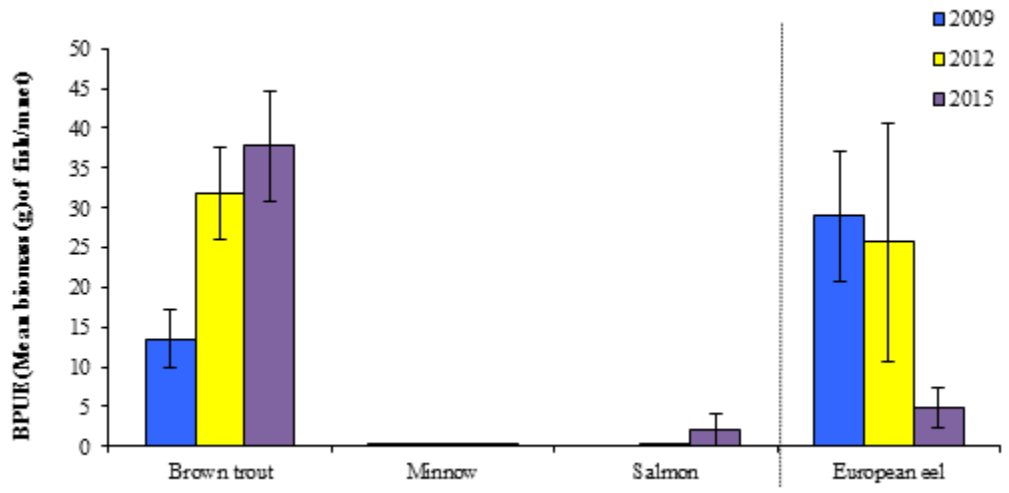

Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Lough Anure (Eel BPUE based on fyke nets only), 2009, 2012 and 2015

1.3.3 Length frequency distributions and growth

Brown trout captured during the 2015 survey ranged in length from 10.5cm to 39.6cm (mean = 19.8cm) (Fig. 1.4). Six age classes were present, ranging from 1+ to 6+, with a mean L1 of 6.1cm (Table 1.3). The dominant age class was 3+ (Fig. 1.4). Mean brown trout L4 in 2015 was 23.4cm indicating a very slow rate of growth for brown trout in this lake according to the classification scheme of Kennedy and Fitzmaurice (1971) (Table 1.3). Brown trout captured during the 2012 survey had similar length and age ranges, with some larger and older fish recorded in the 2015 survey (Fig.1.4).

Five salmon were captured during the 2015 survey, ranging in length from 11.3cm to 47.6cm and were aged from 1+ to 2.1+. Eels ranged in length from 42.0cm to 45.0cm and minnow ranged in length from 4.5cm to 7.1cm.

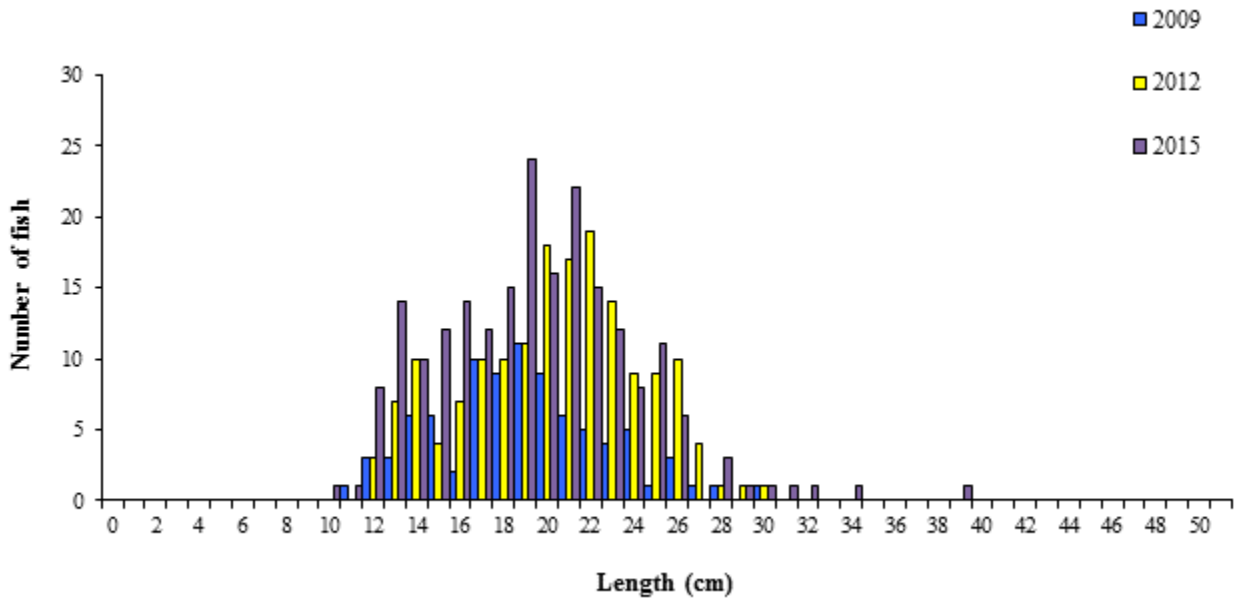

Fig. 1.4. Length frequency of brown trout captured on Lough Anure, 2009, 2012 and 2015

Table 1.3. Mean (±S.E.) brown trout length (cm) at age for Lough Anure, July 2015

	L_1	L_2	L_3	L_4	L_5	L_6	Growth Category
Mean (± S.E.)	6.1 (0.1)	12.8 (0.2)	19.2 (0.3)	23.4 (0.5)	27.6 (1.1)	34.3 (2.4)	Very slow
N	53	43	28	14	7	2	
Range	4.9-7.7	10.2-16.5	15.5-22.4	19.4-28.0	23.7-32.6	31.9-36.7	

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.

Adult trout usually feed principally on crustaceans (*Asellus* sp. and *Gammarus* sp.), insects (principally chironomid larvae and pupae) and molluscs (snails) (Kennedy and Fitzmaurice, 1971, O'Grady, 1981). The dominant food items recorded in a subsample of trout captured during the survey were zooplankton, cased caddis and bivalves (Fig 1.5).

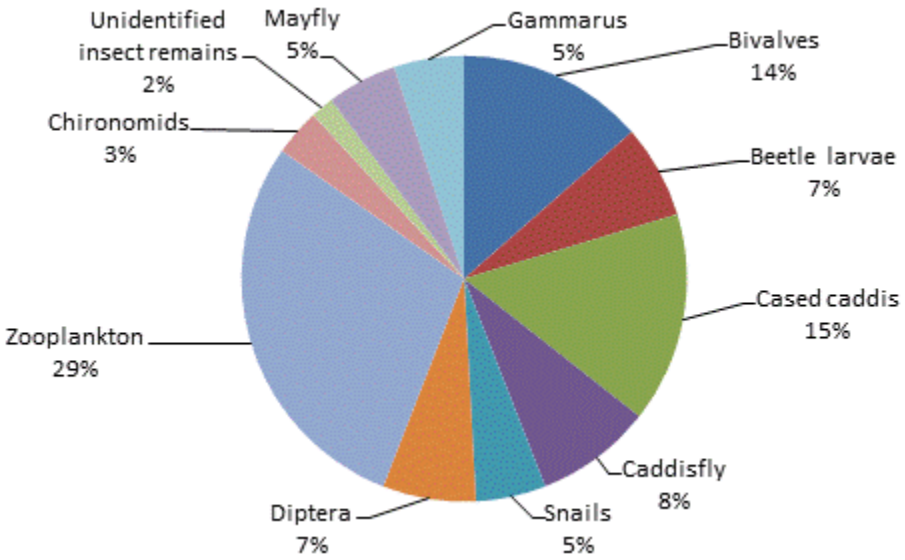

Fig. 1.5. Diet of brown trout captured on Lough Anure 2015 (% occurrence) n=34

1.4 Summary and ecological status

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 was significantly higher in 2015 than in 2009 and the mean brown trout BPUE was also significantly higher in 2015 than in 2009 and 2012. Brown trout ranged in age from 1+ to 6+, indicating reproductive success in six of the previous seven 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 Good based on the fish populations present in 2015. The ecological status assigned to the lake based on the 2006, 2009 and 2012 survey data was High.

In the 2010 to 2012 surveillance monitoring reporting period, the EPA assigned Lough Anure an overall ecological status of Good, 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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