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Sampling Fish for the Water Framework Directive

Lakes 2014

Lough Acoose

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INLAND FISHERIES IRELAND

Water Framework Directive Fish Stock Survey of Lough Acoose, August 2014

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

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1.1 Introduction

Lough Acoose is situated in Co. Kerry in the upper Caragh catchment (Plates 1.1 and 1.2, Fig 1.1). The lake is located approximately seven kilometres south of Killorglin, between Glencar and Kilorglin (Fig. 1.1). The lake has a surface area of 66ha and a maximum depth of 19m. Lough Acoose is categorised as typology class 4 (as designated by the EPA for the Water Framework Directive), i.e. deep (mean depth >4m), greater than 50ha and low alkalinity (<20mg/l $CaCO_3$).

Lough Acoose forms part of the Killarney National Park, Macgillycuddy's Reeks and Caragh River catchment candidate Special Area of Conservation. This is a large area that encompasses a wide variety of habitats designated under Annex I of the EU Habitats Directive, including blanket bog, alluvial woodlands, alpine heath and both upland and lowland oligotrophic lakes. The site has also been selected for the following species; Killarney fern, slender naiad, freshwater pearl mussel, Kerry slug, marsh fritillary, Killarney shad, Atlantic salmon, brook lamprey, river lamprey, sea lamprey, lesser horseshoe bat and otter; all species listed on Annex II of the EU Habitats Directive (NPWS, 2005).

Lough Acoose is historically known to hold a stock of brown trout and gets a run of grilse from July onwards. The lake also historically held a population of Arctic char (Went, 1945) a rare and threatened species listed in the Irish Red Data Book for fish as vulnerable (King, 2011). A review paper on the distribution and status of Arctic Char in Ireland (Igoe *et al.*, 2003) reported that char were not present in the lake following a 1983 survey. In 2006 however, an EPA funded PhD studentship at University College Cork investigating the vulnerability of char eggs to environmental change found a char population present in the lake (E. Morrissey, *pers. com.*).

Lough Acoose was previously surveyed in 2008 and 2011 as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al*., 2009 and Kelly *et al*., 2012a). During the 2011 survey, brown trout and Arctic char were found to be the dominant species present in the lake. Eels and salmon were also captured during the surveys.

This report summarises the results of the 2014 fish stock survey carried out on the lake, as part of the Water Framework Directive surveillance monitoring programme.

Plate 1.1. Lough Acoose

Plate 1.2. Lough Acoose

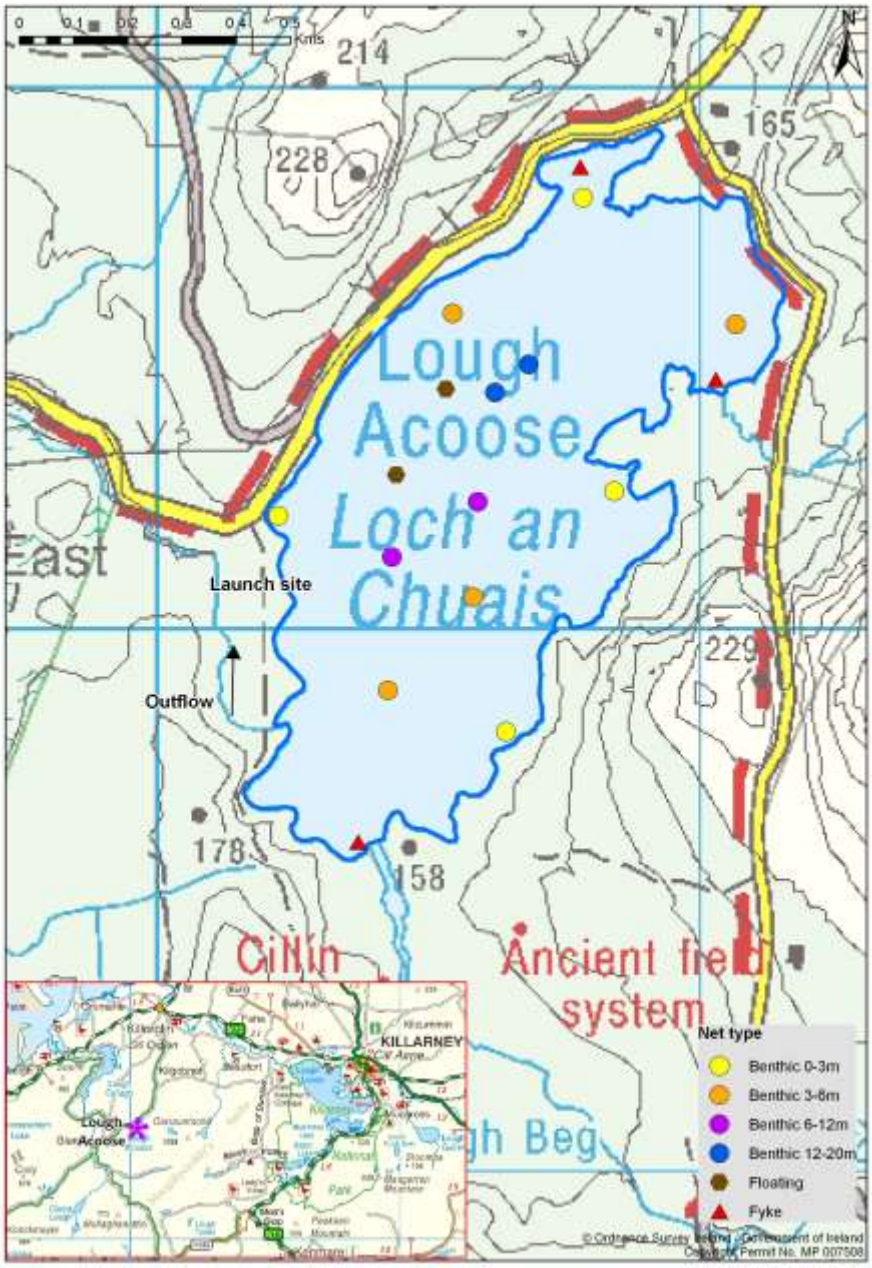

Fig. 1.1 Location map of Lough Acoose showing locations and depths of each net (outflow is indicated on map)

1.2 Methods

Lough Acoose was surveyed over two nights between the 18th and the 20th of August 2014. A total of three sets of Dutch fyke nets, 12 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (4 @ 0-2.9m, 4 @ 3-5.9m, 2 @ 6-11.9m and 2 @ 12-19.9m) and two floating monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets were deployed in the lake (17 sites). Nets were deployed in the same locations as were randomly selected in the previous surveys in 2008 and 2011. 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, Arctic char 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 on Lough Acoose in August 2014, with 278 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 Arctic char, eels and salmon. During the previous surveys in 2008 and 2011 the same species composition was recorded with the exception of salmon, which were not captured during the 2008 survey but were recorded during the 2011 and 2014 survey.

Table 1.1. Number of each fish species captured by each gear type during the survey on Lough Acoose, August 2014

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	183	28	18	229
Salvelinus alpinus	Arctic char	39	4	0	43
Salmo salar	Salmon	1	0	1	2
Anguilla anguilla	European eel	0	0	4	4

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 2008, 2011 and 2014 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 abundance (CPUE) and biomass (BPUE). Although the mean brown trout CPUE increased slightly over the three sampling occasions, these differences were not statistically significant (Table 1.2; Fig 1.2 and 1.3). There were also no significant differences in mean BPUE across the three sampling years. The mean Arctic char CPUE and BPUE was slightly higher in 2011 than in 2008 and 2014, 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 Lough Acoose, 2008, 2011 and 2014

Scientific name	Common name	2008	2011	2014
			Mean CPUE	
Salmo trutta	Brown trout	0.363 (0.084)	0.405 (0.069)	0.431 (0.077)
Salvelinus alpinus	Arctic char	0.066 (0.022)	0.122 (0.031)	0.084 (0.021)
Salmo salar	Salmon	-	0.012 (0.008)	0.003 (0.002)
Anguilla anguilla	European eel	0.117 (0.053)	0.033 (0.016)	0.022 (0.014)
			Mean BPUE	
Salmo trutta	Brown trout	31.634 (7.127)	37.091 (6.957)	33.379 (6.210)
Salvelinus alpinus	Arctic char	2.866 (0.969)	7.147 (1.825)	3.621 (0.958)
Salmo salar	Salmon	-	5.349 (5.085)	0.093 (0.053)
Anguilla anguilla	European eel	23.766 (13.302)	5.437 (1.867)	6.731 (4.141)

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

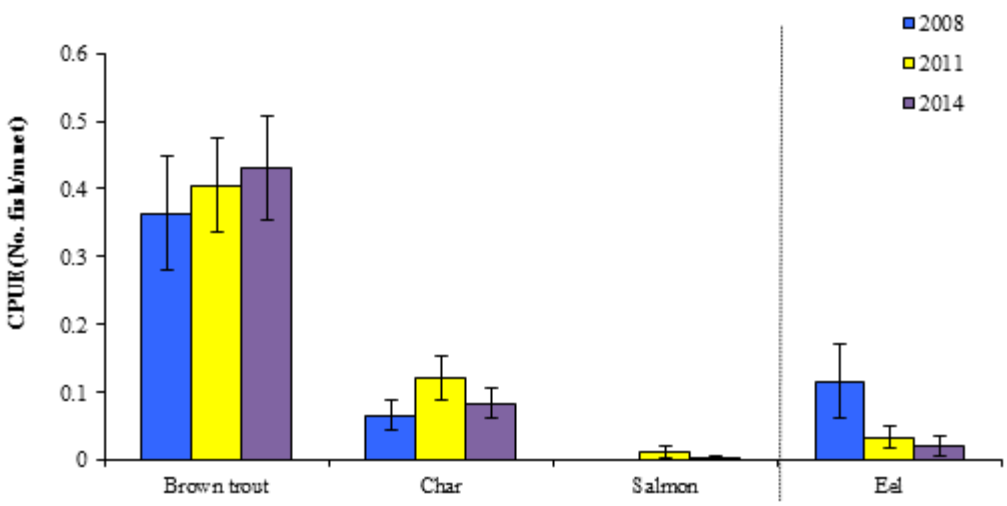

Fig. 1.2. Mean (±S.E.) CPUE for all fish species captured in Lough Acoose (Eel CPUE based on fyke nets only), 2008, 2011 and 2014

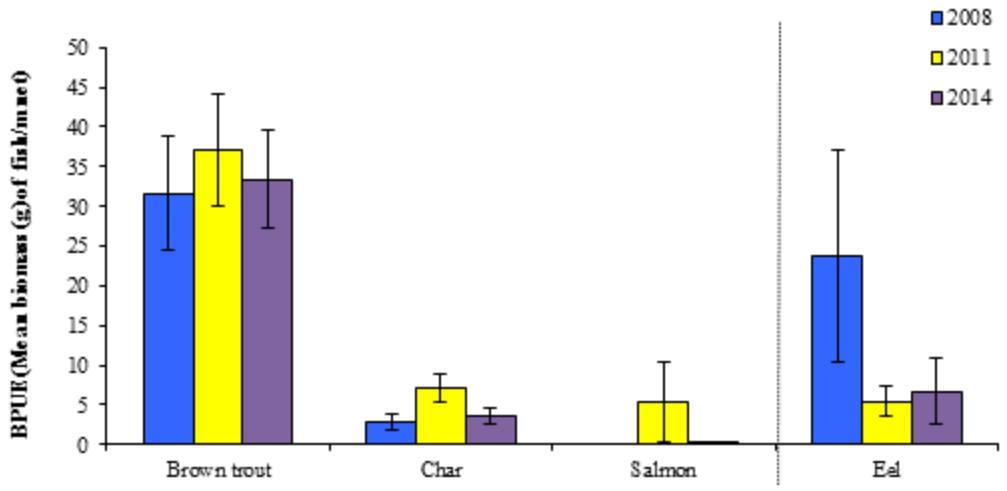

Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Lough Acoose (Eel BPUE based on fyke nets only), 2008, 2011 and 2014

1.3.3 Length frequency distributions and growth

Brown trout captured during the 2014 survey ranged in length from 11.4cm to 35.3cm (mean = 18.6cm) (Fig. 1.4). Four age classes were present, ranging from 1+ to 4+, with a mean L1 of 6.5cm (Table 1.3). The dominant age class was 2+ (Fig. 1.4). Mean brown trout L4 in 2014 was 25.5cm indicating a 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 2008 and 2011 surveys had a similar length range with some larger fish captured in 2011 and 2014.

Arctic char captured during the 2014 survey ranged in length from 6.5cm to 19.0cm (mean = 15.6cm) (Fig.1.5) with four age classes present, ranging from 1+ to 4+. Arctic char captured during the 2008 and 2011 surveys had similar lengths and ages ranged from 0+ to 5+ (Fig.1.5).

Eels captured during the 2014 survey ranged in length from 46.0cm to 55.0cm. Two juvenile salmon captured were aged 1+ and ranged in length from 10.0cm to 12.5cm.

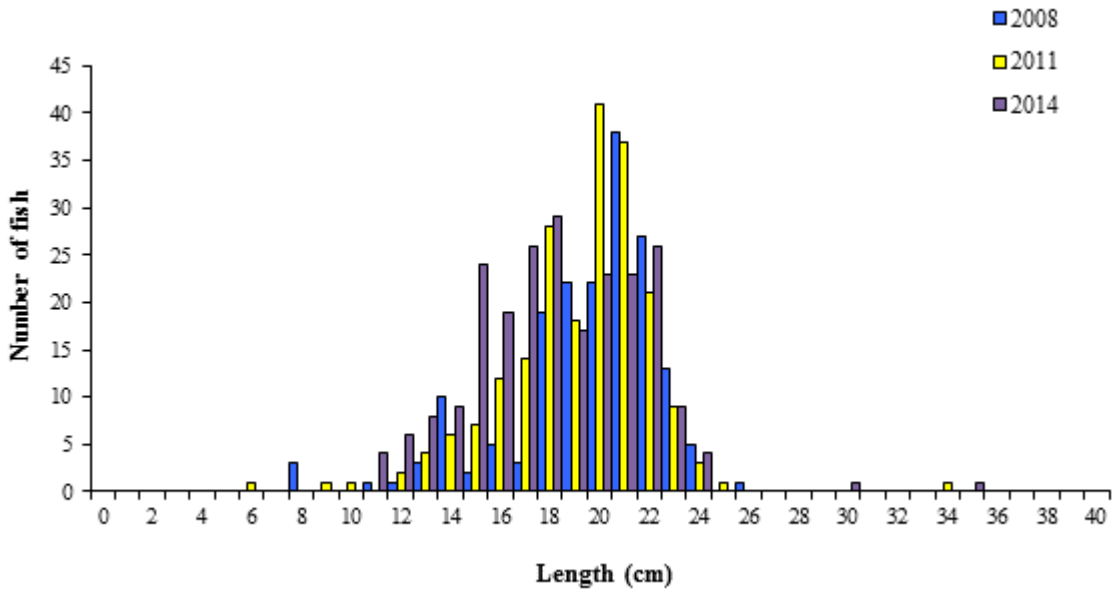

Fig. 1.4. Length frequency of brown trout captured on Lough Acoose, 2008, 2011 and 2014

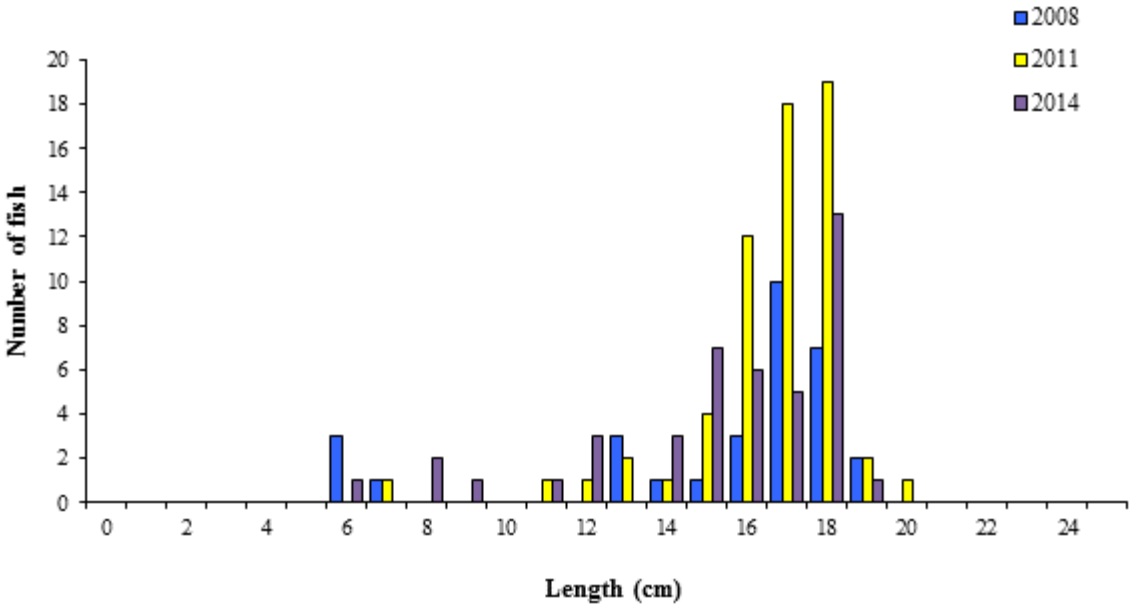

Fig. 1.5. Length frequency of Arctic char captured on Lough Acoose, 2008, 2011 and 2014

Table 1.3. Mean (±SE) brown trout length (cm) at age for Lough Acoose, August 2014

	L_1	L_2	L_3	L_4	Growth Category
Mean	6.5 (0.3)	14.5 (0.5)	20.6 (0.8)	25.5 (1.9)	Slow
N	44	35	9	4	
Range	3.1-9.9	8.3-19.8	17.0-25.1	22.1-30.3	

1.4 Summary

Brown trout was the dominant species in terms of abundance (CPUE) and biomass (BPUE) captured in the survey gill nets during the 2014 survey.

The mean brown trout CPUE increased slightly over the three sampling years; however, these differences were not statistically significant. There were also no significant differences in mean BPUE across the three sampling years. Brown trout ranged in age from 1+ to 4+, indicating reproductive success in the previous five years. The dominant age class was 2+. Length at age analyses revealed that brown trout in the lake exhibit a slow rate of growth according to the classification scheme of Kennedy and Fitzmaurice (1971).

The mean Arctic char CPUE and BPUE was slightly higher in 2011 than in 2008 and 2014; however, these differences were not statistically significant. Arctic char ranged in age from 1+ to 4+, with no 0+ fish being captured.

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, Lough Acoose has been assigned an ecological status of Good for 2008, 2011 and 2014 based on the fish populations present.

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

1.5 References

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