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Sampling Fish for the Water Framework Directive

Lakes 2013

Ardderry Lough

Iascach Intíre Éireann
Inland Fisheries Ireland

Water Framework Directive Fish Stock Survey of Ardderry Lough, August 2013

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

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1.1 Introduction

Ardderry Lough is the second lake on the Screebe system in Co. Galway (Plate 1.1, Fig 1.1). The lake is located adjacent to Maam Cross and to the south of the N59 Galway to Clifden road at an altitude of 37m a.s.l. (Fig. 1.1). The underlying geology is categorised as siliceous. The lake has a surface area of 81.1ha, a mean depth of >4m and a maximum depth of 12m. The lake falls into typology class 4 (as designated by the EPA for the Water Framework Directive), i.e. deep (>4m), greater than 50ha and low alkalinity (<20mg/l $CaCO_3$).

The lake holds a large stock of brown trout, the average size of which is 0.3kg (O' Reilly, 2007). Ardderry Lough was previously surveyed in 2007 and 2010 as part of the WFD surveillance monitoring programme (Kelly and Connor, 2007 and Kelly *et al*., 2011). During the 2010 survey, perch was found to be the dominant species present in the lake. Brown trout, Arctic char, eels and sea trout were also captured during the survey.

Plate 1.1. Ardderry Lough

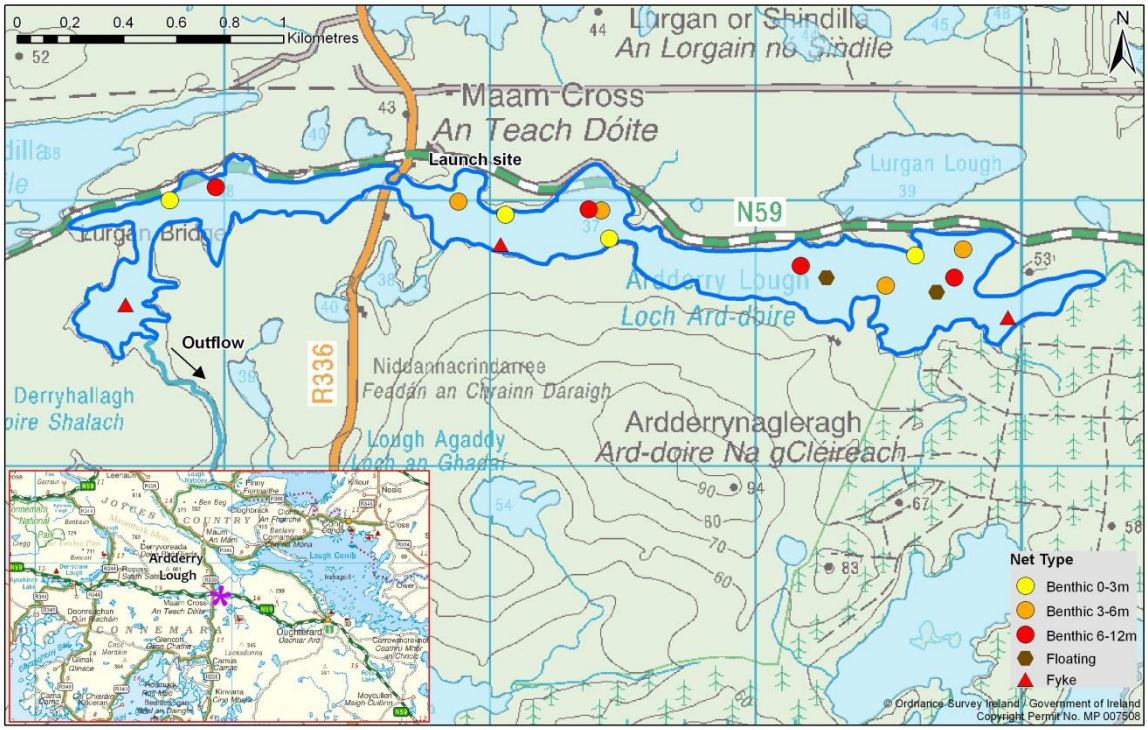

Fig. 1.1. Location map of Ardderry Lough showing net locations and depths of each net (outflow is indicated on map)

1.2 Methods

Ardderry Lough was surveyed over two nights from the 7th to the 9th of August 2013. 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 and 4 @ 6-11.9m) and two floating benthic 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 survey. 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 retained for further analysis.

1.3 Results

1.3.1 Species Richness

A total of three fish species were recorded on Ardderry Lough in August 2013, with 152 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 brown trout and eels. During the previous surveys in 2010 and 2007 the same species composition was recorded except for sea trout which were only recorded in 2010. Salmon were only present in 2007 and Arctic char were not captured in the current survey but were present in 2007 and 2010.

Table 1.1. Number of each fish species captured by each gear type during the survey on Ardderry Lough, August 2013

Scientific name	Common name	Number of fish captured			
		Benthic mono multimesh gill nets	Surface mono multimesh gill nets	Fyke nets	Total
Perca fluviatilis	Perch	139	3	0	142
Anguilla anguilla	European eel	0	0	1	1
Salmo trutta	Brown trout	9	0	0	9

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 2010 and 2013 surveys are summarised in Table 1.2. Mean CPUE and BPUE for all species is illustrated in Figure 1.2 and 1.3.

Perch was the dominant species in terms of both abundance (CPUE) and biomass (BPUE).

Although the mean brown trout CPUE and BPUE fluctuated slightly between sampling years, these differences were not statistically significant (Table 1.2; Fig 1.2 and 1.3).

The mean perch CPUE and BPUE increased each year from 2007 to 2013, however, these differences were also not statistically significant (Table 1.2; Fig 1.2 and 1.3).

The mean Arctic char CPUE and BPUE decreased from 2007 to 2010, however, these differences were not statistically significant (Table 1.2; Fig 1.2 and 1.3). No Arctic char were recorded in 2013.

Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Ardderry Lough, 2007, 2010 and 2013

Scientific name	Common name	2007	2010	2013
			Mean CPUE	
Salmo trutta	Brown trout	0.019 (0.007)	0.017(0.009)	0.018 (0.007)
Perca fluviatilis	Perch	0.127 (0.042)	0.187 (0.042)	0.278 (0.094)
Salvelinus alpinus	Arctic char	0.015 (0.007)	0.002 (0.002)	-
Salmo trutta	Sea trout	-	0.002 (0.002)	-
Salmo salar	Salmon	0.002 (0.002)	-	-
Anguilla anguilla	European eel*	0.002 (0.001)	0.133 (0.034)	0.006 (0.006)
			Mean BPUE	
Salmo trutta	Brown trout	3.347 (1.340)	2.400 (1.526)	2.445 (0.897)
Perca fluviatilis	Perch	18.200 (5.641)	19.339 (4.534)	22.449 (7.911)
Salvelinus alpinus	Arctic char	1.950 (0.901)	0.378 (0.378)	-
Salmo trutta	Sea trout	-	0.458 (0.458)	-
Salmo salar	Salmon	4.901 (4.901)	-	-
Anguilla anguilla	European eel*	3.616 (1.838)	18.088 (6.748)	0.656 (0.656)

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

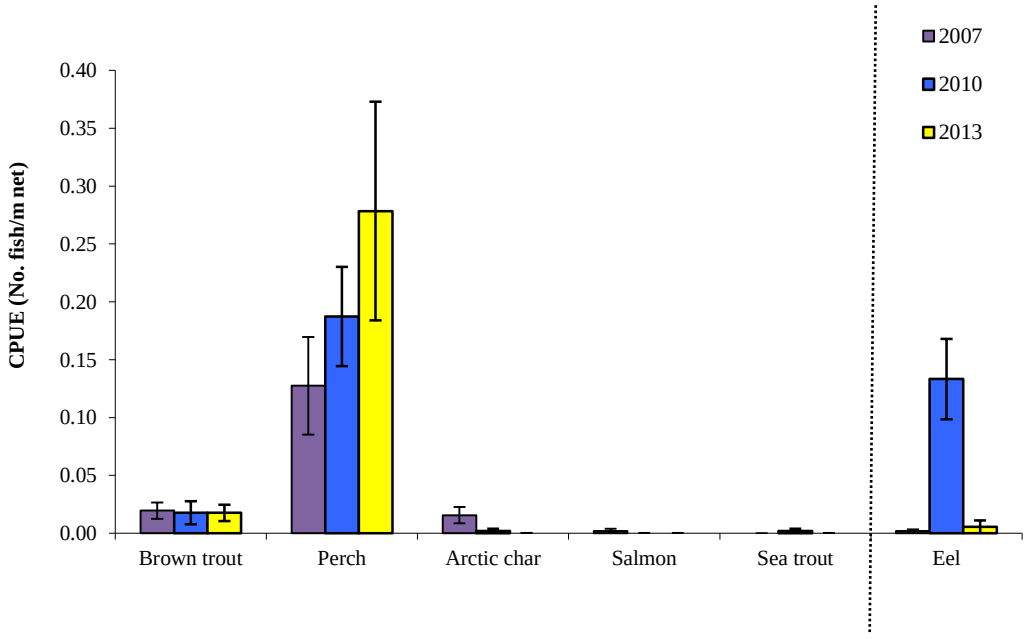

Fig. 1.2. Mean (±S.E.) CPUE on Ardderry Lough (Eel CPUE based on fyke nets only), 2007, 2010 and 2013

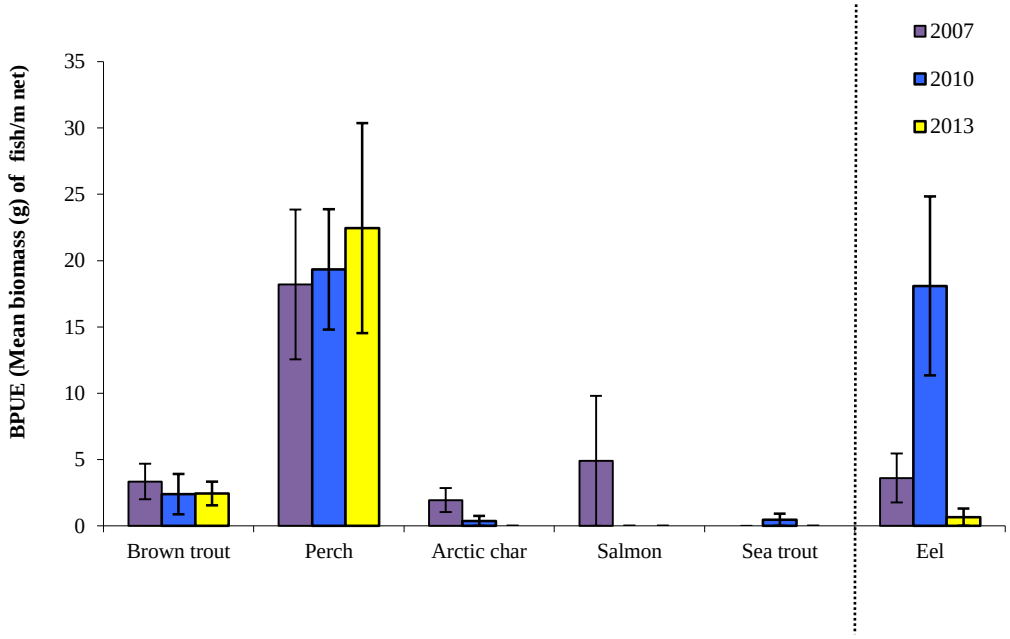

Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Arderry Lough (Eel BPUE based on fyke nets only), 2007, 2010 and 2013

1.3.3 Length frequency distributions and growth

Perch captured during the 2013 survey ranged in length from 5.6cm to 24.7cm (mean = 17.1cm) (Fig.1.4) with eight age classes present, ranging from 0+ to 7+, with a mean L1 of 6.8cm (Table 1.3). The dominant age class was 3+ (Fig 1.4). Perch captured during the 2010 survey had a similar length range (Fig.1.4) and ranged in age from 0+ to 5+. In the 2007 survey, perch ranged in length from 8.8cm to 35.5cm (ranged in age from 2+ to 8+). The dominant age class was 3+ and 2+ in 2007 and 2010 respectively (Fig 1.4).

Brown trout captured during the 2013 survey ranged in length from 14.1cm to 27.6cm (mean = 21.8cm) (Fig. 1.5) and three age classes of brown trout were present, ranging from 1+ to 3+, with a mean L1 of 7.3cm (Table 1.4). The dominant age class was 3+ (Fig 1.5). Brown trout captured during the 2010 and 2007 surveys had a similar length range (Fig. 1.5) and similar growth patterns were observed with brown trout ranging from 2+ to 4+ in 2007 and 2010.

One eel was recorded at 33.9cm.

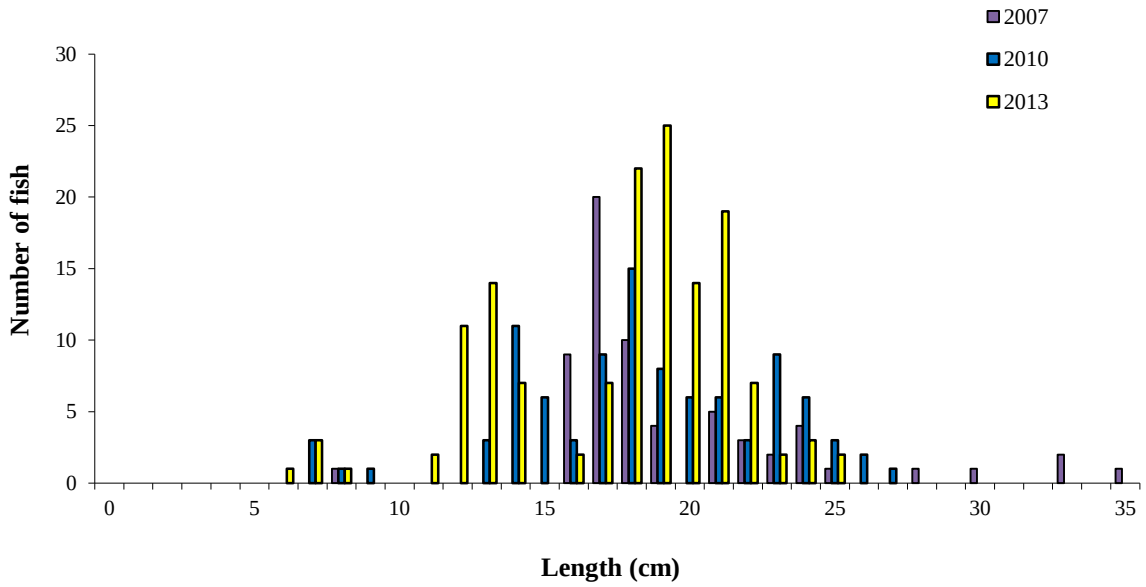

Fig. 1.4. Length frequency of perch captured on Ardderry Lough, 2007, 2010 and 2013

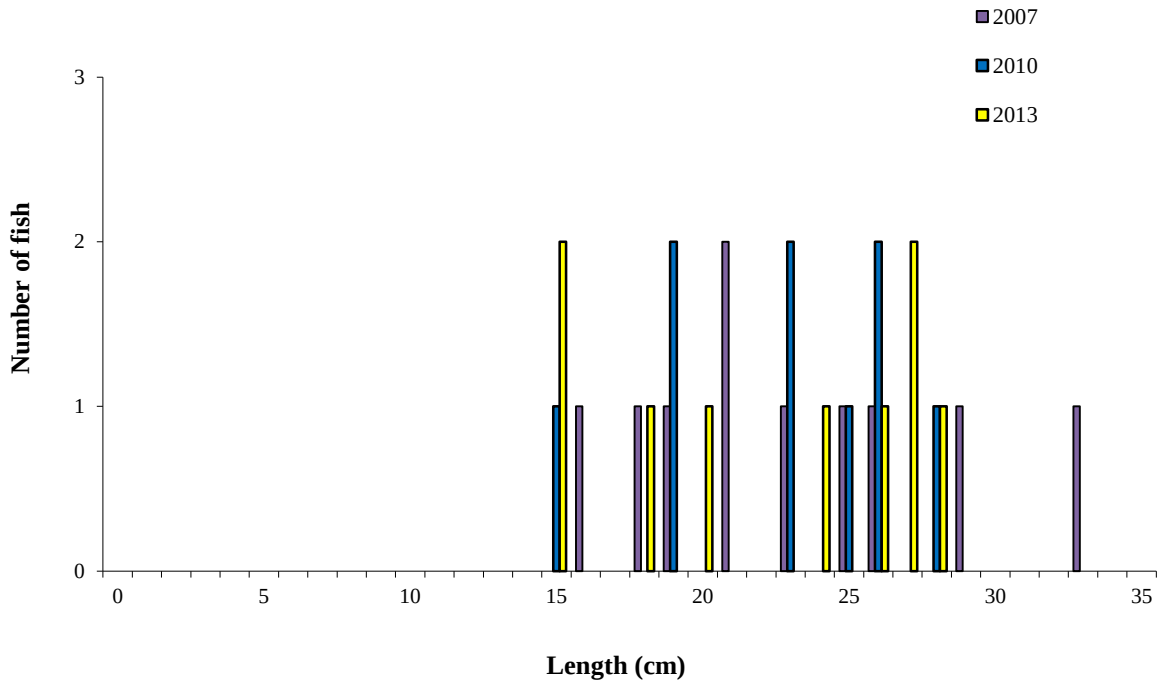

Fig. 1.5. Length frequency of brown trout captured on Ardderry Lough, 2007, 2010 and 2013

Table 1.3. Mean (±SE) perch length (cm) at age for Ardderry Lough, August 2013

	L_1	L_2	L_3	L_4	L_5	L_6	L_7
Mean	6.8 (0.1)	14.5 (0.2)	17.9 (0.3)	20.1 (0.3)	21.7 (0.5)	23.8 (0.4)	24.4
N	57	41	36	25	12	2	1
Range	4.2-8.8	11.1-18.6	15.2-21.2	16.9-22.5	17.7-23.6	23.4-24.2	24.4-24.4

Table 1.4. Mean (±SE) brown trout length (cm) at age for Ardderry Lough, August 2013

	L_1	L_2	L_3
Mean	7.3 (0.6)	16.9 (1.1)	24.4 (0.7)
N	9	7	5
Range	4.4-9.8	11.8-20.9	22.4-26.0

1.4 Summary

Perch was the dominant species in terms of both abundance (CPUE) and biomass (BPUE) during the 2013 survey.

The mean perch CPUE and BPUE increased each year from 2007 to 2013, however, these differences were not statistically significant. Perch ranged in age from 0+ to 7+, indicating reproductive success in each of the previous eight years. The dominant age class was 3+.

Although the mean brown trout CPUE and BPUE fluctuated slightly between sampling years, these differences were not statistically significant. Brown trout ranged in age from 1+ to 3+, with no 0+ age class being recorded. The dominant age class was 3+.

The mean Arctic char CPUE and BPUE decreased from 2007 to 2010, however, these differences were not statistically significant. No Arctic char were recorded in 2013.

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, Ardderry Lough has been assigned an ecological status of Good for 2007, 2010 and 2013 based on the fish populations present.

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

1.5 References

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