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Sampling Fish for the Water Framework Directive

Lakes 2013

Lough Lene

Iascach Intíre Éireann
Inland Fisheries Ireland

Water Framework Directive Fish Stock Survey of Lough Lene, September/October 2013

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

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1.1 Introduction

Lough Lene is a limestone lake, situated in the Upper Boyne catchment in Co. Westmeath (Plate 1.1, Fig. 1.1). It is located approximately 1km north of Collinstown and 4km north-east of Castlepollard. The lake has a surface area of 416.5ha, a mean depth >4m, a maximum depth of 20m and falls into typology class 8 (as designated by the EPA for the Water Framework Directive), i.e. deep (>4m), greater than 50ha and moderately alkaline (20-100mg/l $CaCO_3$).

Lough Lene is a clear, hard-water lake with areas of marl deposition. The lake supports a range of pondweed species (NPWS, 2006). A variety of stoneworts, indicators of marl or hard water lakes, are also present. Areas of woodland found along the shore include willows (*Salix* spp.), birch (*Betula* sp.) and alder (*Alnus glutinosa*) (NPWS, 2006). Bird species found along the shores of Lough Lene include mute swan, teal, pochard, great-crested grebe, little grebe, tufted duck, grey heron, water rail, mallard, golden eye, cormorant and wigeon (NPWS, 2006).

Lough Lene holds a small stock of large wild trout (O' Reilly, 2007), whilst perch, pike and tench are also known to be present. The average size of wild brown trout is 1.6kg and fish up to 5.5kg have been taken from the lake (O' Reilly, 2007). The lake is stocked by the Lough Lene Anglers Association with both brown and rainbow trout. From 2007 to 2010, between 5,000 and 10,000 brown trout were stocked annually. Over the same time period, between 7,000 and 26,000 rainbow trout were stocked annually.

Lough Lene was once home to a population of white clawed crayfish, a species that is listed on Annex II of the E.U. Habitats Directive. However, crayfish disappeared from the lake following an outbreak of the crayfish fungus plague in 1987. Crayfish were reintroduced following their eradication; however, unfortunately the plague reoccurred, leading to a second extinction (NPWS, 2007).

Lough Lene 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 were found to be the dominant species present in the lake followed by brown trout, pike and three-spined stickleback. Small numbers of eels, rainbow trout and tench were also recorded.

Plate 1.1. Lough Lene

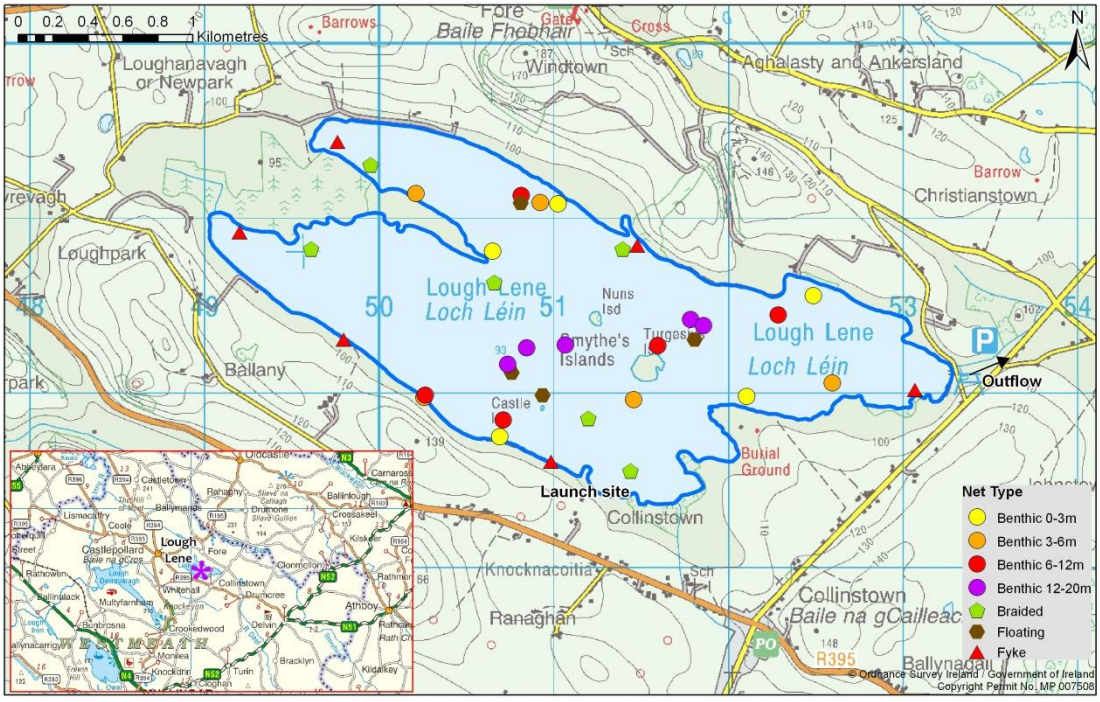

Fig. 1.1. Location map of Lough Lene showing net locations and depths of each net (outflow is indicated on map)

1.2 Methods

Lough Lene was surveyed over one night from the 30th of September to the 1st of October 2013. A total of six sets of Dutch fyke nets, 20 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (5 @ 0-2.9m, 5 @ 3-5.9m, 5 @ 6-11.9m and 5 @ 12-19.9m) and four floating monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets were deployed in the lake (30 sites). The netting effort was supplemented using six benthic braided gill nets (62.5mm mesh knot to knot) at six additional 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 apart from perch were measured and weighed on site and scales were removed from all brown trout, rainbow trout and pike. 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 six fish species were recorded in Lough Lene in October 2013, with 814 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 pike, eels and rainbow trout. Small numbers of brown trout and tench were also captured. The same species composition was recorded during the previous survey in 2010 apart from three-spined stickleback which were not captured in the 2013 survey and eel which were not recorded in 2007.

Table 1.1. Number of each fish captured by each gear type during the survey on Lough Lene, September/October 2013

Scientific name	Common name	Number of fish captured				
		Benthic mono multimesh gill nets	Surface mono multimesh gill nets	Benthic braided gill nets	Fyke nets	Total
Perca fluviatilis	Perch	762	21	1	7	791
Salmo trutta	Brown trout	2	0	1	0	3
Onchorhynchus mykiss	Rainbow trout	4	0	1	0	5
Esox lucius	Pike	5	0	0	2	7
Tinca tinca	Tench	0	0	2	1	3
Anguilla anguilla	European eel	1	0	0	4	5

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 abundance (CPUE) and biomass (BPUE).

Although the mean perch CPUE and BPUE fluctuated over the three sampling years, 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 recorded on Lough Lene, 2007, 2010 and 2013

Scientific name	Common name	2007	2010	2013
			Mean CPUE	
Perca fluviatilis	Perch	0.898 (0.218)	0.627 (0.138)	0.729 (0.142)
Salmo trutta	Brown trout (wild)	-	-	0.003 (0.002)
Salmo trutta	Brown trout (stocked)	0.007 (0.003)	0.009 (0.003) (S)	-
Onchorhynchus mykiss	Rainbow trout	0.007 (0.004)	0.004 (0.002)	0.005 (0.003)
Esox lucius	Pike	0.007 (0.002)	0.008 (0.003)	0.006 (0.003)
Tinca tinca	Tench	0.005 (0.002)	0.007 (0.006)	0.003 (0.002)
Gasterosteus aculeatus	3-spine-stickleback	0.005 (0.002)	0.014 (0.011)	-
Anguilla anguilla	European eel*	-	0.003 (0.003)	0.011 (0.004)
			Mean BPUE	
Perca fluviatilis	Perch	35.254 (9.763)	41.179 (13.094)	33.233 (8.910)
Salmo trutta	Brown trout (wild)	-	-	4.870 (2.818)
Salmo trutta	Brown trout (stocked)	3.650 (1.623)	8.518 (3.637)	-
Onchorhynchus mykiss	Rainbow trout	6.008 (6.008)	3.686 (1.935)	5.367 (3.504)
Esox lucius	Pike	4.448 (2.986)	47.001 (24.468)	4.024 (2.682)
Tinca tinca	Tench	2.328 (1.149)	12.076 (11.320)	3.712 (3.375)
Gasterosteus aculeatus	3-spine-stickleback	0.019 (0.008)	0.008 (0.006)	-
Anguilla anguilla	European eel*	-	0.663 (0.663)	6.519 (2.644)

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

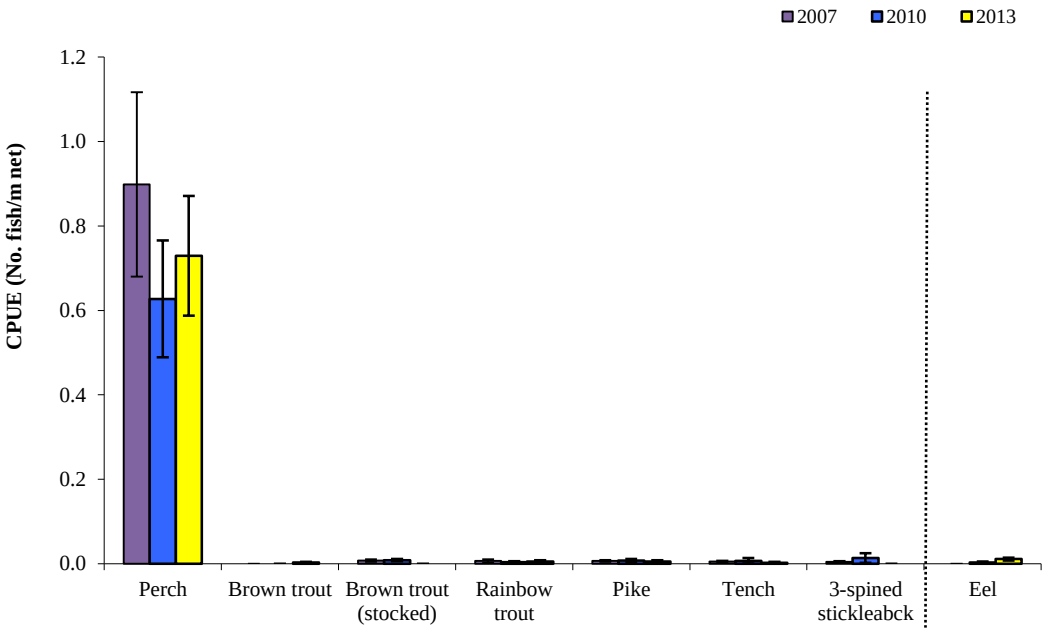

Fig. 1.2. Mean (±S.E.) CPUE for fish species captured on Lough Lene (Eel CPUE based on fyke nets only), 2007, 2010 and 2013

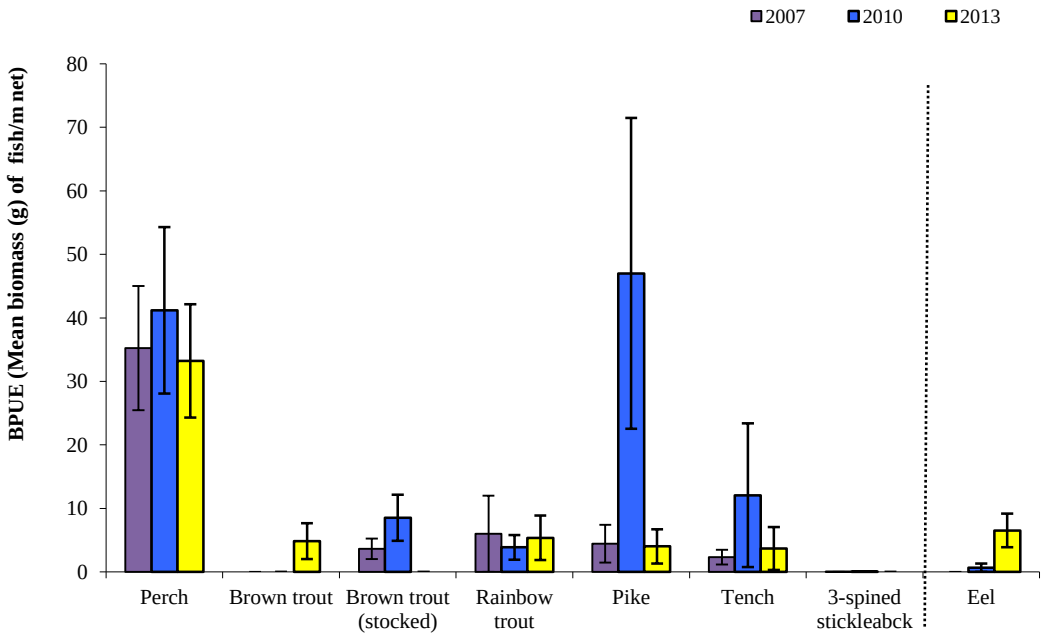

Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Lough Lene (Eel BPUE based on fyke nets only), 2007, 2010 and 2013

1.3.3 Length frequency distributions and growth

Perch captured during the 2013 survey ranged in length from 4.0cm to 33.3cm (mean = 12.1cm) (Fig. 1.4) with ten age classes present, ranging from 0+ to 9+, with a mean L1 of 5.7cm (Table 1.3). The dominant age class was 0+ (Fig 1.4). Perch captured during the 2010 and 2007 survey had a similar length range and dominant age class (Fig. 1.4) (Kelly *et al*., 2011).

Pike captured during the 2013 survey ranged in length from 16.0cm to 63.5cm (mean = 34.4cm) (Fig. 1.5). Pike captured during the 2010 survey ranged in length from 18.8cm to 102.5cm (Fig. 1.5) and lengths ranged from 21.0cm to 70.0cm in 2007. In 2013 three age classes of pike were present, ranging from 0+ to 3+.

All brown trout captured in 2010 and 2007 were stocked fish, however, the brown trout recorded in 2013 were wild. Brown trout captured during the 2013 survey ranged in length from 45.3cm to 57.5cm with two age classes present, ranging from 3+ to 5+, with a mean L1 of 12.6cm (Table 1.4). Brown trout captured during the 2010 survey ranged in length from 26.9cm to 62.5cm with two age classes present, ranging from 2+ to 3+. Brown trout captured during the 2007 survey ranged in length from 31.5cm to 46.0cm and ranged in age from 2+ to 4+.

Rainbow trout ranged in length from 44.5cm to 48.5cm and were all aged at 2+. Eels ranged in length from 51.5cm to 84.2cm (mean = 70.4cm). Tench ranged in length from 34.9cm to 50.5cm.

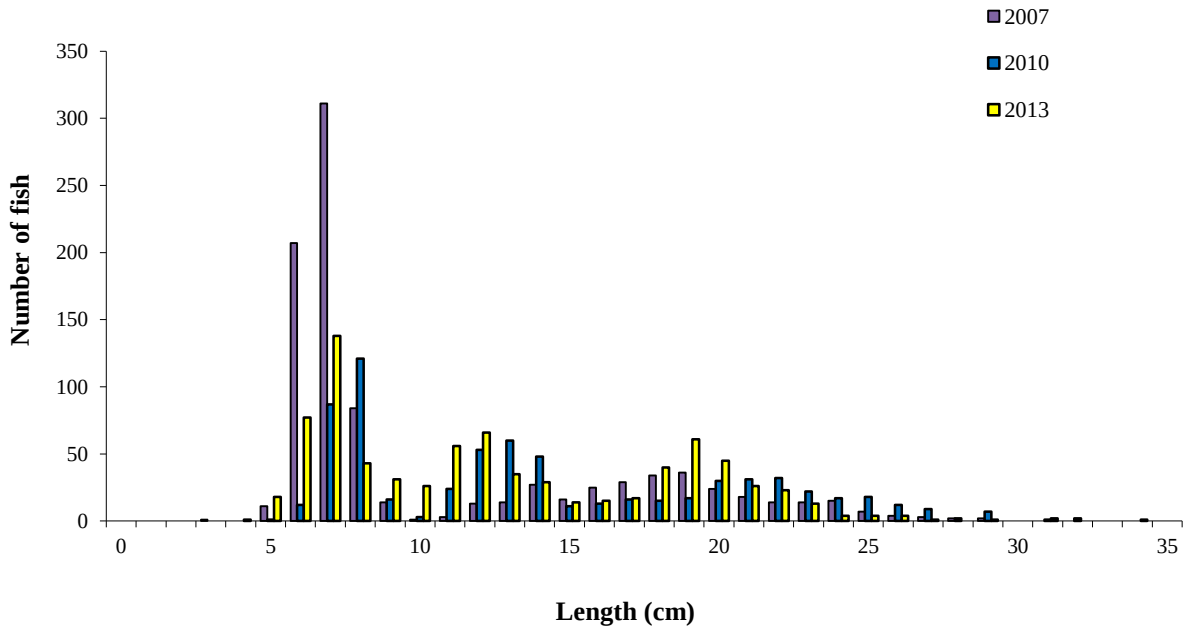

Fig. 1.4. Length frequency of perch captured on Lough Lene, 2007, 2010 and 2013

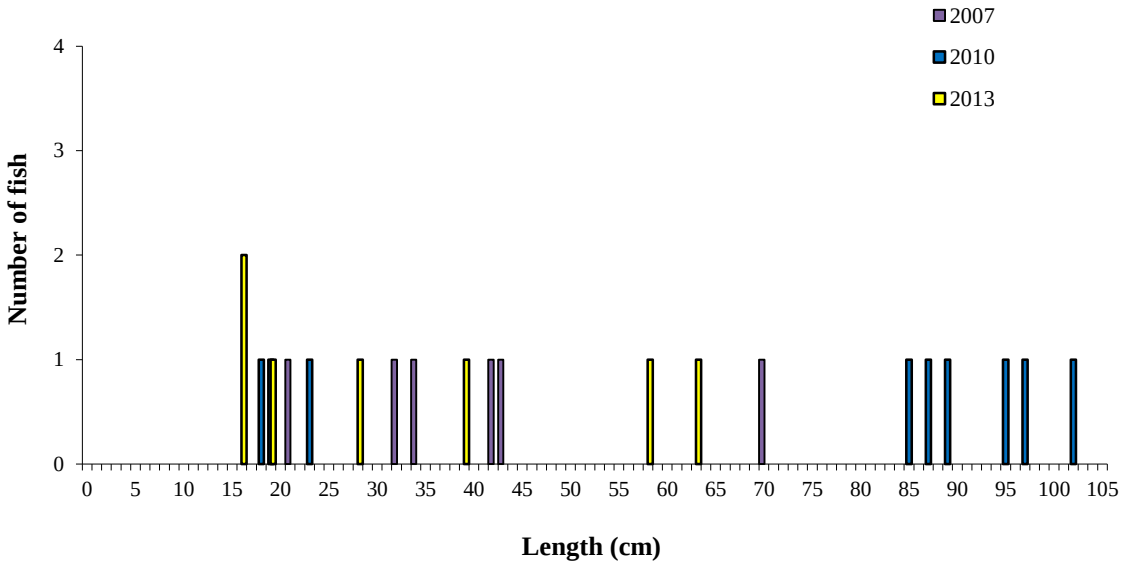

Fig. 1.5. Length frequency of pike captured on Lough Lene, 2007, 2010 and 2013

Table 1.3. Mean (±SE) perch length (cm) at age for Lough Lene, September/October 2013

	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8	L_9
Mean	5.7 (0.1)	11.1 (0.1)	15.0 (0.2)	17.8 (0.3)	20.6 (0.6)	23.4 (0.6)	26.0 (1.3)	27.9 (1.7)	29.7
N	92	62	55	45	18	12	5	4	1
Range	3.7-7.6	8.3-13.5	11.3-19.5	12.6-22.3	16.7-24.8	20.1-26.9	21.0-28.2	23.0-30.9	29.7-29.7

Table 1.4. Mean (±SE) brown trout length (cm) at age for Lough Lene, September/October 2013

	L_1	L_2	L_3	L_4	L_5
Mean	12.6 (0.005)	22.7 (2.9)	35.2 (4.2)	39.6	45.0
N	2	2	2	1	1
Range	12.6-12.6	19.8-25.6	30.9-39.4	39.6-39.6	45.0-45.0

1.4 Summary

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

Although the mean perch CPUE and BPUE fluctuated over the three sampling occasions, these differences were not statistically significant. The dominant age class of perch was 0+. Perch ages ranged from 0+ to 9+, indicating reproductive success in each of the previous ten years.

Only a small number of stocked rainbow trout (aged at 2+) and wild brown trout (aged 3+ to 5+).were captured during the present survey

Lough Lene is stocked annually with brown trout and rainbow trout (a non-native species). These hatchery reared fish have been released into the lake to create an angling amenity in the area, as the native brown trout stock have declined in recent years and cannot support large fishing pressures.

A summary of the effects of stocking on the lake and recommendations for the future can be found in the previous report (Kelly *et al.*, 2011).

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 Lene has been assigned an ecological status of Good based on the fish populations present in 2013. The ecological status assigned to the lake based on the 2007 survey data was also Good and the ecological status in 2010 was Bad.

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

1.5 References

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