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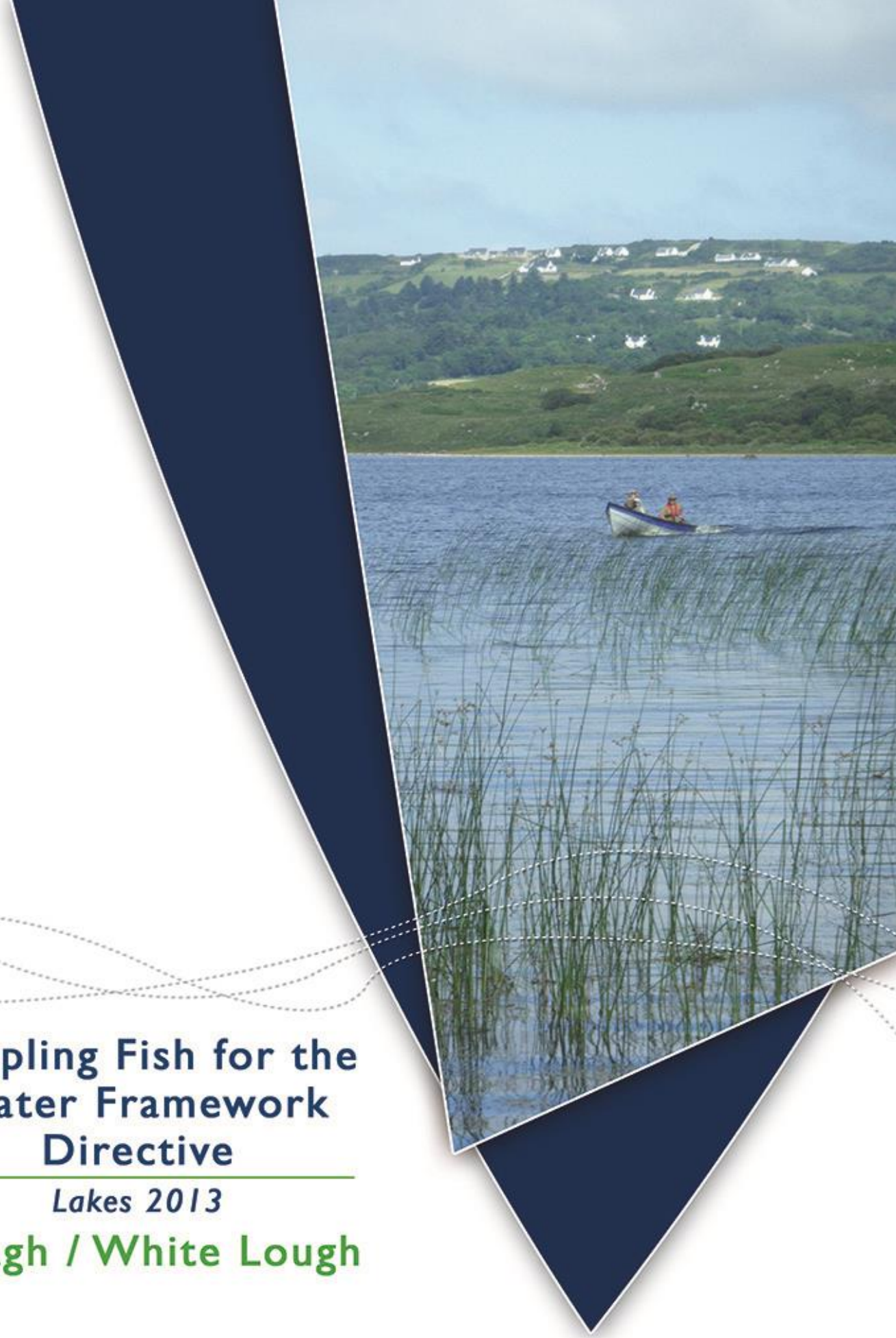

Sampling Fish for the Water Framework Directive

Lakes 2013

Annagh / White Lough

Iascach Intíre Éireann
Inland Fisheries Ireland

Water Framework Directive Fish Stock Survey of Annagh (White) Lough, September 2013

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

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1.1 Introduction

Annagh (White) Lough is located on the Meath-Westmeath border in the Upper Boyne catchment (Plate 1.1 and Fig. 1.1). The lake is located in a small, poorly-drained valley approximately 7km north-east of Castlepollard. The lake has a surface area of 25ha, a mean depth of >4m and a maximum depth of 18m. Annagh (White) Lough is one of four lakes that make up the White Lough, Ben Lough and Lough Doo Special Area of Conservation. These are all hard water lakes, a habitat listed on Annex I of the EU Habitats Directive (NPWS, 1999). The white-clawed crayfish (*Austropotamobius pallipes*), a species listed on Annex II of the EU Habitats Directive has been recorded in the lake. The lake is stocked regularly with rainbow trout by the White Lough Angling Association.

The lake is categorised as typology class 11 (as designated by the EPA for the purposes of the Water Framework Directive), i.e. deep (>4m), less than 50ha and high alkalinity (>100mg/l $CaCO_3$).

A survey in October 1981 yielded perch, pike, rainbow trout, three-spined stickleback and ten-spined stickleback (CFB unpublished archival data).

Annagh (White) 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 were found to be the dominant species present in the lake. Rainbow trout, brown trout, minnow and pike were also captured during the survey. Dutch fyke nets were set in the lake in 2013, but no eels were captured.

Plate 1.1. Annagh (White) Lough

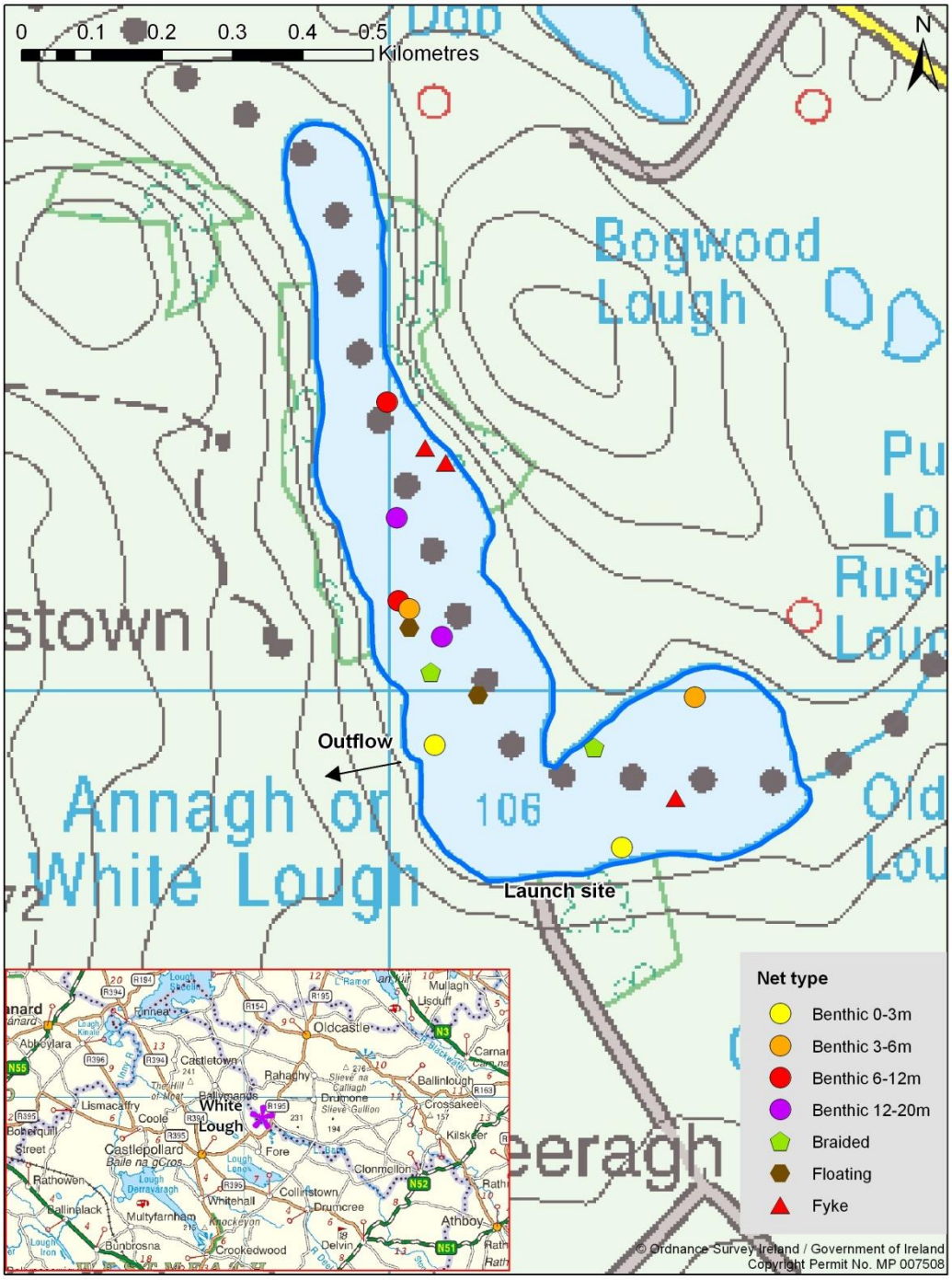

Fig. 1.1. Location map of Annagh (White) Lough showing net locations and depths of each net (outflow is indicated on map)

1.2 Methods

Annagh (White) Lough was surveyed over one night on the 16th of September 2013. A total of three sets of Dutch fyke nets, eight benthic monofilament multi-mesh CEN standard survey gill nets (2 @ 0-2.9m, 2 @ 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 (13 sites). The netting effort was supplemented using two benthic braided gill nets (62.5mm mesh knot to knot) at two additional sites. Nets were deployed in the same locations as were randomly selected in the previous survey in 2010. 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 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 three fish species were recorded on Annagh (White) Lough in September 2013, with 228 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 rainbow trout and pike. During the previous surveys in 2010 and 2007, the same species composition was recorded with the addition of brown trout and minnow in 2010 only.

Table 1.1. Number of each fish species captured by each gear type during the survey on Annagh (White) Lough, 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	207	0	0	9	216
Onchorhynchus mykiss	Rainbow trout	4	0	3	2	7
Esox lucius	Pike	1	0	2	2	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 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 2010 and 2013 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 pike was the dominant species in terms of biomass (BPUE) captured in the survey gill nets during the 2013 survey.

Although the mean perch CPUE and BPUE were higher in 2013 than in 2010 and 2007, these differences were not statistically significant (Table 1.2; Fig 1.2 and 1.3).

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

Brown trout were only recorded in the 2010 survey (Fig. 1.2 and 1.3).

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

Scientific name	Common name	2007	2010	2013
			Mean CPUE	
Perca fluviatilis	Perch	0.233 (0.140)	0.300 (0.182)	0.470 (0.204)
Onchorhynchus mykiss	Rainbow trout	0.039 (0.011)	0.007 (0.005)	0.014 (0.006)
Salmo trutta	Brown trout	-	0.002 (0.002)	-
Esox lucius	Pike	0.023 (0.011)	0.004 (0.003)	0.009 (0.004)
Phoxinus phoxinus	Minnow	-	0.002 (0.002)	-
			Mean BPUE	
Perca fluviatilis	Perch	1.351 (0.884)	5.586 (3.384)	19.496 (10.501)
Onchorhynchus mykiss	Rainbow trout	20.799 (7.146)	7.060 (5.551)	21.178 (8.428)
Salmo trutta	Brown trout	-	6.667 (6.667)	-
Esox lucius	Pike	7.884 (4.370)	8.484 (5.789)	22.431 (15.334)
Phoxinus phoxinus	Minnow	-	0.700 (0.007)	-

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.

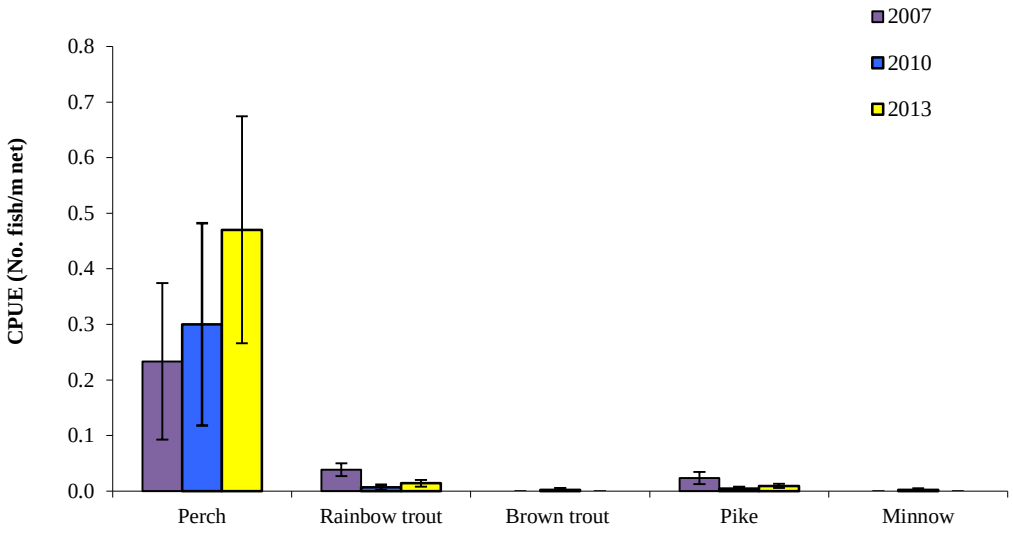

Fig. 1.2. Mean (±S.E.) CPUE for all fish species captured in Annagh (White) Lough 2007, 2010 and 2013

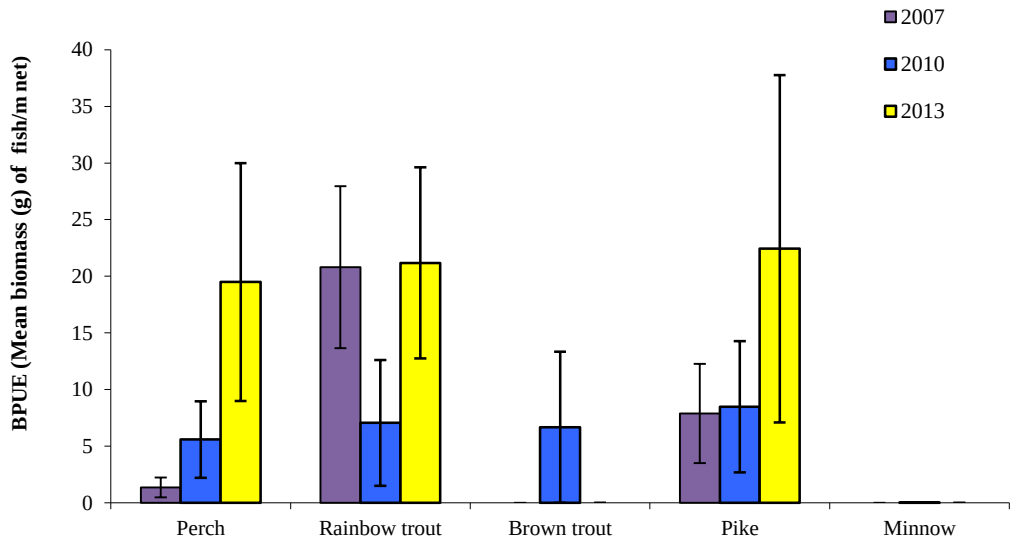

Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Annagh (White) Lough 2007, 2010 and 2013

1.3.3 Length frequency distributions and growth

Perch captured during the 2013 survey ranged in length from 5.0cm to 33.2cm (mean = 11.3cm) (Fig. 1.4) with seven age classes present, ranging from 1+ to 7+, with a mean L1 of 6.1cm (Table 1.3). The dominant age class was 1+ (Fig 1.4). Perch captured during the 2010 survey ranged in length from 5.0cm to 20.2cm (Fig. 1.4) and ranged in age from 0+ to 3+. Perch captured during the 2007 survey had a similar length and age range to 2010 (Fig 1.4). The dominant age class in 2007 and 2010 was also 1+ (Fig. 1.4).

Rainbow trout captured during the 2013 survey ranged in length from 38cm to 55.8cm (Fig. 1.5) with two age classes present, ranging from 3+ to 4+, with a mean L1 of 8.3cm (Table 1.4). In the 2010 survey, rainbow trout ranged in length from 32.9cm to 41.8cm and were all aged at 2+ (Fig. 1.5). In the 2007 survey rainbow trout ranged in length from 28.0cm to 44.0cm (Fig. 1.5) and ranged in age from 1+ to 3+.

Pike captured during the 2013 survey ranged in length from 17.0cm to 91.5cm.

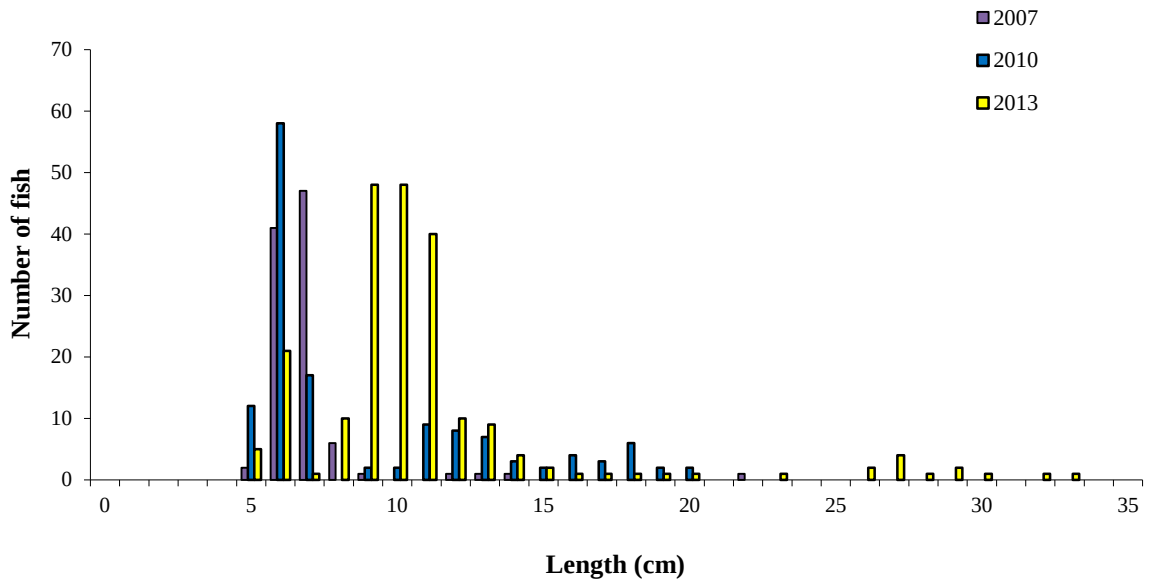

Fig 1.4. Length frequency of perch captured on Annagh (White) Lough, 2007, 2010 and 2013

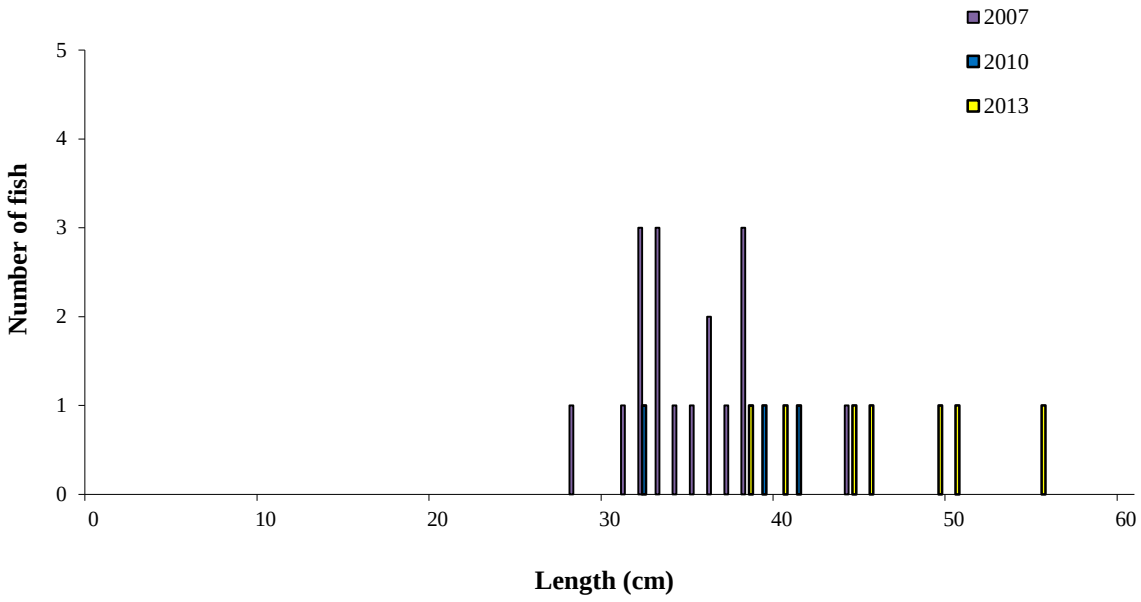

Fig. 1.5. Length frequency of rainbow trout captured on Annagh (White) Lough, 2007, 2010 and 2013

Table 1.3. Mean (±SE) perch length (cm) at age for Annagh (White) Lough, September 2013

	L_1	L_2	L_3	L_4	L_5	L_6	L_7
Mean	6.1 (0.1)	11.2 (0.5)	17.0 (0.9)	22.9 (1.0)	25.7 (2.2)	25.7 (3.4)	30.3
N	61	22	14	11	3	2	1
Range	4.7-8.6	6.9-16.9	11.0-22.3	15.8-27.3	21.2-28.2	22.3-29.1	30.3-30.3

Table 1.4. Mean (±SE) rainbow trout length (cm) at age for Annagh (White) Lough, September 2013

	L_1	L_2	L_3	L_4
Mean	8.3 (0.4)	18.6 (1.7)	32.6 (3.8)	40.4 (5.3)
N	6	6	6	2
Range	7.2-10.1	12.8-23.4	21.1-45.9	35.1-45.7

1.4 Summary

Perch was the dominant species in terms of abundance (CPUE) and pike was the dominant species in terms of biomass (BPUE) captured in the survey gill nets during 2013.

Although the mean perch CPUE and BPUE was higher in 2013 than in 2010 and 2007, these differences were not statistically significant. Perch ranged in age from 1+ to 7+, indicating reproductive success in seven of the previous eight years. The dominant age class of perch was 1+.

The mean rainbow trout CPUE and BPUE fluctuated slightly between the three sampling years, however, these differences were not statistically significant. Rainbow trout ranged in age from 3+ to 4+. No brown trout were recorded during the 2013 survey.

Annagh (White) Lough is stocked regularly with rainbow trout (a non-native species). These hatchery reared fish have been released into the lake to create an angling amenity in the area. Only a small number of stocked two year old rainbow trout were captured during the present survey.

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 2011 (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, Annagh (White) Lough 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 and 2010 survey data was also Good.

In the 2010 to 2012 surveillance monitoring reporting period, the EPA assigned Annagh (White) 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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