Sampling Fish for the Water Framework Directive

Lakes 2010

Annagh or White Lough

Iascach Intíre Éireann
Inland Fisheries Ireland

ACKNOWLEDGEMENTS

1.1 Introduction

Annagh (White) Lough (Plate 1.1 and 1.2, Fig. 1.1) is situated on the Meath-Westmeath border in the Upper Boyne catchment. 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. 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 $CaCO_3$).

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 have been recorded in the lake. The lake is stocked regularly with rainbow trout by the White Lough Angling Association. A survey in October 1981 yielded perch, pike, rainbow trout, three-spined stickleback and ten-spined stickleback (CFB unpublished archival data).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 as part of the WFD Surveillance Monitoring Programme (Kelly and Connor, 2007). During this survey perch and rainbow trout were found to be the dominant species present in the lake. Pike were also captured during the survey. Dutch fyke nets were set in the lake, but no eels were captured.

At the time of the 2010 survey, shoreline work was being conducted to expand the existing car park (Plate 1.2).

Plate 1.1. Annagh (White) Lough

Plate 1.2. Annagh (White) Lough shoreline works, October 2010
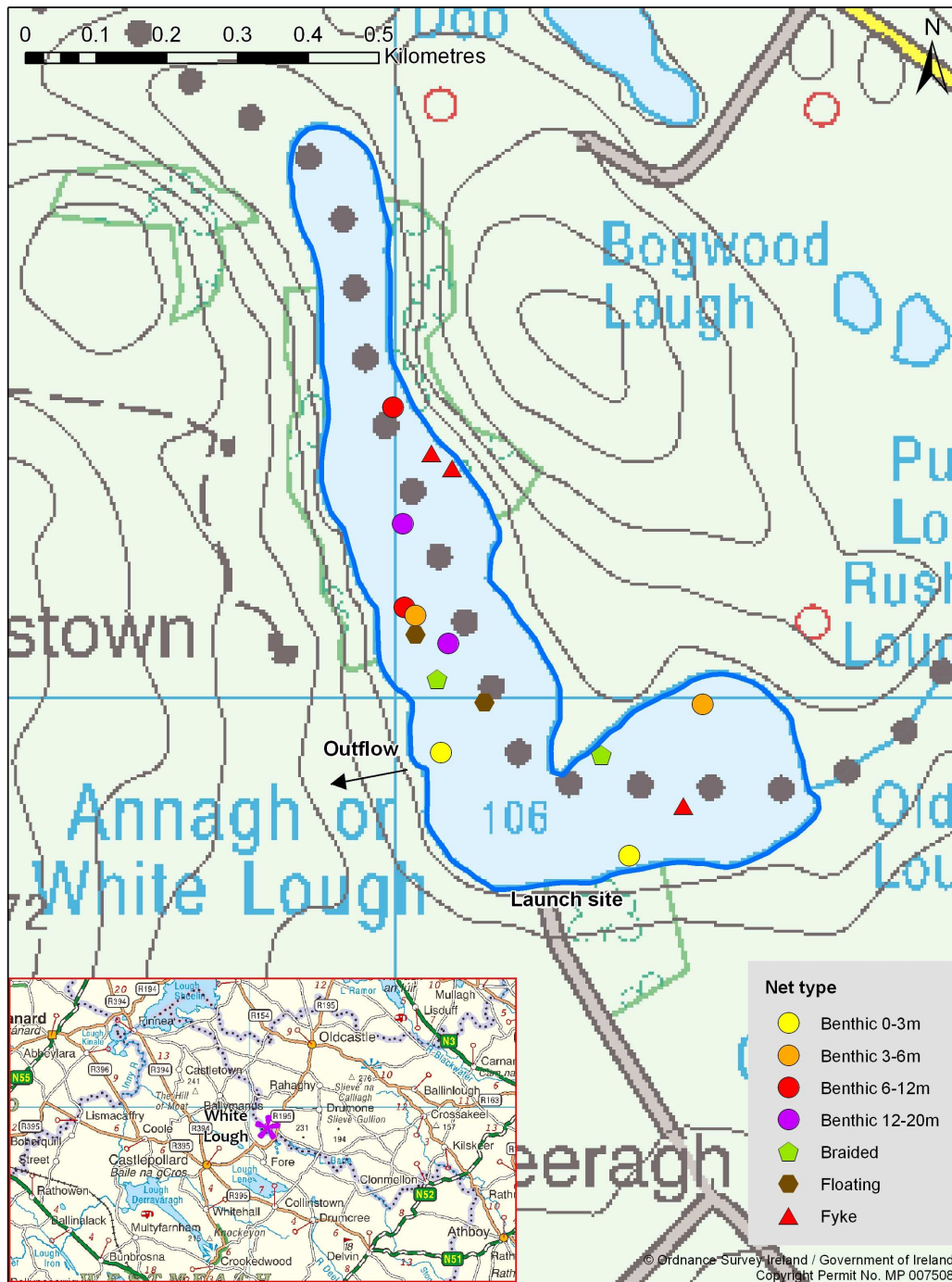
Fig. 1.1. Location map of Annagh (White) Lough showing net locations and depths of each net (outflow is indicated on map)

1.2 Methods

Annagh (White) Lough was surveyed over one night on the 7th of October 2010. A total of three sets of Dutch fyke nets, eight benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) 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. 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 five fish species were recorded on Annagh (White) Lough in October 2010, with 144 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 survey in 2007, the same species composition was recorded with the exception of brown trout and minnow, which were not present during the 2007 survey but were captured in the current survey.

Table 1.1. Number of each fish species captured by each gear type during the survey on Annagh (White) Lough, October 2010

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	133	0	0	4	137
Salmo trutta	Brown trout	0	0	1	0	1
Esox lucius	Pike	1	0	1	0	2
Onchorhynchus mykiss	Rainbow trout	3	0	0	0	3
Phoxinus phoxinus	Minnow	1	0	0	0	1

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 are summarised in Table 1.2. Mean CPUE for all species captured in 2007 and 2010 is illustrated in Figure 1.2.

Although the mean perch CPUE was higher in 2010 than in 2007 (Fig. 1.2), this was not statistically significant. The differences in the mean perch CPUE between Annagh (White) Lough and three other similar lakes were assessed with no significant differences being found (Fig. 1.3).

Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Annagh (White) Lough, 2007 and 2009

Scientific name	Common name	2007	2010
		Mean CPUE	
Salmo trutta	Brown trout	-	0.002 (0.002)
Onchorhynchus mykiss	Rainbow trout (stocked)	0.039 (0.011)	0.007 (0.005)
Perca fluviatilis	Perch	0.233 (0.140)	0.300 (0.182)
Esox lucius	Pike	0.023 (0.011)	0.004 (0.003)
Phoxinus phoxinus	Minnow	-	0.002 (0.002)
		Mean BPUE	
Salmo trutta	Brown trout	-	6.666 (6.666)
Onchorhynchus mykiss	Rainbow trout (stocked)	20.799 (7.146)	7.060 (5.551)
Perca fluviatilis	Perch	1.351 (0.884)	5.586 (3.384)
Esox lucius	Pike	7.884 (4.370)	8.484 (5.788)
Phoxinus phoxinus	Minnow	-	0.007 (0.007)

* On the rare occasion where biomass data was unavailable for an individual fish, this was determined from a length/weight regression for that species.
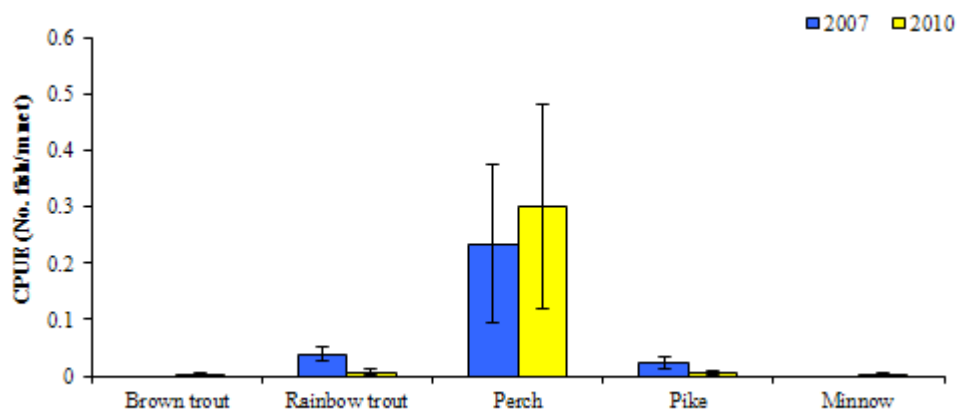
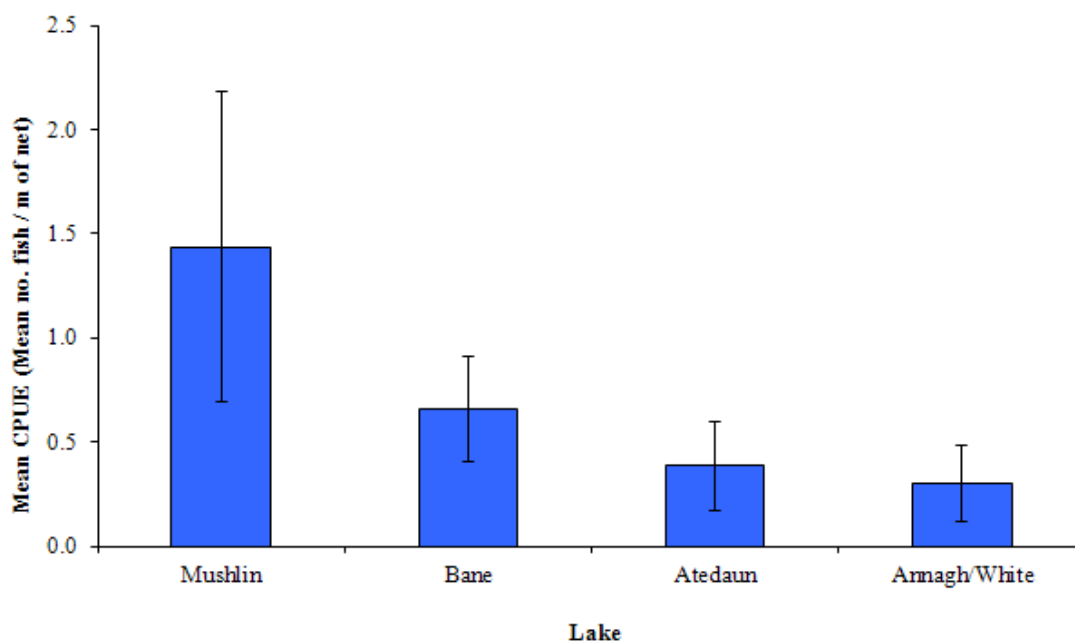**Fig. 1.2. Mean (±S.E.) CPUE on Annagh (White) Lough (Eel CPUE based on fyke nets only), 2007 and 2010**

Fig. 1.3. Mean (±S.E.) perch CPUE in four lakes surveyed during 2010

1.3.3 Length frequency distributions

Perch captured during the 2010 survey ranged in length from 5.0cm to 20.2cm (mean = 9.3cm) (Fig. 1.4). Perch captured during the 2007 survey ranged in length from 5.3cm to 22.0cm (Fig. 1.4). Rainbow trout captured during the 2010 survey ranged in length from 32.9cm to 41.8cm (Fig. 1.5), whilst rainbow trout captured during the 2007 survey ranged in length from 28.0cm to 44.0cm (Fig.

1.5). The single brown trout captured during the 2010 survey measured 57.9cm in length. Two pike were recorded measuring 64.0cm and the one minnow captured measured 6.0cm.
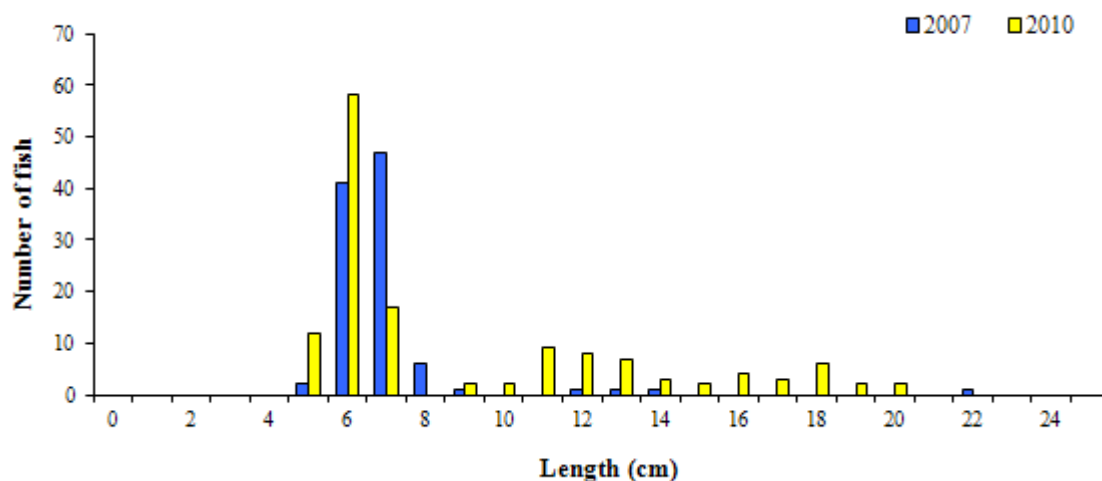
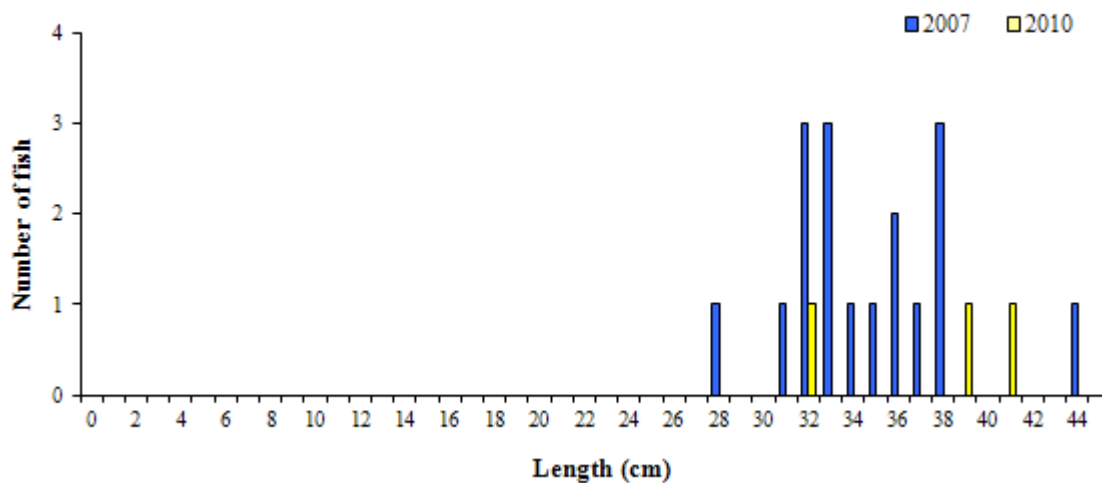**Fig 1.4. Length frequency of perch captured on Annagh (White) Lough**

Fig. 1.5. Length frequency of rainbow trout captured on Annagh (White) Lough

1.3.4 Fish age and growth

Four age classes of perch were present, ranging from 0+ to 3+, with a mean L1 of 6.3cm (Table 1.3). In the 2007 survey, perch ranged from 0+ to 4+ with a mean L1 of 5.5cm.

The three rainbow trout captured were all aged 2+, with a mean L1 of 13.4cm (Table 1.4). In the 2007 survey, rainbow trout ranged from 1+ to 3+ with a mean L1 of 9.1cm.

The two pike captured were aged 3+ and 4+.

Table 1.3. Mean (±SE) perch length (cm) at age for Annagh (White) Lough, October 2010

	L_1	L_2	L_3
Mean	6.3 (0.2)	11.1 (0.3)	17.8
N	39	20	1
Range	4.1-8.3	7.4-13.3	17.8-17.8

Table 1.3. Mean (±SE) rainbow trout length (cm) at age for Annagh (White) Lough, October 2010

	L_1	L_2
Mean	13.4 (0.6)	31.1 (2.5)
N	2	2
Range	12.1-14.3	28.3-36.1

1.4 Summary

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

The mean perch CPUE in Annagh (White) Lough was similar to the other lakes assessed during 2010, with no significant differences being found. Perch ranged in age from 0+ to 3+ indicating reproductive success in each of the previous three years.

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. Research has shown that stocked rainbow trout have a poor survival rate in the wild (e.g. ranging from 15% to 50% in the USA, Canada and Australia) (Bettinger and Bettoli, 2002; Teuscher *et al.*, 2003; High and Meyer, 2009).

Stocking of fish (including non indigenous species such as rainbow trout) has been identified as an action with potential to impact on the quality status of rivers and lakes and is listed as a pressure in the WFD REFCOND guidance document *(*Wallin *et al.* 2005). In WFD terms, it could impact on the ecological status class scoring system and would serve to drive down the water body's quality rating. While this classifying may seem arbitrary to some it does reflect the concern of WFD to identify issues that are not appropriate in water resource (in broadest terms) management. Deterioration of ecological status is not permissible under WFD, unless in cases of major public or national importance.

A review of the survival of stocked fish in Annagh (White) Lough is recommended, and the stocking policy for the lake should also be reviewed and revised. The stocking programme developed should be consistent with EU legislation (WFD, Habitats Directive and the Fish Health Directive) and national programmes such as the National Biodiversity Plan. The revised stocking policy for the lake should include a review of habitat and spawning potential of the wild brown trout population, choice of stocked species, triploid versus diploid, timing of stocking events, catch and release policy, bag limits, and fin clipping of stocked trout.

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 class. Using the FIL2 classification tool, Annagh (White) Lough has been assigned an ecological status of Good for both the 2007 and 2010 surveys, based on the fish populations present.

In the 2007 to 2009 surveillance monitoring reporting period, the EPA assigned Annagh (White) Lough an overall ecological status of Good, based on all monitored physico-chemical and biological elements, including fish. This status classification will be revised at the end of 2012.

1.5 References

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