Sampling Fish for the Water Framework Directive

Lakes 2010

Lough Bane

Iascach Intíre Éireann
Inland Fisheries Ireland

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1.1 Introduction

Lough Bane is situated on the Meath-Westmeath border within the Boyne catchment, approximately 10km south of Oldcastle (Plate 1.1 and Fig. 1.1). It has a surface area of 75ha, a mean depth of >4m and a maximum depth of 16m. The lake is categorised as typology class 12 (as designated by the EPA for the purposes of the Water Framework Directive), i.e. deep (>4m), greater than 50ha and high alkalinity (>100mg/l CaCO3). Lough Bane is a public water supply for the north Meath area.

Lough Bane historically held a stock of wild brown trout; however it is also stocked regularly by the Lough Bane Angling Association, who control fishing on the lake (O'Reilly, 2007). The angling association has been in existence for fourteen years and has been stocking approximately 1,000 brown trout and 1,000 rainbow trout into the lake each year. In a survey carried out during 2007, brown trout were not captured in the lake (Kelly and Connor, 2007).

Lough Bane is one of three lakes, along with Lough Glass and Lough Glass North, to make up the Lough Bane and Lough Glass Special Area of Conservation (NPWS, 2000). The lakes are situated in a shallow valley that occurs at the headwaters of the River Deel, with the main outflow at the south-east end of Lough Bane. Lough Bane is a good example of a hard water marl lake, an important habitat listed on Annex I of the E.U. Habitats Directive (NPWS, 2000). The lake contains well developed stonewort communities, and at least four species of Charophyte, i.e. *Chara rudis C. curta C. globularis* and *C. contraria.* Mixed woodland made composed of beech (*Fagus sylvatica*), oak (*Quercus* sp.), holly (*Ilex aquifolium*), Scots pine (*Pinus sylvestris*) and European larch (*Larix decidua*) occur along parts of the southern and northern shores of the lake. Lough Bane was once home to a population of white-clawed crayfish (*Austropotamobius pallipes*), a species listed on Annex II of the E.U. Habitats Directive (NPWS, 2007). However, in 1986 this species was declared extinct from the lake due to an infestation of the fungal plague, *Aphanomyces astaci* (NPWS, 2000). Crayfish have successfully been reintroduced to other lakes in the area and it is the intention of National Parks and Wildlife to reintroduce them to Lough Bane. Bird species found at the lake include the little grebe, cormorant, lapwing, curlew and snipe (NPWS, 2000).

Lough Bane was previously surveyed in 2007 as part of the Water Framework Directive surveillance monitoring programme (Kelly and Connor, 2007). During this survey perch were found to be the dominant species present in the lake. Nine-spined stickleback, pike and eels were also captured during the survey.

Plate 1.1. Lough Bane

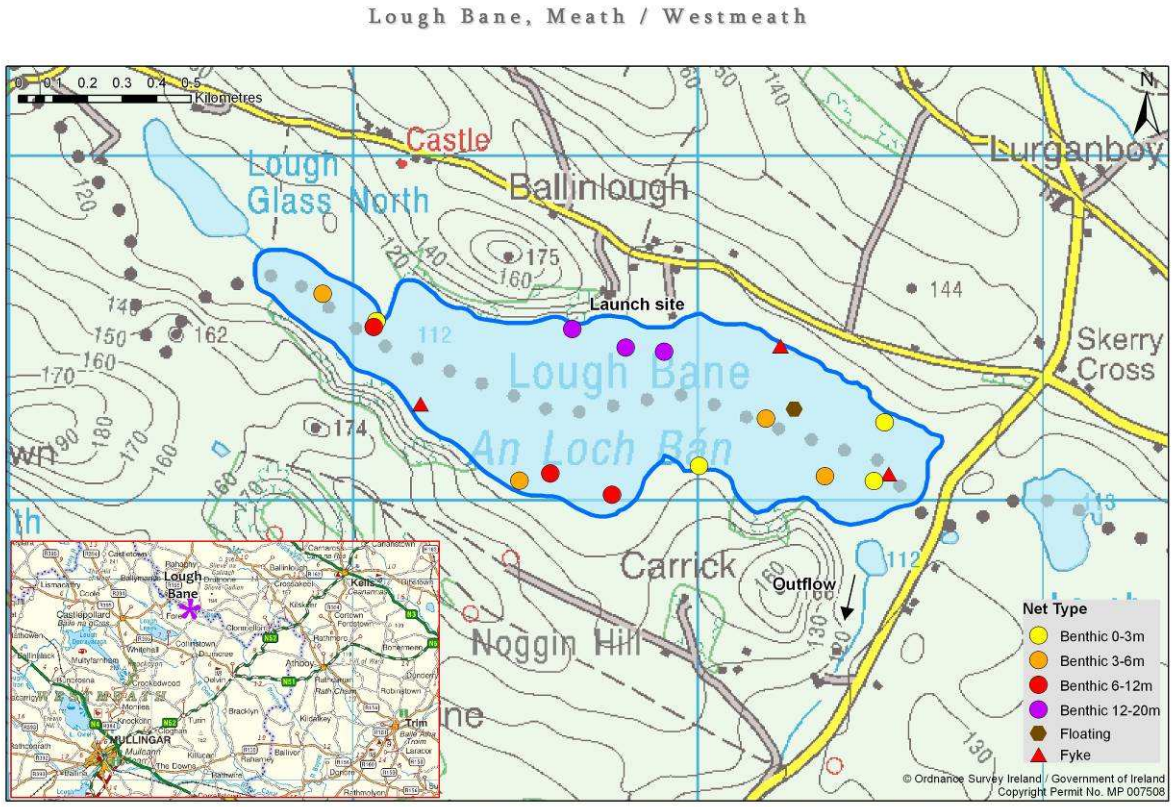

Fig. 1.1. Location map of Lough Bane and depths of each net (outflow is indicated on map)

1.2 Methods

Lough Bane was surveyed over two nights from the 19th to the 21st of July 2010. A total of three sets of Dutch fyke nets, 14 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (4 @ 0-2.9m, 4 @ 3-5.9m, 3 @ 6-11.9m and 3 @ 12-19.9m) and one floating monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill net were deployed in the lake (18 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 pike, brown trout and rainbow 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 six fish species were recorded on Lough Bane in July 2010, with 384 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. During the previous survey in 2007 the same species composition was recorded with the exception of brown trout, 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 in Lough Bane, July 2010

Scientific name	Common name	Number of fish captured			
		Benthic mono multimesh gill nets	Surface mono multimesh gill nets	Fyke nets	Total
Perca fluviatilis	Perch	354	0	2	356
Oncorhynchus mykiss	Rainbow trout (stocked)	4	4	0	8
Anguilla anguilla	European eel	0	0	6	6
Salmo trutta	Brown trout (stocked)	5	0	0	5
Pungitius pungitius	Nine-spined stickleback	4	0	0	4
Esox lucius	Pike	4	0	1	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 2007 and 2010 surveys are summarised in Table 1.2. Mean CPUE for all fish species captured in 2007 and 2010 is illustrated in Figure 1.2.

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

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

Scientific name	Common name	2007	2010
		Mean CPUE	
Salmo trutta	Brown trout (stocked)	-	0.009 (0.004)
Oncorhynchus mykiss	Rainbow trout (stocked)	0.003 (0.002)	0.015 (0.008)
Perca fluviatilis	Perch	0.154 (0.055)	0.657 (0.249)
Esox lucius	Pike	0.005 (0.003)	0.008 (0.003)
Pungitius pungitius	Nine-spined stickleback	0.041 (0.029)	0.007 (0.004)
Anguilla anguilla	European eel	0.011 (0.006)	0.033 (0.026)
		Mean BPUE	
Salmo trutta	Brown trout (stocked)	-	10.481 (5.972)
Oncorhynchus mykiss	Rainbow trout (stocked)	3.379 (2.405)	9.620 (5.126)
Perca fluviatilis	Perch	17.725 (8.923)	17.995 (8.676)
Esox lucius	Pike	0.144 (0.079)	4.137 (2.779)
Pungitius pungitius	Nine-spined stickleback	0.135 (0.091)	0.007 (0.004)
Anguilla anguilla	European eel	1.252 (0.875)	25.777 (20.137)

* On the rare occasion where biomass data was unavailable for an individual fish, this was determined from a length/weight regression for that species.

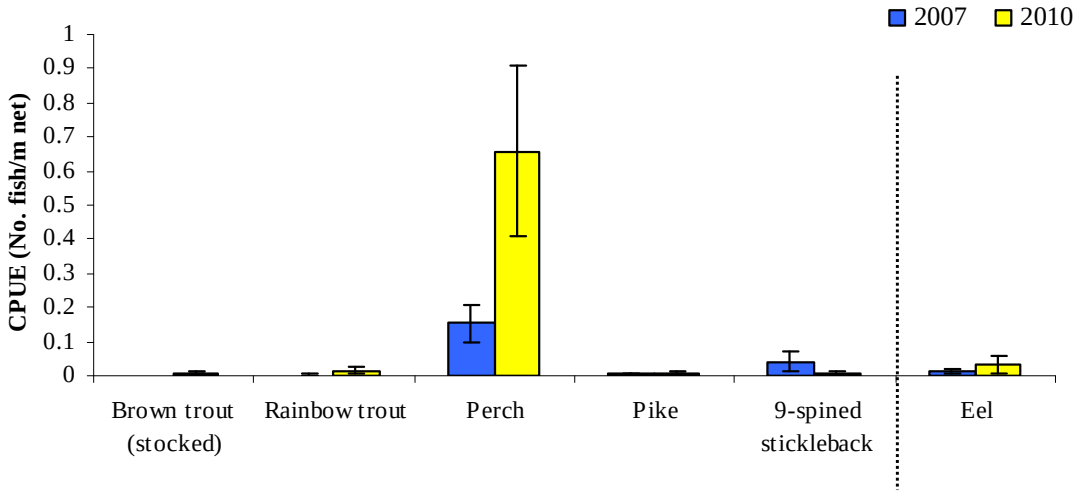

Fig. 1.2. Mean (±S.E.) CPUE for all fish species captured in Lough Bane (Eel CPUE based on fyke nets only), 2007 and 2010

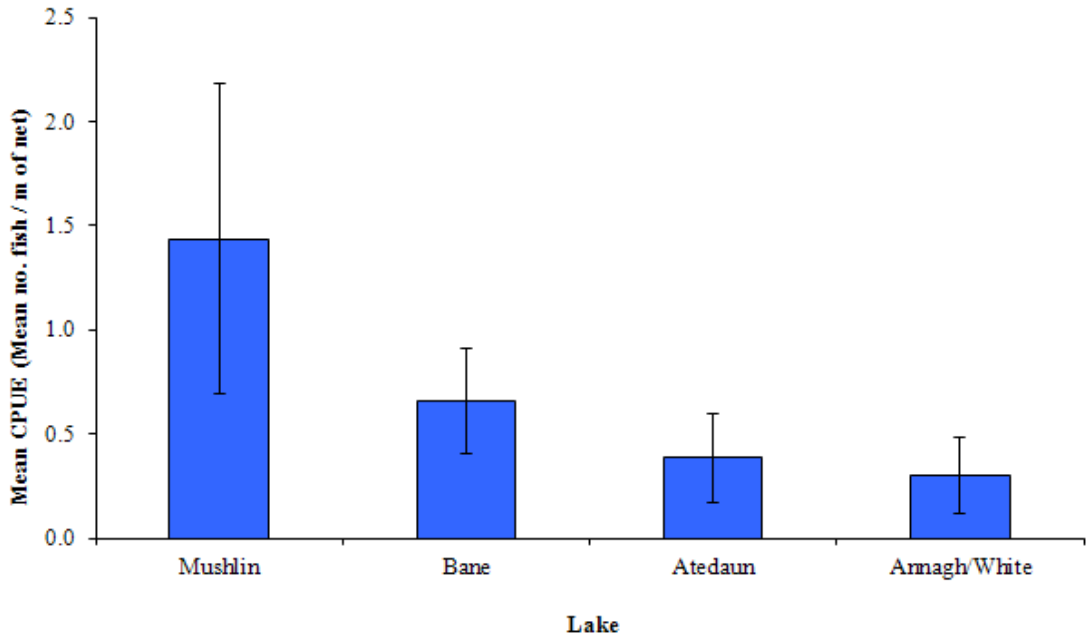

Fig. 1.3. Mean (±S.E.) perch CPUE in four lakes surveyed during 2010

1.3.3 Length frequency distributions

Perch captured during the 2010 survey ranged in length from 3.2cm to 36.0cm (mean = 7.0cm) (Fig. 1.4). Perch captured during the 2007 survey ranged in length from 8.6cm to 33.2cm (Fig. 1.4).

Rainbow trout captured during the 2010 survey ranged in length from 33.8cm to 40.0cm (mean = 37.4cm) (Fig.1.5). Rainbow trout captured during the 2007 survey were larger and ranged in length from 46.0cm to 48.0cm (Fig.1.5).

Brown trout captured during the 2010 survey ranged in length from 37.2cm to 54.5cm. Eels ranged in length from 69.8cm to 77.0.cm, nine-spined stickleback ranged in length from 3.5cm to 4.5cm and pike ranged in length from 12.7cm to 54.5cm.

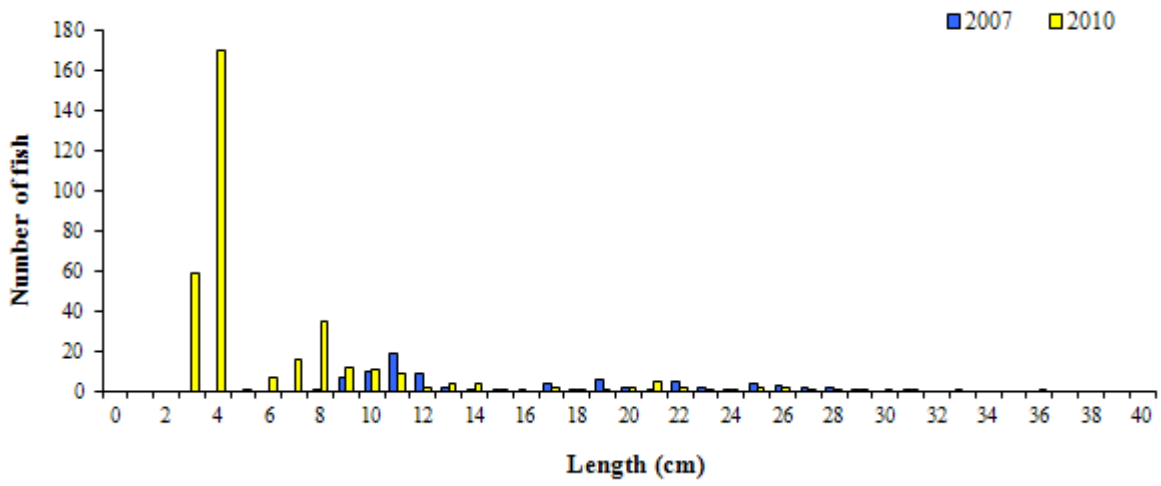

Fig. 1.4. Length frequency of perch captured in Lough Bane

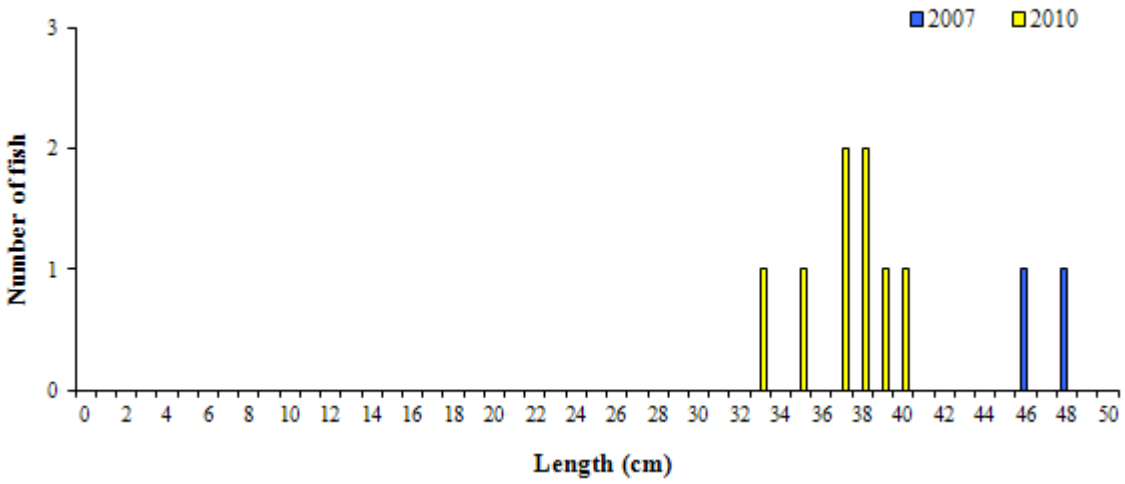

Fig. 1.5. Length frequency of rainbow trout captured in Lough Bane, 2007 and 2010

Plate 1.2: Perch captured on Lough Bane, July 2010 (length - 36cm and weight – 1.1kg)

1.3.4 Fish age and growth

Seven age classes of perch were present, ranging from 0+ to 7+, with a mean L1 of 5.9cm (Table 1.3). In the 2007 survey, perch ranged from 1+ to 4+ with a mean L1 of 7.5cm. The dominant age class in 2010 was 0+, corresponding to the 3cm to 4cm length class (Fig. 1.3), whereas the dominant age class in 2007 was 1+.

Rainbow trout ranged in age from 2+ to 3+, with a mean L1 of 13.7cm (Table 1.4). In the 2007 survey, the two rainbow trout captured were aged 2+, with a mean L1 of 11.2cm.

Two age classes of brown trout were present, ranging from 3+ to 4+ and two age classes of pike were present, ranging from 0+ to 3+.

Table 1.3. Mean (±SE) perch length (cm) at age for Lough Bane, July 2010

	L_1	L_2	L_3	L_4	L_5	L_6	L_7
Mean	5.9 (0.1)	11.6 (0.6)	19.0 (0.6)	25.3 (0.7)	28.3 (1.5)	33.8	35.6
N	61	30	23	10	5	1	1
Range	4.0-9.3	6.8-17.9	15.2-24.2	21.4-28.8	23.7-32.0	33.8-33.8	35.6-35.6

Table 1.4. Mean (±SE) rainbow trout length (cm) at age for Lough Bane, July 2010

	L_1	L_2	L_3
Mean	13.7 (0.7)	30.1(1.3)	36.4 (1.0)
N	8	8	1
Range	11.3-16.3	22.2-34.2	36.4-36.4

1.4 Summary

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

The mean perch CPUE in Lough Bane was similar to other the mean CPUE from three other lakes included in the statistical comparison, with no significant differences being found. The dominant age class of perch was 0+, with ages ranging from 0+ to 7+ indicating reproductive success in each of the previous seven years.

No wild brown trout were captured in the lake during the 2007 or 2010 surveys.

Lough Bane 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 can not support large fishing pressures. Only a small number of stocked rainbow trout and brown trout were captured during the present

survey. These ranged in age from 2+ to3+ and 3+ to 4+ respectively. 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.* 2003). In WFD terms, it could impact on the ecological status class scoring system and would serve to drive down the water'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 Lough Bane 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.

It is also recommended that the impact of water abstraction on the spawning of native brown trout in the lake be assessed. Local knowledge indicated that wild brown trout spawned along the shoreline prior to the abstraction scheme (Lough Bane anglers, *pers. comm.*). The lowering of water levels as a consequence of water abstraction is a cause for concern, as it may be having serious implications for the spawning success of the resident brown trout population. An appropriate water abstraction management regime should be drawn up for the lake to ensure the long term survival of the native brown trout population.

The IFI WFD lakes team also examined the out flowing stream and determined that it was heavily weeded and silted in certain areas. Enquiries locally established that the outflow dries up during warm dry summers. It is recommended that an enhanced maintenance or fisheries enhancement scheme be drawn up for the outflow stream to improve the habitat for the native brown trout population migrating upstream into the lake.

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. Using the FIL2 classification tool, Lough Bane has been assigned an ecological status of Good based on the fish populations present. The ecological status assigned to the lake based on the 2007 survey data was High.

In the 2007 to 2009 surveillance monitoring reporting period, the EPA assigned Lough Bane 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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