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Sampling Fish for the Water Framework Directive

Lakes 2012

Lough Tay

Iascach Intíre Éireann
Inland Fisheries Ireland

Water Framework Directive Fish Stock Survey of Lough Tay, September 2012

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

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1.1 Introduction

Lough Tay is located in Luggala Estate in County Wicklow, lying between the mountains of Djouce and Luggala at an altitude of 250m a.s.l. (Plate 1.1, Fig. 1.1). It is a small lake with a surface area of approximately 50ha, a maximum depth of 35.0m and a mean depth of 10.1m. It is fed by the Cloghoge River and drains into Lough Dan to the south. Lough Tay is categorised as typology class 3 (as designated by the EPA for the purposes of the Water Framework Directive), i.e. deep (>4m), less than 50ha and low alkalinity (<20mg/l CaCO3).

Arctic char were historically known to be present in three lakes in Co.Wicklow, including Lough Tay. The first recorded Arctic char in Lough Tay was reported in 1832; however, they are believed to be extinct since the 1930's (Tierney *et al*., 2000). Gill net surveys carried out in 1984, 1985 and 1994 revealed that brown trout were the only species present in this lake (Walsh, 1987; Tierney *et al*., 2000). Lough Tay was surveyed by the Irish Char Conservation Group during 2005, with brown trout again being the only fish species recorded (Igoe *et al*., 2005).

The lake was also previously surveyed in August 2009 as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al*., 2010). During this survey, brown trout were found to be the dominant species present in the lake. Eels were also captured during the survey.

Plate 1.1. Lough Tay

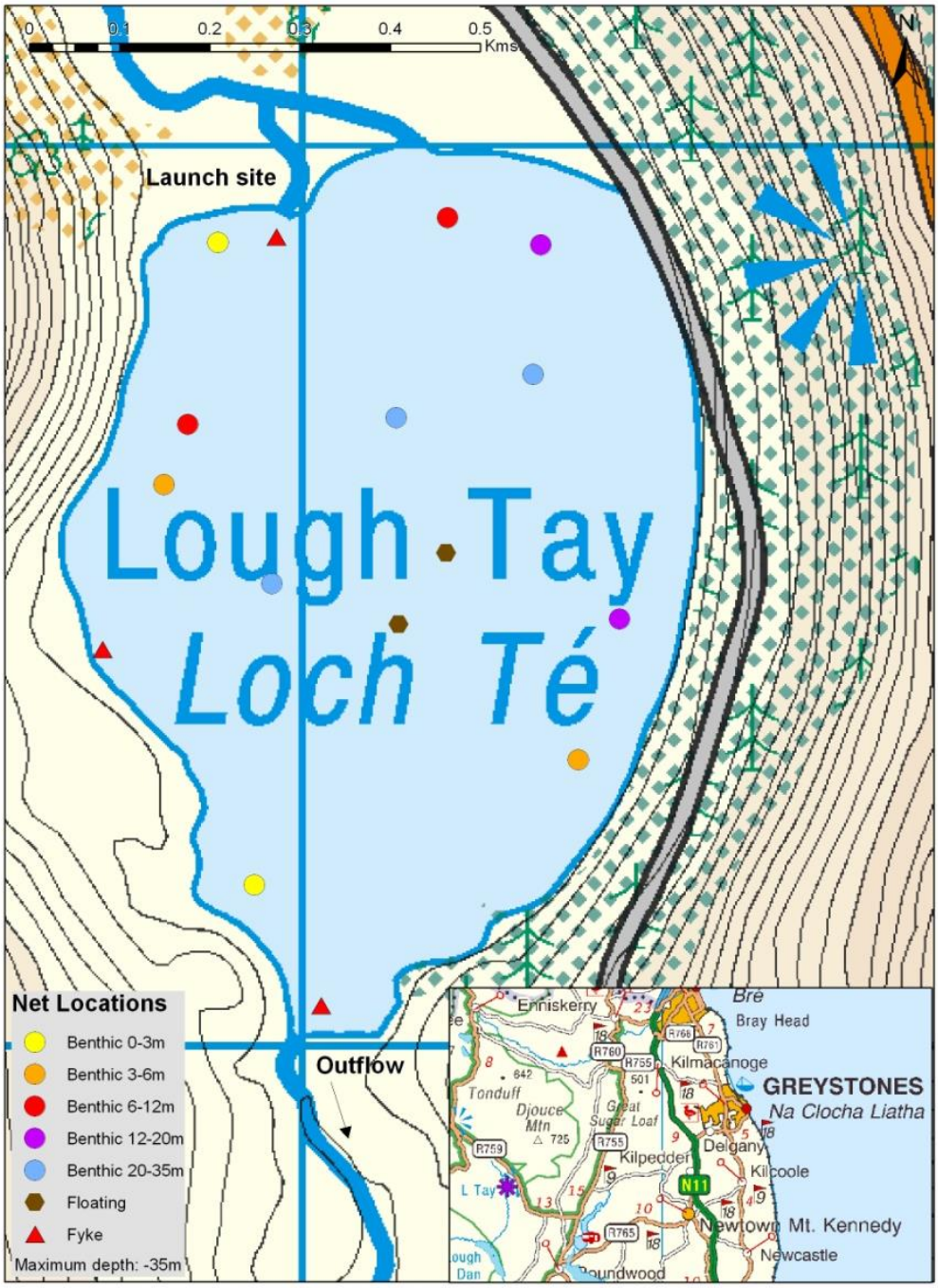

Fig. 1.1. Location map of Lough Tay showing locations and depths of each net (outflow is indicated on map)

1.2 Methods

Lough Tay was surveyed over one night from the 24th to the 25th of August 2012. A total of three sets of Dutch fyke nets, 11 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, 2 @ 12-19.9m and 3 @ 20-34.9m) and two surface monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets were deployed randomly in the lake (16 sites). Nets were deployed in the same locations as were randomly selected in the previous survey in 2009. 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 returned to the laboratory for further analysis.

1.3 Results

1.3.1 Species Richness

A total of one fish species was recorded on Lough Tay in September 2012, with 165 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Brown trout was the only fish species recorded. During the previous survey in 2009 the same species composition was recorded with the exception of eels, which were not recorded during the 2012 survey but were captured in 2009 (Kelly *et al.*, 2010).

Table 1.1. Number of each fish species captured by each gear type during the survey on Lough Tay, September 2012

Scientific name	Common name	Number of fish captured			
		Benthic mono multimesh gill nets	Surface mono multimesh gill nets	Fyke nets	Total
Salmo trutta	Brown trout	142	11	12	165

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 2009 and 2012 are summarised in Table 1.2. Mean CPUE and BPUE for all fish species is illustrated in Figures 1.2 and 1.3.

Although the mean brown trout CPUE and BPUE were higher in 2012 than in 2009, these differences were not statistically significant (Fig. 1.2 and Fig. 1.3).

The differences in the mean brown trout CPUE and BPUE between Lough Tay and three similar lakes was assessed, with no overall significant differences being found (Kruskal-Wallis, $P>0.05$) (Fig. 1.4 and Fig. 1.5). However, Independent-Samples Mann-Whitney U tests between each lake showed that Lough Tay had a significantly higher mean brown trout CPUE and BPUE than Dunglow Lough ($P<0.05$).

Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Lough Tay, 2009 and 2012

Scientific name	Common name	2009	2012
		Mean CPUE	
Salmo trutta	Brown trout	0.231 (0.087)	0.331 (0.098)
Anguilla anguilla	Eel	0.005 (0.005)	-
		Mean BPUE	
Salmo trutta	Brown trout	17.010 (6.657)	25.091 (7.331)
Anguilla anguilla	Eel	2.827 (2.827)	-

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

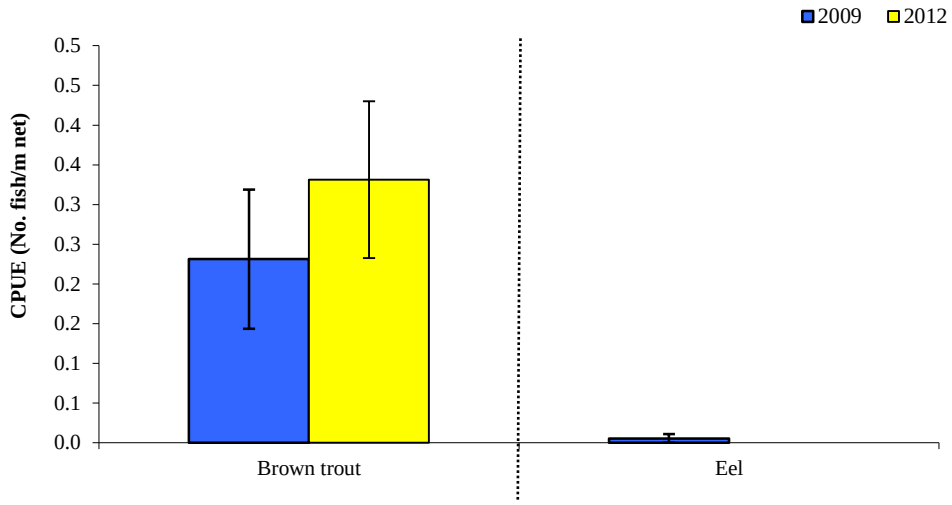

Fig. 1.2. Mean (±S.E.) CPUE for all fish species captured in Lough Tay (Eel CPUE based on fyke nets only), 2009 and 2012

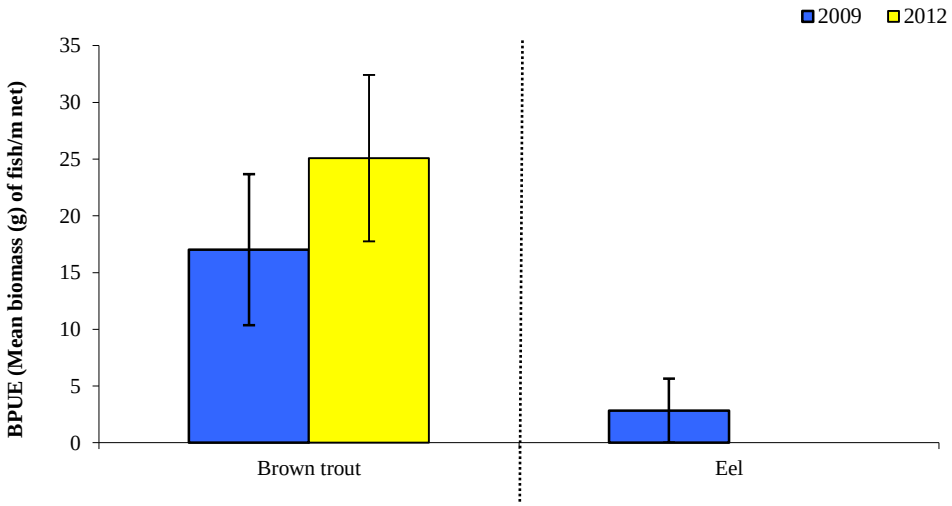

Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Lough Tay (Eel BPUE based on fyke nets only), 2009 and 2012

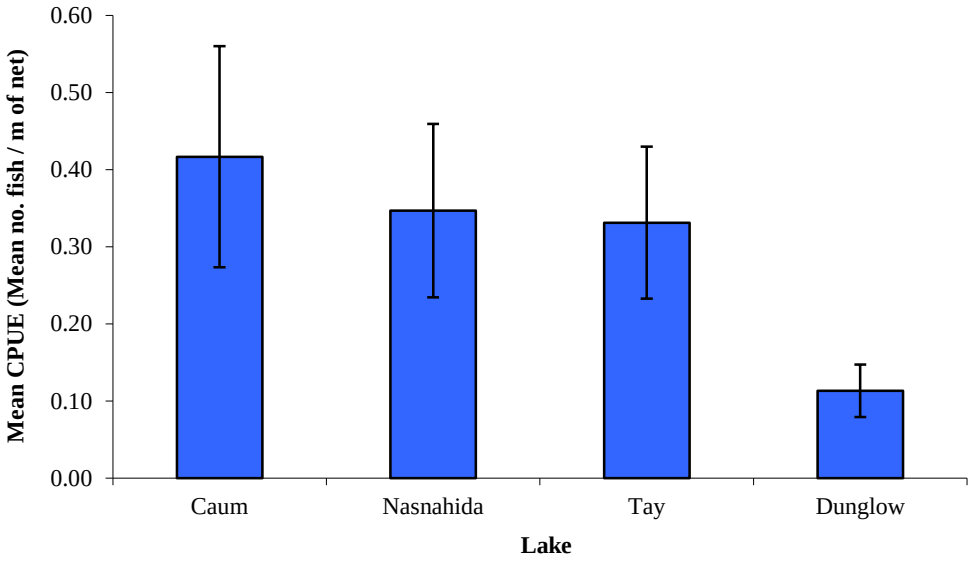

Fig. 1.4. Mean (±S.E.) brown trout CPUE in four lakes surveyed during 2012

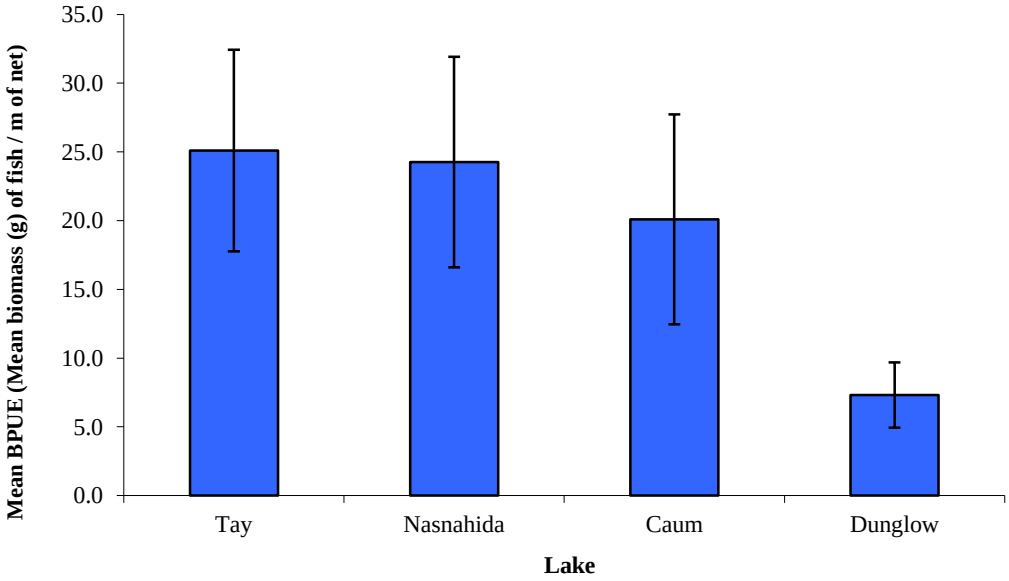

Fig. 1.5. Mean (±S.E.) brown trout BPUE in four lakes surveyed during 2012

1.3.3 Length frequency distributions

Brown trout captured during the 2012 survey ranged in length from 10.4cm to 26.5cm (mean = 18.3cm) (Fig. 1.6). Brown trout captured during the 2009 survey ranged in length from 10.0cm to 26.8cm (Fig. 1.6).

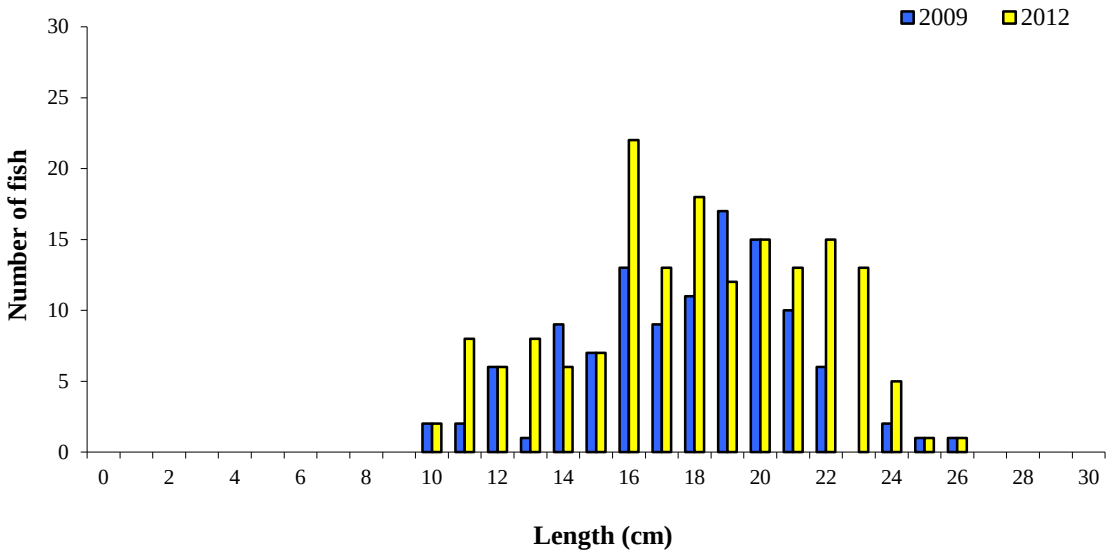

Fig. 1.6. Length frequency of brown trout captured on Lough Tay, 2009 and 2012

1.3.4 Fish age and growth

Five age classes of brown trout were present, ranging from 1+ to 5+, with a mean L1 of 5.8cm (Table 1.3). In the 2009 survey, brown trout ranged from 1+ to 4+ with a mean L1 of 5.3cm. Mean brown trout L4 in 2012 was 20.4cm indicating a very slow rate of growth for brown trout in this lake according to the classification scheme of Kennedy and Fitzmaurice (1971).

Table 1.3. Mean (±SE) brown trout length (cm) at age for Lough Tay, September 2012

	L_1	L_2	L_3	L_4	L_5
Mean	5.8 (0.1)	13.0 (0.2)	18.5 (0.3)	20.4 (0.5)	22.2 (0.6)
N	109	77	51	13	3
Range	3.6-8.5	8.5-18.7	14.0-23.2	17.1-22.5	21.5-23.4

1.4 Summary

Brown trout was the dominant species in terms of abundance (CPUE) and biomass (BPUE) captured in the survey gill nets.

Although the mean brown trout CPUE and BPUE in Lough Tay were slightly higher in 2012 than in the 2009 survey, these differences were not statistically significant. The mean brown trout CPUE and BPUE in Lough Tay was significantly higher than Dunglow Lough, another similar lake surveyed. Brown trout ranged in age from 1+ to 5+, indicating reproductive success in five of the previous six years. Length at age analyses revealed that brown trout in the lake exhibit a very slow rate of growth according to the classification scheme of Kennedy and Fitzmaurice (1971).

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 Tay has been assigned an ecological status of High based on the fish populations present in 2012. The ecological status assigned to the lake based on the 2009 survey data was also High.

In the 2007 to 2009 surveillance monitoring reporting period, the EPA assigned Lough Tay an overall ecological status of Moderate, 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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