National Research Survey Programme
Lakes 2016

Lough Tay

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Iascach Intíre Éireann
Inland Fisheries Ireland

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Fish Stock Survey of Lough Tay, September 2016

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

ACKNOWLEDGEMENTS

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 35m 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 between 1984 and 2005 revealed that brown trout were the only species present in this lake (Walsh, 1987; Tierney *et al.*, 2000 and Igoe *et al.*, 2005).

The lake was also previously surveyed in 2009 and 2012 as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al.*, 2010 and 2013). During these surveys, brown trout were found to be the dominant species present in the lake. Eels were only captured during the 2009 survey.
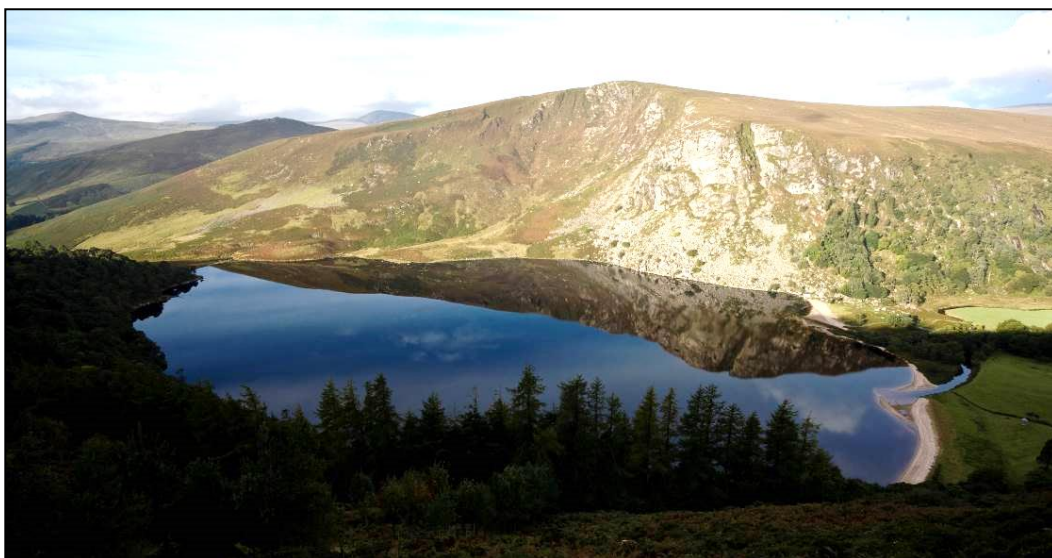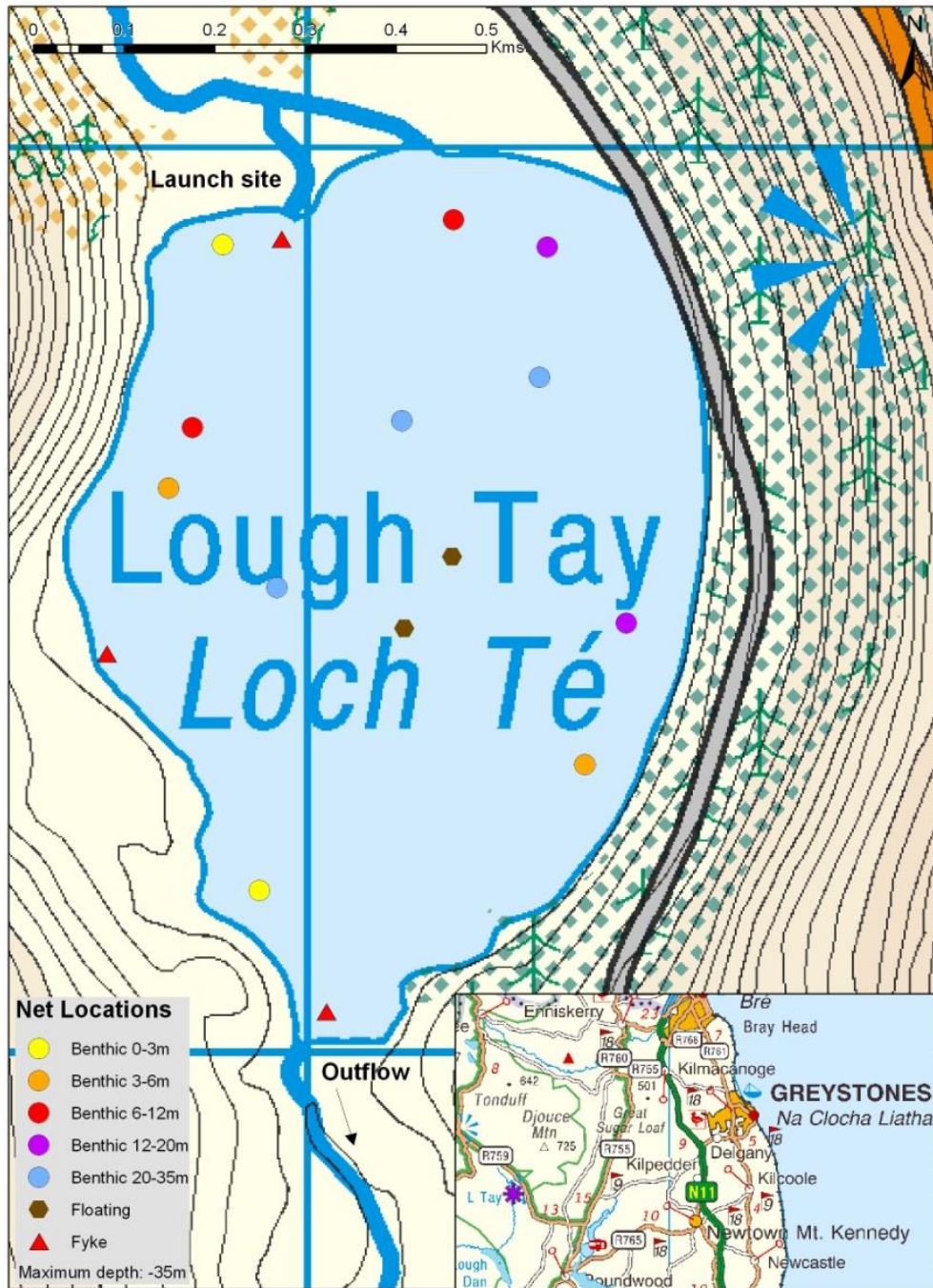

Plate 1.1. Lough Tay

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

1.2 Methods

1.2.1 Netting methods

Lough Tay was surveyed over one night from the 23rd to the 24th of September 2016. 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. 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.

1.2.2 Fish diet

Fish were frozen before being dissected for stomach content analysis in the IFI laboratory. Total stomach contents were inspected and individual items were counted and identified to the lowest taxonomic level possible. The percentage frequency occurrence (%O) of prey items were then calculated to identify key prey items (Amundsen *et al.*, 1996).

$$\%O_i = (N_i/\ N)\times100$$

Where:

%O$_i$ is the percentage frequency of prey item i,

N$_i$ is the number of a particular species with prey i in their stomach,

N is total number of a particular species with stomach contents.

1.2.3 Biosecurity - disinfection and decontamination procedures

Procedures are required for disinfection of equipment in order to prevent dispersal of alien species and other organisms to uninfected waters. A standard operating procedure was compiled by Inland Fisheries Ireland for this purpose (Caffrey, 2010) and is followed by staff in IFI when moving between water bodies.

1.3 Results

1.3.1 Species Richness

Only one fish species, brown trout, was recorded on Lough Tay in September 2016, with 205 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. During the previous surveys in 2009 and 2012 the same species composition was recorded with the exception of eels, which were only recorded during the 2009 survey (Kelly *et al.*, 2010 and 2013).

Table 1.1. Number of each fish species captured by each gear type during the survey on Lough Tay, September 2016

Scientific name	Common name	Number of fish captured			
		BM CEN	FM CEN	Fyke	Total
Salmo trutta	Brown trout	140	52	13	205

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 2009, 2012 and 2016 surveys are summarised in Table 1.2. Mean CPUE and BPUE for all species is illustrated in Figure 1.2 and 1.3.

Brown trout

The mean brown trout CPUE and BPUE increased over the three sampling occasions; however these differences were not statistically significant (Table 1.2; Fig 1.2 and 1.3).
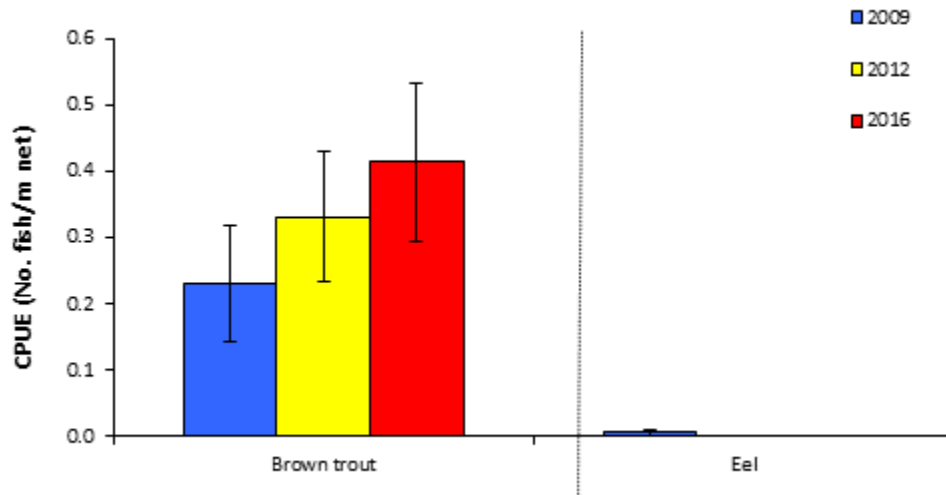
**Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Lough Tay, 2009, 2012 and 2016**

Scientific name	Common name	2009	2012	2016
		Mean CPUE		
Salmo trutta	Brown trout	0.231 (0.087)	0.331 (0.098)	0.414 (0.119)
Anguilla anguilla	European eel	0.005 (0.005)	-	-
		Mean BPUE		
Salmo trutta	Brown trout	17.010 (6.657)	25.091 (7.331)	29.800 (7.798)
Anguilla anguilla	European eel	2.827 (2.827)	-	-

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 all fish species captured in Lough Tay (Eel CPUE based on fyke nets only), 2009, 2012 and 2016
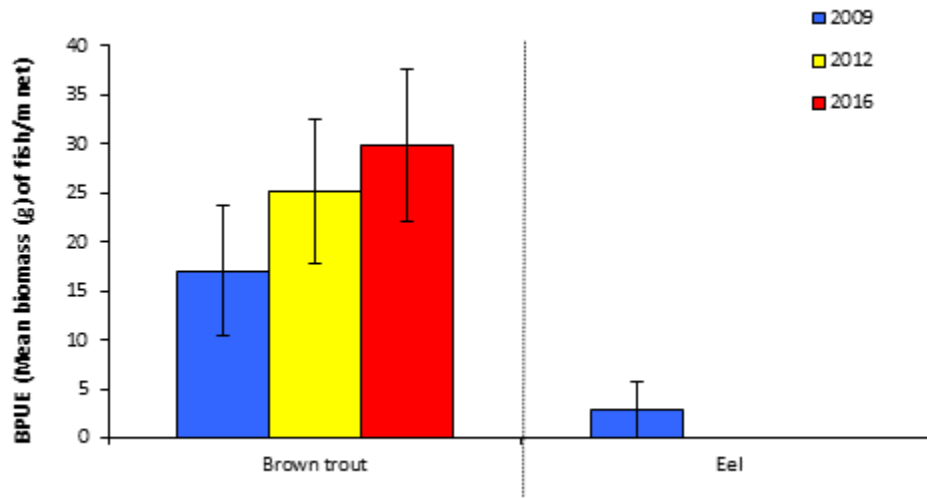
Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Lough Tay (Eel BPUE based on fyke nets only), 2009, 2012 and 2016

1.3.3 Length frequency distributions and growth

Brown trout

Brown trout captured during the 2016 survey ranged in length from 10.1cm to 30.2cm (mean = 17.9cm) (Fig. 1.4). Five age classes were present, ranging from 1+ to 5+, with a mean L1 of 5.4cm (Table 1.3). The dominant age class was 3+ (Fig. 1.4). Mean brown trout L4 in 2016 was 22.9cm 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). Brown trout captured during the 2009 and 2012 surveys had similar length and age ranges, with some larger fish recorded in the 2016 survey (Fig.1.4).
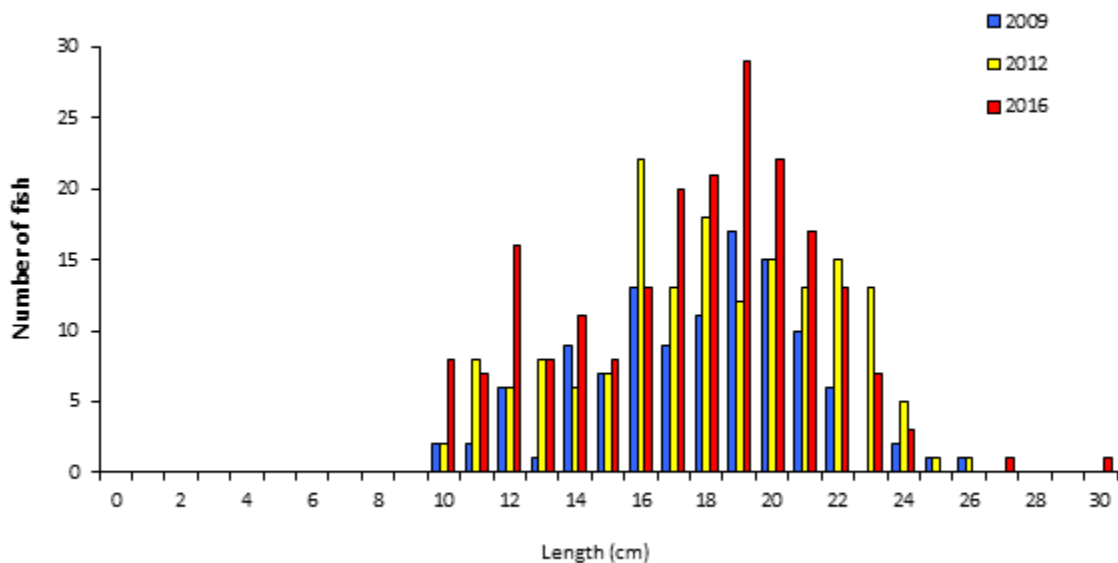

Fig. 1.4. Length frequency of brown trout captured on Lough Tay, 2009, 2012, 2016

Table 1.3. Mean (±S.E.) brown trout length (cm) at age for Lough Tay, September 2016

	L_1	L_2	L_3	L_4	L_5	Growth Category
Mean (±S.E.)	5.4 (0.1)	11.8 (0.3)	17.2 (0.4)	22.9 (0.8)	24.7	Very slow
N	48	38	25	4	1	
Range	3.3-9.3	8.1-16.4	12.3-22.4	21.8-25.4	24.7-24.7	

1.3.4 Stomach and diet analysis

Dietary analysis studies provide a good indication of the availability of food items and the angling methods that are likely to be successful. However, the value of stomach content analysis is limited unless undertaken over a long period as diet may change on a daily basis depending on the availability of food items. The stomach contents of a subsample of brown trout captured during the survey were examined and are presented below.

Adult trout usually feed principally on crustaceans (*Asellus* sp*.* and *Gammarus* sp.), insects (principally chironomid larvae and pupae) and molluscs (snails) (Kennedy and Fitzmaurice, 1971, O'Grady, 1981). A total of 80 stomachs were examined; four were found to contain no prey items and the remaining had 79% invertebrates in their stomachs, 14% had digested material and 7% had a combination of both invertebrates/digested material (Fig 1.5).
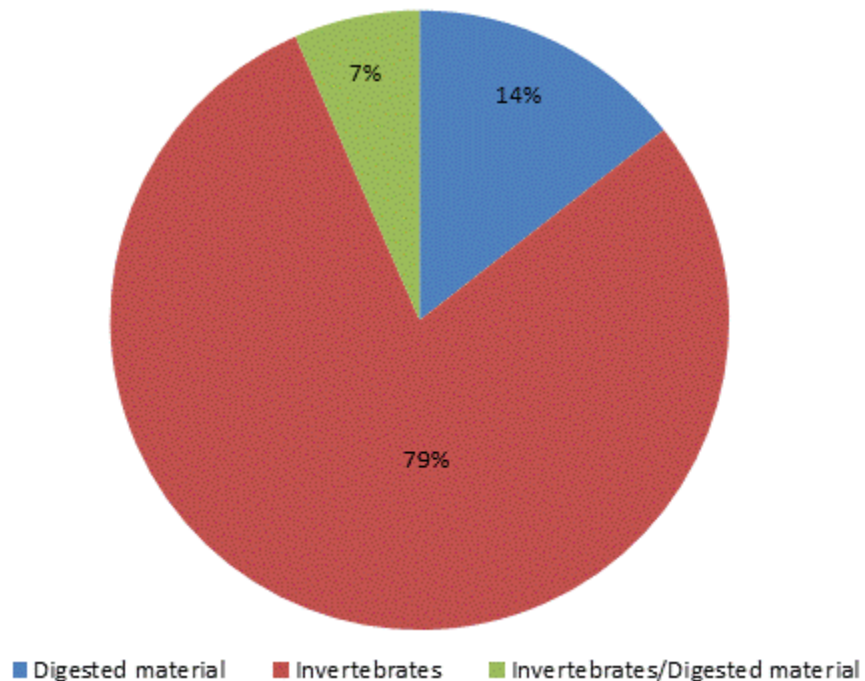

Fig 1.5. Diet of brown trout (n=76) captured on Lough Tay, 2016 (% occurrence)

1.4 Summary and ecological status

Brown trout was the dominant species in terms of abundance (CPUE) and biomass (BPUE) captured in the survey gill nets during the 2016 survey.

Although the mean brown trout CPUE and BPUE increased over the three sampling occasions, these differences were not statistically significant. Brown trout ranged in age from 1+ to 5+, indicating reproductive success in the previous five years. The dominant age class was 3+. 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). Invertebrates were the main prey item category in the stomachs of brown trout examined during the survey.

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 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*., 2012b). Using the FIL2 classification tool, Lough Tay has been assigned an ecological status of High for 2016 based on the fish populations present. The lake was also assigned a fish status of High in 2009 and 2012.

In the 2010 to 2015 surveillance monitoring reporting period, the EPA assigned Lough Tay an overall ecological status of Moderate.

1.5 References

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