National Research Survey Programme

Lakes 2017

Glencullin Lough

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Fish Stock Survey of Glencullin Lough, September 2017

Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

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

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1.1 Introduction

Glencullin Lough is situated in Co. Mayo in the Bundorragha catchment (Plate 1.1, Fig. 1.1). The lake is one of four situated in the Delphi Fishery and is located just north-west of Doo Lough, south of Louisburgh, Co. Mayo. The lake has a surface area of 34ha, a mean depth of 2.6m and a maximum depth of 13m. The lake is categorised as typology class 1 (as designated by the EPA for the Water Framework Directive), i.e. shallow (mean depth <4m), less than 50ha and low alkalinity (<20mg/l $CaCO_3$).

Glencullin Lough is situated in the Mweelrea/Sheeffry/Erriff Complex candidate Special Area of Conservation, which has been selected as such for containing a number of priority habitats on Annex I of the EU Habitats Directive including active blanket bog, lagoons, machair, decalcified dunes and petrifying springs. The site is also selected for the following species listed on Annex II of the EU Habitats Directive - freshwater pearl mussel, Atlantic salmon, otter, the snails *Vertigo angustior* and *Vertigo geyeri,* the plant Slender naiad and the liverwort Petalwort (NPWS, 2005).

Glencullin Lough was historically a sea trout fishery and is now fished primarily for brown trout and occasionally salmon (O' Reilly, 2007).

Glencullin Lough was previously surveyed in 2008, 2011 and 2014 as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al*., 2009, 2012a, 2015a and 2015b). During the 2014 survey, brown trout were found to be the dominant species present in the lake. Sea trout, three-spined stickleback, salmon and eels were also captured during the survey.

This report summarises the results of the 2017 fish stock survey carried out on the lake, as part of the Water Framework Directive surveillance monitoring programme.

Plate 1.1. Glencullin Lough

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

1.2 Methods

1.2.1 Netting methods

Glencullin Lough was surveyed over one night from the 25th to the 26th of September 2017. A total of two sets of Dutch fyke nets, six benthic monofilament multi-mesh (BM CEN) (12 panel, 5-55mm mesh size) CEN standard survey gill nets (2 @ 0-2.9m, 2 @ 3-5.9m and 2 @ 6-11.9m) and two floating monofilament multi-mesh (FM CEN) (12 panel, 5-55mm mesh size) CEN standard survey gill nets were deployed in the lake (10 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, salmon and sea 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.

1.2.2 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 (%FO) of prey items were then calculated to identify key prey items (Amundsen *et al.*, 1996).

$$\%FO_i = (N_i / N) \times 100$$

Where:

$\%FO_i$ 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

A total of four fish species (sea trout are included as a separate 'variety' of trout) were recorded on Glencullin Lough in September 2017, with 87 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Brown trout was the most common fish species recorded, three-spined stickleback, sea trout, eels and salmon were also recorded. During the previous surveys in 2008, 2011 and 2014 the same species composition was recorded with the exception of salmon, which were not captured during the 2008 survey (Kelly *et al*., 2009, 2012a, 2015a and 2015b).

Table 1.1. Number of each fish species captured by each gear type during the survey on Glencullin Lough, September 2017

Scientific name	Common name	Number of fish captured			
		BM CEN	FM CEN	Fyke	Total
Salmo trutta	Brown trout	59	2	1	62
	Sea trout	1	0	0	1
Gasterosteus aculeatus	Three-spined stickleback	3	6	0	9
Salmo salar	Salmon	4	0	0	4
Anguilla anguilla	European eel	0	0	11	11

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 2008, 2011, 2014 and 2017 surveys are summarised in Table 1.2 and illustrated in Figures 1.2 and 1.3.

Brown trout

Brown trout was the dominant fish species in terms of abundance (CPUE) and biomass (BPUE). Although the mean brown trout CPUE and BPUE fluctuated slightly over the four sampling occasions, 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 Glencullin Lough, 2008, 2011, 2014 and 2017

Scientific name	Common name	2008	2011	2014	2017
			Mean CPUE (±S.E.)		
Salmo trutta	Brown trout	0.136 (0.052)	0.225 (0.075)	0.230 (0.083)	0.205 (0.076)
	Sea trout	0.006 (0.004)	0.020 (0.013)	0.026 (0.012)	0.003 (0.003)
Gasterosteus aculeatus	Three-spined stickleback	0.020 (0.008)	0.013 (0.007)	0.063 (0.025)	0.030 (0.009)
Salmo salar	Salmon	-	0.006 (0.006)	0.006 (0.006)	0.013 (0.009)
*Anguilla Anguilla**	European eel*	0.258 (0.008)*	0.150 (0.133)*	0.017 (0.001)*	0.092 (0.008)*
			Mean BPUE (±S.E.)		
Salmo trutta	Brown trout	18.168 (7.477)	23.655 (8.421)	18.549 (9.243)	16.307 (7.206)
	Sea trout	2.553 (1.791)	7.530 (5.080)	9.162 (4.749)	0.965 (0.965)
Gasterosteus aculeatus	Three-spined stickleback	0.076 (0.035)	0.016 (0.009)	0.085 (0.038)	0.035 (0.020)
Salmo salar	Salmon	-	0.065 (0.065)	0.120 (0.120)	3.853 (3.714)
*Anguilla Anguilla**	European eel*	39.725 (2.358)*	31.825 (30.425)*	2.817 (1.127)*	20.742 (6.192)*

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 (Connor *et al.*, 2017).

*Eel CPUE and BPUE based on fyke nets only

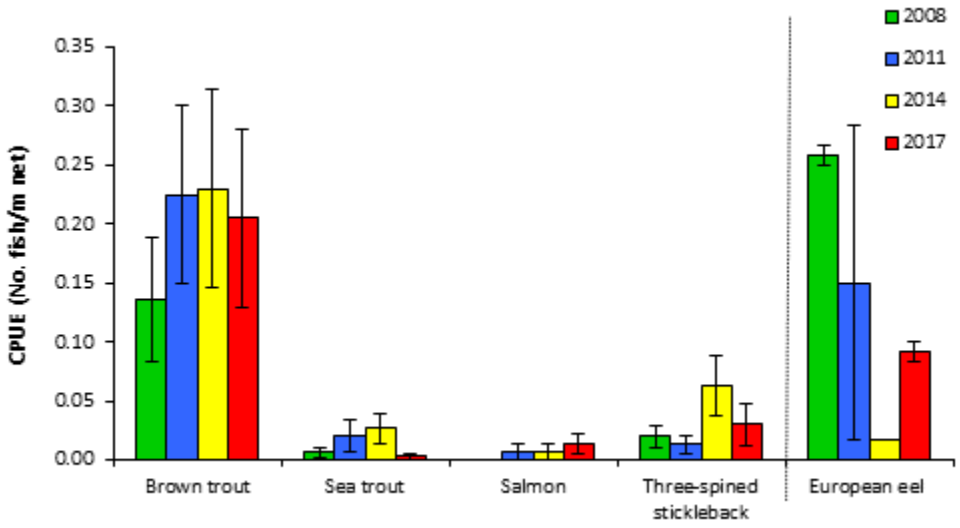

Fig. 1.2. Mean (±S.E.) CPUE for all fish species captured in Glencullin Lough (Eel CPUE based on fyke nets only), 2008, 2011, 2014 and 2017

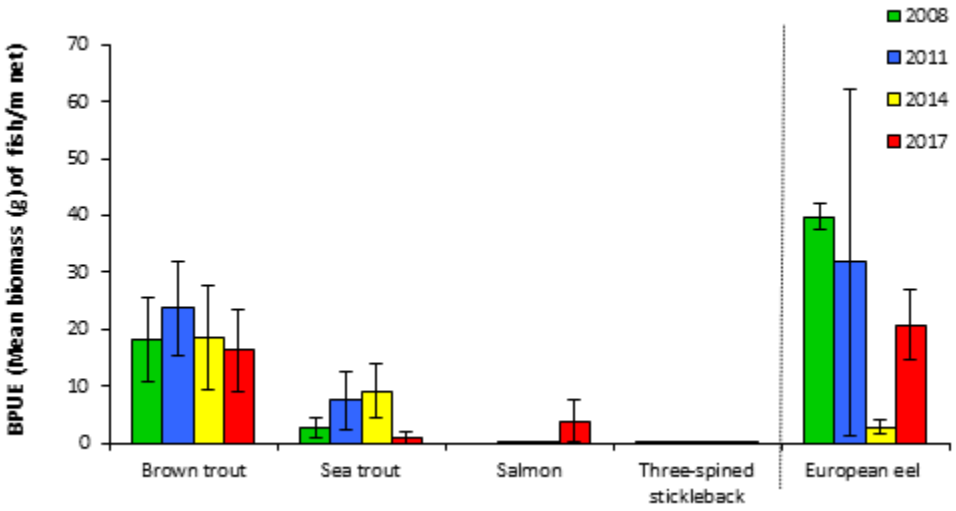

Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Glencullin Lough (Eel BPUE based on fyke nets only), 2008, 2011, 2014 and 2017

1.3.3 Length frequency distributions and growth

Brown trout

Brown trout captured during the 2017 survey ranged in length from 8.0cm to 42.9cm (mean = 18.0cm) (Fig. 1.4). Three age classes were present, ranging from 1+ to 3+, with a mean L1 of 6.8cm (Table 1.3). The dominant age class was 2+ (Fig. 1.4). Brown trout captured during the 2008, 2011 and 2014 surveys had similar length and age ranges, with some smaller fish recorded in the 2008, 2014 and 2017 surveys (Fig.1.4).

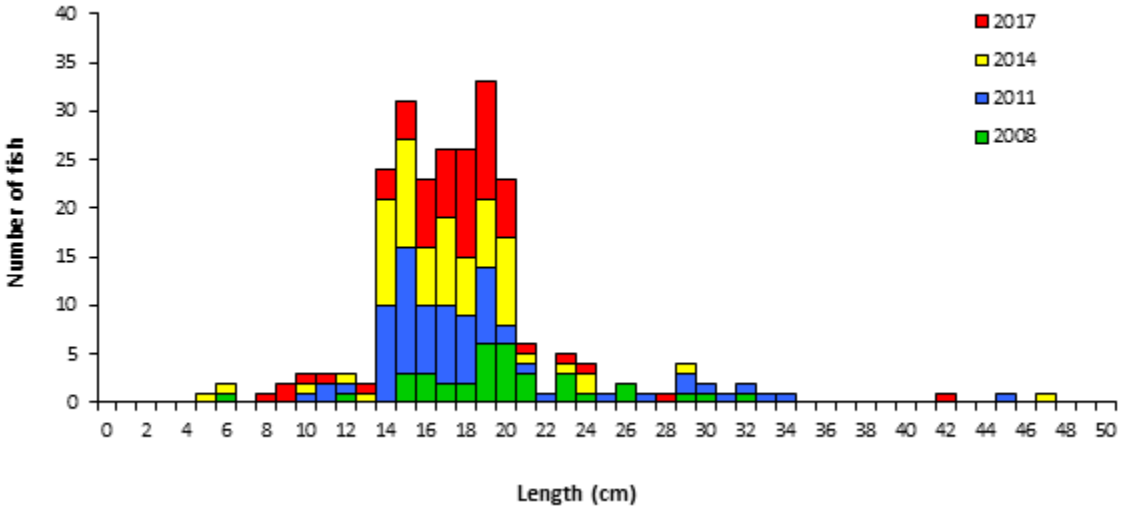

Fig. 1.4. Length frequency of brown trout captured on Glencullin Lough, 2008, 2011, 2014 and 2017

Table 1.3. Mean (±S.E.) brown trout length (cm) at age for Glencullin Lough, September 2017

	L_1	L_2	L_3
Mean (±S.E.)	6.8 (0.1)	15.6 (0.4)	23.8
N	28	18	1
Range	4.8-8.0	11.0-17.8	23.8-23.8

Other fish species

Eels captured during the 2017 survey ranged in length from 38.6cm to 68.0cm. Salmon captured measured 11.9cm to 47.0cm and ages ranged from 1.0 to 1.0+. One sea trout was measured at 30.0cm and was aged at 2.1+. Three-spined stickleback ranged in length from 3.5cm to 6.0cm.

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.

Brown trout

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 38 stomachs were examined. Of these 16 were found to contain no prey items. Of the remaining 22 stomachs containing food, 45% contained invertebrates, 23% unidentified digested material/invertebrates, 18% unidentified digested material, 5% zooplankton/invertebrates, 5% zooplankton and 4% fish (Fig. 1.5).

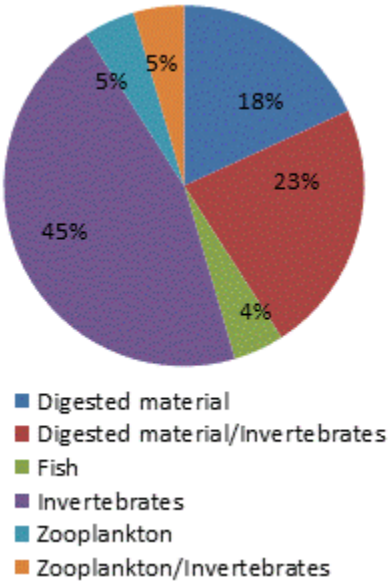

Fig 1.5. Diet of brown trout (n=22) captured on Glencullin Lough, September 2017 (% FO)

1.4 Summary and ecological status

A total of four fish species (sea trout are included as a separate 'variety' of trout) were recorded on Glencullin Lough in September 2017. Brown trout was the dominant species in terms of abundance (CPUE) and biomass (BPUE) captured in the survey gill nets during the 2017 survey.

Although the mean brown trout CPUE and BPUE fluctuated slightly over the four sampling occasions, these differences were not statistically significant. Brown trout ranged in age from 1+ to 3+, indicating reproductive success in the previous three out of four years. The dominant age class was 2+.

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, Glencullin Lough has been assigned an ecological status of High for 2017 based on the fish populations present. In previous years the lake was assigned a fish status of High in 2008, 2011 and 2014.

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

1.5 References

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