

Sampling Fish for the Water Framework Directive

Lakes 2014

Glencullin Lough





Water Framework Directive Fish Stock Survey of Glencullin Lough, August 2014

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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 on the Doo Lough Pass, 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 CaCO₃).

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 and 2011 as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al.*, 2009 and Kelly *et al.*, 2012a). During the 2011 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 2014 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

Glencullin Lough was surveyed over one night from the 5th to the 6th of August 2014. A total of two sets of Dutch fyke nets, six benthic monofilament multi-mesh (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 (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 surveys in 2008 and 2011. 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.

1.3 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 August 2014, with 101 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Brown trout was the most abundant fish species recorded, followed by three-spined stickleback, sea trout, eels and salmon. During the previous surveys in 2011 and 2008 the same species composition was recorded with the exception of salmon, which were not captured during the 2008 survey.

Table 1.1. Number of each fish species captured by each gear type during the survey on Glencullin Lough, August 2014

Scientific name	Common name	Number of fish captured			
		Benthic mono multimesh gill nets	Surface mono multimesh gill nets	Fyke nets	Total
<i>Salmo trutta</i>	Brown trout	62	6	2	70
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	19	0	0	19
<i>Salmo trutta</i>	Sea trout	8	0	0	8
<i>Salmo salar</i>	Salmon	2	0	0	2
<i>Anguilla anguilla</i>	European eel	0	0	2	2



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 and 2014 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 was the dominant species in terms of abundance (CPUE) and biomass (BPUE). Although the mean brown trout CPUE and BPUE fluctuated slightly over the three sampling years, 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 and 2014

Scientific name	Common name	2008	2011	2014
Mean CPUE				
<i>Salmo trutta</i>	Brown trout	0.136 (0.052)	0.225 (0.075)	0.230 (0.083)
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	0.02 (0.008)	0.013 (0.007)	0.063 (0.025)
<i>Salmo trutta</i>	Sea trout	0.006 (0.004)	0.02 (0.013)	0.026 (0.012)
<i>Salmo salar</i>	Salmon	-	0.006 (0.006)	0.006 (0.006)
<i>Anguilla anguilla</i>	European eel	0.258 (0.008)	0.15 (0.133)	0.017
Mean BPUE				
<i>Salmo trutta</i>	Brown trout	18.168 (7.477)	23.655 (8.421)	18.549 (9.243)
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	0.076 (0.035)	0.016 (0.009)	0.085 (0.038)
<i>Salmo trutta</i>	Sea trout	2.553 (1.791)	7.53 (5.080)	9.162 (4.749)
<i>Salmo salar</i>	Salmon	-	0.065 (0.065)	0.120 (0.120)
<i>Anguilla anguilla</i>	European eel	39.725 (2.358)	31.825 (30.425)	2.817 (1.127)

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

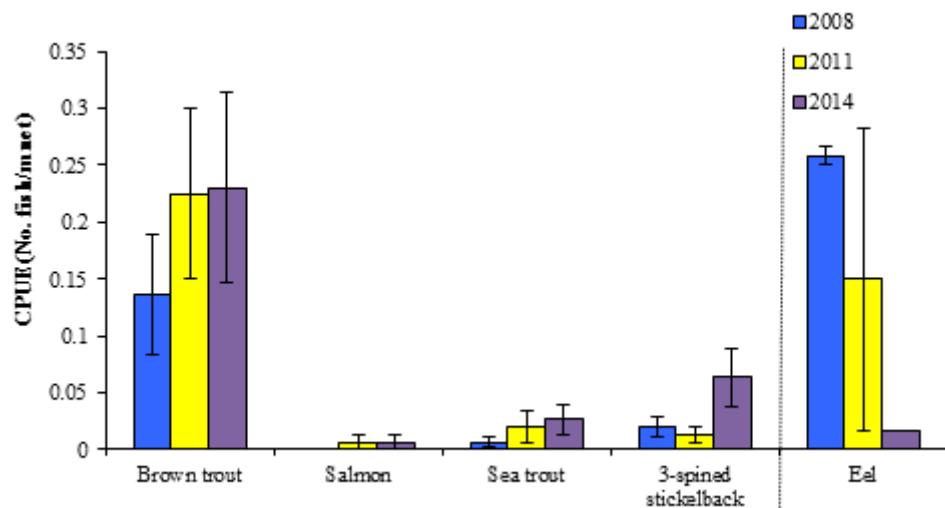


Fig. 1.2. Mean (\pm S.E.) CPUE for all fish species captured in Glencullin Lough (Eel CPUE based on fyke nets only), 2008, 2011 and 2014

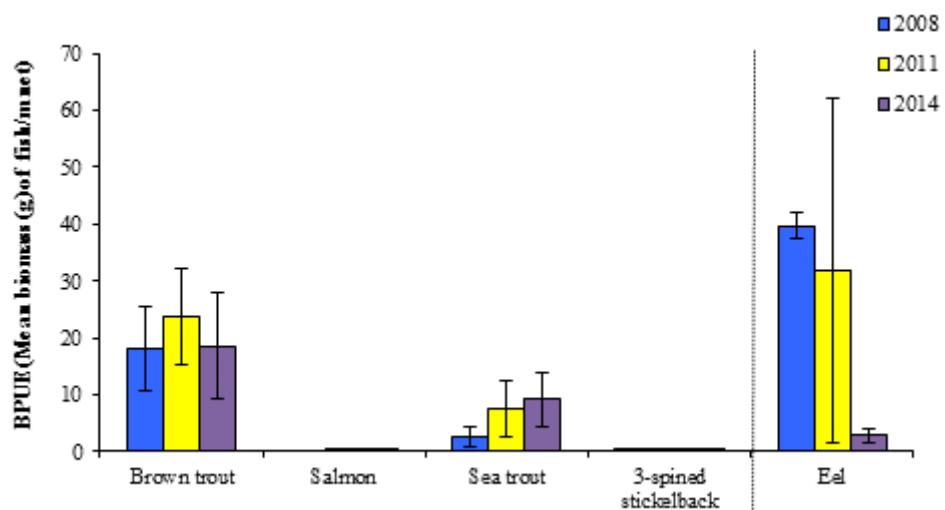


Fig. 1.3. Mean (\pm S.E.) BPUE for all fish species captured in Glencullin Lough (Eel BPUE based on fyke nets only), 2008, 2011 and 2014

1.3.3 Length frequency distributions and growth

Brown trout captured during the 2014 survey ranged in length from 5.8cm to 47.5cm (mean = 18.2cm) (Fig. 1.4) with five age classes present, ranging from 0+ to 4+, with a mean L1 of 6.2cm (Table 1.3). The dominant age class was 2+ (Fig. 1.4). Mean brown trout L4 in 2014 was 23.8cm 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 2008 and 2011 surveys had a similar length range, with 2014 having the broadest range (Fig. 1.4). The age range and growth rates were similar in the 2008 and 2014 surveys; however, there was a wider age range and faster growth rate exhibited in the 2014 survey (Fig. 1.4).

Three-spined stickleback captured during the 2014 survey ranged in length from 4.5cm to 6.8cm and eels ranged from 37.8cm to 51.8cm. Two juvenile salmon captured were aged 1+ and ranged in length from 10.4cm to 12.2cm. Sea trout ranged in length from 25.9cm to 31.0cm and were aged at 2.0+ to 3.1.1SM+.

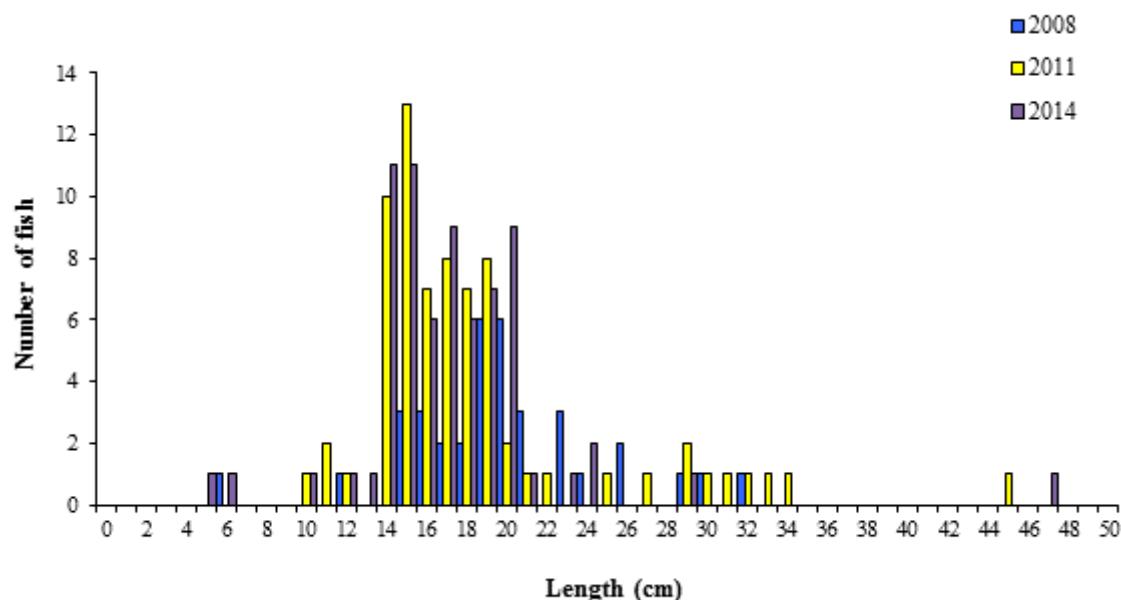


Fig. 1.4. Length frequency of brown trout captured on Glencullin Lough, 2008, 2011 and 2014



Table 1.3. Mean (\pm SE) brown trout length (cm) at age for Glencullin Lough, August 2014

	L ₁	L ₂	L ₃	L ₄	Growth Category
Mean	6.2 (0.2)	14.0 (0.5)	19.5 (0.6)	23.8 (1.5)	Very slow
N	30	21	6	2	
Range	3.5-9.2	8.9-17.8	17.8-21.4	22.2-25.3	

1.4 Summary

Brown trout was the dominant species in terms of abundance (CPUE) and biomass (BPUE) captured in the survey gill nets during the 2014 survey.

Although the mean brown trout CPUE and BPUE fluctuated slightly over the three sampling years, these differences were not statistically significant. Brown trout ranged in age from 0+ to 4+, indicating reproductive success in each of the previous five years. The dominant age class was 2+. 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.

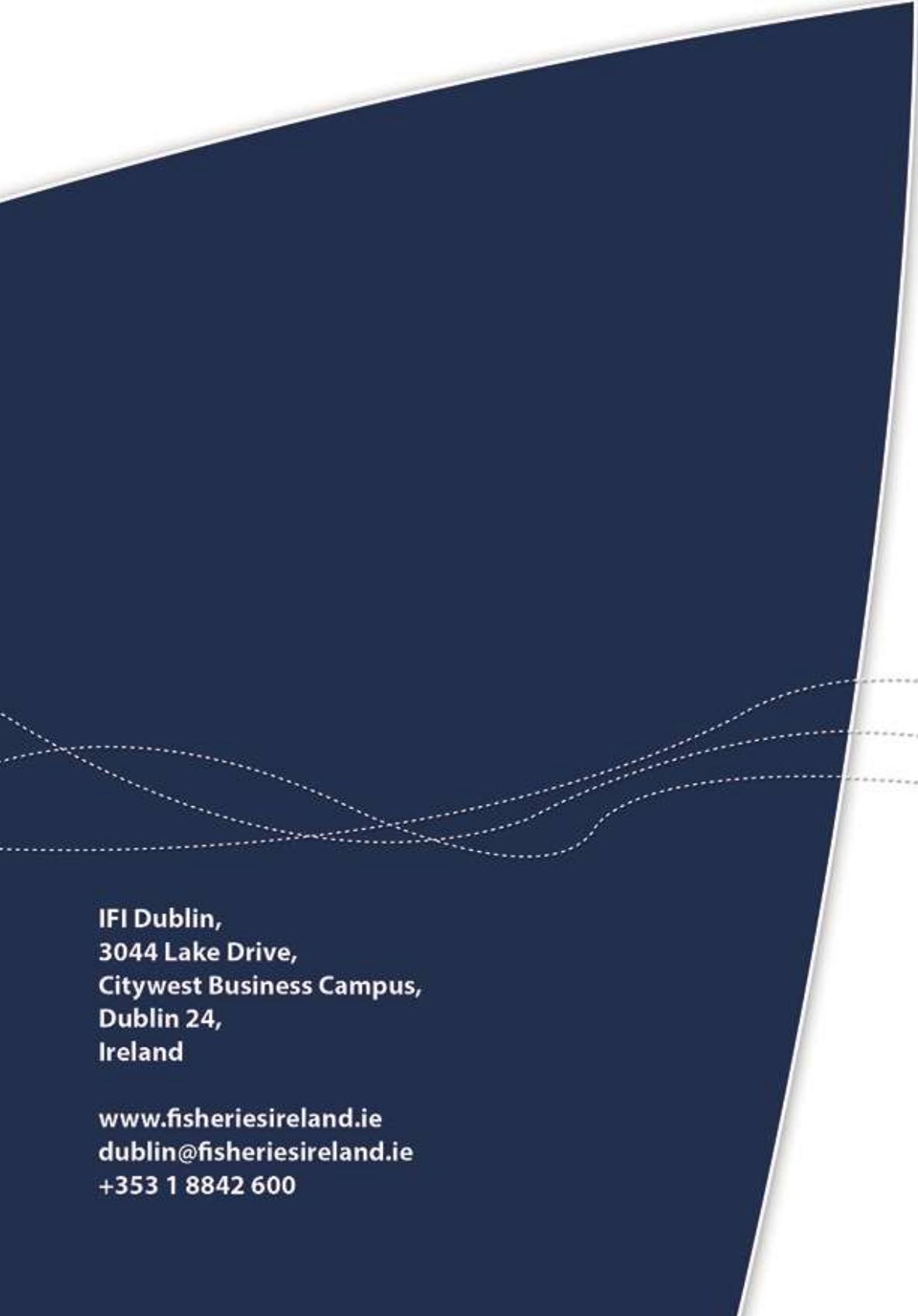
A multimetric fish ecological classification tool (Fish in Lakes – ‘FIL’) was developed for the island of Ireland (Ecoregion 17) using IFI and Agri-Food and Biosciences Institute Northern Ireland (AFBINI) data generated during the NSSHARE Fish in Lakes project (Kelly *et al.*, 2008). This tool was further 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.*, 2012b). Using the FIL2 classification tool, Glencullin Lough has been assigned an ecological status of High for 2008, 2011 and 2014 based on the fish populations present.

In the 2010 to 2012 surveillance monitoring reporting period, the EPA assigned Glencullin Lough an overall draft ecological status of High, based on all monitored physico-chemical and biological elements, including fish.



1.5 References

- Kelly, F.L., Harrison, A., Connor, L., Allen, M., Rosell, R. and Champ, T. (2008) *FISH IN LAKES Task 6.9: Classification tool for Fish in Lakes. FINAL REPORT.* Central Fisheries Board. NS Share project report.
- Kelly, F.L., Connor, L., Wightman, G., Matson, R. Morrissey, E., O'Callaghan, R., Feeney, R., Hanna, G. and Rocks, K. (2009) *Sampling fish for the Water Framework Directive – Summary report 2008.* Central and Regional Fisheries Boards. Internal report.
- Kelly, F., Harrison A., Connor, L., Matson, R., Morrissey, E., Wogerbauer, C., Feeney, R., O'Callaghan, R. and Rocks, K. (2012a) *Sampling Fish for the Water Framework Directive – Summary Report 2011.* Inland Fisheries Ireland.
- Kelly, F.L., Harrison, A.J., Allen, M., Connor, L. and Rosell, R. (2012b) Development and application of an ecological classification tool for fish in lakes in Ireland. *Ecological Indicators*, **18**, 608-619.
- Kennedy, M. and Fitzmaurice, P. (1971) Growth and food of brown trout *Salmo trutta* (L.) in Irish waters. *Proceedings of the Royal Irish Academy*, **71B** (18), 269-352.
- NPWS (2005) Site synopsis: *Mweelrea/Sheeffry/Erriff Complex. Site code: 0001932.* Site Synopsis report, National Parks and Wildlife Service.
- O'Reilly, P., (2007) *Lough of Ireland, A Flyfisher's Guide 4th edition.* UK. Merlin Unwin Books.



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