



Sampling Fish for the Water Framework Directive

Lakes 2011

Glencullin Lough



Iascach Intíre Éireann
Inland Fisheries Ireland

Water Framework Directive Fish Stock Survey of Glencullin Lough, August 2011

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CITATION: Kelly, F.L., Connor, L., Morrissey, E., Wogerbauer, C., Matson, R., Feeney, R. and Rocks, K. (2012)
Water Framework Directive Fish Stock Survey of Glencullin Lough, August 2011. Inland Fisheries Ireland, Swords
Business Campus, Swords, Co. Dublin, Ireland.

Cover photo: Lynda and Fiona gill netting © Inland Fisheries Ireland

ACKNOWLEDGEMENTS

The authors wish to gratefully acknowledge the help and co-operation of the regional director Dr. John Connelly and the staff from IFI, Galway. The authors would also like to gratefully acknowledge the help and cooperation of all their colleagues in IFI, Swords.

The authors would also like to acknowledge the funding provided for the project from the Department of Communications, Energy and Natural Resources for 2011.

The authors would also like to thank Mr. Michael Wade from Delphi Fishery.

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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 falls into 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 as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al.*, 2009). During this survey, brown trout were found to be the dominant species present in the lake. Sea trout, three-spined stickleback and eels were also captured during the survey.

This report summarises the results of the 2011 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 2nd to the 3rd of August 2011. 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 survey in 2008. 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 2011, 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 eels. During the previous survey in 2008 the same species composition was recorded with the exception of salmon, which were present during the 2011 survey but were not captured in 2008.

Table 1.1. Number of each fish species captured by each gear type during the survey on Glencullin Lough, August 2011

Scientific name	Common name	Number of fish captured			Total
		Benthic mono multimesh gill nets	Surface mono multimesh gill nets	Fyke nets	
<i>Salmo trutta</i>	Brown trout	61	3	7	71
	Sea trout	6	0	0	6
<i>Salmo salar</i>	Salmon	2	0	0	2
<i>Gasterosteus aculeatus</i>	3-spined stickleback	4	0	0	4
<i>Anguilla anguilla</i>	European eel	0	0	18	18

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 2008 and 2011 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 appeared higher in 2011 than in 2008, these differences were not statistically significant (Figs. 1.2 and 1.3).

The differences in the mean brown trout CPUE and BPUE between Glencullin Lough and four similar lakes was assessed, with no overall significant differences being found (Figs. 1.4 and 1.5).

Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Glencullin Lough, 2008 and 2011

Scientific name	Common name	2008	2011
Mean CPUE			
<i>Salmo trutta</i>	Brown trout	0.136 (0.052)	0.225 (0.075)
	Sea trout	0.006 (0.004)	0.02 (0.013)
<i>Salmo salar</i>	Salmon	-	0.006 (0.006)
<i>Gasterosteus aculeatus</i>	3-spined stickleback	0.02 (0.008)	0.013 (0.007)
<i>Anguilla anguilla</i>	European eel	0.258 (0.008)	0.15 (0.133)
Mean BPUE			
<i>Salmo trutta</i>	Brown trout	18.168 (7.477)	23.655 (8.421)
	Sea trout	2.553 (1.791)	7.53 (5.080)
<i>Salmo salar</i>	Salmon	-	0.065 (0.065)
<i>Gasterosteus aculeatus</i>	3-spined stickleback	0.076 (0.035)	0.016 (0.009)
<i>Anguilla anguilla</i>	European eel	39.725 (2.358)	31.825 (30.425)

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

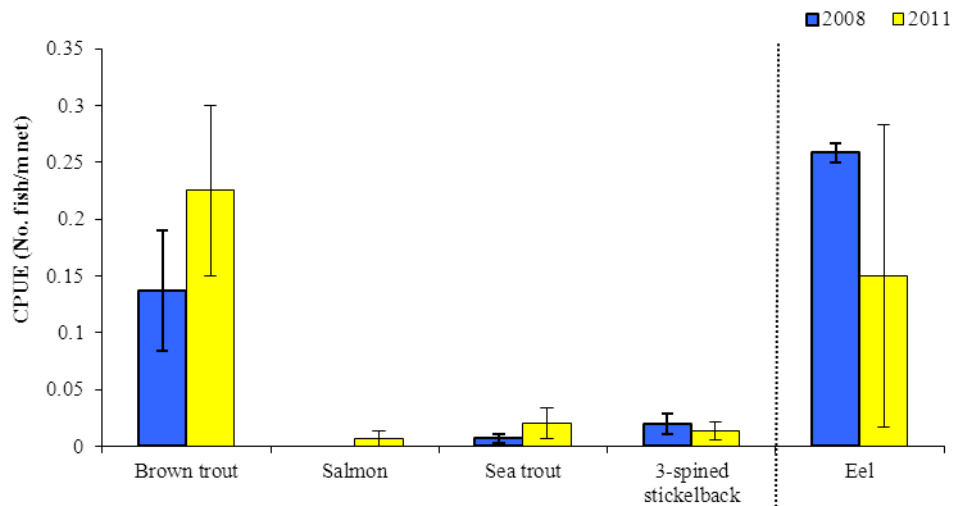


Fig. 1.2. Mean (\pm S.E.) CPUE for all fish species captured in Glencullin Lough (Eel CPUE based on fyke nets only), 2008 and 2011

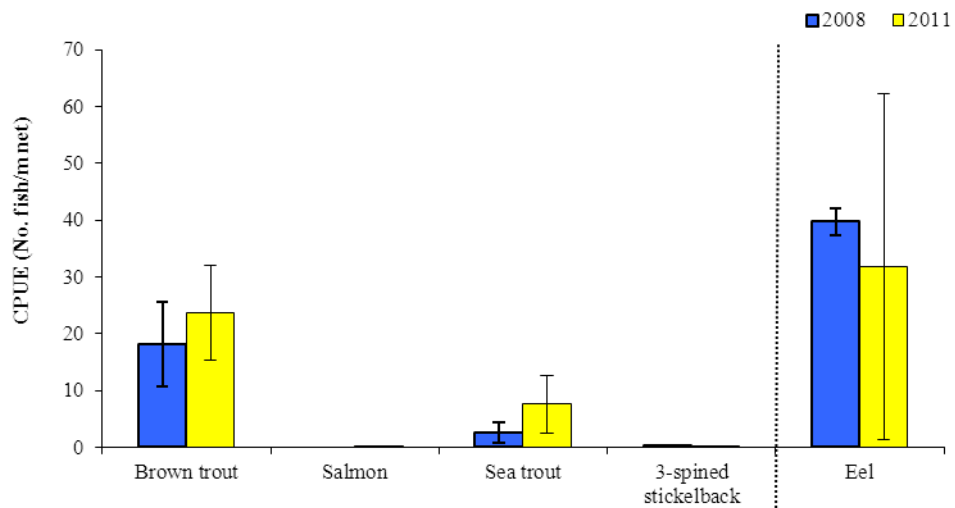


Fig. 1.3. Mean (\pm S.E.) BPUE for all fish species captured in Glencullin Lough (Eel CPUE based on fyke nets only), 2008 and 2011

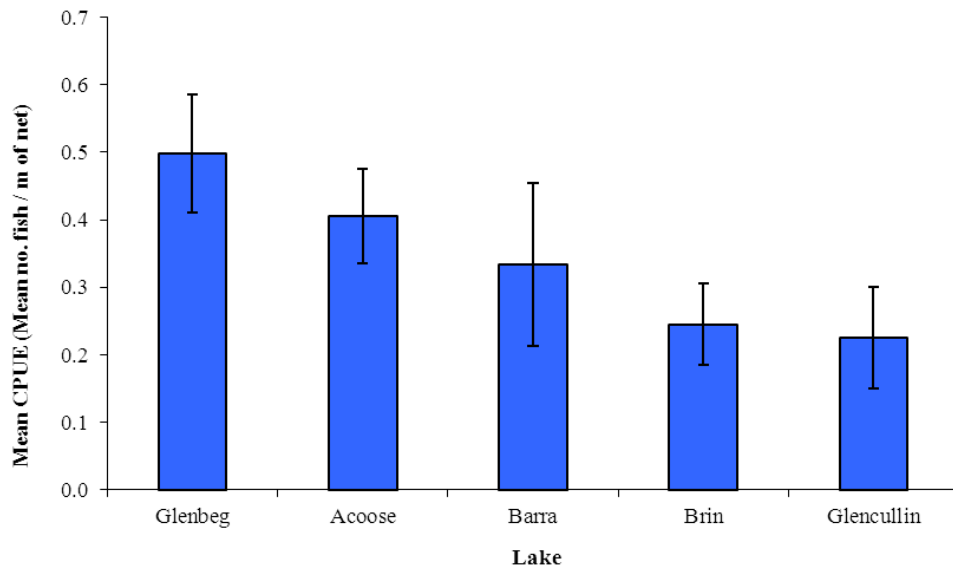


Fig. 1.4. Mean (\pm S.E.) brown trout CPUE in five lakes surveyed during 2011

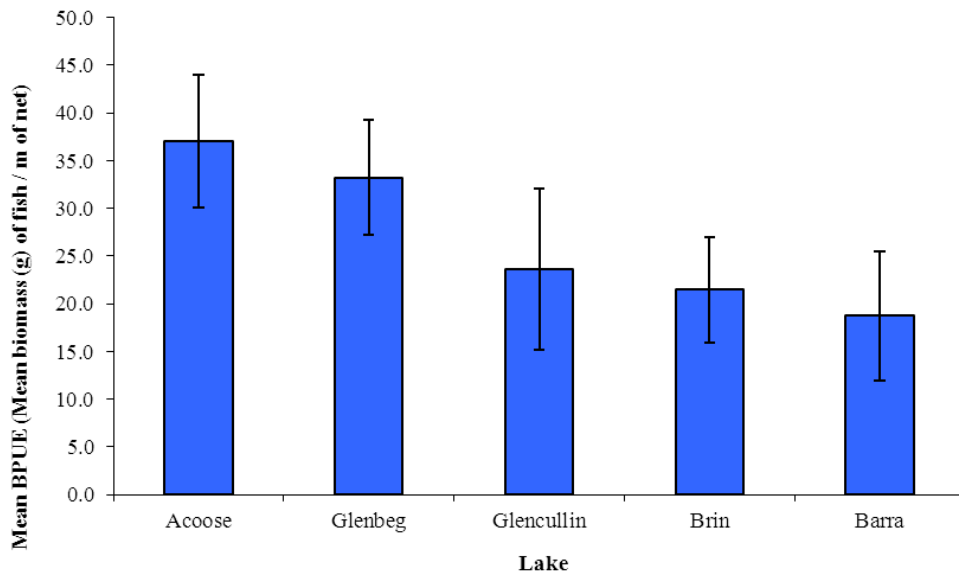


Fig. 1.5. Mean (\pm S.E.) brown trout BPUE in five lakes surveyed during 2011

1.3.3 Length frequency distributions

Brown trout captured during the 2011 survey ranged in length from 10.8cm to 45.0cm (mean = 18.7cm) (Fig. 1.6). Brown trout captured during the 2008 survey ranged in length from 6.7cm to 32.5cm (Fig. 1.6).

Eels captured during the 2011 survey ranged in length from 35.2cm to 73.2cm (mean = 46.6cm). Eels captured during the 2008 survey had lengths ranging from 28.0cm to 70.0cm.

Salmon captured during the 2011 survey ranged in length from 8.0cm to 10.8cm and sea trout ranged in length from 25.4cm to 42.0cm. Three-spined stickleback ranged in length from 3.2cm to 4.7cm were also captured.

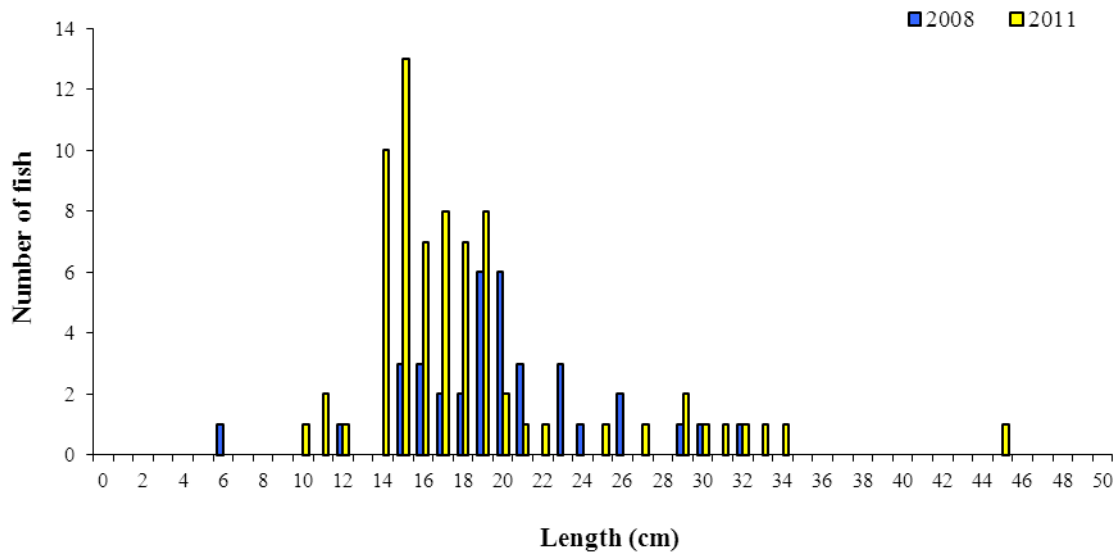


Fig. 1.6. Length frequency of brown trout captured on Glencullin Lough

1.3.4 Fish age and growth

Six age classes of brown trout were present, ranging from 1+ to 6+, with a mean L1 of 6.5cm (Table 1.3). In the 2008 survey, brown trout ranged from 0+ to 4+ with a mean L1 of 6.2cm. Mean brown trout L4 in 2011 was 26.4cm indicating a slow rate of growth for brown trout in this lake according to the classification scheme of Kennedy and Fitzmaurice (1971).

The juvenile salmon captured ranged in age from 0+ to 1+ and the sea trout ranged from 2.0+ to 3.0+.

Table 1.3. Mean (\pm SE) brown trout length (cm) at age for Glencullin Lough, August 2011

	L₁	L₂	L₃	L₄	L₅	L₆
Mean	6.5 (0.3)	15.1 (0.4)	21.8 (0.9)	26.4 (0.8)	30.5 (1.2)	31.5
N	45	30	11	5	2	1
Range	2.8-11.9	11.1-21.9	16.5-28.2	24.3-28.2	29.2-31.7	31.5-31.5

1.4 Summary

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

The mean brown trout CPUE and BPUE in Glencullin Lough was similar to the other lakes assessed (Lough Acoose, Glenbeg Lough, Lough Brin, Co. Kerry and Lough Barra, Co. Donegal), with no statistically significant differences being found between lakes. There was also no significant change in the mean CPUE and BPUE of brown trout between 2008 and 2011. Brown trout ranged in age from 1+ to 6+, indicating reproductive success in six of the previous seven years. Length at age analyses revealed that brown trout in the lake exhibit a 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, Glencullin Lough has been assigned an ecological status of High based on the fish populations present. The ecological status assigned to the lake based on the 2008 survey data was also High.

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

- 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.L., Harrison, A.J., Allen, M., Connor, L. and Rosell, R. (2012) 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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