



Sampling Fish for the Water Framework Directive

Lakes 2011

Lough Easky



Íascach Intíre Éireann
Inland Fisheries Ireland

Water Framework Directive Fish Stock Survey of Lough Easky, September 2011

Fiona L. Kelly, Lynda Connor, Emma Morrissey, Ciara Wogerbauer, Ronan Matson, Rory Feeney and
Kieran Rocks

Inland Fisheries Ireland, Swords Business Campus, Swords, Co. Dublin

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 Lough Easky, September 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 Conneely and the staff from IFI, Ballina. 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 report includes Ordnance Survey Ireland data reproduced under OSi Copyright Permit No. MP 007508.

*Unauthorised reproduction infringes Ordnance Survey Ireland and Government of Ireland copyright.
© Ordnance Survey Ireland, 2011.*

1.1 Introduction

Lough Easky is located in the Ox Mountains, south of Dromore West, Co. Sligo (Plate 1.1 and Fig. 1.1). The lake has a surface area of 119ha, a mean depth of 3m and a maximum depth of 13m. The lake falls into typology class 2 (as designated by the EPA for the Water Framework Directive), i.e. shallow (mean depth <4m), greater than 50ha and low alkalinity (<20mg/l CaCO₃).

Lough Easky forms part of the Ox Mountain Bogs Special Area of Conservation. Several oligotrophic lakes occur within the SAC, the largest of which is Lough Easky. Lough Easky is a stony-bottomed lake which supports aquatic vegetation typical of such oligotrophic lakes e.g. shoreweed (*Littorella uniflora*), quillwort (*Isoetes* sp.), bulbous rush (*Juncus bulbosus*), water lobelia (*Lobelia dortmanna*), common spike-rush (*Eleocharis palustris*), water horsetail (*Equisetum fluviatile*), sharp-flowered rush (*Juncus acutiflorus*) and bog pondweed (*Potamogeton polygonifolius*) (NPWS, 1997). Lough Easky historically contained brown trout, sea trout salmon and char (O' Reilly, 1998).

In the first half of 2008 a small landslide was observed on the eastern shore of the lake due to high levels of rainfall. It resulted in the accumulation of silt and debris on the shore of the lake (Collins, *pers. comm.*).

The lake was previously surveyed to assess its fish stocks in 1986 and 1991 by Inland Fisheries Ireland (previously the Central Fisheries Board and the North Western Regional Fisheries Board) (IFI, unpublished data). Brown trout was the dominant fish species recorded during both surveys, however Arctic char were recorded in the latter survey (IFI, unpublished data). A survey in 2004 on Lough Easky, carried out by the Irish Char Conservation Group, found no record of char in the lake even though the species was recorded in the 1991 survey (Neylon, *pers. comm.*).

Lough Easky was also 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. 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. Lough Easky at the outflow

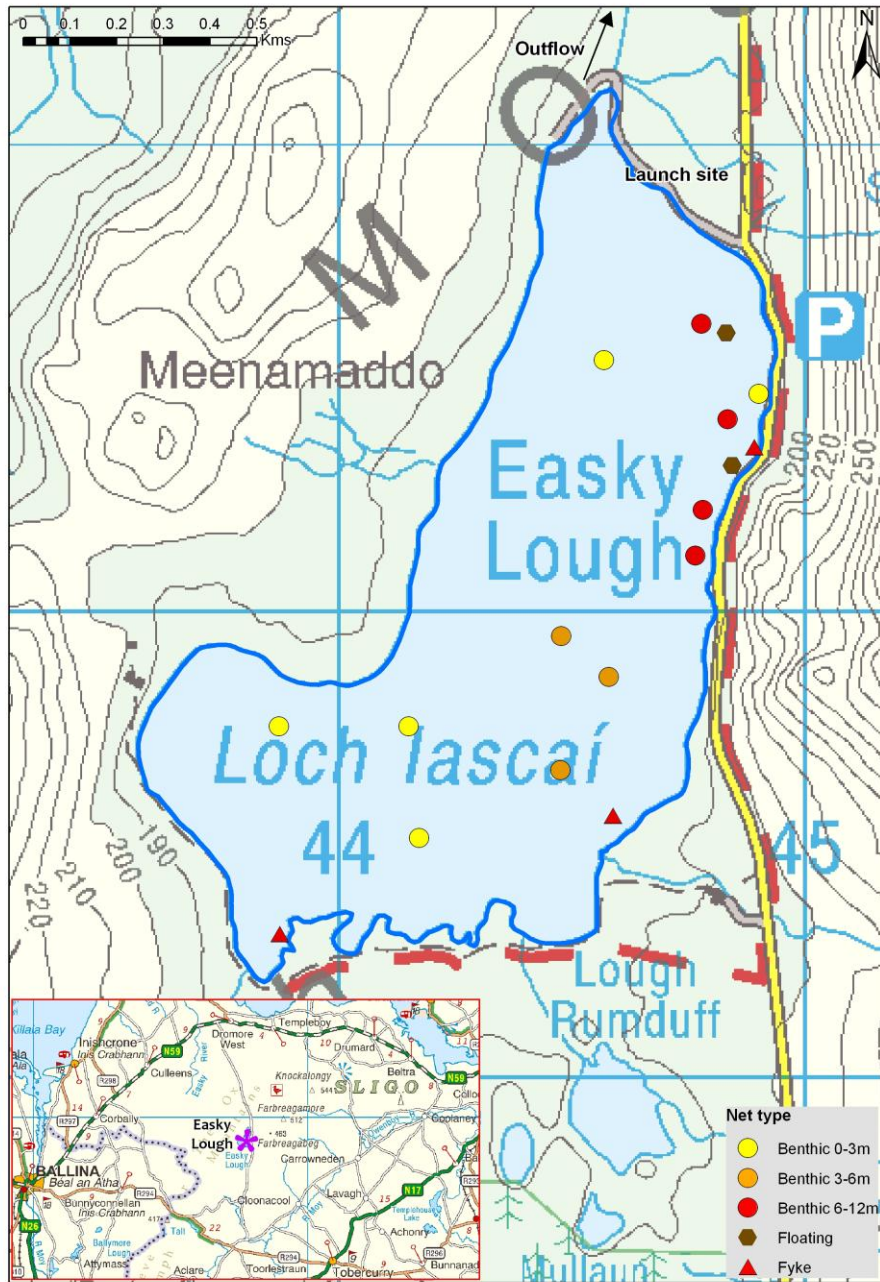


Fig. 1.1. Location map of Lough Easky showing locations and depths of each net (outflow is indicated on map)

1.2 Methods

Lough Easky was surveyed over two nights between the 28th and the 30th of September 2011. A total of three sets of Dutch fyke nets, 12 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (5 @ 0-2.9m, 3 @ 3-5.9m and 4 @ 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 (17 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 and salmon. 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 three fish species were recorded on Lough Easky in September 2011, with 168 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 and salmon. 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 Lough Easky, September 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	149	1	2	152
<i>Salmo salar</i>	Salmon	1	0	0	1
<i>Anguilla anguilla</i>	European eel	0	0	15	15

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 slightly 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 Lough Easky and four similar lakes were assessed and found to be statistically significant (Kruskal-Wallis, $P < 0.05$) (Figs. 1.4 and 1.5). Independent-Samples Mann-Whitney U tests between each lake showed that Lough Easky had a significantly higher mean brown trout CPUE and BPUE than Lough Allua (CPUE: $z = -3.600$, $P < 0.05$; BPUE: $z = -3.790$, $P < 0.05$).

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

Scientific name	Common name	2008	2011
Mean CPUE			
<i>Salmo trutta</i>	Brown trout	0.274 (0.07)	0.296 (0.082)
<i>Salmo salar</i>	Salmon	-	0.002 (0.002)
<i>Anguilla anguilla</i>	European eel	0.066 (0.034)	0.083 (0.033)
Mean BPUE			
<i>Salmo trutta</i>	Brown trout	16.411 (4.341)	24.506 (6.892)
<i>Salmo salar</i>	Salmon	-	0.018 (0.018)
<i>Anguilla anguilla</i>	European eel	27.016 (16.768)	14.179 (3.531)

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

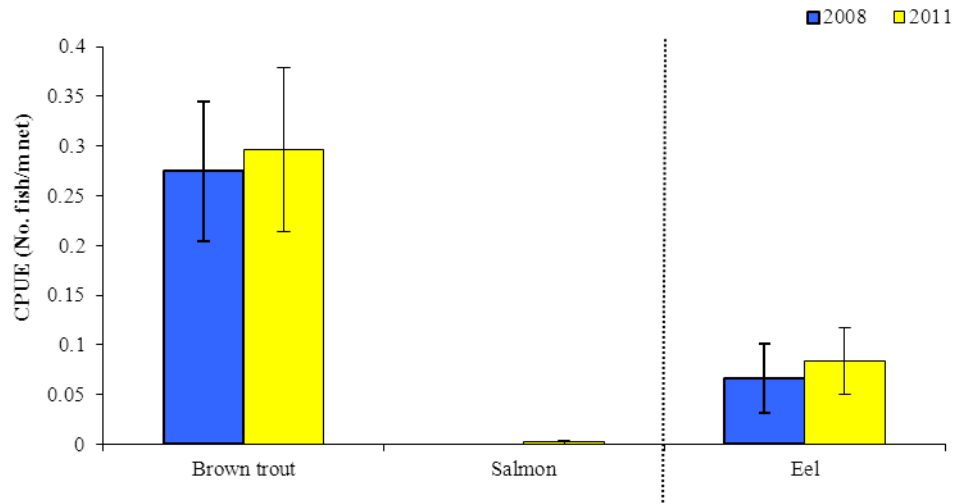


Fig. 1.2. Mean (\pm S.E.) CPUE for all fish species captured in Lough Easky (Eel CPUE based on fyke nets only), 2008 and 2011

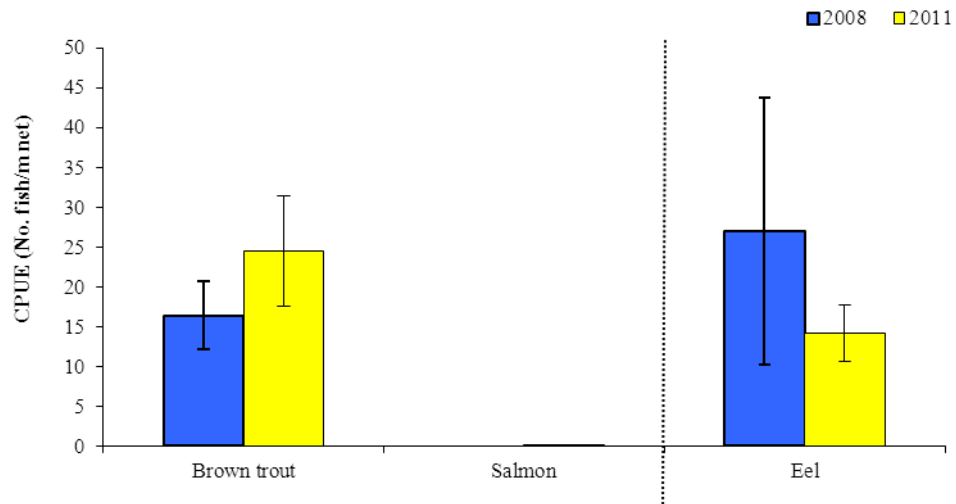


Fig. 1.3. Mean (\pm S.E.) BPUE for all fish species captured in Lough Easky (Eel CPUE based on fyke nets only), 2008 and 2011

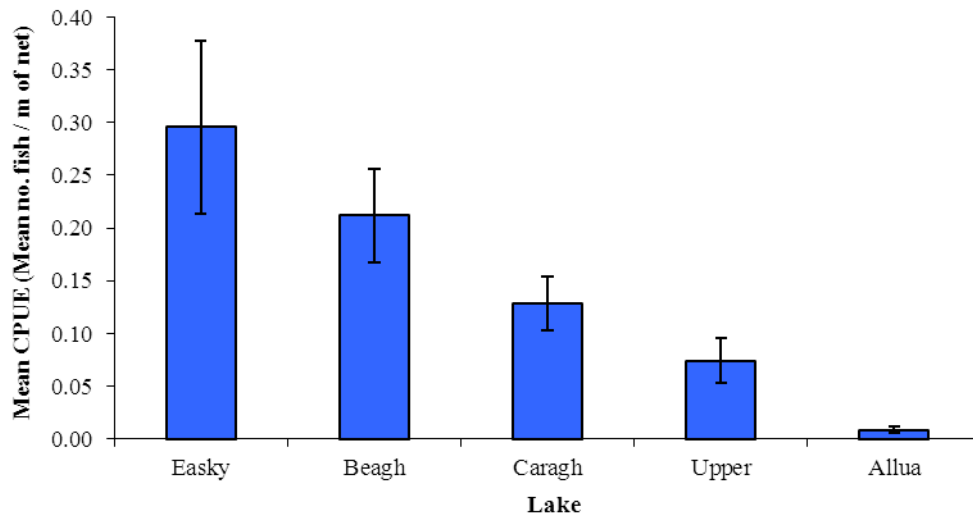


Fig. 1.4. Mean (\pm S.E.) brown trout CPUE in five lakes surveyed during 2011

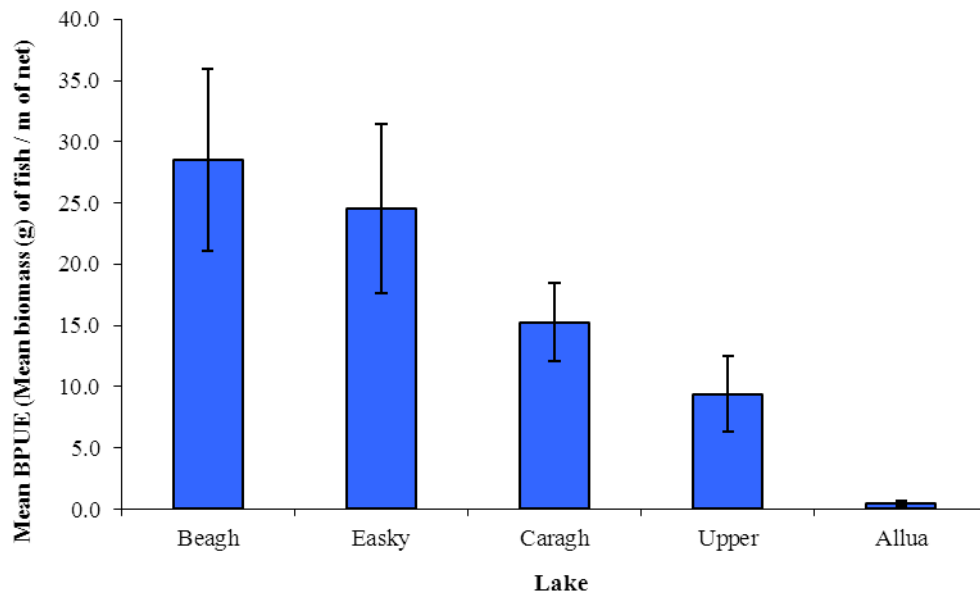


Fig. 1.5. Mean (\pm S.E.) brown trout BPUE in five lakes surveyed during 2011

1.3.3 Length frequency distributions

Brown trout captured during the 2011 survey ranged in length from 5.4cm to 25.0cm (mean = 18.4cm) (Fig. 1.6). Brown trout captured during the 2008 survey ranged in length from 7.0cm to 25.0cm (Fig. 1.6).

Eels captured during the 2011 survey ranged in length from 33.0cm to 62.5cm (mean = 43.5cm). Eels captured during the 2008 survey had lengths ranging from 38.0cm to 84.0cm. One salmon captured during the 2011 survey was recorded at 8.4cm.

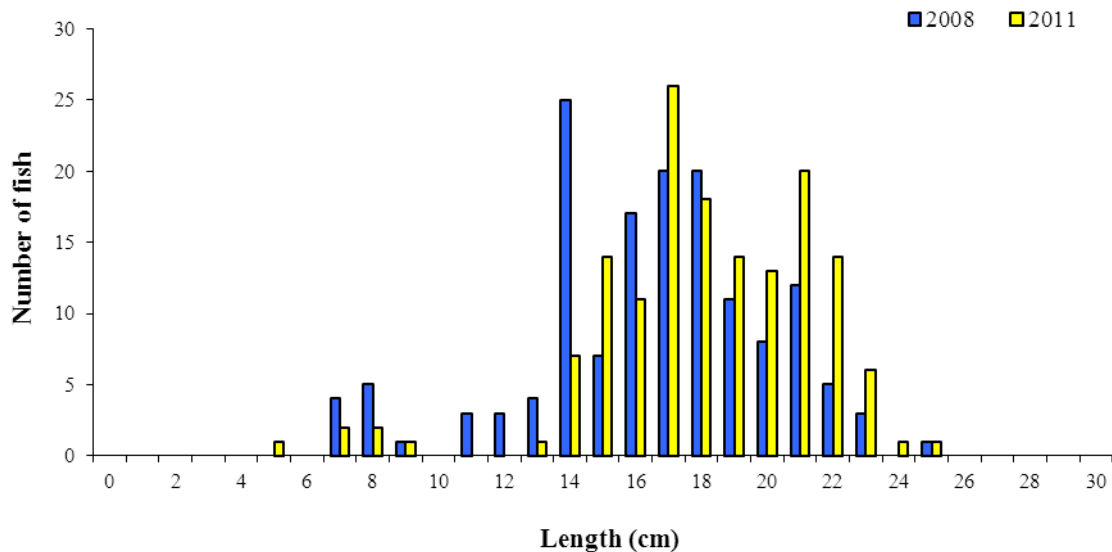


Fig. 1.6. Length frequency of brown trout captured on Lough Easky

1.3.4 Fish age and growth

Five age classes of brown trout were present, ranging from 0+ to 4+, with a mean L1 of 5.8cm (Table 1.3). In the 2008 survey, brown trout ranged from 0+ to 3+ with a mean L1 of 6.5cm. Mean brown trout L4 in 2011 was 20.8cm indicating a very slow rate of growth for brown trout in this lake according to the classification scheme of Kennedy and Fitzmaurice (1971).

The single juvenile salmon captured was aged 1+.

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

	L ₁	L ₂	L ₃	L ₄
Mean	5.8 (0.2)	13.7 (0.3)	18.2 (0.9)	20.8 (2.2)
N	55	46	9	2
Range	3.0-9.7	7.9-18.6	13.2-22.0	18.5-23.1

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 appeared slightly higher in 2011 than in 2008, there was no significant difference between years. The mean brown trout CPUE and BPUE in Lough Easky was significantly higher than Lough Allua, Co. Cork, another similar lake surveyed. Brown trout ranged in age from 0+ to 4+, indicating reproductive success in each of the previous five 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 Easky has been assigned an ecological status of Good based on the fish populations present. The ecological status assigned to the lake based on the 2008 survey data was High.

In the 2007 to 2009 surveillance monitoring reporting period, the EPA assigned Lough Easky 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.
- 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 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*, **71 (B) (18)**, 269-352.
- NPWS (1997) Site synopsis: *Lough Hoe Bog cSAC. Site code: 000633*. National Parks and Wildlife Conservation Plan for 2005-2010.
- O' Reilly, P., (1998) *Loughs of Ireland, A Flyfisher's Guide 3rd edition*. UK. Merlin Unwin Books.



**Inland Fisheries Ireland
Swords Business Campus,
Swords,
Co. Dublin,
Ireland.**

**Web: www.fisheriesireland.ie
Email: info@fisheriesireland.ie
Tel: +353 1 8842 600
Fax: +353 1 8360 060**