Sampling Fish for the Water Framework Directive

Lakes 2010

Upper Lough Erne

Iascach Intíre Éireann
Inland Fisheries Ireland

ACKNOWLEDGEMENTS

The authors wish to gratefully acknowledge the help and co-operation of the regional director Dr. Milton Matthews and the staff from IFI, Ballyshannon. We also acknowledge the help of the staff from the Department of Culture, Arts and Leisure (DCAL) and the Agri-Food and Biosciences Institute Northern Ireland (AFBINI). 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 2010.

1.1 Introduction

Upper Lough Erne (Plate 1.1, Fig. 1.1) is a large and complex freshwater system situated in County Fermanagh (NIEA, 2010). It is situated at an altitude of 38.2m a.s.l., has a surface area of 3218ha, a mean depth of < 4m and a maximum depth 21m. The lake is categorised as typology class 6 (as designated by the EPA for the Water Framework Directive), i.e. shallow (<4m), greater than 50ha and moderate alkalinity (20-100mg/l CaCO3).

The lake is comprised of a number of drumlins which have been flooded, giving rise to a series of islands and bays. This lake has been included on the list of wetlands of international importance as designated by the Ramsar Convention. The Ramsar site is comprised of the Upper Lough Erne Special Area for Conservation (SAC) and Upper Lough Erne Special Protection Area (SPA) (NIEA, 2010). The designation of the lake as an SAC and SPA is due to the presence of a number of habitats listed on Annex I of the EU Habitats Directive and because it supports a number of rare vulnerable or endangered species of plant and animal (JNCC, 2010; NIEA, 2010).

Upper Lough Erne is an example of a northern eutrophic lake of glacial origin. The lake is naturally eutrophic and is situated in a drumlin landscape where the underlying geology of the area is predominantly calcareous bedrock (JNCC, 2010). Upper Lough Erne also represents one of the largest areas of semi-natural woodland remaining in Northern Ireland. Drier soils to the south of the lake support well-developed mature oak woods. The shores of Upper Lough Erne contain the most extensive area of alluvial forests in Northern Ireland.

The lake is a maze of channels and islands with vast reed beds that provide ideal habitat for pike (Erne Angling, 2010). Rare invertebrate species include the white clawed crayfish, the lunar hornet moth, a pondskater *Limnoporus rufoscutellatus*, the water beetles, *Donacia aquatica*, *Donacia bicolora*, *Gyrinus distinctus*, *Gyrinus natator*, *Hydroporus glabriusculus* and the carabid *Lebia cruxminor*. Nationally important numbers of over wintering wildfowl species are present on the lake (NIEA, 2010). The Annex II species, the otter, *Lutra lutra*, is also found along the shores of Upper Lough Erne (JNCC, 2010).

Plate 1.1. Setting a floating gill net in Upper Lough Erne

Plate 1.2. Floating gill net set in Upper Lough Erne

Lough Erne Upper, Cavan / Fermanagh

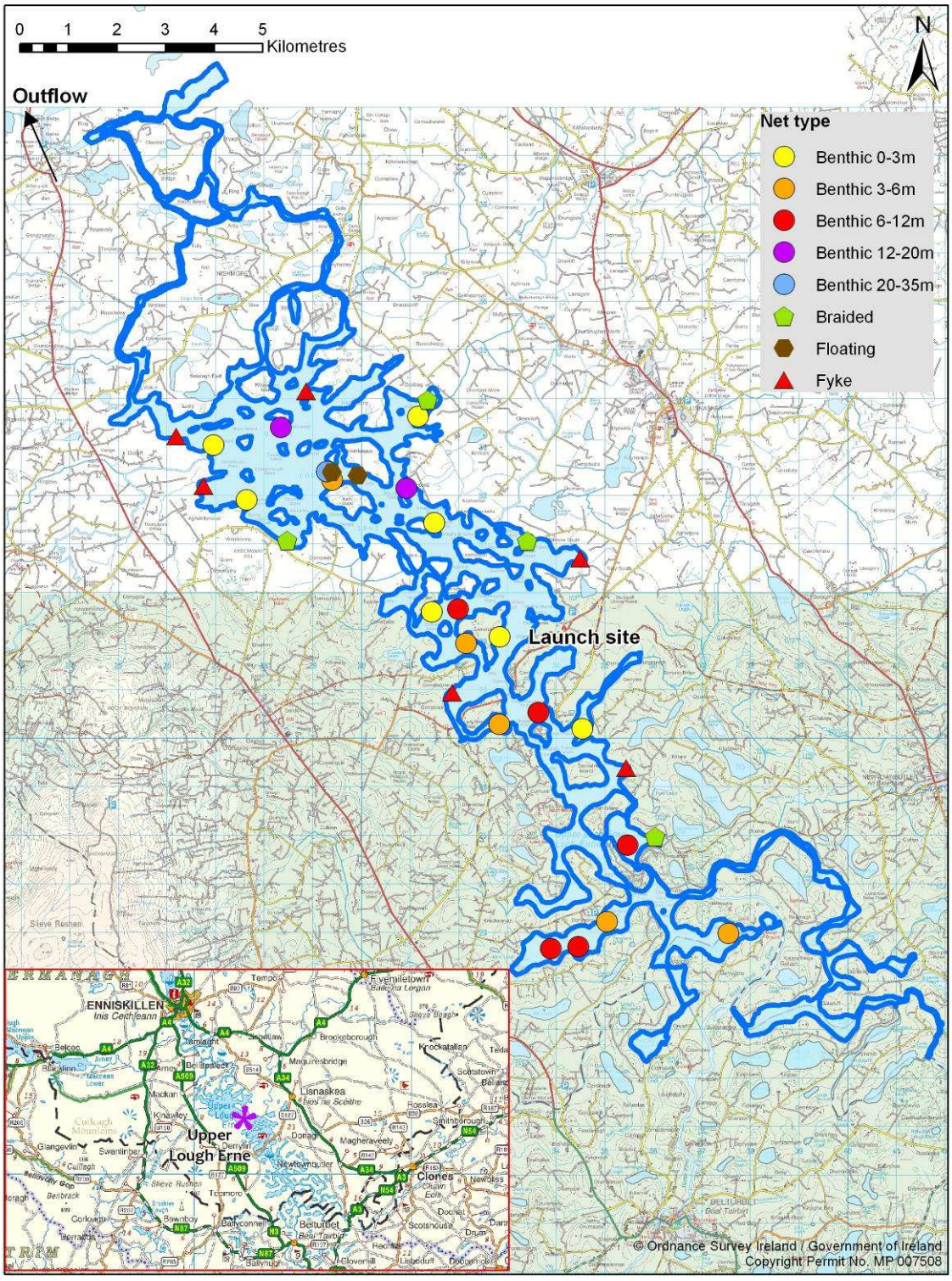

Fig. 1.1. Location map of Upper Lough Erne showing net locations and depths of each net (outflow is indicated on map)

1.2 Methods

Upper Lough Erne was surveyed over four nights from the 28th of June to the 2nd of July 2010. A total of six sets of Dutch fyke nets, 20 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (7 @ 0-2.9m, 5 @ 3-5.9m, 5 @ 6-11.9m, 2 @ 12-19.9m and 1 @ 20-34.9m) and two floating monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets were deployed randomly in the lake (28 sites). The netting effort was supplemented using four benthic braided survey gill nets (62.5mm mesh knot to knot) at four additional sites. Survey locations were randomly selected within each depth zone using a grid placed over a map of the lake. 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 apart from perch were measured and weighed on site and scales were removed from all roach, bream, brown trout, pike, and roach x bream hybrids. 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 six fish species and one type of hybrid were recorded in Upper Lough Erne during the survey, with 1,411 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Perch was the most abundant fish species recorded, followed by roach, eels and roach x bream hybrids. Small numbers of bream, brown trout and pike were also captured.

Table 1.1. Number of each fish captured by each gear type during the survey on Upper Lough Erne, July 2010

Scientific name	Common name	Number of fish captured				
		Benthic mono multimesh gill nets	Surface mono multimesh gill nets	Benthic braided gill nets	Fyke nets	Total
Perca fluviatilis	Perch	1029	2	0	0	1031
Rutilus rutilus	Roach	282	26	0	1	309
Anguilla anguilla	European eel	0	0	0	31	31
Rutilus rutilus x Abramis brama	Roach x Bream hybrid	29	0	0	0	29
Abramis brama	Bream	0	0	4	0	4
Esox lucius	Pike	3	0	0	1	4
Salmo trutta	Brown trout	2	1	0	0	3

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 are summarised in Table 1.2.

The differences in the mean perch CPUE between Upper Lough Erne and three other similar lakes were assessed and although higher than the mean CPUE for the other three lakes no statistically significant differences were identified (Fig. 1.2).

The differences in the mean roach CPUE between Upper Lough Erne and four other similar lakes were also assessed with no statistically significant differences being found (Fig. 1.3).

Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Upper Lough Erne, July 2010

Scientific name	**Common name**	
		Mean CPUE
Perca fluviatilis	Perch	1.073 (0.294)
Rutilus rutilus	Roach	0.321 (0.085)
Anguilla anguilla	European eel	0.086 (0.021)
Rutilus rutilus x Abramis brama	Roach x Bream hybrid	0.030 (0.008)
Abramis brama	Bream	0.004 (0.003)
Esox lucius	Pike	0.003 (0.001)
Salmo trutta	Brown trout	0.003 (0.001)
		Mean BPUE
Perca fluviatilis	Perch	25.202 (9.516)
Rutilus rutilus	Roach	28.219 (7.557)
Anguilla anguilla	European eel	19.929 (5.705)
Rutilus rutilus x Abramis brama	Roach x Bream hybrid	8.146 (3.292)
Abramis brama	Bream	9.331 (7.736)
Esox lucius	Pike	12.929 (10.474)
Salmo trutta	Brown trout	9.064 (6.249)

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

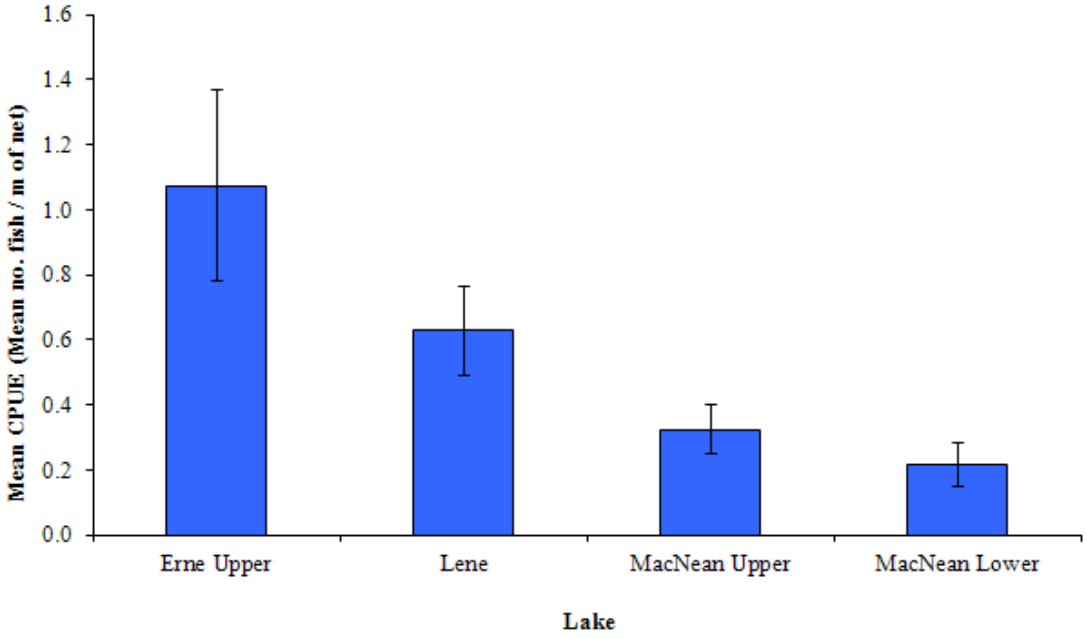

Fig. 1.2. Mean (±S.E.) perch CPUE in four lakes surveyed during 2010

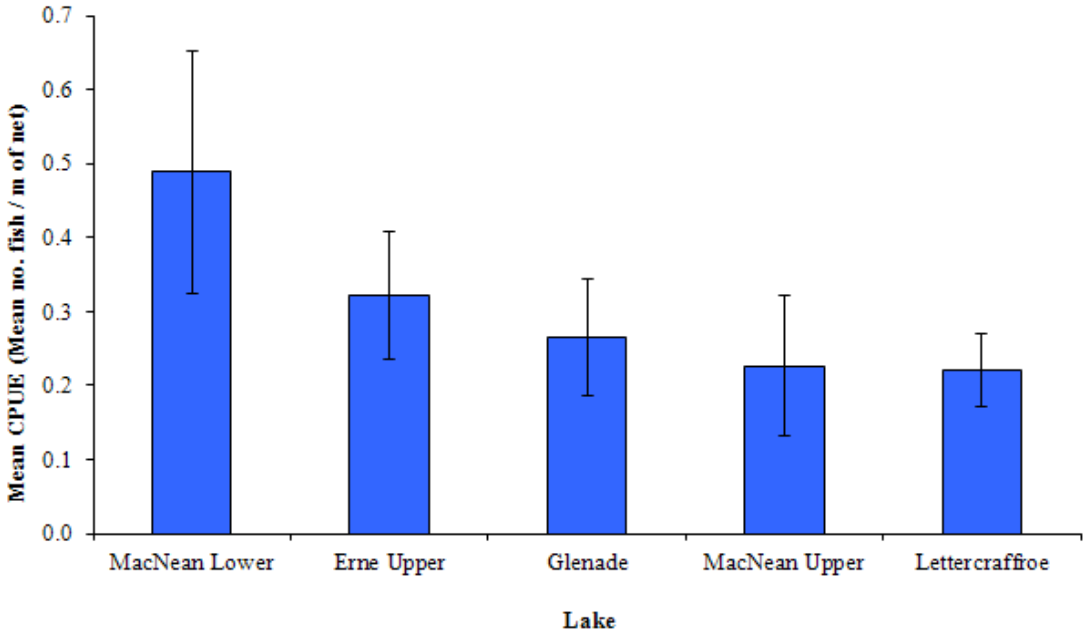

Fig. 1.3. Mean (±S.E.) roach CPUE in five lakes surveyed during 2010

1.3.3 Length frequency distributions

Perch ranged in length from 3.0cm to 30.5cm (mean = 8.2cm) (Fig. 1.4). Roach ranged in length from 5.0cm to 30.5cm (mean = 14.9cm) (Fig. 1.5). Roach x bream hybrids ranged in length from 7.7cm to 37.2cm. Eels ranged in length from 38.3cm to 60.7cm, brown trout ranged from 23.8cm to 70.2cm, bream ranged in length from 44.0cm to 49.2cm and pike ranged from 26.3cm to 86.0cm.

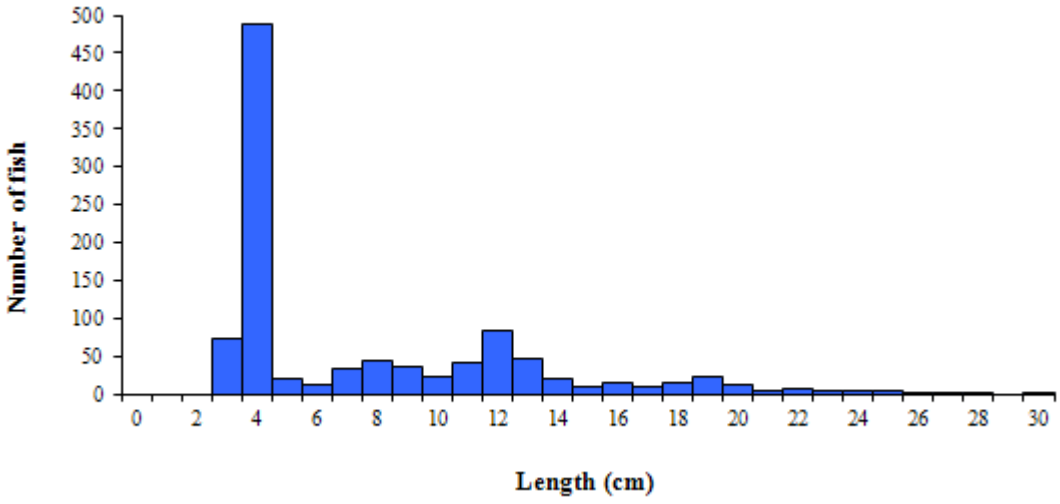

Fig. 1.4. Length frequency of perch captured in Upper Lough Erne

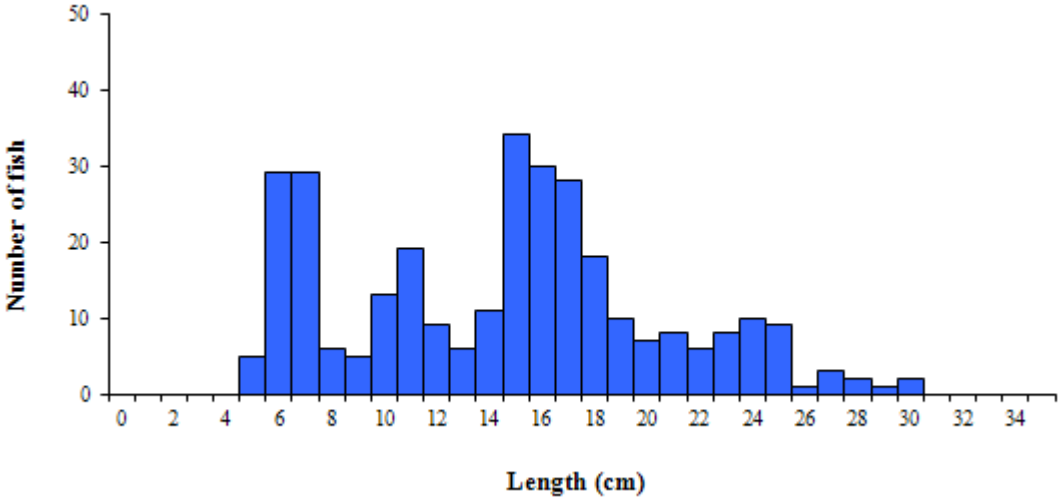

Fig. 1.5. Length frequency of roach captured in Upper Lough Erne

1.3.4 Fish age and growth

Eight age classes of perch were present, ranging from 0+ to 7+, with a mean L1 of 5.2cm (Table 1.3). The dominant age class was 0+, corresponding to the 3cm to 5cm length class (Fig. 1.4).

Nine age classes of roach were present, ranging from 1+ to 9+, with a mean L1 of 3.6cm (Table 1.4). Seven age classes of roach x bream hybrids were present, ranging from 2+ to 13+, three age classes of brown trout were present, ranging from 3+ to 8+, three age classes of bream were present, ranging from 9+ to 14+ and three age classes of pike were present, ranging from 1+ to 4+.

Table 1.3. Mean (±SE) perch length (cm) at age for Upper Lough Erne, July 2010

	L_1	L_2	L_3	L_4	L_5	L_6	L_7
Mean	5.2 (0.1)	9.4 (0.2)	14.8 (0.3)	19.3 (0.4)	22.7 (0.7)	25.4 (0.9)	26.2 (1.9)
N	107	85	62	47	16	9	3
Range	3.3-7.4	6.4-14.6	8.2-20.6	12.1-24.2	16.7-26.5	20.4-28.3	23.6-29.9

Table 1.4. Mean (±SE) roach length (cm) at age for Upper Lough Erne, July 2010

	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8	L_9
Mean	3.6 (0.1)	7.8 (0.1)	12.4 (0.2)	16.4 (0.3)	20.3 (0.4)	23.0 (0.5)	24.3 (0.8)	25.1 (1.2)	27.6
N	83	77	62	56	32	17	8	3	1
Range	2.3-5.2	5.2-10.8	7.2-17.0	11.6-20.1	15.6-24.0	18.9-26.4	20.8-28.5	22.8-26.8	27.6-27.6

1.4 Summary

Perch was the dominant species in terms of abundance (CPUE) and roach was the dominant species in terms of biomass (BPUE).

The mean perch CPUE in Upper Lough Erne was slightly higher when compared to the other similar lakes surveyed; however, these differences were not statistically significant. The dominant age of perch was 0+, with ages ranging from 0+ to 7+, indicating reproductive success in each of the previous seven years.

The mean roach CPUE in Upper Lough Erne was not statistically different when compared with other similar lakes surveyed. Roach ranged in age from 1+ to 9+, indicating reproductive success in nine of the previous ten years; however, no 0+ fish were recorded.

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. Using the FIL2 classification tool, Upper Lough Erne has been assigned an ecological status of Poor/Bad based on the fish populations present.

In the 2007 to 2009 surveillance monitoring reporting period, the EPA assigned Upper Lough Erne an overall ecological status of Moderate, 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

Erne Angling (2010) http://www.erneangling.com/

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, NSSHARE project.

JNCC (2010) http://www.jncc.gov.uk/ProtectedSites/SACselection/sac.asp?EUCode=UK0016614

NIEA (2010) http://www.ni-environment.gov.uk/ramsar/ramsar_upperlerne.shtml

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