Sampling Fish for the Water Framework Directive

Lakes 2010

Beltra Lough

Iascach Intíre Éireann
Inland Fisheries Ireland

ACKNOWLEDGEMENTS

1.1 Introduction

Beltra Lough (Plate 1.1, Fig 1.1) is a very picturesque lake located 8km north-east of Newport and 11km north-west of Castlebar. It is 2.4km in length and 1.6km wide, has a surface area of 403ha, a mean depth of > 4m and a maximum depth of 26.0m. The lake is categorised as typology class 4 (as designated by the EPA for the purposes of the Water Framework Directive), i.e. deep (>4m), greater than 50ha and high alkalinity (<20mg/l $CaCO_3$).

Beltra Lough gets an excellent run of spring salmon and, from June onwards, a run of grilse and sea trout. The sea trout average approximately 0.34kg but fish of between 1.8kg and 2.3kg are taken annually (O' Reilly, 2007).

Beltra Lough forms part of the Newport River Special Area of Conservation (SAC). The site consists of the Newport River, its tributaries and Beltra Lough (NPWS, 2005). The site is selected as an SAC for containing Atlantic salmon and freshwater pearl mussel (*Margaritifera margaritifera*), both species listed on Annex II of the E.U. Habitats Directive. The Newport River and Beltra Lough are important for spring salmon and grilse, and contain important spawning areas. Broad-leaved deciduous woodland is also found within the site, which is comprised of ash, hawthorn, downy birch, alder and willow. The kingfisher, a species listed on Annex I of the E.U. Birds Directive, has also been recorded along the Newport River.

Water quality in Beltra Lough is considered to be good; however, there are potential threats to water quality through nutrient enrichment, particularly from agricultural run-off. Afforestation within the catchment could also pose a threat to water quality (NPWS, 2005).

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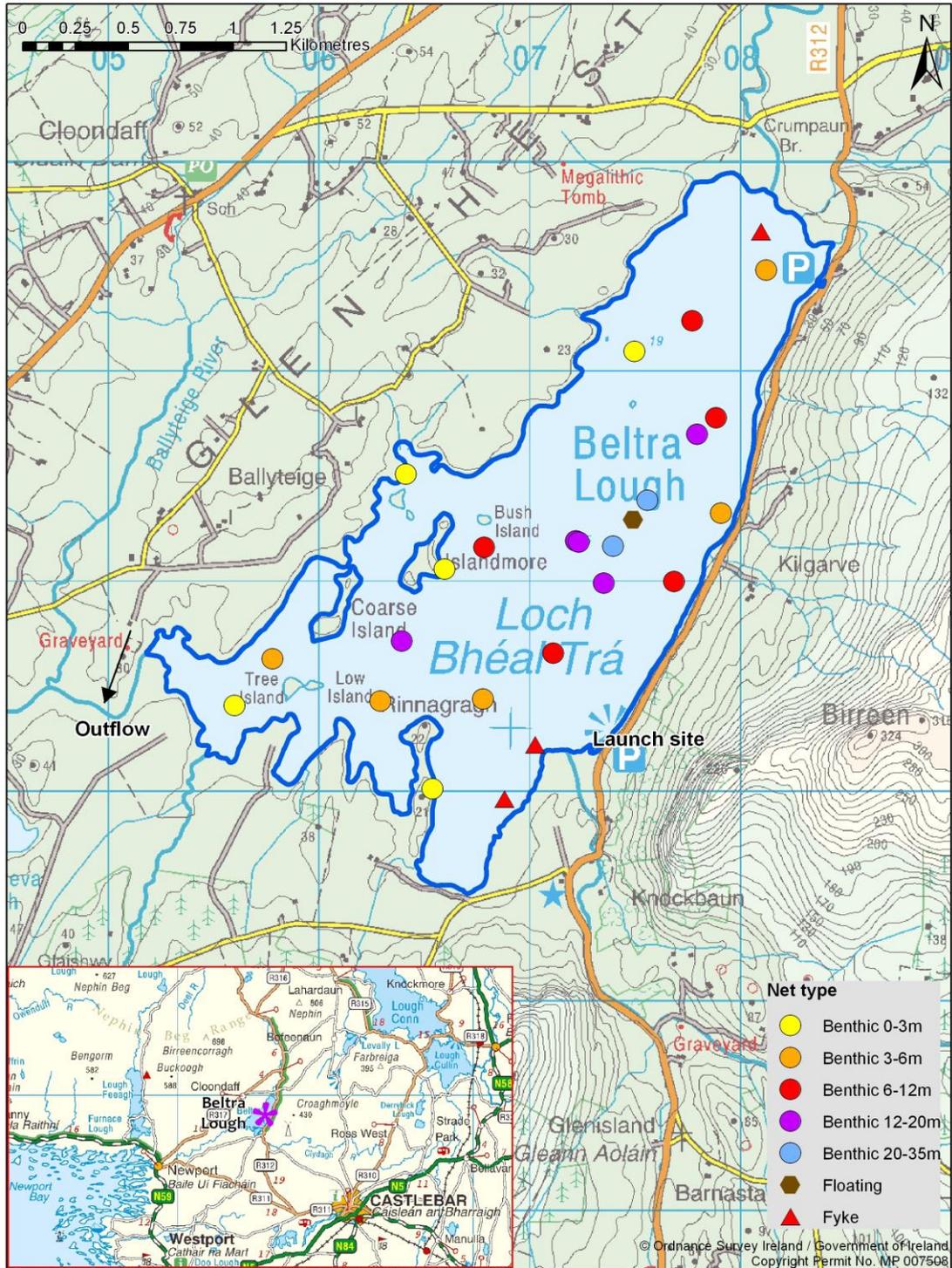
Fig. 1.1. Location map of Beltra Lough showing net locations and depths of each net (outflow is indicated on map)

1.2 Methods

Beltra Lough was surveyed over two nights from the 9th to the 11th of August 2010. A total of three sets of Dutch fyke nets, 22 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (5 @ 0-2.9m, 5 @ 3-5.9m, 5 @ 6-11.9m, 5 @ 12-19.9m and 2 @ 20-34.9m) and one floating monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill net were deployed randomly in the lake (26 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 brown trout, sea 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 four fish species (sea trout are included as a separate 'variety' of trout) were recorded in Beltra Lough during the August 2010 survey, with 177 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 eels and brown trout. Small numbers of sea trout and salmon were also recorded.

Table 1.1. Number of each fish species captured by each gear type during the survey in Beltra Lough, August 2010

Scientific name	Common name	Number of fish captured			
		Benthic mono multimesh gill nets	Surface mono multimesh gill nets	Fyke nets	Total
Perca fluviatilis	Perch	80	0	2	82
Anguilla anguilla	European eel	0	0	73	73
Salmo trutta	Brown trout	15	1	1	17
Salmo trutta	Sea trout	3	0	0	3
Salmo salar	Salmon	1	0	1	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 are summarised in Table 1.2.

The differences in the mean brown trout CPUE between Beltra Lough and two other similar lakes were assessed and found to be statistically significant (Kruskal-Wallis, P<0.001) (Fig. 1.2). Independent-Samples Mann-Whitney U tests between each lake showed that Beltra Lough had a significantly lower mean brown trout CPUE than Glencar Lough (z = -3.305, P<0.001).

The differences in the mean perch CPUE between Beltra lough and four other similar lakes were also assessed and found to be statistically significant (Kruskal-Wallis, P<0.05) (Fig. 1.3). Independent-Samples Mann-Whitney U tests between each lake showed that Beltra Lough had a significantly lower mean perch CPUE than Lough Rea (z = -2.656, P<0.05) and Urlaur Lough (z = -3.460, P<0.001).

Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured in Beltra Lough, 2010

Scientific name	Common name	
		Mean (S.E.) CPUE
Perca fluviatilis	Perch	0.104 (0.031)
Anguilla anguilla	European eel	0.405 (0.078)
Salmo trutta	Brown trout	0.021 (0.012)
Salmo trutta	Sea trout	0.004 (0.003)
Salmo salar	Salmon	0.002 (0.001)
		Mean (S.E.) BPUE
Perca fluviatilis	Perch	4.439 (1.258)
Anguilla anguilla	European eel	54.838 (21.326)
Salmo trutta	Brown trout	2.211 (1.353)
Salmo trutta	Sea trout	1.094 (0.889)
Salmo salar	Salmon	0.852 (0.832)

* On the rare occasion where biomass data was unavailable for an individual fish, this was determined from a length/weight regression for that species.
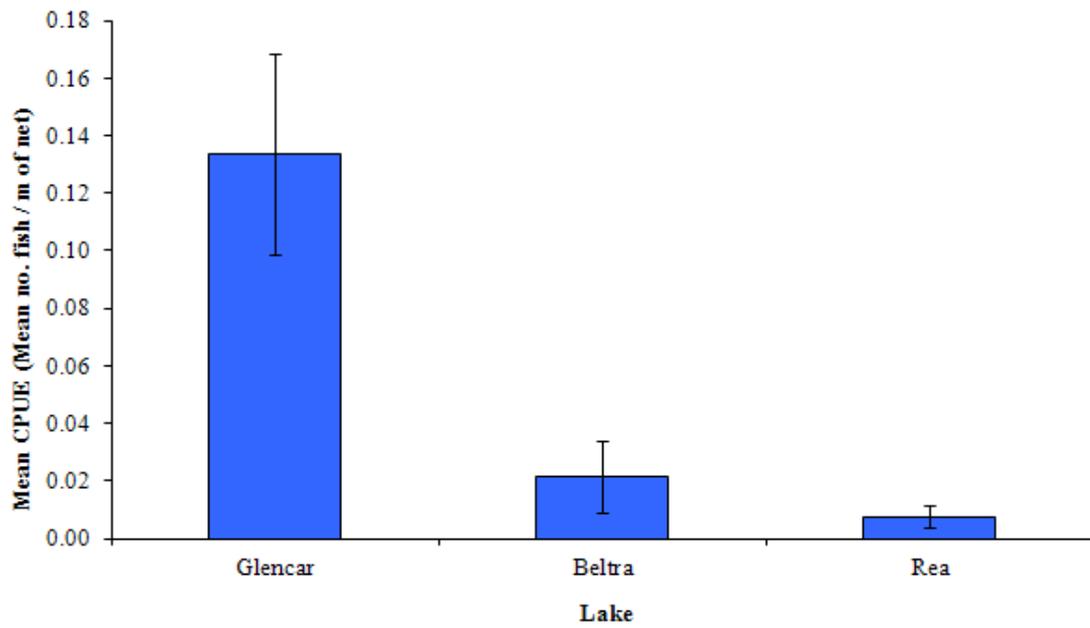
Fig. 1.2. Mean (±S.E.) brown trout CPUE in four lakes surveyed during 2010
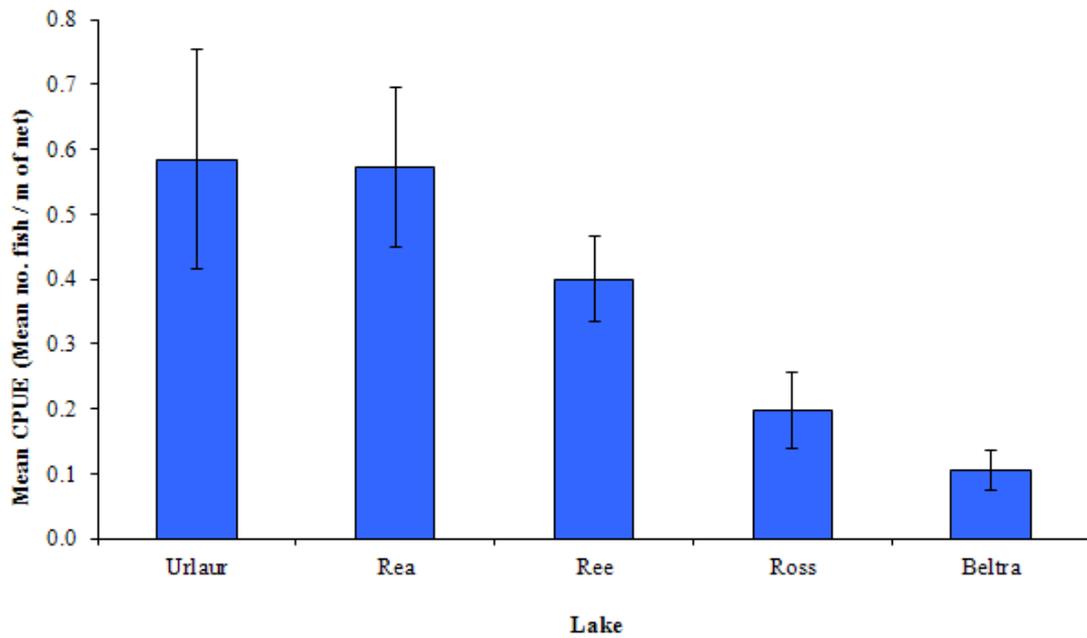
Fig. 1.3. Mean (±S.E.) perch CPUE in five lakes surveyed during 2010

1.3.3 Length frequency distributions

Brown trout ranged in length from 13.5cm to 32.2cm (mean = 19.9cm) (Fig. 1.4). Perch ranged in length from 5.1cm to 24.0cm (mean = 14.8cm) (Fig. 1.5). Sea trout ranged in length from 26.5cm to 30.0cm. Eels ranged in length from 28.0cm to 88.0cm and salmon ranged in length from 10.6cm to 51.0cm.
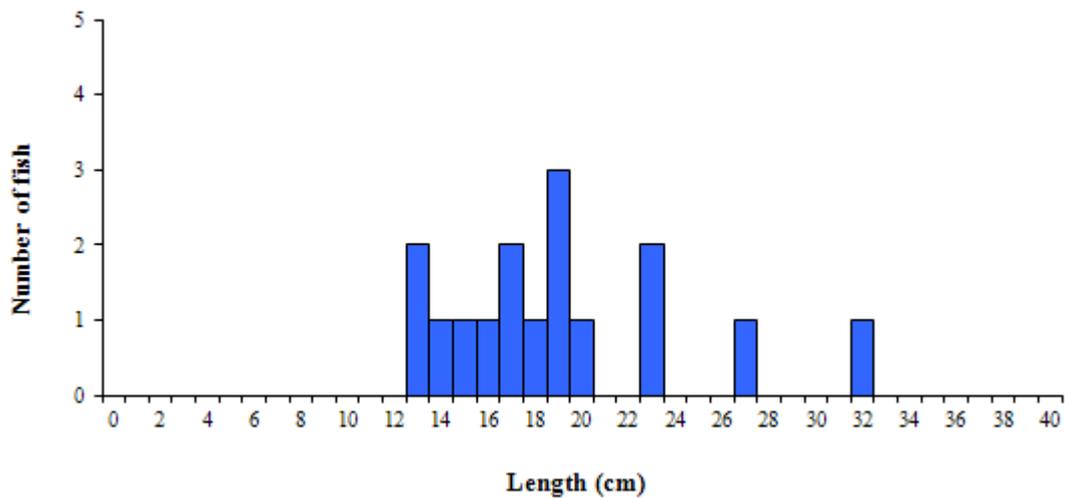
Fig. 1.4. Length frequency of brown trout captured in Beltra Lough
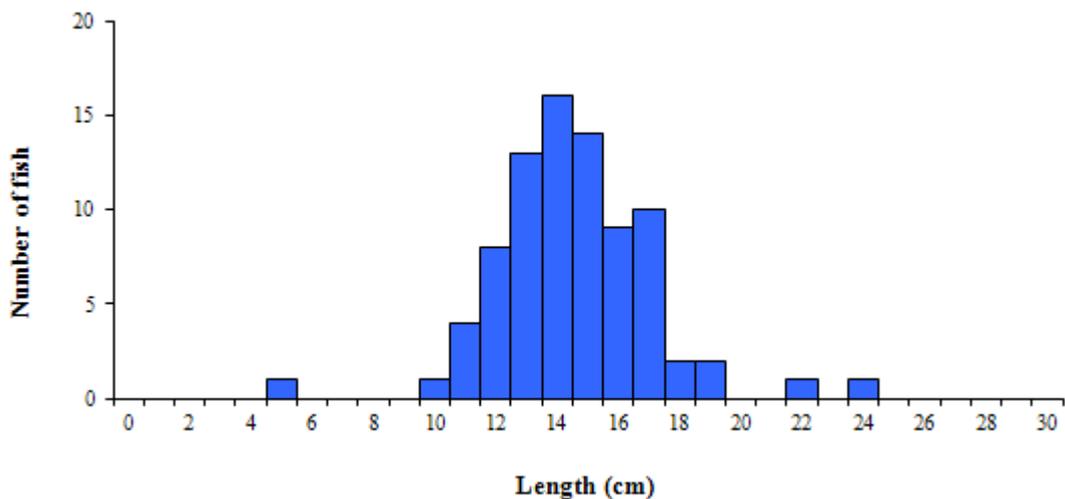
Fig. 1.5. Length frequency of perch captured in Beltra Lough

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1.3.4 Fish age and growth

Seven age classes of perch were present, ranging from 0+ to 7+, with a mean L1 of 5.3cm (Table 1.3).

Three age classes of brown trout were present, ranging from 1+ to 3+, with a mean L1 of 8.0cm (Table 1.4). Three sea trout captured were aged 1.1+, 2.0+ and 2.0+2SM.

Table 1.3. Mean (±SE) perch length (cm) at age for Beltra Lough, August 2010

	L_1	L_2	L_3	L_4	L_5	L_6	L_7
Mean	5.3 (0.1)	10.5 (0.1)	13.6 (0.2)	15.5 (0.3)	16.6 (0.8)	18.2 (0.8)	19.9 (1.3)
N	53	53	40	23	9	6	4
Range	4.2-7.1	7.7-12.8	10.8-16.5	12.5-18.2	13.0-19.5	16.0-21.0	17.1-22.8

Table 1.4. Mean (±SE) brown trout (cm) length at age for Beltra Lough, August 2010

	L_1	L_2	L_3
Mean	8.0 (0.3)	16.5 (1.0)	24.1 (1.9)
N	15	11	3
Range	5.7-9.5	10.1-20.7	21.0-27.6

1.4 Summary

Perch was the dominant fish species captured in the survey gill nets in terms of both abundance (CPUE) and biomass (BPUE).

The mean brown trout CPUE in Beltra Lough was significantly lower than in Glencar Lough but was significantly higher than in Lough Ree. Brown trout ranged in age from 1+ to 3+, indicating reproductive success in the previous three years.

The mean perch CPUE in Beltra Lough was significantly lower than Lough Rea and Urlaur Lough. Perch ranged in age from 0+ to 7+, indicating reproductive success in each of the previous seven years.

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, Beltra Lough has been assigned an ecological status of Good based on the fish populations present.

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, NSSHARE project.

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O' Reilly (2007) *Loughs of Ireland. A Flyfisher's Guide.* 4th Edition. Merlin Unwin Books.