



Sampling Fish for the Water Framework Directive

Lakes 2013

Beltra Lough



Iascach Intíre Éireann
Inland Fisheries Ireland

Water Framework Directive Fish Stock Survey of Beltra Lough, July 2013

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

Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

CITATION: Kelly, F.L., Connor, L., Morrissey, E., Coyne, J., Matson, R., Feeney, R. and Rocks, K. (2014)
Water Framework Directive Fish Stock Survey of Beltra Lough, July 2013. Inland Fisheries Ireland, 3044 Lake
Drive, Citywest Business Campus, Dublin 24.

Cover photo: Netting survey on Glen Lough © Inland Fisheries Ireland

© Inland Fisheries Ireland 2014

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 2013.

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, 2010.*

1.1 Introduction

Beltra Lough is a picturesque lake located 8km north-east of Newport and 11km north-west of Castlebar (Plate 1.1, Fig 1.1). 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 CaCO₃).

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 the lake 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).

Beltra Lough was previously surveyed in 2010 as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al.*, 2011). During this survey perch were found to be the dominant species present in the lake. Eels, brown trout, sea trout and salmon were also captured during the survey.



Plate 1.1. Beltra Lough

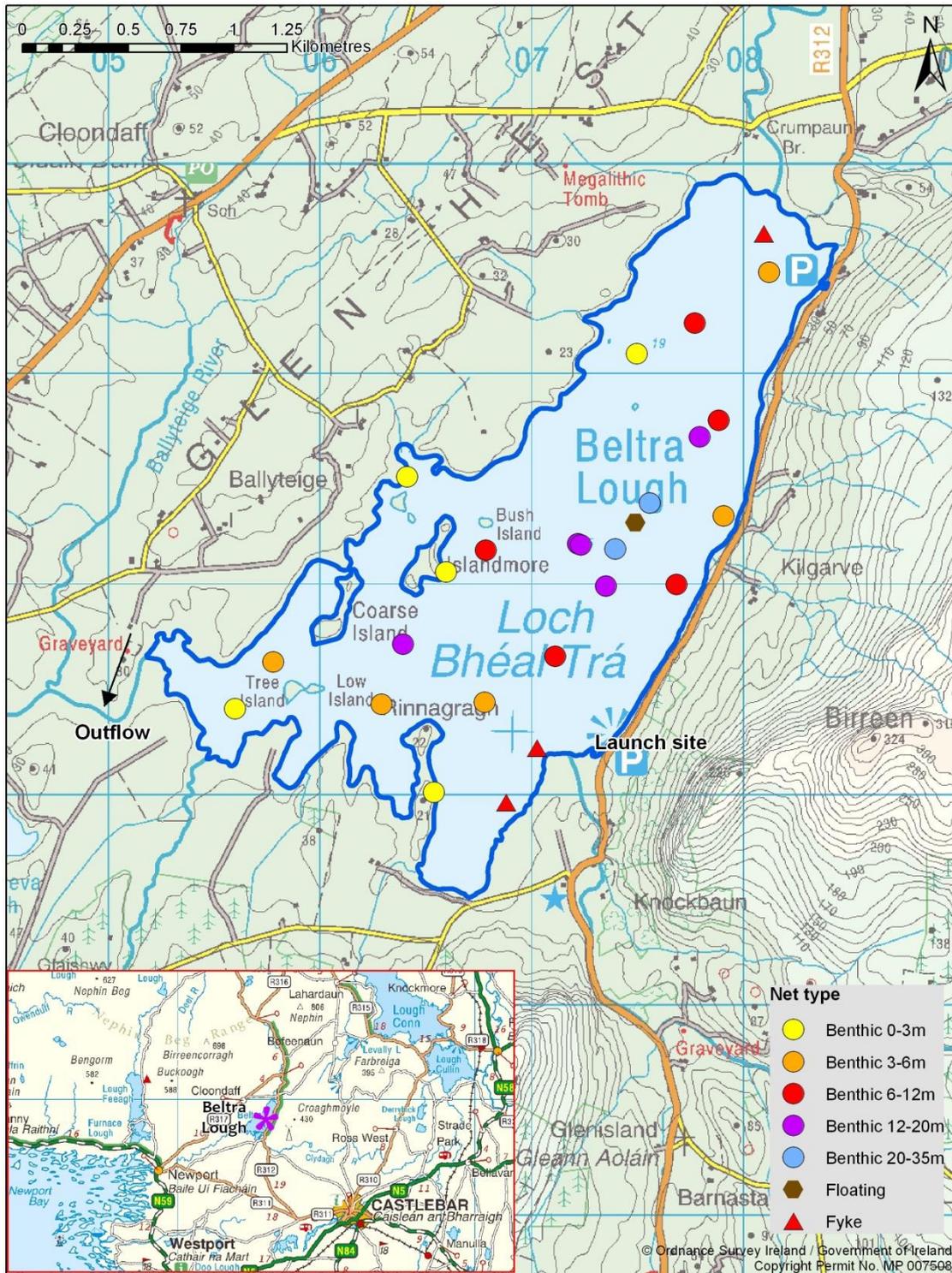


Fig. 1.1. Location map of Beltra Lough showing net locations and depths of each net (outflow is indicated on map)

1.2 Methods

Beltra Lough was surveyed over two nights from the 22nd to the 24th of July 2013. 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 July 2013 survey, with 253 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 brown trout and eels. Sea trout and salmon were also recorded. The same species composition was recorded in 2010.

Table 1.1. Number of each fish species captured by each gear type during the survey in Beltra Lough, July 2013

Scientific name	Common name	Number of fish captured			
		Benthic mono multimesh gill nets	Surface mono multimesh gill nets	Fyke nets	Total
<i>Perca fluviatilis</i>	Perch	159	0	2	161
<i>Salmo trutta</i>	Brown trout	42	5	6	53
<i>Anguilla anguilla</i>	European eel	0	0	28	28
<i>Salmo trutta</i>	Sea trout	5	1	0	6
<i>Salmo salar</i>	Salmon	5	0	0	5

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 2010 and 2013 surveys are summarised in Table 1.2. Mean CPUE and BPUE for all species is illustrated in Figure 1.2 and 1.3.

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

Although the mean perch CPUE and BPUE was higher in 2013 than in 2010, these differences were not statistically significant (Table 1.2; Fig 1.2 and 1.3).

The mean brown trout CPUE and BPUE was significantly higher in 2013 than in 2010 (Mann-Whitney, $P < 0.01$) (Table 1.2; Figs 1.2 and 1.3).

Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured in Beltra Lough, 2010, 2013

Scientific name	Common name	2010	2013
Mean CPUE			
<i>Perca fluviatilis</i>	Perch	0.104 (0.031)	0.205 (0.056)
<i>Salmo trutta</i>	Brown trout	0.021 (0.012)	0.064 (0.014)
<i>Anguilla anguilla</i>	European eel*	0.405 (0.078)	0.156 (0.106)
<i>Salmo trutta</i>	Sea trout	0.004 (0.003)	0.008 (0.003)
<i>Salmo salar</i>	Salmon	0.002 (0.001)	0.006 (0.003)
Mean BPUE			
<i>Perca fluviatilis</i>	Perch	4.439 (1.258)	8.401 (2.310)
<i>Salmo trutta</i>	Brown trout	2.211 (1.353)	4.363 (1.140)
<i>Anguilla anguilla</i>	European eel*	54.838 (21.326)	24.500 (11.570)
<i>Salmo trutta</i>	Sea trout	1.094 (0.889)	3.494 (1.602)
<i>Salmo salar</i>	Salmon	0.852 (0.832)	14.073 (7.813)

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

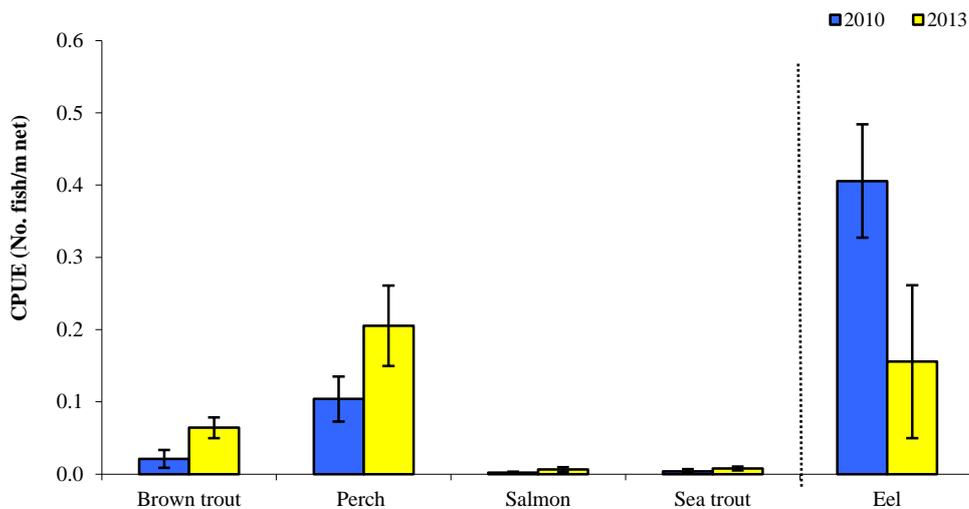


Fig. 1.2. Mean (\pm S.E.) CPUE on Beltra Lough (Eel CPUE based on fyke nets only) in 2010 and 2013

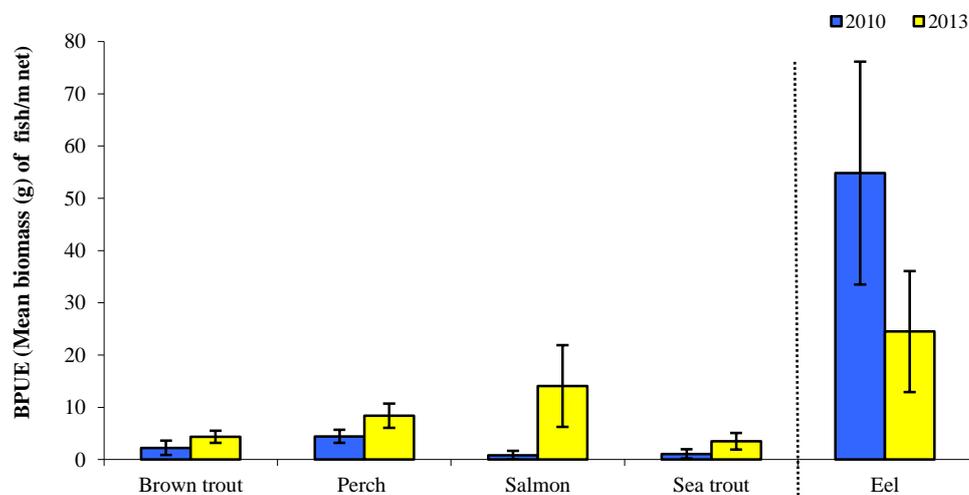


Fig. 1.3. Mean (\pm S.E.) BPUE for all fish species captured in Beltra Lough (Eel BPUE based on fyke nets only), 2010 and 2013

1.3.3 Length frequency distributions and growth

Perch captured during the 2013 survey ranged in length from 7.4cm to 26.8cm (mean = 14.0) (Fig. 1.4) with eight age classes present, ranging from 1+ to 8+, with a mean L1 of 5.2 cm (Table 1.3). The dominant age class was 4+ (Fig 1.4). Perch captured during the 2010 survey ranged in length from 5.1cm to 24.0cm (Fig. 1.4) with seven age classes present, ranging from 0+ to 7+ and the dominant age class was similar to the 2013 survey.

Brown trout captured during the 2013 survey ranged in length from 10.5cm to 25.2cm (mean = 17.1cm) (Fig. 1.5) with three age classes present, ranging from 1+ to 3+ (Table 1.4). The dominant age class was 1+ (Fig 1.5). This was similar to the 2010 survey, where three age classes of brown trout were also present, ranging from 1+ to 3+ and lengths ranged from 13.5cm to 32.2cm (Fig. 1.5). The dominant age class was 2+ (Fig 1.5).

Eels captured during the 2013 survey had lengths ranging from 29.7cm to 83.0cm, sea trout ranged in length from 17.1cm to 32.6cm (ages ranged from 2.0+ to 3.1+) and salmon ranged in length from 10.5cm to 70.1cm (ages ranged from 2.1+ and 2.2+).

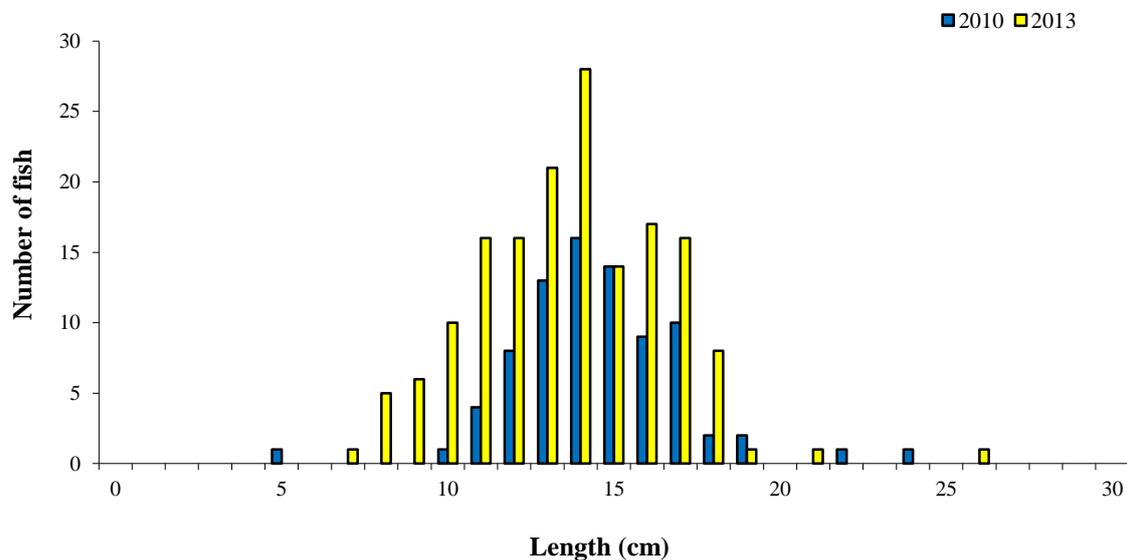


Fig. 1.4. Length frequency of perch captured in Beltra Lough, 2010 and 2013

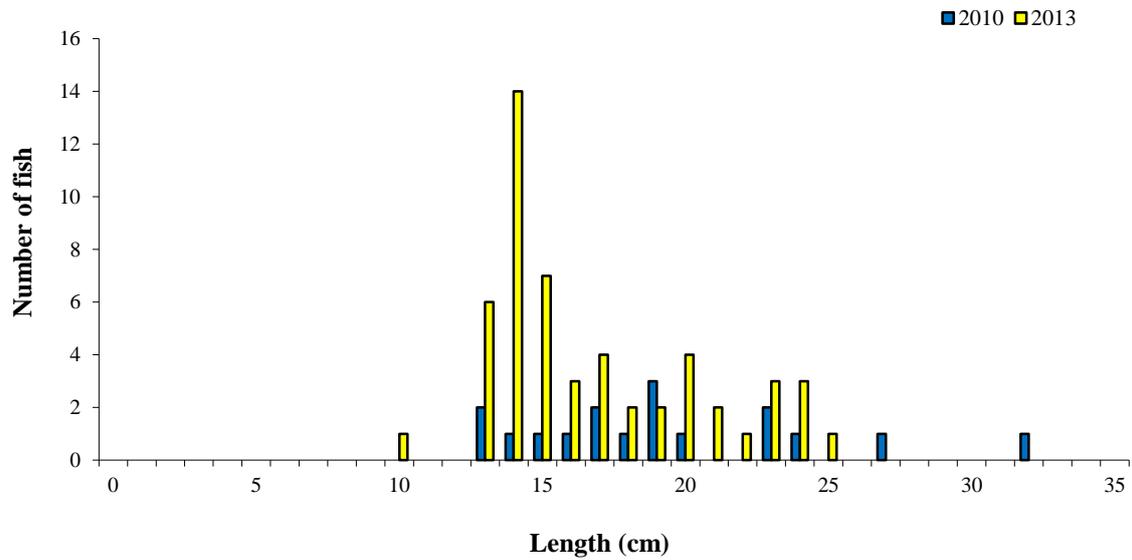


Fig. 1.5. Length frequency of brown trout captured in Beltra Lough, 2010 and 2013

Table 1.3. Mean (\pm SE) perch length (cm) at age for Beltra Lough, July 2013

	L₁	L₂	L₃	L₄	L₅	L₆	L₇	L₈
Mean	5.2 (0.1)	9.7 (0.2)	12.4 (0.3)	14.4 (0.4)	16.3 (0.7)	16.7 (0.4)	17.2 (1.1)	16.8
N	53	47	41	33	16	9	2	1
Range	3.4-8.1	7.0-14.4	8.8-18.8	10.2-21.3	12.4-25.9	14.9-18.3	16.2-18.3	16.8-16.8

Table 1.4. Mean (\pm SE) brown trout (cm) length at age for Beltra Lough, July 2013

	L₁	L₂	L₃
Mean	7.2 (0.3)	15.7 (0.6)	22.2 (1.0)
N	27	17	6
Range	4.3-9.9	11.9-21.0	17.7-24.7

1.4 Summary

Perch was the dominant fish species captured in the survey gill nets in terms of abundance (CPUE) and salmon was the dominant fish species in terms of biomass (BPUE) during the 2013 survey.

Although the mean perch CPUE and BPUE was higher in 2013 than in 2010, these differences were not statistically significant. Perch ranged in age from 1+ to 8+, indicating reproductive success in eight of the previous nine years. The dominant age class was 4+.

The mean brown trout CPUE and BPUE was significantly higher in 2013 than in 2010. Brown trout ranged in age from 1+ to 3+, indicating reproductive success in three of the previous four years. The dominant age class was 1+.

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 High based on the fish populations present in 2013. The ecological status assigned to the lake based on the 2010 survey data was Good.

In the 2010 to 2012 surveillance monitoring reporting period, the EPA assigned Beltra Lough an overall draft ecological status of Good, 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, NSSHARE project.
- Kelly, F., Harrison A., Connor, L., Matson, R., Morrissey, E., Wogerbauer, C., Feeney, R., O'Callaghan, R. and Rocks, K. (2011) *Sampling Fish for the Water Framework Directive – Summary Report 2010*. Inland Fisheries Ireland.
- Kelly, F.L., Harrison A., Connor, L., Morrissey, E., Wogerbauer, C., Matson, R., Feeney, R., O'Callaghan, R. and Rocks, K. (2011) *Water Framework Directive Fish Stock Survey of Beltra Lough, August 2010*. Inland Fisheries Ireland.
- 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.
- NPWS (2005) *Site synopsis: Newport River. Site code: 002144*. Site Synopsis report, National Parks and Wildlife Service.
- O' Reilly (2007) *Loughs of Ireland. A Flyfisher's Guide*. 4th Edition. Merlin Unwin Books.



**IFI Dublin,
3044 Lake Drive,
Citywest Business Campus,
Dublin 24,
Ireland**

**www.fisheriesireland.ie
dublin@fisheriesireland.ie
+353 1 8842 600**