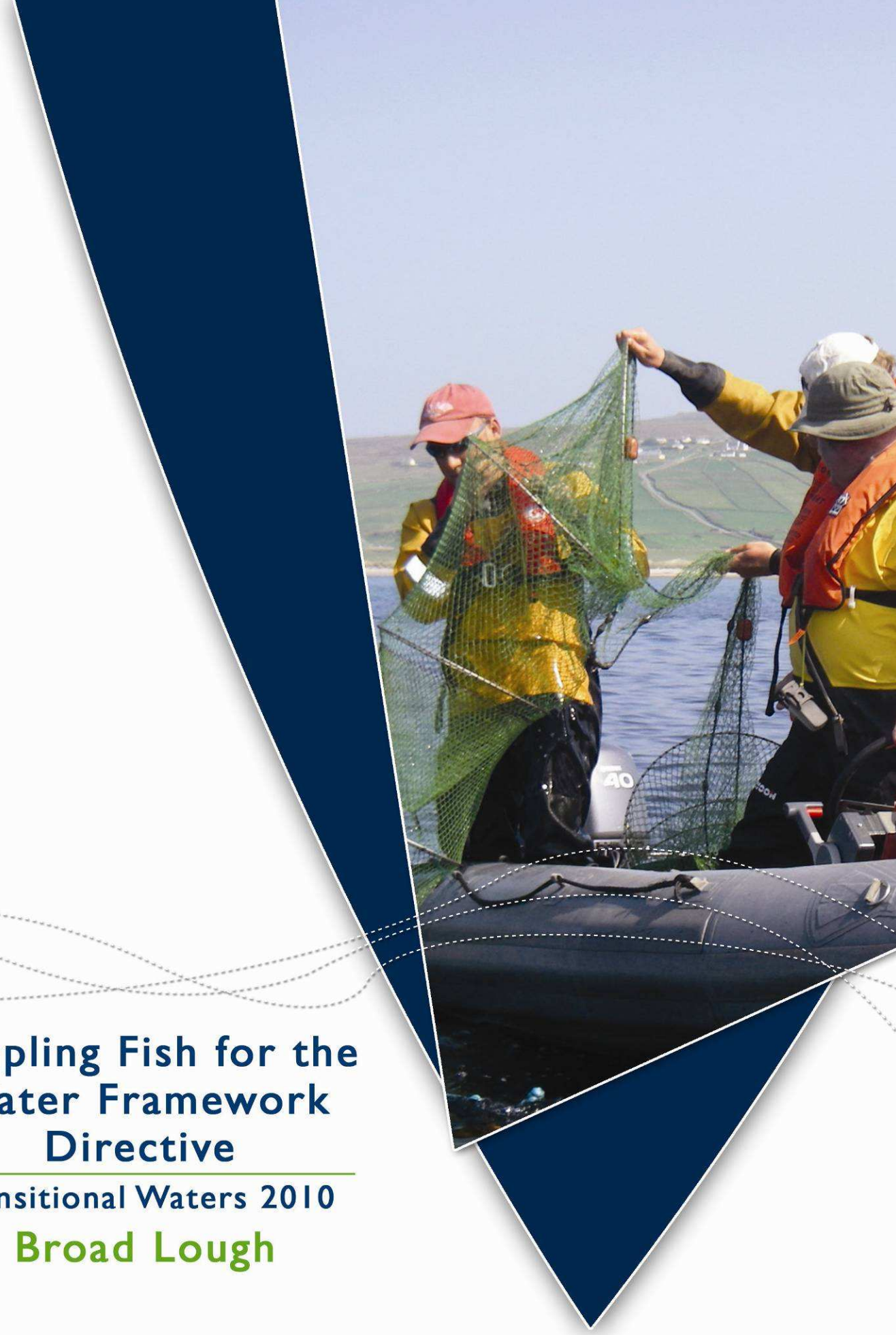

Sampling Fish for the Water Framework Directive

Transitional Waters 2010

Broad Lough

Iascach Intíre Éireann
Inland Fisheries Ireland

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1. INTRODUCTION

A fish stock survey was conducted on Broad Lough Estuary in the Eastern River Basin District (ERBD) as part of the programme of fish monitoring for the Water Framework Directive (WFD), between the 5th and the 7th of October 2010 by staff from Inland Fisheries Ireland.

Broad Lough Estuary covers an area of 0.80km² and is situated just north of Wicklow town on Ireland's east coast, approximately 35km south of Dublin City (Fig. 1.1, Plate 2.1). This estuary is fed by the Vartry River and is separated from the open sea by a long grassy spit of land called the Murrough. Broad Lough is divided by a causeway and narrow bridge, built to carry the Dublin-Wexford railway line (Fig. 1.1 and Plate 1.1). The upper section (north of the railway bridge) is relatively shallow and free of anthropogenic changes. It consists of a partly tidal salt marsh, with intertidal flats that become exposed at low tide, thus limiting access. The lower section has been physically modified to accommodate small and large boat traffic, with the largest boats restricted primarily to the harbour area.

The Murrough (and Murrough wetlands) are listed as both a special protection area (SPA) and special area of conservation (SAC) because of its wetland habitats and the wide diversity of wild birds present in the area (NPWS, 2000; NPWS, 2007).

Broad Lough was previously surveyed by Inland Fisheries Ireland (formerly the Central and Regional Fisheries Boards) in September 2008 (Kelly *et al*., 2009).

Plate 1.1. Aerial photo of Broad Lough. The upper estuary looking south towards Wicklow. (Photo courtesy of CFB and No. 3 Operational Wing, Irish Air Corps [Aer Chór na hÉireann])

Plate 1.2. Aerial photos of Broad Lough. The lower estuary with large boat traffic. (Photo courtesy of CFB and No. 3 Operational Wing, Irish Air Corps [Aer Chór na hÉireann])

Fig. 1.1. Location map of Broad Lough indicating sample sites, October 2010

2. METHODS

Current work in the Republic of Ireland and United Kingdom indicates the need for a multi-method (beach seine, fyke net and beam trawl) approach to sampling fish in estuaries and these procedures are now the standard IFI methodology for fish stock surveys in transitional waters for the WFD monitoring program.

Beach seining (Plate 2.1) is conducted using a 30m x 3m net (10mm mesh size) to capture fish in littoral areas. The bottom of the net has a weighted lead line to increase sediment disturbance and catch efficiency. Fyke nets (15m in length with a 0.8m diameter front hoop, joined by an 8m leader with a 10mm square mesh) are used to sample benthic fish in the littoral areas. Beam trawls are used for sampling benthic fish in the littoral and open waters, where bed type is suitable. The beam trawl measures 1.5m x 0.5m, with a 10mm mesh bag, decreasing to 5mm mesh in the cod end. The trawl is attached to a 20m tow rope and towed by a boat. Trawls are conducted along transects of 100 – 200m in length.

Sample sites are selected to represent the range of geographical and habitat ranges within the water body, based on such factors as exposure/orientation, shoreline slope, and substrate type. A handheld GPS is used to mark the precise location of each site.

All nets are processed on-site by identifying the species present and counting the total numbers caught in each. Length measurements are recorded for each species using a representative sub-sample of 30 fish, while scales are only collected for certain species, such as salmon and sea trout. Unidentified specimens were retained for subsequent identification in the laboratory.

A total of eight beach seines, four fyke nets and six beam trawls were deployed in Broad Lough in October 2010.

Plate 2.1. Retrieving a seine net in Broad Lough, October 2010

3. RESULTS

A total of 16 fish species (sea trout are included as a separate 'variety' of trout) were recorded in Broad Lough in October 2010 (Table 3.1). Sand goby (175) was the most abundant species, followed by flounder (60) and sand smelt (52). A slightly higher species richness was recorded in the previous (2008) survey (Kelly *et al*., 2009) when compared to this one. Furthermore, no beam trawl nets were deployed on that occasion.

Flounder was the only species captured using all three netting methods, suggesting a good distribution throughout the estuary. Flounder ranged in length from 3.6cm to 46.1cm and the length frequency distribution suggests that there were at least three age classes present (Fig. 3.1).

Sand goby ranged in length from 2.5cm to 8.1cm (Fig. 3.2) and sand smelt ranged in length from 3.8cm to 8.0cm (Fig. 3.3). One specimen of river lamprey, a fish species listed in the Irish Vertebrate Red Data Book (King *et al*., 2011) species and in Annex II and IV of the EU Habitats Directive (92/43/EEC) was recorded in a single fyke net.

Sea trout, three-spined stickleback and eels (listed as critically endangered in the Irish Red Data Book (King *et al*., 2011)) were also present.

Salinity values taken at beach seine and beam trawl sites ranged from 17.7ppt to 25.8ppt.

Table 3.1. Number of each species captured by each gear type in Broad Lough, October 2010

Scientific name	Common name	Beach seine (8)	Fyke net (4)	Beam trawl (6)	Total
Pomatoschistus minutus	Sand goby	166	-	9	175
Platichthys flesus	Flounder	36	14	10	60
Atherina presbyter	Sand smelt	52	-	-	52
Gasterosteus aculeatus	Three-spined stickleback	15	-	-	15
Ammodytes tobianus	Lesser sandeel	6	-	-	6
Ciliata mustela	Five-bearded rockling	-	5	-	5
Gadus morhua	Cod	-	5	-	5
Pleuronectes platessa	Plaice	5	-	-	5
Chelon labrosus	Thick-lipped grey mullet	4	-	-	4
Merlangius merlangus	Whiting	-	3	-	3
Anguilla anguilla	European eel	-	1	1	2
Salmo trutta	Sea trout	2	-	-	2
Lampetra fluviatilis	River lamprey	-	1	-	1
Scophthalmus rhombus	Brill	-	-	1	1
Scyliorhinus canicula	Lesser spotted dogfish	-	1	-	1
Taurulus bubalis	Long-spined sea scorpion	-	-	1	1

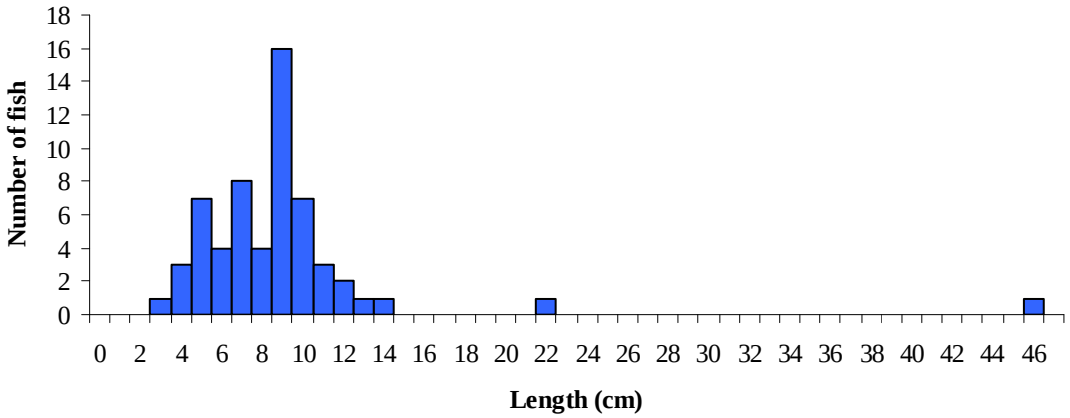

Fig. 3.1. Length frequency distribution of a sub-sample of flounder in Broad Lough, October 2010 (n=59)

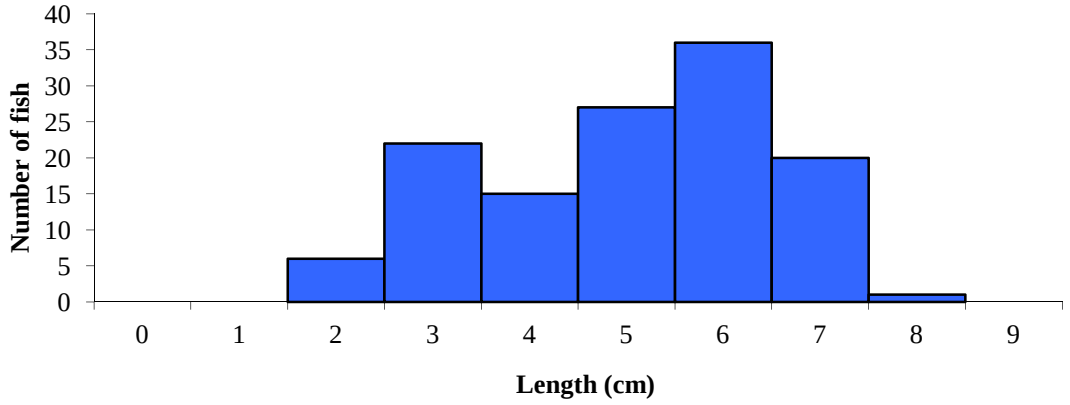

Fig. 3.2. Length frequency distribution of a sub-sample of sand goby in Broad Lough, October 2010 (n=127)

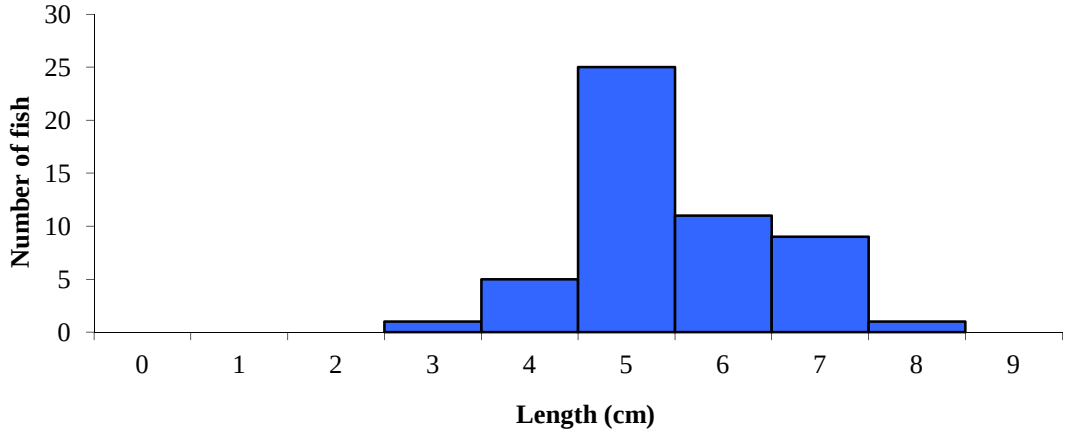

Fig. 3.3. Length frequency distribution of sand smelt in Broad Lough, October 2010 (n=52)

4. SUMMARY

A total of 16 fish species were recorded in Broad Lough, which is similar to other transitional waters along the east coast surveyed during 2010. Although some freshwater species were present, the majority of species captured were marine. This, as well as high salinity levels recorded, indicates that the sea exerts a greater influence on this water body than freshwater from the river. A number of commercially important fish species were present, including cod, plaice and whiting as well as other species of angling importance, including sea trout, thick-lipped grey mullet and lesser spotted dogfish. Species richness and distribution for selected species among all transitional water bodies surveyed can be seen in the 2010 WFD summary report (Kelly *et al*., 2011).

An essential step in the WFD monitoring process is the classification of the ecological status of transitional waters, which in turn will assist in identifying the objectives that must be set in the individual River Basin Management Plans.

A new WFD fish classification tool, Transitional Fish Classification Index or TFCI, has been developed for the island of Ireland (Ecoregion 1) using IFI and Northern Ireland Environment Agency (NIEA) data. This is a multi-metric tool based on similar tools developed in South Africa and the UK (Harrison and Whitfield, 2004; Coates *et al.*, 2007). The TFCI is still undergoing further development in order to make it fully WFD compliant and to account for differences in estuary typologies; however, at this stage it has been used, along with expert opinion, to provide draft ecological status classifications for each transitional water body surveyed for the WFD.

Using this approach, Broad Lough Estuary has been assigned a draft ecological status classification of "Good" based on the fish populations present. This shows no change from 2008, when this water body was also assigned a classification of good status (Kelly *et al*., 2009).

The EPA have assigned Broad Lough Estuary an overall interim draft classification (2007 to 2009) of "Moderate" status, based on general physico-chemical elements, phytoplankton and macroalgal growths.

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