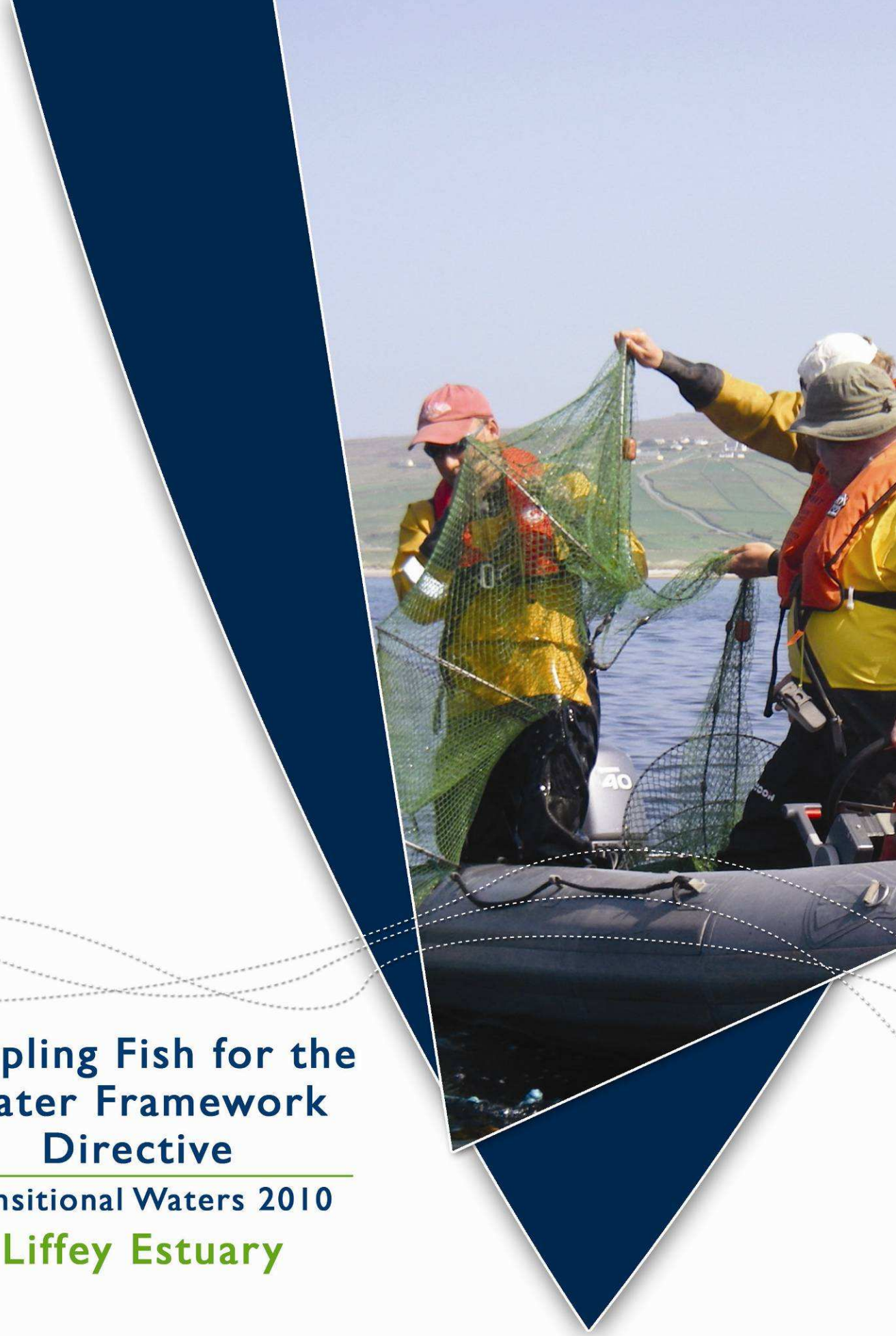

Sampling Fish for the Water Framework Directive

Transitional Waters 2010

Liffey Estuary

Iascach Intíre Éireann
Inland Fisheries Ireland

ACKNOWLEDGEMENTS

The authors wish to gratefully acknowledge the help and co-operation of the Director Mr. William Walsh and staff from IFI Blackrock as well as various other offices throughout the region. The authors also gratefully acknowledge the help and cooperation of their colleagues in IFI Swords.

We would like to thank the landowners and angling clubs that granted us access to their land and respective fisheries.

We would also like to thank Dr. Martin O' Grady (IFI) and No. 3 Operational Wing, Irish Air Corps (Aer Chór na hÉireann) for the aerial photographs.

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The authors would also like to acknowledge the funding provided for the project from the Department of Communications Energy and Natural Resources for 2010.

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1. INTRODUCTION

Fish stock surveys were conducted on the River Liffey Estuary (Table 1.1, Fig. 1.1) in the Eastern River Basin District (ERBD) as part of the programme of fish monitoring for the Water Framework Directive (WFD) between the 12th and the 15th of October 2010 by staff from Inland Fisheries Ireland.

The Liffey Estuary is situated in Dublin city, separating the north side from the south side. For the purposes of WFD monitoring and reporting, this estuary system has been split into two separate water bodies (Table 1.1), further details of which are given in each individual results section.

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

Table 1.1. Transitional water bodies surveyed for the WFD fish surveillance monitoring programme, September 2010 (TW=transitional)

Transitional Waterbody	MS Code	Easting	Northing	Type	Area (km^2)
Liffey Estuary, Upper	EA_090_0400	314071	234314	TW	0.20
Liffey Estuary, Lower	EA_090_0300	322144	234429	TW	4.81

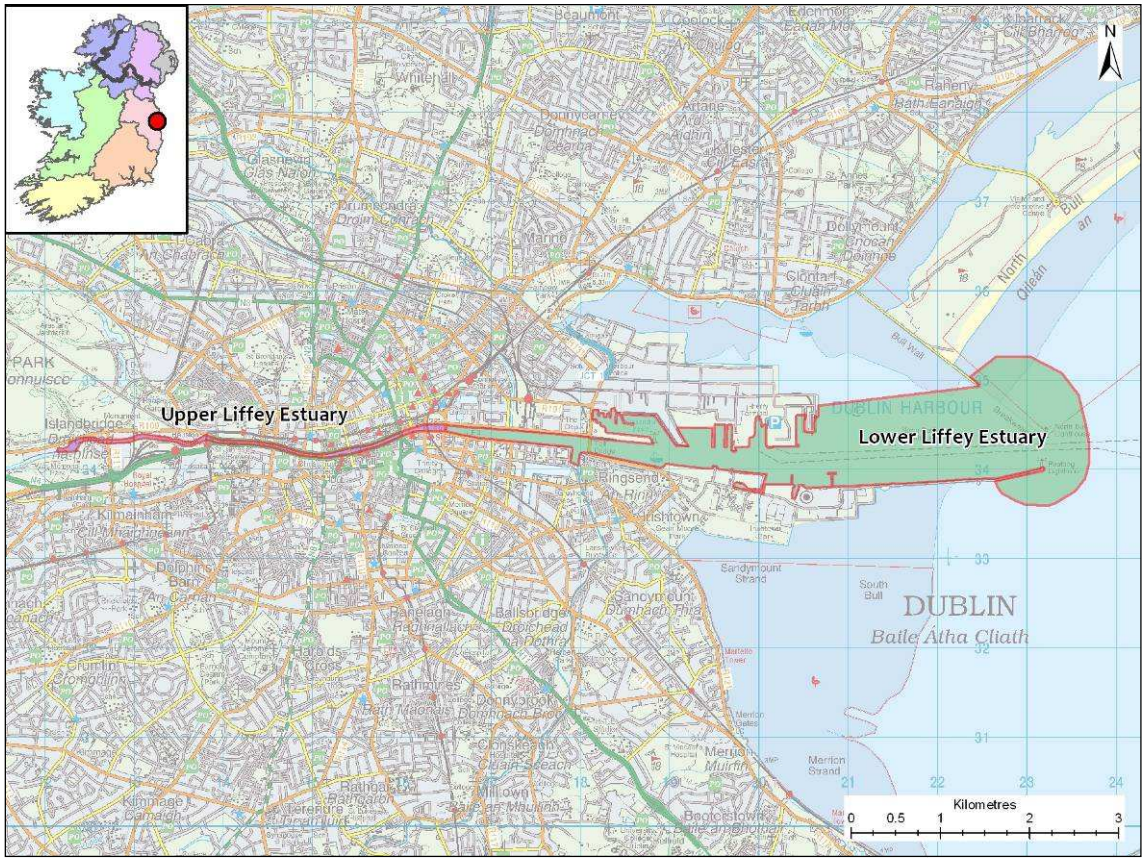

Fig. 1.1. Location map of the two transitional water bodies in the Liffey Estuary system surveyed for WFD fish monitoring, September 2010

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 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 100m 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.

Plate 2.1. Catch from a beach seine in the Lower Liffey Estuary (mostly juvenile thick-lipped grey mullet)

3. RESULTS

3.1 The Upper Liffey Estuary

Plate 3.1. The Upper Liffey Estuary looking towards O'Connell Bridge in Dublin's City Centre

The Upper Liffey estuary covers an area of 0.20 km². It begins at Islandbridge weir and extends downstream to the Talbot Memorial Bridge near the Customs House (Fig. 3.1, Plate 3.1). The vast majority of riverbank, shoreline and channel in the estuary has been modified and manipulated over time to allow for urban development. This includes works such as river channelisation, retaining walls, dredging and pier construction.

A total of one beach seine, two fyke nets and one beam trawl were deployed in the Upper Liffey Estuary in October 2010. Access issues restricted the number of samples that could be taken.

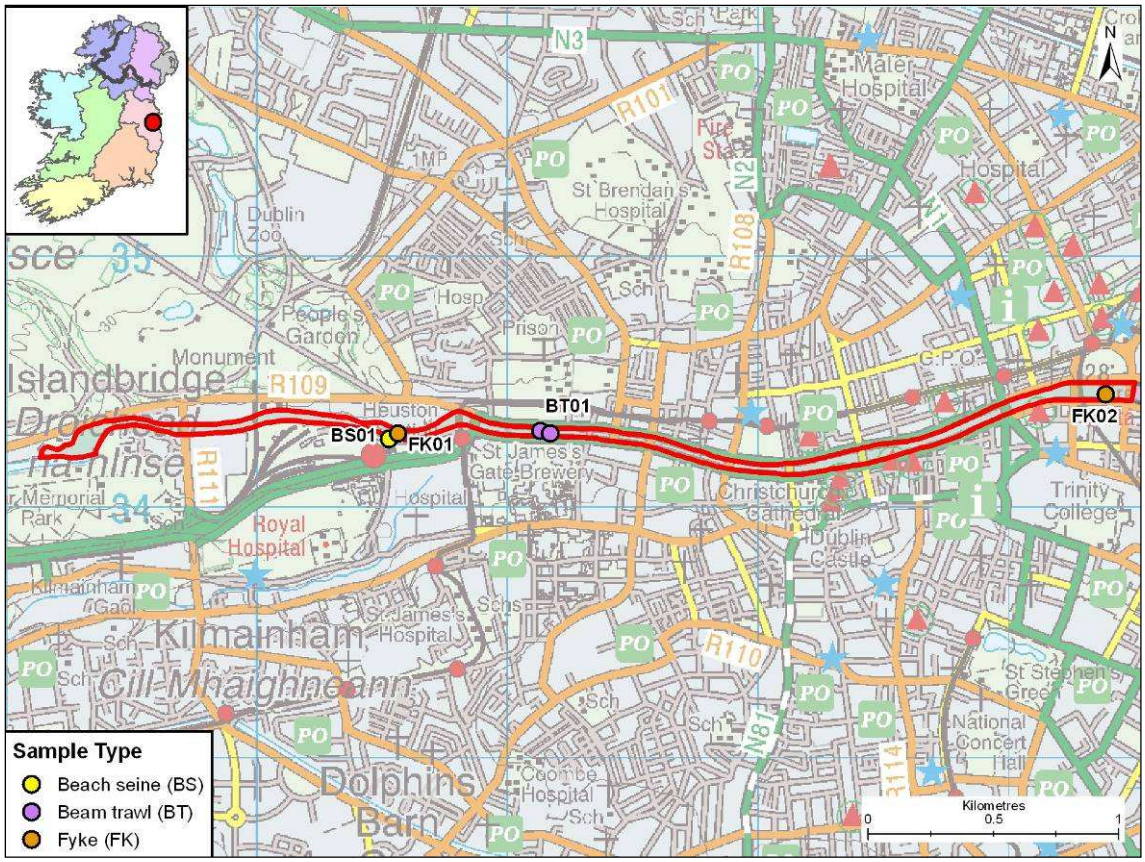

Fig. 3.1. Location map of the Upper Liffey Estuary indicating sample sites, October 2010

A total of nine fish species were recorded in the Upper Liffey in October 2010 (Table 3.1). Sand goby (13) was the most abundant species, followed by flounder (9) and three-spined stickleback (9). Although there was a slightly higher number of species recorded in 2011 when compared with the previous survey in 2008 (Kelly *et al*., 2009), species such as roach and flounder were captured in much lower quantities. No beam trawls were deployed during that previous survey.

Flounder was the only species captured using all three netting methods, although they were caught in low numbers (Table 3.1). Flounder ranged in length from 7.3cm to 20.8cm. The length frequency distribution for flounder indicates that there were two age classes present in the sample (Fig. 3.2).

Three 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) were recorded in a single fyke net. Other species of interest recorded were brown trout, three-spined stickleback and eels (listed as critically endangered in the Irish Red Data Book (King *et al*., 2011)).

Salinity values taken at beach seine and beam trawl sites ranged from 0.125ppt to 0.52ppt.

Table 3.1. Number of each species captured by each gear type in the Upper Liffey Estuary, October 2010

Scientific name	Common name	Beach seine (1)	Fyke net (2)	Beam trawl (1)	Total fish
Pomatoschistus minutus	Sand goby	11	-	2	13
Gasterosteus aculeatus	Three-spined stickleback	9	-	-	9
Platichthys flesus	Flounder	1	6	2	9
Gadus morhua	Cod	-	4	-	4
Anguilla anguilla	European eel	-	3	-	3
Lampetra fluviatilis	River lamprey	-	3	-	3
Merlangius merlangus	Whiting	-	1	-	1
Rutilus rutilus	Roach	1	-	-	1
Salmo trutta	Brown trout	-	1	-	1

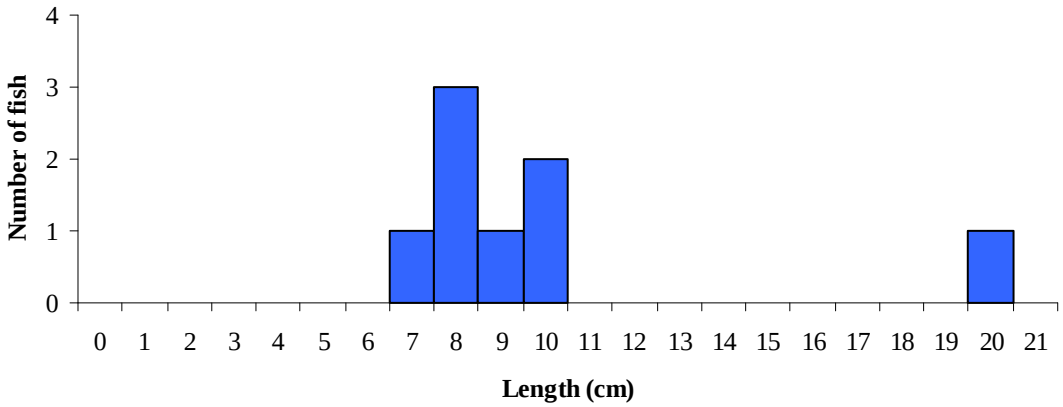

Fig. 3.2. Length frequency distribution of flounder in the Upper Liffey Estuary, October 2010 (n=8)

3.2 The Lower Liffey Estuary

Plate 3.2. Aerial photo of the Lower Liffey Estuary looking towards the upper estuary (left hand side). (Photo courtesy of IFI and No. 3 Operational Wing, Irish Air Corps [Aer Chór na hÉireann])

The Lower Liffey Estuary (Fig. 3.3, Plate 3.2) covers an area of 4.80 km². It begins at the Talbot Memorial Bridge and extends downstream, just past the Bull and Great South Walls. This section of the estuary encompasses the busy area of Dublin port, with artificial walled banks on each side of the channel.

A total of two beach seines, two fyke nets and three beam trawls were deployed in the Lower Liffey Estuary in October 2010.

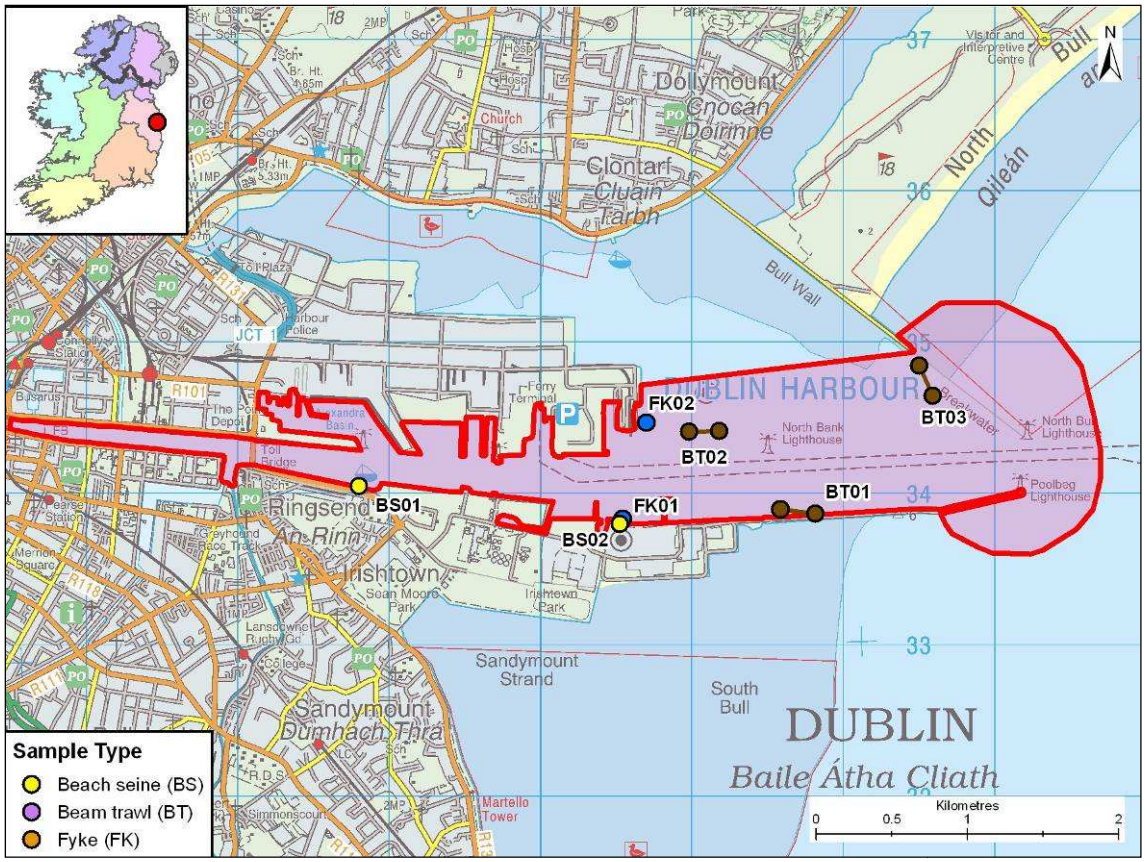

Fig. 3.3. Location map of the Lower Liffey Estuary indicating sample sites, October 2010

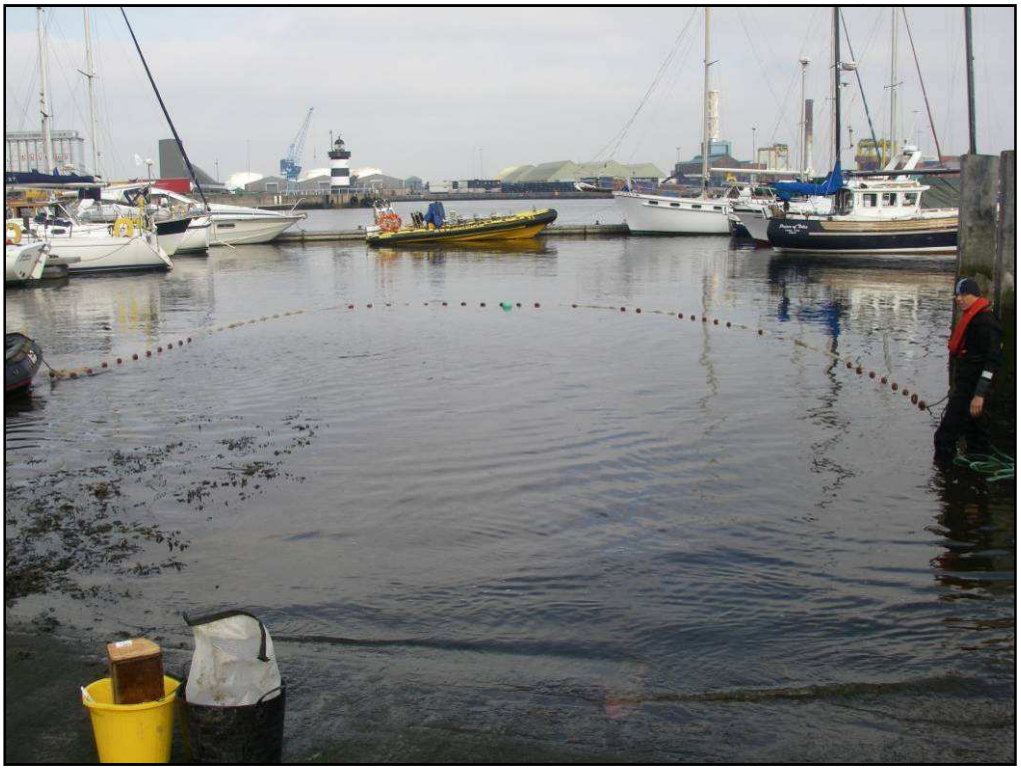

Plate 3.2. Beach seining in the Lower Liffey

A total of 17 fish species were recorded in the Lower Liffey Estuary in September 2010 (Table 3.2). Again slightly more species were recorded during this survey, when compared with the previous survey in 2008 (Kelly *et al*., 2009). Less sprat were also observed in 2010 compared to 2008, however far greater numbers of thick-lipped grey mullet were recorded in 2010.

Thick-lipped grey mullet (1078) was the most abundant species, followed by sand goby and flounder (Table 3.2). Flounder was the only species caught using all three netting methods, albeit in relatively low numbers. The length frequency distribution of thick-lipped grey mullet shown in Figure 3.4 indicates the presence of only juveniles.

Salinity values taken at beach seine and beam trawl sites ranged from 0.37ppt to 25.50ppt.

Table 3.2. Number of each species captured by each gear type in the Lower Liffey Estuary, October 2010

Scientific name	Common name	Beach seine (2)	Fyke net (2)	Beam trawl (3)	Total fish
Chelon labrosus	Thick-lipped grey mullet	1078	-	-	1078
Pomatoschistus minutus	Sand goby	9	-	15	24
Platichthys flesus	Flounder	5	1	3	9
Taurulus bubalis	Long-spined sea scorpion	-	1	3	4
Ammodytes tobianus	Lesser sandeel	3	-	-	3
Ciliata mustela	Five-bearded rockling	-	3	-	3
Gadus morhua	Cod	-	3	-	3
Pollachius pollachius	Pollack	-	3	-	3
Spinachia spinachia	Fifteen-spined stickleback	2	-	1	3
Atherina presbyter	Sand smelt	2	-	-	2
Pleuronectes platessa	Plaice	-	-	2	2
Syngnathus acus	Greater pipefish	2	-	-	2
Aspitrigla cuculus	Red gurnard	-	-	1	1
Crenilabrus melops	Corkwing wrasse	1	-	-	1
Labrus bergylta	Ballan wrasse	1	-	-	1
Pholis gunnellus	Gunnel (Butterfish)	1	-	-	1
Sprattus sprattus	Sprat	1	-	-	1

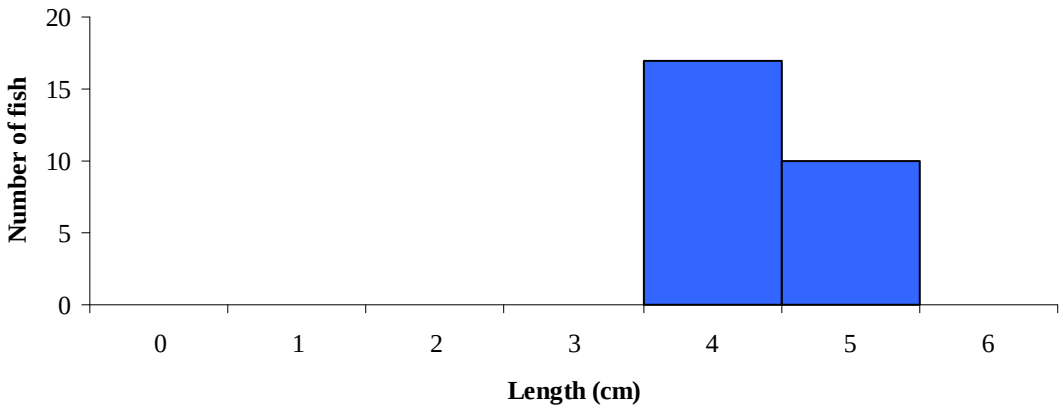

Fig. 3.4. Length frequency distribution of a sub-sample of thick-lipped grey mullet in the Lower Liffey Estuary, October 2010 (n=27)

4. SUMMARY

As expected, fewer fish species were recorded in the upper estuary in comparison to the lower estuary. This follows a similar trend observed in other transitional water surveys, where there is a transition from a freshwater dominated fish fauna in the less saline upper estuaries to one with a greater number of marine species in the lower, more saline portions. Fish species richness and distribution 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 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, both the Upper and Lower Liffey Estuaries have been assigned draft ecological status classifications of "Moderate" based on the fish populations present. Previously, in 2008, the upper and lower estuaries were classified as moderate and good respectively (Kelly *et al*., 2009).

The EPA have assigned both the Upper and Lower Liffey estuaries an overall interim draft classification of "Moderate" status, based on general physico-chemical elements, phytoplankton, fish and macroalgal growths.

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