

**Sampling Fish for the
Water Framework
Directive**

Transitional Waters 2012

**Eastern River
Basin District**



Iascach Intíre Éireann
Inland Fisheries Ireland

Water Framework Directive Fish Stock Survey of Transitional Waters in the Eastern River Basin District – Boyne Estuary

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1. INTRODUCTION

A fish stock survey was conducted on the Boyne Estuary in the Eastern River Basin District (ERBD) as part of the programme of fish monitoring for the Water Framework Directive (WFD), between the 1st and the 3rd of October 2012. This estuary was previously surveyed in 2009. The survey was carried out jointly by Inland Fisheries Ireland and the Northern Ireland Environment Agency (NIEA) with the objective of developing harmonised sampling protocols for fish in transitional waters for the island of Ireland.

The Boyne Estuary covers an area of 3.16km² and is located on Ireland's east coast dividing the town of Drogheda (Counties Meath and Louth) into two parts (Figs. 1.1 and Plate 1.1). In general, the site has been modified somewhat by human activity, such as on-going dredging for shipping. A number of factories are also present along the river, upstream of the estuary. The Boyne River channel, which is navigable and dredged, is defined by training walls that are breached in some places. Intertidal flats occur on the sides of the river channel. The sediments vary from fine muds in the sheltered areas to sandy muds or sands towards the river mouth.

This waterbody lies within the Boyne Coast and Boyne Estuary SAC, which is important for habitats listed in Annex I of the EU Habitats Directive, including estuaries, tidal mud flats and Atlantic salt meadows. The area is also an important habitat for large numbers of wild birds (NPWS, 2001).

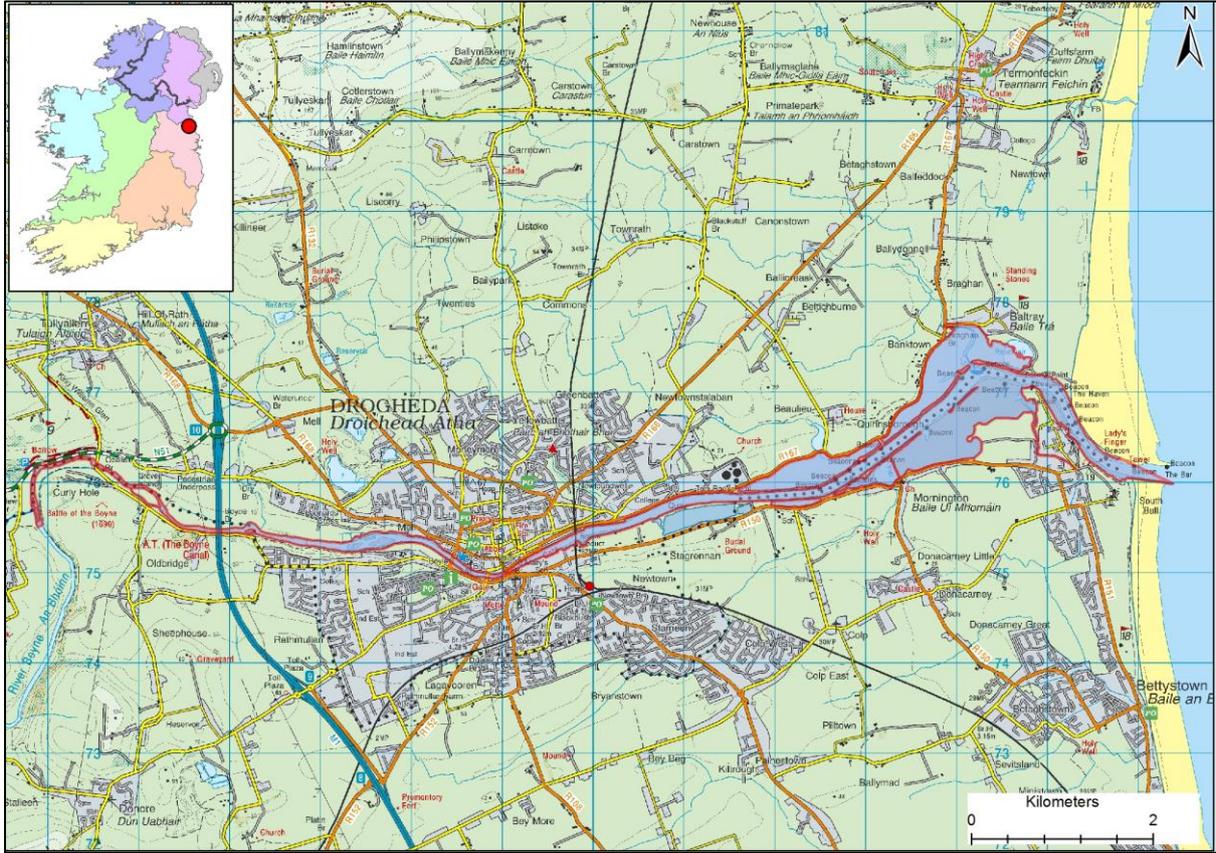


Fig. 1.1. Location map of the Boyne Estuary, Drogheda, Co. Louth



Plate 1.1. Aerial view of the Boyne River Bridge crossing the Boyne Estuary (Photo courtesy of IFI and No. 3 Operational Wing, Irish Air Corps [Aer Chór na hÉireann])

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 (Plate 2.1). 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, 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 16 beach seines, 16 beam trawls and nine fyke nets were deployed in the Boyne Estuary in October 2012 (Figs. 2.1 and 2.2).



Plate 2.1. Beach seining on the Boyne Estuary

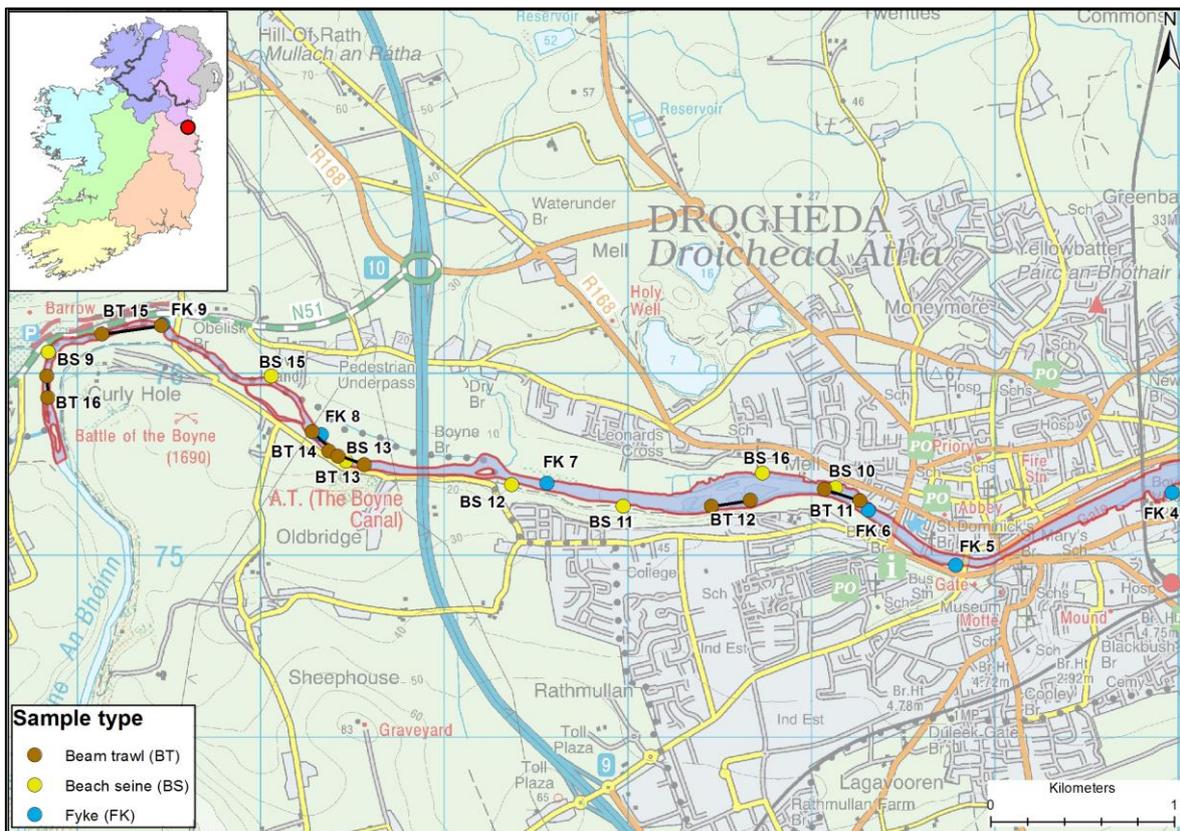


Fig. 2.1. Location map of the Boyne Estuary (west) indicating sample sites, October 2012

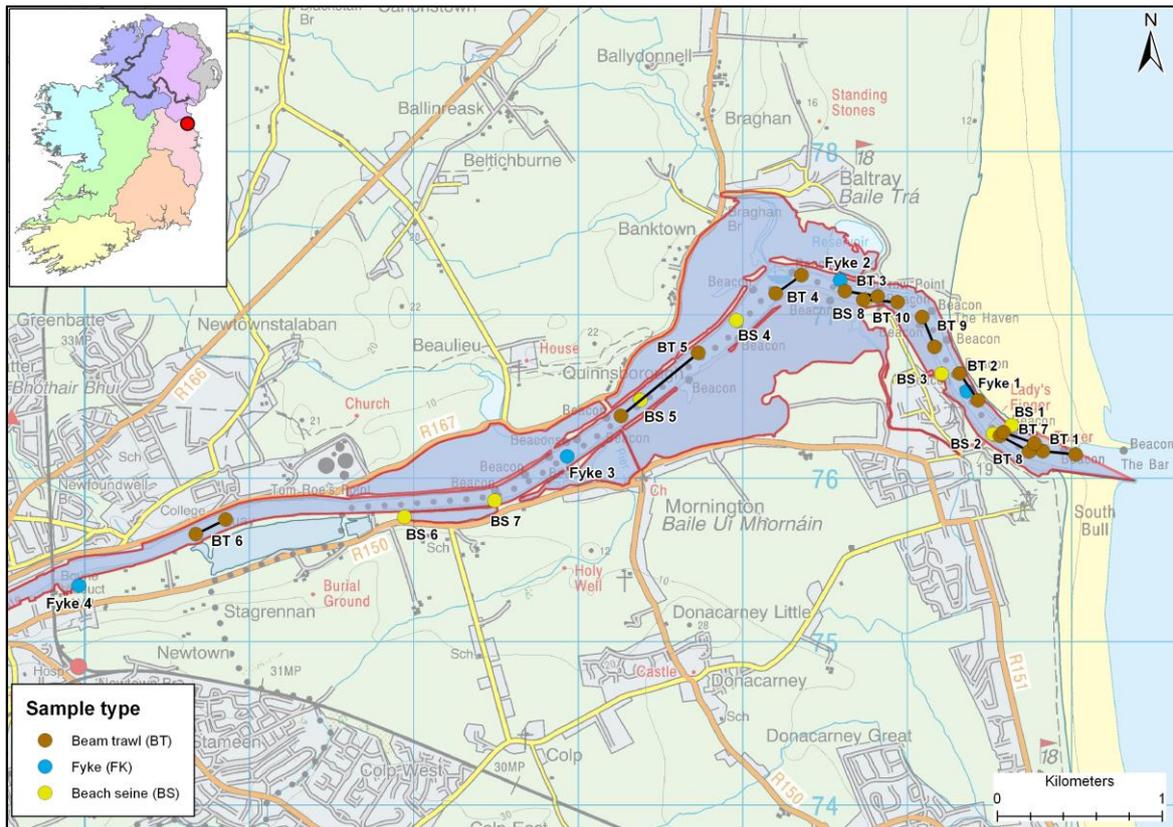


Fig. 2.2. Location map of the Boyne Estuary (east), indicating sample sites, October 2012

3. RESULTS

Twenty-three fish species (sea trout are included as a separate ‘variety’ of trout) were recorded in the Boyne Estuary in October 2012 (Table 3.1). Lesser sandeel was the most abundant species, followed by minnow and flounder. Flounder and brown trout were the only species captured using all three netting methods, while sand gobies, plaice and long-spined sea scorpion were recorded in both beach seines and beam trawls. Cod were captured using fyke nets and beam trawls, while three-spined stickleback were captured using beach seine and fyke nets. All other species were recorded using only one method each, indicating the effectiveness of each method’s ability to target different species.

Flounder captured during the 2012 survey ranged in length from 3.0cm to 25.3cm (mean = 10.2cm) (Fig. 3.1). Flounder captured during the 2009 survey ranged in length from 2.5cm to 20cm (mean = 5.8cm) (Fig. 3.1).

Eels captured during the 2012 survey ranged in length from 27.0cm to 59.5cm (mean = 35.9cm) (Fig. 3.2). Eels captured during the 2009 survey ranged in length from 6.2cm to 57.6cm (mean = 35.6cm) (Fig. 3.2).

Cod captured during the 2012 survey ranged in length from 11.4cm to 22.0cm (mean = 15.4cm) (Fig. 3.3). Cod captured during the 2009 survey ranged in length from 8.3cm to 20.2cm (mean = 13.1cm) (Fig. 3.3).

Salinity values taken at beach seine sites ranged from 0.31ppt to 11.3ppt.

Table 3.1. Number of each species captured by each gear type in the Boyne Estuary, October 2012

Scientific name	Common name	Beach seine (16)	Fyke net (9)	Beam trawl (16)	Total fish
<i>Ammodytes tobianus</i>	Lesser sandeel	1159	-	-	1159
<i>Phoxinus phoxinus</i>	Minnow	829	-	-	829
<i>Platichthys flesus</i>	Flounder	18	51	95	164
<i>Pomatoschistus minutus</i>	Sand goby	45	-	21	66
<i>Gadus morhua</i>	Cod	-	46	1	46
<i>Anguilla anguilla</i>	European eel	-	32	-	32
<i>Ciliata mustela</i>	Five-bearded rockling	-	31	-	31
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	16	1	-	17
<i>Salmo salar</i>	Salmon	-	-	13	13
<i>Salmo trutta</i>	Brown trout	2	6	4	12
<i>Pleuronectes platessa</i>	Plaice	5	-	3	8
<i>Salmo trutta</i>	Sea trout	-	5	-	5
<i>Taurulus bubalis</i>	Long-spined sea scorpion	1	-	4	5
<i>Sprattus sprattus</i>	Sprat	5	-	-	5
<i>Gobiusculus flavescens</i>	Two-spotted goby	5	-	-	5
<i>Pholis gunnellus</i>	Gunnel (Butterfish)	-	-	3	3
<i>Pollachius pollachius</i>	Pollack	-	2	-	2
<i>Spinachia spinachia</i>	Fifteen-spined stickleback	1	-	-	1
<i>Syngnathus acus</i>	Greater pipefish	-	-	1	1
<i>Barbatula barbatula</i>	Stone loach	-	-	1	1
<i>Agonus cataphractus</i>	Pogge	-	1	-	1
<i>Rutilus rutilus</i>	Roach	-	1	-	1
<i>Myoxocephalus scorpius</i>	Short-spined sea scorpion	-	1	-	1

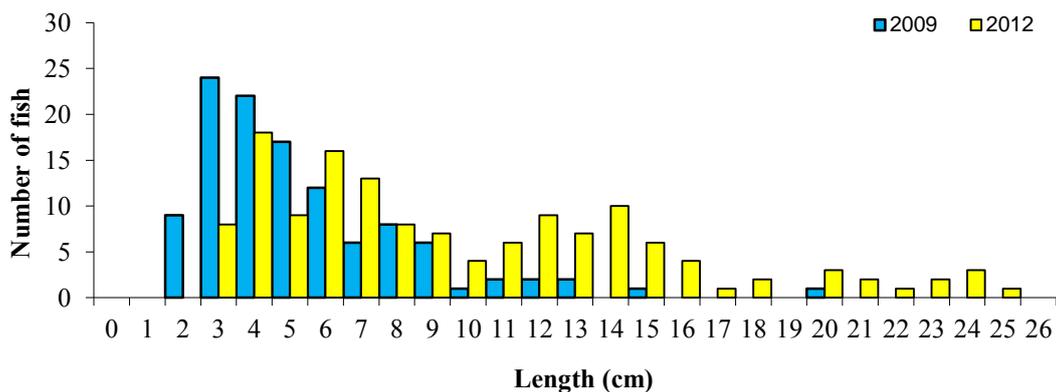


Fig. 3.1. Length frequency distribution of flounder in the Boyne Estuary, September 2009 (n=113) and October 2012 (sub-sample, n=140)

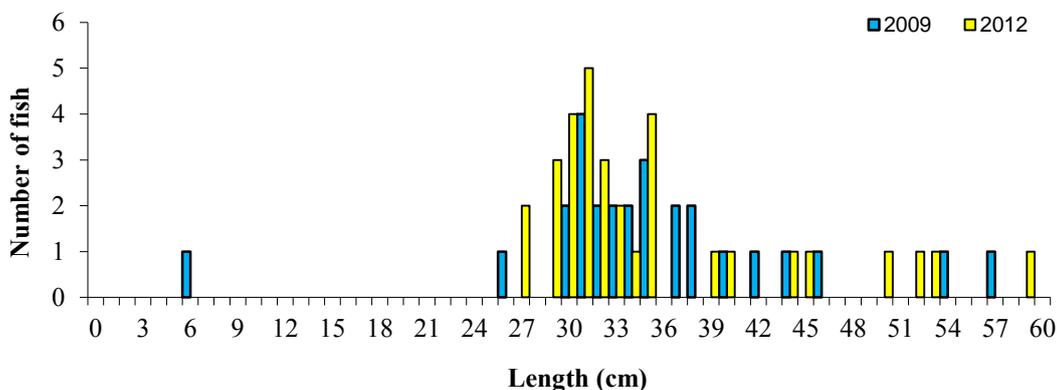


Fig. 3.2. Length frequency distribution of eels in the Boyne Estuary, September 2009 (n=27) and October 2012 (n=32)

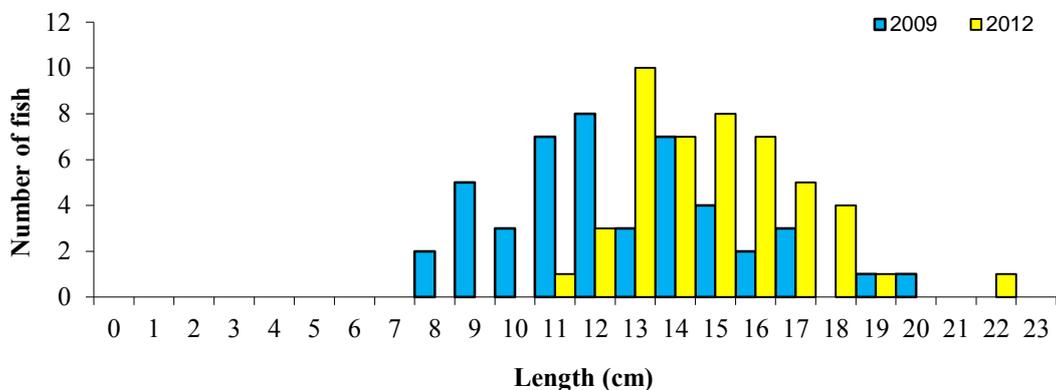


Fig. 3.3. Length frequency distribution of cod in the Boyne Estuary, September 2009 (sub-sample, n=46) and October 2012 (n=47)

4. SUMMARY

A total of twenty-three fish species (sea trout are included as a separate ‘variety’ of trout) were recorded in the Boyne Estuary during the 2012 survey. This is comparable with other estuarine waterbodies, within a similar salinity range, where freshwater fish in the upper reaches, become replaced by salt-tolerant species in closer to the sea. In the previous survey in 2009, the same number of species was recorded, with the only difference being, the presence and absence of a few species. In 2012, fifteen-spined stickleback, stone loach and two-spotted goby were recorded, while herring, thick-lipped grey mullet and whiting were unique in 2009. Species richness and distribution of selected fish species among all transitional water bodies surveyed during 2012 can be seen in the 2012 WFD summary report (Kelly *et al.*, 2013).

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 has been successfully intercalibrated in a Europe-wide exercise; however it is undergoing further development to account for differences in typologies, 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, the Boyne Estuary has been assigned a draft ecological status classification of “Good” based on the fish populations present. In 2009, this waterbody was also classified as ‘Good’.

In the 2007 to 2009 surveillance monitoring reporting period, the EPA assigned the Boyne Estuary an overall ecological status of ‘Good’ based on all monitored physico-chemical and biological elements. This status classification will be revised at the end of 2012.

5. REFERENCES

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