Boyne Estuary

Sampling Fish for the Water Framework Directive - Transitional Waters 2009

The Central and Regional Fisheries Boards

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1. INTRODUCTION

A fish stock survey was conducted on the Boyne Estuary between the 7th and the 9th of September 2009 as part of the fish monitoring programme for the Water Framework Directive (WFD). The survey was conducted by staff from the Central Fisheries Board (CFB) and the Eastern Regional Fisheries Board (ERFB).

The Boyne Estuary covers an area of 3.16km^2 and is located on Ireland's east coast dividing the town of Drogheda (Counties Meath and Louth) in two (Fig. 1.1, Fig. 1.2 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 channeled river. The sediments vary from fine muds in the sheltered areas to sandy muds or sands towards the river mouth.

This water body lies within the Boyne Coast and 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).

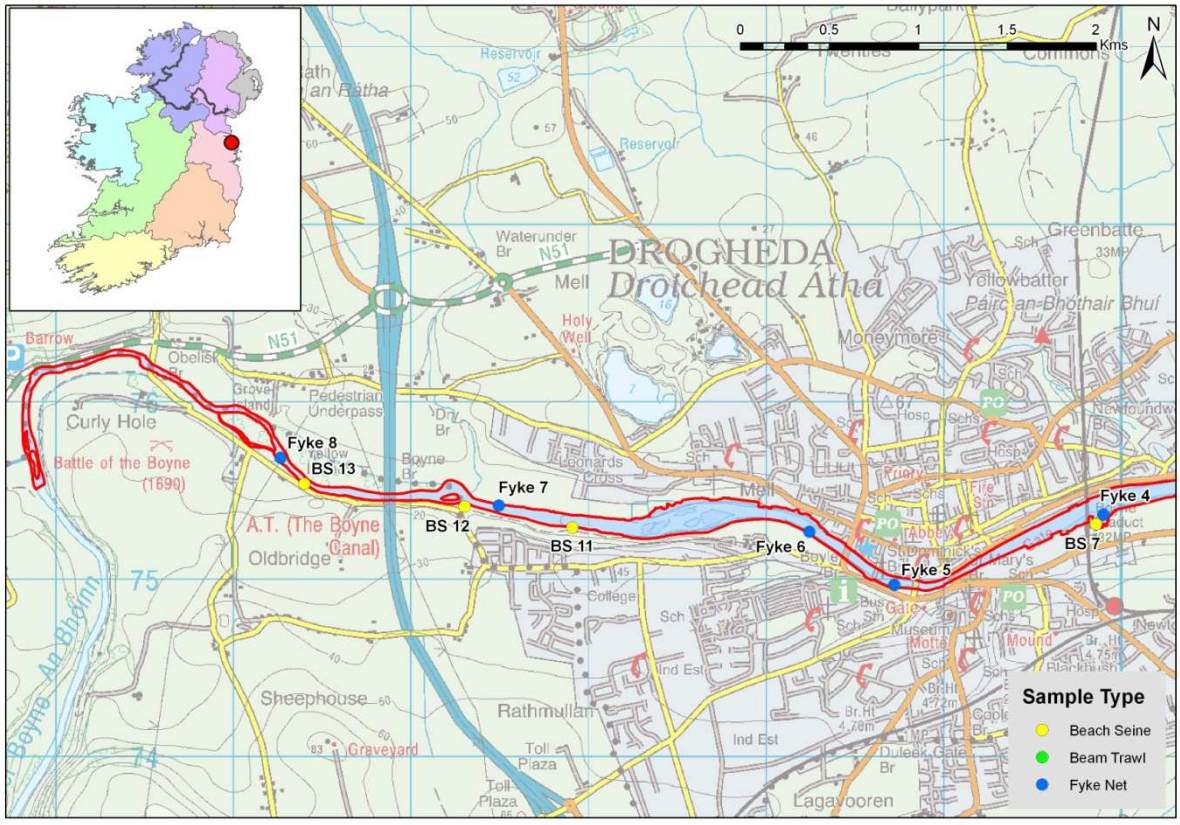

Fig 1.1. Location map of the Upper Boyne Estuary indicating sample sites, September 2009

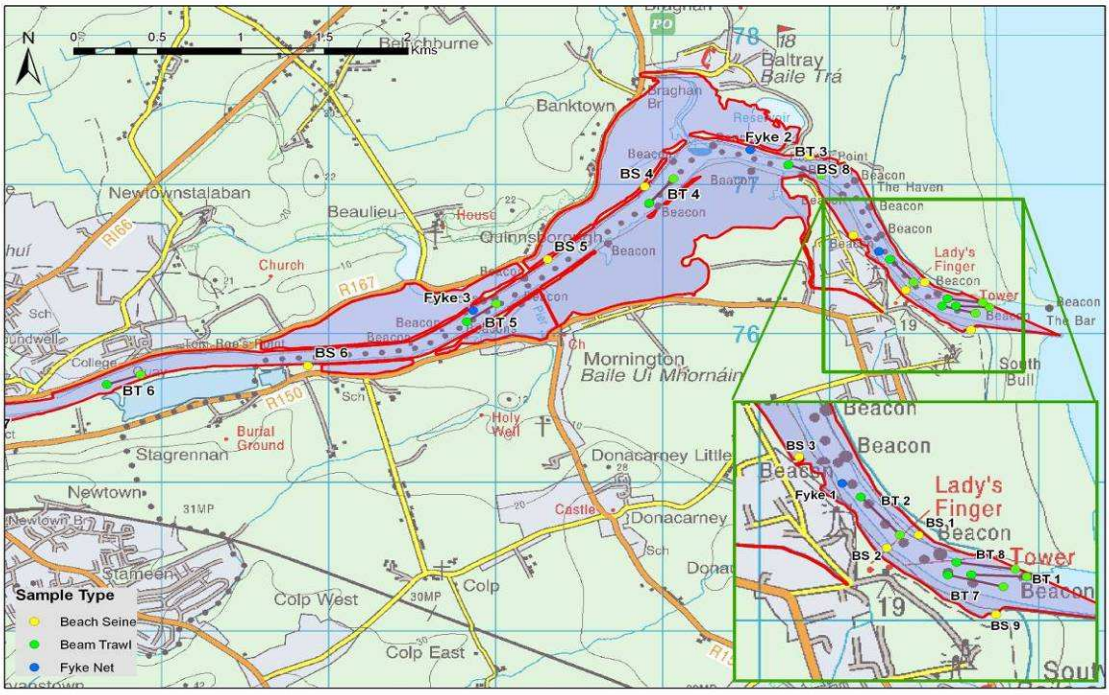

Fig 1.2. Location map of the Lower Boyne Estuary indicating sample sites, September 2009

Plate 1.1. Aerial photo of the Boyne Estuary in Drogheda. (Photo courtesy of CFB and No. 3 Operational Wing, Irish Air Corps [Aer Chór na hÉireann])

2. METHODS

Current work in the UK and ROI 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 CFB 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 (Plate 2.1). 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 13 beach seine, eight beam trawl and eight fyke net sites were deployed in the Boyne Estuary in September 2009.

Plate 2.1: Hauling a beach seine on the Boyne estuary, September 2009.

3. RESULTS

A total of 23 fish species (sea trout are included as a separate 'variety' of trout) were recorded in the Boyne Estuary in September 2009 (Table 3.1). Sprat was the most abundant species captured, followed by flounder, long-spined sea scorpion and cod (Table 3.1). Salmon (listed as vulnerable in the Irish Red Data List (King *et al*., 2011) and also listed in Annex II of the EU Habitats Directive), brown trout, sea trout, three-spined stickleback, eels (listed as critically endangered in the Irish Red Data Book (King *et al*., 2011)), roach and flounder were also present.

Table 3.1. Number of each species captured by each gear type in the Boyne Estuary, September 2009

Scientific name	Common Name	Beach seine (13)	Fyke net (8)	Beam trawl (8)	Total
Sprattus sprattus	Sprat	2232	-	-	2232
Platichthys flesus	Flounder	94	17	3	114
Taurulus bubalis	Long-spined sea scorpion	1	-	98	99
Gadus morhua	Cod	3	2	81	86
Pomatoschistus minutus	Sand goby	37	-	4	41
Ammodytes tobianus	Lesser sandeel	36	-	-	36
Anguilla anguilla	Eel	1	26	-	27
Pleuronectes platessa	Plaice	4	-	16	20
Clupea harengus	Herring	16	-	-	16
Pholis gunnellus	Gunnel (Butterfish)	-	-	10	10
Chelon labrosus	Thick-lipped grey mullet	9	-	-	9
Syngnathus acus	Greater pipefish	8	-	-	8
Ciliata mustela	Five-bearded rockling	-	5	1	6
Gasterosteus aculeatus	Three-spined stickleback	5	-	-	5
Pollachius pollachius	Pollack	1	1	3	5
Salmo trutta	Sea trout	2	1	-	3
Agonus cataphractus	Pogge	-	-	3	3
Rutilus rutilus	Roach	3	-	-	3
Merlangius merlangus	Whiting	-	-	3	3
Salmo salar	Salmon	2	-	-	2
Myoxocephalus scorpius	Short-spined sea scorpion	2	-	-	2
Salmo trutta	Brown trout	1	-	-	1
Phoxinus phoxinus	Minnow	1	-	-	1

All of the brown trout, minnow, roach and three-spined stickleback as well as most of the flounder were captured in beach seines in the upper reaches of the Boyne Estuary, reflecting the strong influence of freshwater in this more riverine part of the water body.

Flounder ranged in length from 2.5cm to 20.0cm and their length frequency distribution the sample was composed predominantly of juvenile individuals, thus indicating that this estuary is utilised as a nursery area for this species (Fig. 3.1). Long-spined sea scorpion were caught in far greater numbers in the Boyne Estuary than in any other WFD transitional water body surveyed in 2009; they ranged in length from 4.6cm to 14.7cm (Fig. 3.2).

Salinity values taken at beach seine sites ranged from 5.9ppt in the upper estuary to 20.9ppt in the lower estuary.

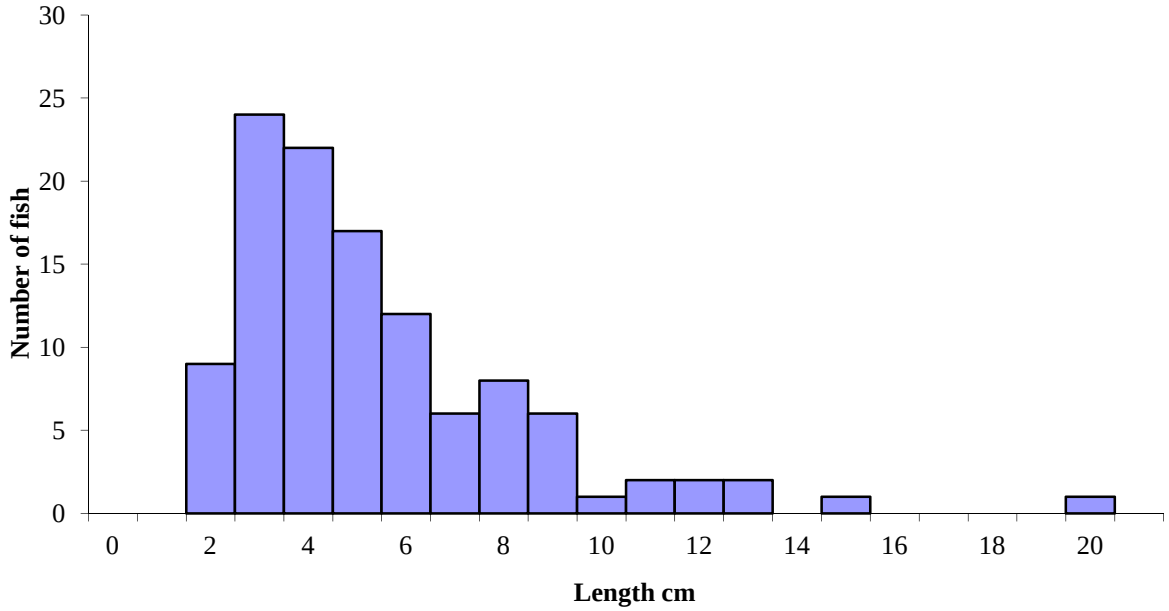

Fig. 3.1. Length frequency distribution of a sub-sample of flounder captured in the Boyne Estuary, September 2009 (n = 113)

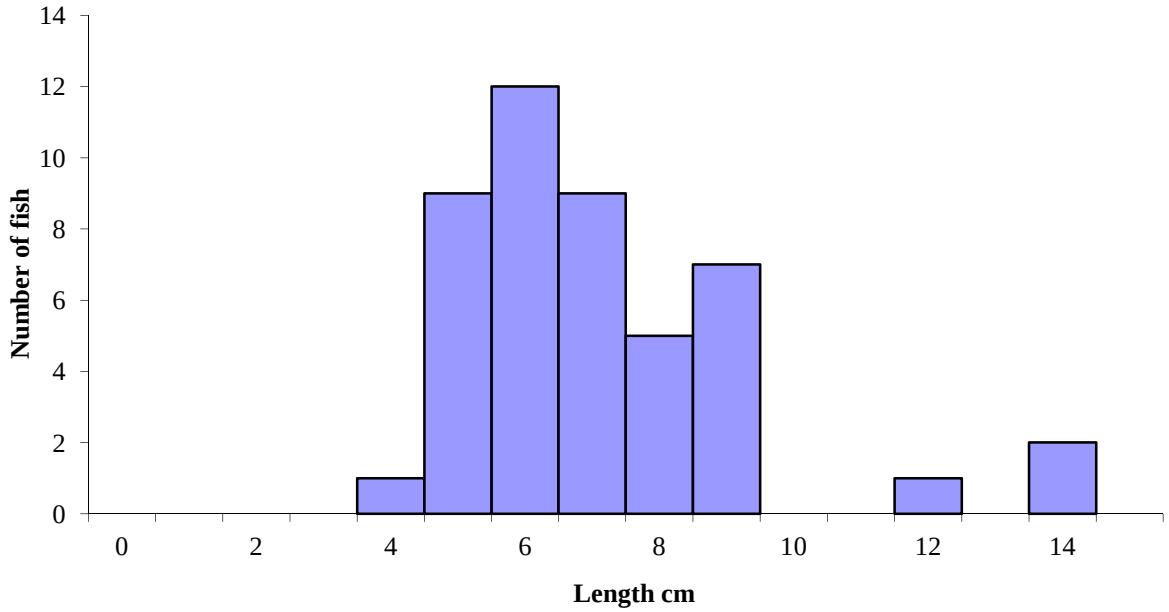

Fig. 3.1. Length frequency distribution of a sub-sample of long-spined sea scorpion captured in the Boyne Estuary, September 2009 (n = 46)

4. SUMMARY

A total of 23 fish species (sea trout are included as a separate 'variety' of trout) were recorded in the Boyne Estuary, which is the highest among all WFD transitional water bodies surveyed in the ERFB during 2009. Juveniles of a number of commercially important species were present, including cod, plaice and herring, as well as other species of angling importance, including flounder, sea trout and thick-lipped grey mullet. The diversity of species present reflects the salinity gradient and variety of habitat in the Boyne Estuary from more freshwater/brackish conditions in its upper reaches to more saline conditions closer to the sea. Species richness and distribution among all transitional water bodies surveyed during 2009 can be found in the 2009 WFD summary report (Kelly *et al*., 2010).

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 Northern Ireland Environment Agency (NIEA) and CFB 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, the Boyne Estuary has been assigned a draft ecological status classification of "Good" based on the fish populations present.

The EPA have assigned the Boyne Estuary an overall interim draft classification of "Good" status, based on general physico-chemical elements, phytoplankton and macroalgal growths.

5. REFERENCES

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