

Shannon Estuary



Sampling Fish for the Water Framework Directive - Transitional Waters 2008



The Central and Regional
Fisheries Boards

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INTRODUCTION

A fish stock survey was carried out at sites on the Shannon estuary, as part of the programme of monitoring for the Water Framework Directive (WFD), between the 17th and the 26th of September and the 10th and the 11th of November 2008 by staff from the Central Fisheries Board (CFB) and the Shannon Regional Fisheries Board (ShRFB). Staff from the CFBs large protection vessel, An Cosantóir Bradán, provided support during the survey.

The Shannon estuary is the largest estuary in Ireland and is bordered by counties Kerry, Clare and Limerick. The estuary is separated into the upper and lower estuaries for WFD sampling and reporting purposes. The Upper Shannon Estuary covers an area of 39.5km² (Fig. 1) and the Lower Shannon Estuary covers an area of 123.10km² (Figs. 2 and 3). The upper estuary begins approximately four kilometres downstream of Limerick city and extends downstream to the mouth of the Fergus (Fig. 1). The lower estuary begins where the upper estuary ends and continues downstream to the mid point of Carrig Island (Figs. 2 and 3).

The estuary receives the waters of the River Shannon, which is Ireland's largest river system and originates in County Fermanagh, Northern Ireland. Domestic and industrial wastes are discharged into the Shannon, but water quality is generally satisfactory - except in the upper estuary, reflecting the sewage load from Limerick City (NPWS, 2005). Analysis for trace metals suggests a relatively clean estuary with no influences by industrial discharges apparent (NPWS, 2005). Further industrial development on the banks of the Shannon and water polluting operations are potential threats to the estuary. Commercial vessels use the estuary to carry goods to Foynes port and to Limerick Docks.

The estuary is very important for birds especially wading birds and wildfowl. In addition the estuary is utilized by bottle-nosed dolphins. The entire estuary has extensive mud flats which are exposed at low tide (Plate 1). These mud flats are the dominant substrate in both the upper and lower estuary although there are some rock outcrops and gravel beaches in the lower portion of the Lower Shannon Estuary.



Plate 1: Upper Shannon Estuary showing the extensive marginal mud flats at low tide. (Photo courtesy of CFB and No. 3 Operational Wing, Irish Air Corps [Aer Chór na hÉireann])

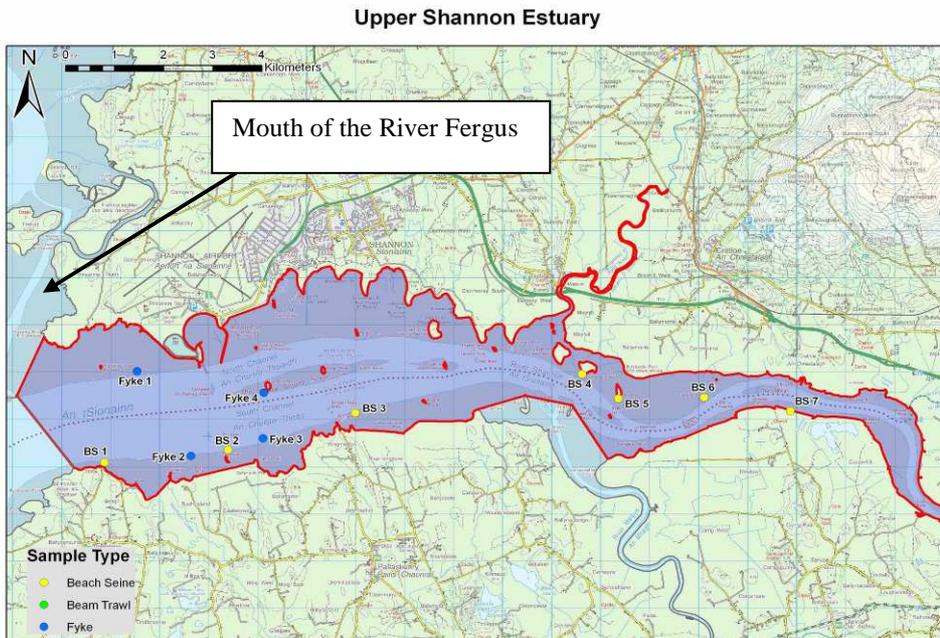


Fig. 1: Location map of Upper Shannon Estuary indicating sampling sites, September and November 2008



Plate 2: Lower Shannon Estuary, with Tarbert Power Station in the centre of the photo. (Photo courtesy of CFB and No. 3 Operational Wing, Irish Air Corps [Aer Chór na hÉireann])

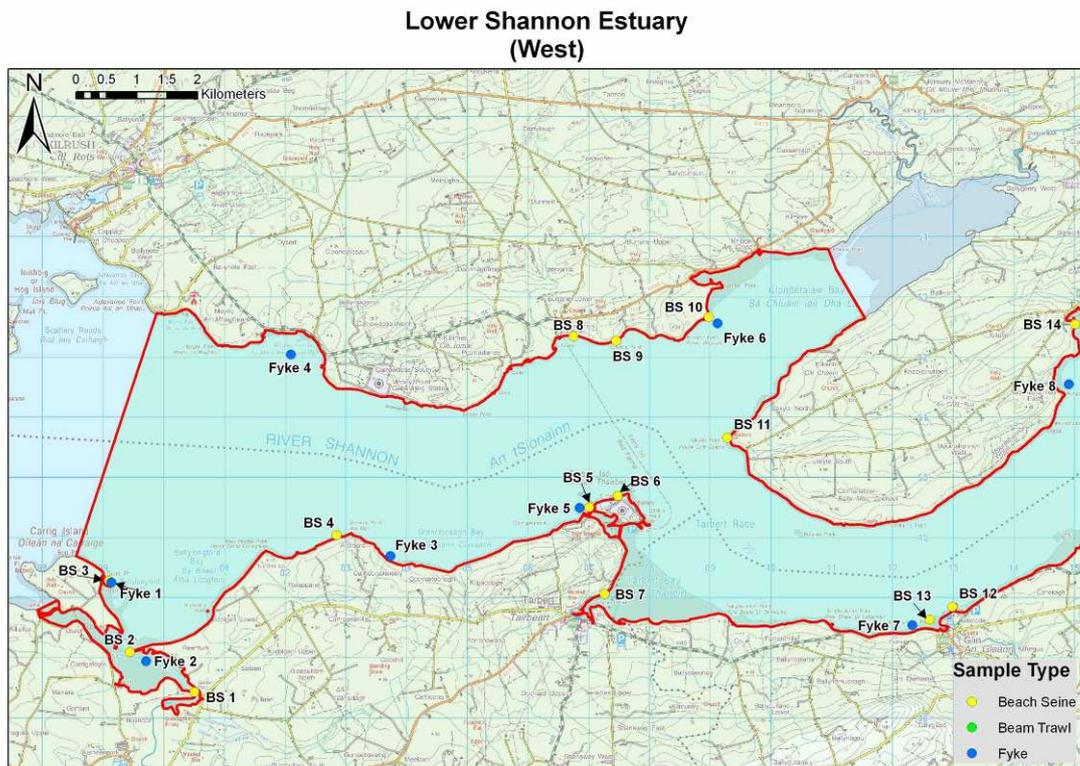
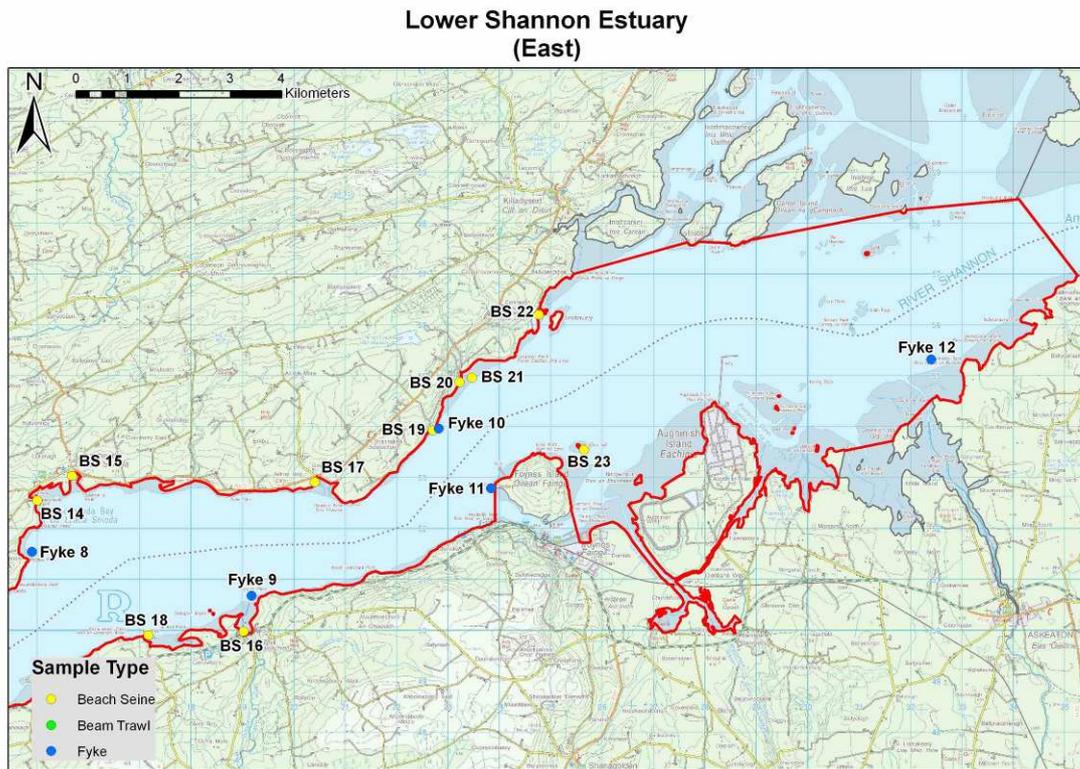


Fig. 2: Location map of the Lower Shannon Estuary (west side) indicating sampling sites, September and November 2008



METHODS

Current work in the UK indicates the need for a multi-method netting approach (seine nets, fyke nets and beam trawls) to sampling for fish in estuaries and these procedures are now the standard CFB methodology for fish stock surveys in transitional waters for the WFD monitoring programme. Two sampling methods were used during the Shannon Estuary survey (i.e. beach seines and fyke nets). Beam trawling was not attempted due to the soft mud substrate and shallow nature of most of the estuary. Portable GPS instruments were used to mark the precise location of each sampling site (Fig. 1-3).

The entire Shannon Estuary has strong tides and extensive shallow mud flats which made sampling challenging. In addition, severe weather hampered sampling and some sites in the lower estuary had to be returned to in November when weather conditions improved. A total of twenty three beach seine and twelve fyke net sites were selected in the lower estuary and seven beach seine and four fyke net sites were selected in the upper estuary (Figs. 2 and 3) encompassing the majority of geographical and, where possible, habitat ranges of the estuary.

RESULTS

The Lower Shannon Estuary has a very strong marine influence and the majority of the fish captured were marine species. A total of 31 fish species were recorded in the Lower Shannon Estuary. The most abundant fish species was sprat (16,730) followed by common goby (2,170) and sand smelt (161) (Table 1). The most commonly captured fish at beach seine sites was sprat and common goby which were captured in 22 and 16 of the 23 sites respectively. The most common fish species captured in the fyke nets was 5-bearded rockling which was captured in 7 of the 12 sites. A number of ballan wrasse with an unusual colour variation were captured during the survey (Plate 3). All the sand smelt were captured in beach seine sites 2 through 10 which are in the lower portion of the lower estuary. Length frequency analysis showed two distinct age classes of sand smelt (Fig. 3).

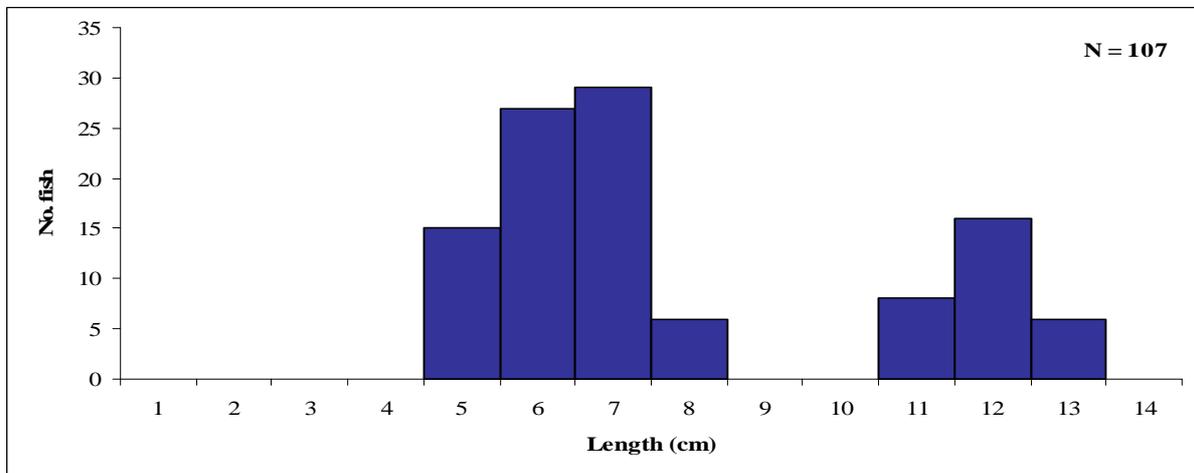


Fig. 3: Length frequency distribution of sand smelt, Lower Shannon Estuary September 2008



Plate 3: Ballan wrasse with an unusual green colour variation

A total of 16 fish species were recorded in the Upper Shannon Estuary. The most plentiful fish species was sprat (777) followed by greater pipefish (165), common goby (105) and flounder (75). The most common fish species at beach seine sites was common goby which were captured in six of the seven sites while the most commonly captured fish in fyke nets was flounder which was captured in all four sites. A number of smelt (*Osmerus eperlanus*) were captured during the survey which is important as they are a listed species in the Irish Red Data Book.

Salinity values taken at beach seine sites ranged from 11.60ppt to 26.80ppt in the lower estuary and 0.10ppt to 7.00ppt in the upper estuary.

Table 1: List of fish species and abundances of each species by net type in the Lower and Upper Shannon Estuary, September-November 2008

Scientific name	Common Name	Shannon Lower		Shannon Upper	
		Beach seine (23)	Fyke net (12)	Beach seine (7)	Fyke net (4)
<i>Chelon labrosus</i>	Thick Lipped Grey Mullet	13	-	-	-
<i>Platichthys flesus</i>	Flounder	15	6	47	28
<i>Dicentrarchus labrax</i>	Sea Bass	9	-	1	-
<i>Sprattus sprattus</i>	Sprat	16,730	-	777	-
<i>Pomatoschistus microps</i>	Common Goby	2,170	-	105	-
<i>Pleuronectes platessa</i>	Plaice	20	4	-	1
<i>Entelrus aequoreus</i>	Snake Pipefish	2	-	-	-
<i>Anguilla anguilla</i>	Eel	1	6	-	3
<i>Pholis gunnellus</i>	Gunnel (Butterfish)	2	-	-	-
<i>Gobius niger</i>	Black Goby	1	-	-	-
<i>Atherina prebyter</i>	Sand Smelt	161	-	-	-
<i>Pomatoschistus minutus</i>	Sand Goby	1	1	-	-
<i>Ciliata mustela</i>	5-Bearded Rockling	1	12	-	4
<i>Limanda limanda</i>	Dab	-	4	-	-
<i>Taurulus bubalis</i>	Long-Spined Sea-Scorpion	-	-	-	3
<i>Gasterosteus aculeatus</i>	3-Spined Stickleback	6	-	33	-
<i>Gadus morhua</i>	Cod	-	43	-	-
<i>Pollachius pollachius</i>	Pollock	1	5	-	-
<i>Myoxocephalus scorpius</i>	Short-Spined Sea Scorpion	-	2	-	2
<i>Labrus bergylta</i>	Ballan Wrasse	11	3	-	-
<i>Syngnathus rostellatus</i>	Nilsson's Pipefish	-	1	-	-
<i>Spinachia spinachia</i>	15-Spined Stickleback	1	-	-	-
<i>Gobiusculus flavescens</i>	2-Spotted Goby	5	-	-	-
<i>Syngnathus acus</i>	Greater Pipefish	1	-	163	2
<i>Solea solea</i>	Common Sole	3	7	-	2
<i>Symphodus melops</i>	Corkwing Wrasse	6	-	-	-
<i>Callionymus lyra</i>	Dragonet	1	-	-	-
<i>Scyliorhinus canicula</i>	Lesser Spotted Dog fish	-	19	-	-
<i>Agonus cataphractus</i>	Pogge	-	1	-	-
<i>Labrus mixtus</i>	Cuckoo Wrasse	-	3	-	-
<i>Conger conger</i>	Conger Eel	-	1	-	-
<i>Merlangus merlangus</i>	Whiting	-	-	-	1
<i>Perca fluviatilis</i>	Perch	-	-	1	-
<i>Trisopterus minutus</i>	Poor Cod	-	14	-	1
<i>Osmerus eperlanus</i>	Smelt	-	-	18	-

DISCUSSION

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.

The EPA have assigned the Lower and Upper Shannon Estuary an interim draft classification of “Moderate” status (must be improved to “Good” status by 2015) and “Good” status (must prevent deterioration below “Good” status) respectively, based on general physico-chemical elements, phytoplankton and macroalgal growths (ShIRBD 2008).

A new WFD fish classification tool, Transitional Fish Classification Index or TFCI, has been developed for the island of Ireland (Ecoregion 1) using 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 Shannon Lower and Upper have been assigned a draft classification of “High” (EQR=0.80) and “Good” (EQR=0.65) respectively, using the fish classification tool.

A final overall classification will be assigned to the estuaries in December 2009 after the consultation and review period has been completed.

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