



Sampling Fish for the Water Framework Directive

Transitional Waters 2010

Avoca Estuary



Iascach Intíre Éireann
Inland Fisheries Ireland

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1. INTRODUCTION

A fish stock survey was conducted on the Avoca Estuary in the Eastern River Basin District (ERBD) as part of the programme of fish monitoring for the Water Framework Directive (WFD), between the 4th and the 5th of October 2010 by staff from Inland Fisheries Ireland.

The Avoca Estuary is located in South Co. Wicklow, approximately 73km south of Dublin city (Fig. 1.1, Plate 1.1 and 1.2). It covers an area of 0.17km² and divides the town of Arklow in two. The estuary is situated within an industrialised area with banks that are either walled or steep with heavy tree cover (Plate 1.1 and 1.2). It is a relatively small and narrow estuary with a high degree of physical modification to the lower portion below the bridge, primarily consisting of sea walls, boat moorings and piers.

The Avoca catchment contains some of the most polluted stretches of river in Ireland, with acid mine drainage having a profound impact on the lower 15km of river. These mines leach high levels of lead, copper and zinc (ERBD, 2009). This catchment also has a wide variety of other polluting inputs along its length, including pharmaceutical, chemical and light engineering operations, along with a number of treated and untreated sewerage inputs. Furthermore, agriculture and forestry contribute to diffuse pollution loads (ERBD, 2009).

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

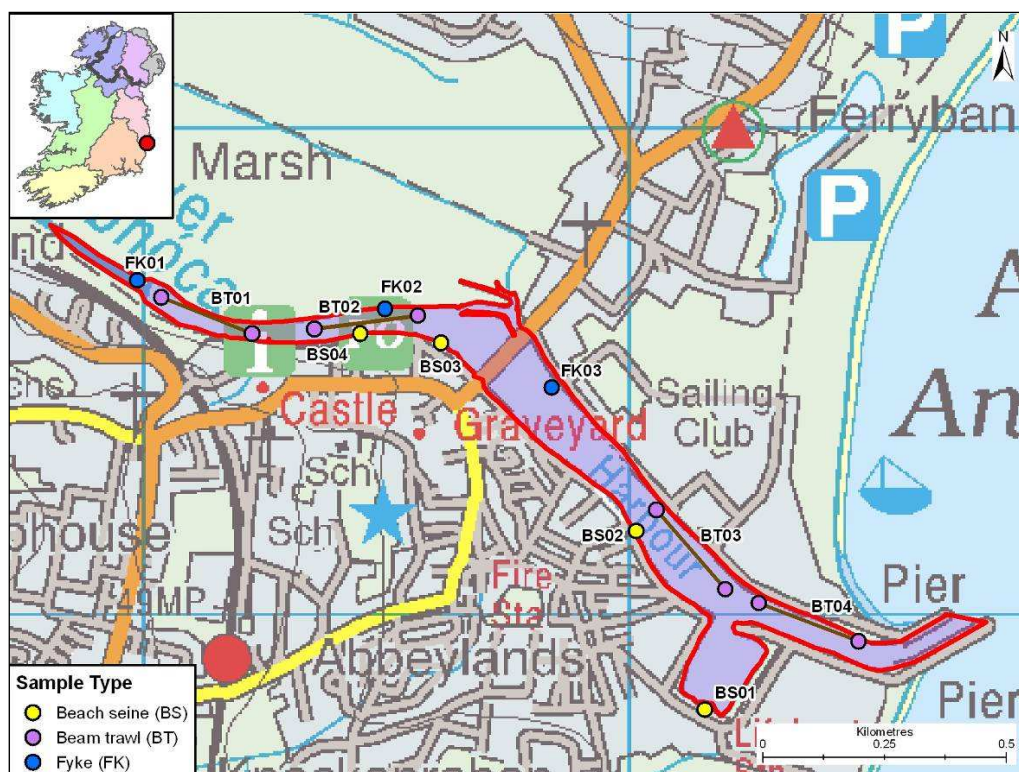


Fig. 1.1. Location map of the Avoca Estuary indicating sample sites, October 2010



Plate 1.1. Seine netting in the lower Avoca Estuary, October 2010



Plate 1.2. The upper Avoca Estuary

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 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 four beach seines, three fyke nets and four beam trawls were deployed in the Avoca Estuary in October 2010.

3. RESULTS

A total of 12 fish species (sea trout are included as a separate ‘variety’ of trout) were recorded in the Avoca Estuary in October 2010 (Table 3.1). Flounder (97) was the most abundant species, followed by thick-lipped grey mullet (31) and sand goby (21).

Flounder were well distributed throughout the water body and were the only species captured using all three netting methods. Flounder ranged in length from 3.2cm to 35.8cm. Length frequency analysis reveals that a number of different age classes were present in the sample, with the majority of individuals belonging to the 0+ or 1+ age class (Fig. 3.1).

River lamprey, a species listed on Annex II and V of the EU Habitats Directive (92/43/EEC) were captured in the fyke nets. Brown trout, sea trout, three-spined stickleback, and eels (listed as critically endangered in the Irish Red Data Book (King *et al.*, 2011)) were also captured during the survey (Table 3.1).

Cod and haddock were also recorded in the fyke nets. All thick-lipped grey mullet captured in the beach seines were juveniles, indicating the utilisation of this water body as a nursery habitat for this species.

Salinity values taken at beach seine and beam trawl sites ranged from 0.043ppt to 1.31ppt.

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

Scientific name	Common name	Beach seine (4)	Fyke net (3)	Beam trawl (4)	Total
<i>Platichthys flesus</i>	Flounder	15	36	46	97
<i>Chelon labrosus</i>	Thick-lipped grey mullet	31	-	-	31
<i>Pomatoschistus minutus</i>	Sand goby	7	-	14	21
<i>Anguilla anguilla</i>	European eel	-	9	-	9
<i>Lampetra fluviatilis</i>	River lamprey	-	9	-	9
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	2	-	-	2
<i>Salmo trutta</i>	Sea trout	-	2	-	2
<i>Salmo trutta</i>	Brown trout	-	2	-	2
<i>Spinachia spinachia</i>	Fifteen-spined stickleback	2	-	-	2
<i>Gadus morhua</i>	Cod	-	1	-	1
<i>Melanogrammus aeglefinus</i>	Haddock	-	1	-	1
<i>Syngnathus acus</i>	Greater pipefish	-	-	1	1

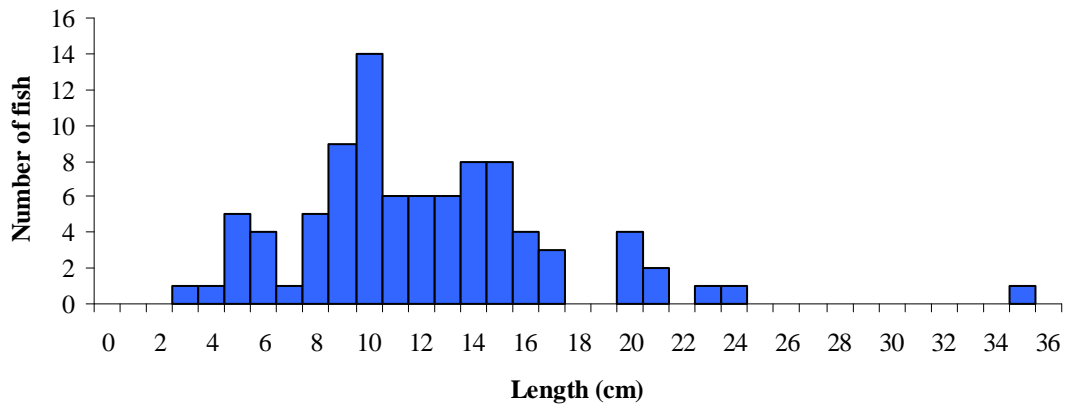


Fig. 3.1. Length frequency distribution for a subsample of flounder in the Avoca Estuary, October 2010 (n=90)

4. SUMMARY

A total of 12 fish species (sea trout are included as a separate ‘variety’ of trout) were recorded in the Avoca Estuary, which is similar to other transitional water bodies on the eastern coast in 2010. Transitional waters like this one, that are riverine in nature, tend to have a high proportion of freshwater species due to their low salinity and limited connectivity with open sea. Furthermore, transitional waters with a stronger marine influence typically have higher species richness, due to the larger variety of marine fauna that can potentially inhabit them. Cod, haddock, brown trout and sea trout, which are all important commercial or angling species were recorded in this water body. 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, the Avoca Estuary has been assigned a draft ecological status classification of “Moderate” based on the fish populations present. This shows no change from 2008, when the estuary was also assigned a classification of “Moderate” status based on the fish populations (Kelly *et al.*, 2009).

The EPA have assigned the Avoca Estuary an overall interim draft classification (2007 to 2009) of “Moderate” status, based on general physico-chemical elements, fish, phytoplankton and macroalgal growths.

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