

Fish Stock Survey of Transitional Waters in the South Western River Basin District 2020

Argideen Estuary

IFI/2020/1-4530



Iascach Intíre Éireann
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National Research Survey Programme

**Fish Stock Survey of Transitional Waters in the South Western River
Basin District 2020– Argideen estuary**

Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

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Project team

Senior Research Officer

Project Manager

Research Officer

Dr. William Roche

Mr. Glen Wightman

Mr. Will Corcoran

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1. Summary

This report presents fish capture data collected during Inland Fisheries Ireland (IFI) surveys of transitional waterbodies. This report focuses on the survey which was conducted within the Argideen estuary in the south west of Ireland. It was conducted primarily to designate an ecological status based on fish populations, as per the requirements of the Water Framework Directive (Directive 2000/60/EC). The populations of species of angling and conservation importance are also discussed.

A number of fish sampling methods were used to ensure that a range of habitat types were sampled, thus making it likely that all fish species present in the estuary were captured. Across the survey, a total of 15 species and 578 individual fish were captured. Current data was also compared to previous surveys in 2008 and 2017 to assess how fish populations have changed in the intervening years.

2. Introduction

The Argideen river, enters the sea on the south-west coast of Ireland by the village of Timoleague. In angling terms the catchment is known for the popular species, especially sea trout and Atlantic salmon, and gilt-head bream and golden grey mullet are caught by anglers in the estuary. The latter two are somewhat uncommon in Irish estuaries.

The main objectives of the current survey are:

- To measure the ecological status of fish populations in the estuary complex as per the requirements of the European Water Framework Directive (WFD; 2000/60/EC).
- To examine fish population dynamics in the estuary.
- To provide scientific advice to support conservation measures within the estuary complex.

According to the WFD, ecological status of waterbodies must be assessed by both a number of physical and chemical characteristics and a range of biological indicators. Fish populations are one of the key biological indicators of ecological status in transitional waters. Essentially, they are assessed by comparing data collected from monitoring against reference (natural) conditions. Fish status was assessed using the estuarine multi-metric fish index (EMFI) (Harrison and Kelly, 2013) to derive ecological status. As the estuary was surveyed in 2008 and 2017, it was possible to examine any changes in population structure in the intervening years.

3. Methods

The Argideen estuary covers an area of 4.92km². Fish stock surveys were conducted to ensure sufficient coverage of the water body so that stocks could be assessed. Sampling took place between 28th - 29th September 2020. Habitat type across the sites, ranged from soft mud to hard sandy substrate, and brackish to fully saline waters. The separate waterbodies are described in more detail in www.wfdfish.ie.

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.

In 2020, due to Covid-19 (i.e. social distancing) and manual handling considerations a lighter beach seine and reduced numbers of fykes in each fyke set were utilised. Beach seining was conducted using a 30m x 2.5m net (14mm mesh size side panels 12m x 2.5m with the middle/bunt of the net 6.5mm mesh size 6m x 2.5m) 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. Previous surveys used 3 fyke nets tied together to form a set whereas 2 fykes were tied together to form a set in 2020. 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.

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 if necessary. Unidentified fish specimens were retained for subsequent identification in the laboratory.

A handheld GPS was used to mark the precise location of each site. Physiochemical data were also collected at beach seine sites.

4. Results

4.1 Data summary – 2020 survey

A total of 18 samples were taken using three different sampling methods (7 beach seine, 4 fykes and 7 beam trawls), over the course of the sampling programme (Fig.1). Temperatures ranged from 13.7-18.0 °C (mean = 15.2°C) and salinity (ppt) ranged from 13.1 to 33.4 (mean= 27.96)

In the Argideen estuary, 578 individual fish were captured, counted and identified to species level prior to release. A total of 15 different fish species were encountered over the course of the survey (Table 1). The three most abundant species were sand goby, lesser sandeel and five-bearded rockling.

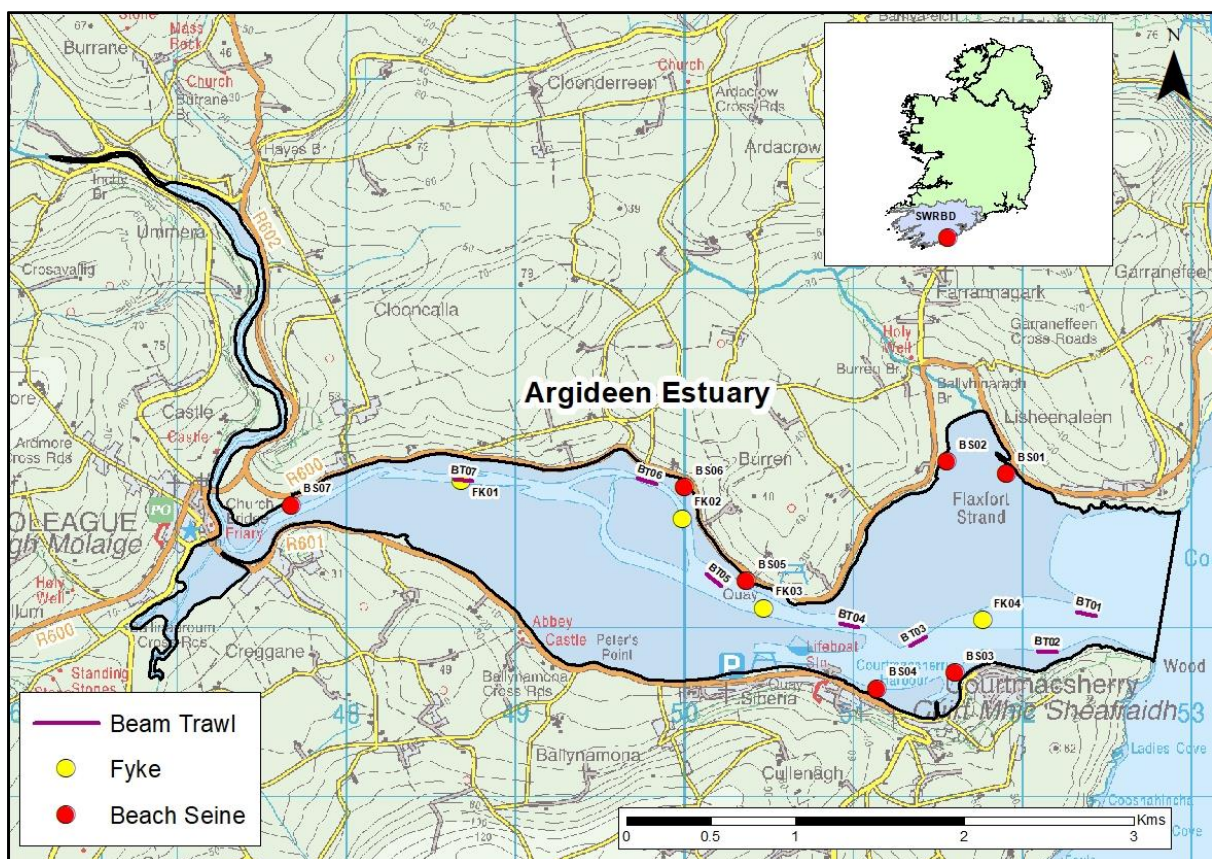


Fig. 1: Map of the Argideen Estuary showing all samples taken during the September 2020 survey.

Table 1: List of species captured during the 2020 WFD survey of the Argideen estuary.

Species	Total count	Count measured	Ave length(cm)	Max length(cm)	Min length(cm)	Standard deviation (cm)	Relative abundance %
Brill	5	5	11.8	14.5	9.2	2.0	0.9
Common dragonet	1	1	9.5	9.5	9.5	NA	0.2
Corkwing wrasse	2	2	6.5	6.7	6.3	0.3	0.3
European eel	1	1	60.0	60	60	NA	0.2
Five-beard rockling	25	25	12.9	16.4	6.5	2.1	4.3
Flounder	8	8	13.9	23.8	9.7	5.2	1.4
Lesser sandeel	33	30	6.6	10.4	4.2	1.2	5.7
Long-spined sea scorpion	2	2	9.3	9.3	9.2	0.1	0.3
Nilsson's pipefish	1	1	6.4	6.4	6.4	NA	0.2
Plaice	19	19	6.8	9.1	5.1	1.2	3.3
Pollack	1	1	18.8	18.8	18.8	NA	0.2
Sand goby	444	179	6.2	9	3.7	1.1	76.8
Sand smelt	22	22	7.3	14.8	4.5	1.9	3.8
Sprat	10	10	5.8	7.8	4.3	0.9	1.7
Tub gurnard	4	4	6.1	8.4	4.5	1.7	0.7

4.2 Comparative analyses

4.2.1 *Abundant species*

Gobies (Gobiidae) were by far the most abundant species within the estuary in 2020, making up over 76% of the total catch (Fig. 2). Lesser sandeel and five-bearded rockling were also common, making up 5.7% and 4.3 % of the total catch, respectively. Lesser sandeel were not present in great numbers in 2017 and 2020, unlike 2008, where they made up 22.6% of the catch (Fig. 2)

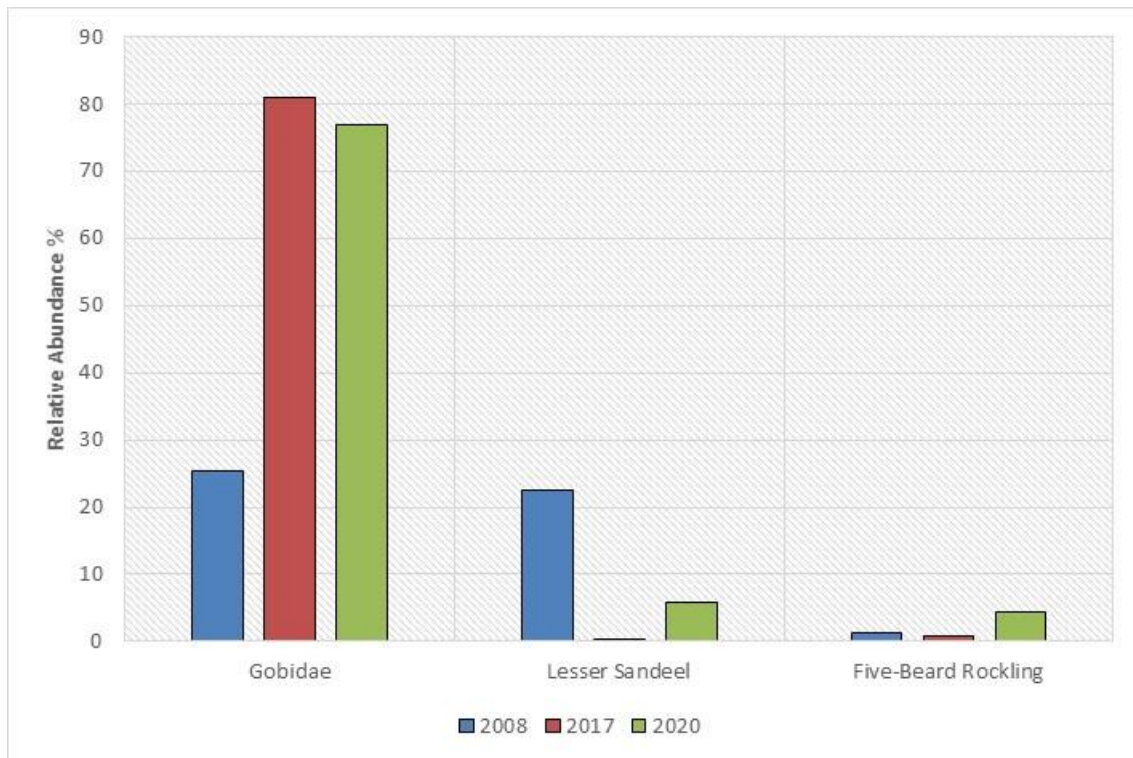


Fig 2: Relative abundance of the most abundant species captured during the 2020 WFD survey of the Argideen estuary and comparison with the 2008 and 2017 survey.

4.2.2 Key species

The estuary is a noted angling destination for anglers targeting bass, flounder, mullet, plaice, gilt-head bream, conger, dab, dogfish and thornback ray (<https://fishinginireland.info>). Of these species only flounder and plaice were captured making up 1.4% and 3.3% of the catch, respectively. Several small brill and tub gurnard were captured which are species of angling interest. No mullet species (juveniles or adults) were captured in 2020 however several larger individuals were observed jumping clear of the beach seine during retrieval.

4.2.3 EMFI quality rating

The Argideen estuary achieved Moderate status in 2020 which is a return to its status in 2008 and a downgrade from its 2017 status. (Table 2).

Table 2. EMFI quality ratings of the Argideen estuary

System	Year	EMFI	EQR	Classification
Argideen Estuary	2020	49	0.625	Moderate
Argideen Estuary	2017	51	0.661	Good
Argideen Estuary	2008	49	0.625	Moderate

5. Discussion

Sand gobies and lesser sandeels made up over 82% of the catch. As the substrate is largely sand/mud within the estuary, this is not surprising. Sand gobies are associated with shallow water and intertidal sediments where they can occur in high densities (Jaquet & Raffaelli 1989). Sand gobies form an important ecological relationship between benthic invertebrates and larger predatory fish (Souza *et al.* 2015). Lesser sandeels are regarded as plankton feeders and is an important trophic link between zooplankton and a variety of piscivorous marine vertebrates (O' Connell and Five 1995). Subsequently, these species provide an abundant and important food source for piscivorous fish feeding within the shelter of the estuary.

In WFD Fish status terms the Argideen was classified as Moderate in 2020 and had the exact same EMFI, EQR score and classification as it had in 2008. It was classified as WFD Fish 'Good' in the 2017 survey where a greater variety of fish species were captured which contributed towards improving its classification to Good. The EQR scores are similar in all three survey years.

An estuary is classified as Moderate or Good if it has an EQR score between 0.35 and <0.65 and between 0.65 and <0.92 respectively. Essentially the Argideen could be classified on the high end of the moderate scale in 2008 and 2020 and on the low end of the Good scale if such a scale existed.

The Argideen Estuary in West Cork experiences frequent algal blooms, primarily caused by the seaweed *Ulva* spp. These blooms are fuelled by excess nutrients, particularly nitrogen, entering the estuary from its catchment area, with agriculture being the main source (Mc Govern *et al.*, 2020). These authors found that the overall Argideen system, including the Argideen Estuary, reducing river nitrogen and phosphorus inputs by 66% would restore compliance with trophic status parameters. However, none of the scenarios considered could reduce macroalgae bloom magnitudes in the Argideen Estuary to within compliance limits.

The trophic status and, to a lesser extent, the WFD fish status suggest that the ecology of Argideen estuary has been subject to pressures related to enrichment.

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**Inland Fisheries Ireland
3044 Lake Drive,
Citywest Business Campus,
Dublin 24,
Ireland.
D24 Y265**

**www.fisheriesireland.ie
info@fisheriesireland.ie**

+353 1 8842 600

