

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

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## **Fish Stock Survey of Transitional Waters in the South Western River Basin District 2017– Argideen estuary**

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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 of 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 both surveys, a total of 24 species and 1718 individual fish were captured. Current data was also compared to a previous survey in 2008 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. The catchment is known for the popular species, Atlantic salmon and sea trout, as well as golden grey mullet which are otherwise a rare species in Ireland

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 inform on the role of this waterbody in relation to important marine recreational fish species
- To provide scientific advice to support any potential fish conservation measures within the estuary

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, it was possible to examine any changes in population structure in the intervening years.

### **3. Methods**

The Argideen estuary covers an area of 4.92km<sup>2</sup>. Fish stock surveys were conducted to ensure sufficient coverage of the water body so that stocks could be assessed. Sampling took place between 18<sup>th</sup> October and 19<sup>th</sup> October 2017. Habitat type across the sites ranges from soft mud to hard sandy substrate and brackish to fully saline and all in between. The separate waterbodies are described in more detail in [www.wfdfish.ie](http://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 (Harrison and Kelly, 2013) 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 100m in length.

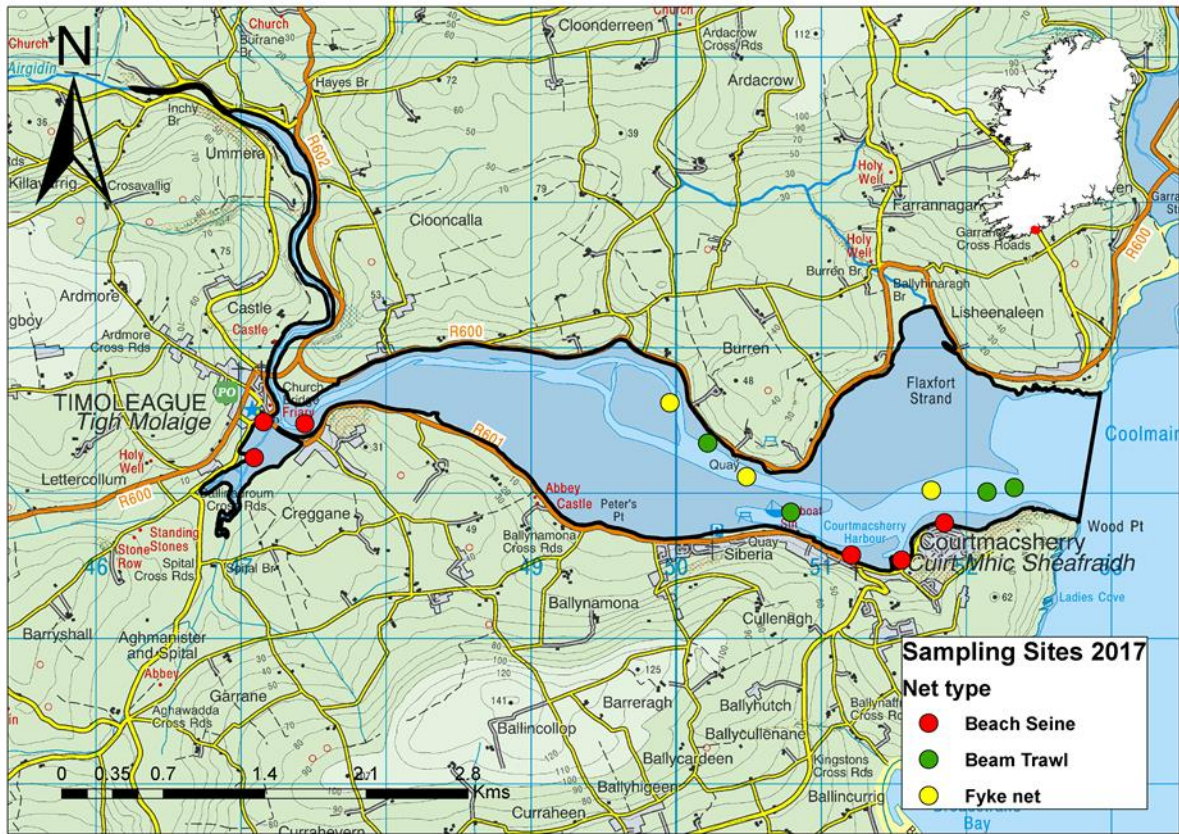
All nets are processed on-site by identifying the species present and counting the total numbers caught in each. Length measurements are recorded for each species using a representative sub-sample of 30 fish if necessary. Unidentified fish specimens were retained for subsequent identification in the laboratory.

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

### **4. Results**

#### **4.1 Data summary – 2017 survey**

A total of 13 samples were taken using three different sampling methods (6 beach seine, 3 fykes and 4 beam trawls), over the course of the sampling programme (Fig.1). Temperatures ranged from 12-13.4 °C (mean = 12.6) and salinity ranged from 31.8 to 0.5 (mean= 16.1) 1718 individual fish were captured, counted and identified to species level prior to release. 24 different fish species were encountered over the course of the survey (Table 1).



**Fig. 1:** Map of the Arigdeen Estuary showing all samples taken during the October 2017 survey.

<i>Species (scientific name)</i>	<b>Species (common name)</b>	<b>Total count</b>	<b>Count measured</b>	<b>Ave length(cm)</b>	<b>Max length(cm)</b>	<b>Min length(cm)</b>	<b>Standard deviation</b>	<b>Relative abundance %</b>
<i>Labrus bergylta</i>	Ballan wrasse	1	1	8.8	8.8	8.8	NA	0.1
<i>Pollachius virens</i>	Coalfish	1	1	19.0	19	19	NA	0.1
<i>Gadus morhua</i>	Cod	2	2	19.8	23.8	15.8	5.7	0.1
<i>Callionymus lyra</i>	Common dragonet	1	1	9.9	9.9	9.9	NA	0.1
<i>Pomatoschistus microps</i>	Common goby	1194	104	5.3	8.5	2.8	1.2	69.5
<i>Symphodus melops</i>	Corkwing wrasse	4	4	7.2	7.5	6.9	0.3	0.2
<i>Limanda limanda</i>	Dab	10	10	6.6	8.2	4.9	1.0	0.6
<i>Dicentrarchus labrax</i>	European seabass	1	1	42.0	42	42	NA	0.1
<i>Spinachia spinachia</i>	Fifteen spined stickleback	4	4	11.9	13.8	9.7	1.8	0.2
<i>Ciliata mustela</i>	Five bearded rockling	15	15	15.3	18.3	12.8	1.8	0.9
<i>Platichthys flesus</i>	Flounder	168	79	8.9	13.3	4.6	2.3	9.8
<i>Chelon auratus</i>	Golden grey mullet	3	3	38.8	43.3	31.2	6.6	0.2
<i>Pholis gunnellus</i>	Gunnel	1	1	6.5	6.5	6.5	NA	0.1
<i>Ammodytes tobianus</i>	Lesser sandeel	6	6	14.0	15.3	13.4	0.8	0.3
<i>Scyliorhinus canicula</i>	Lesser spotted dogfish	1	1	66.2	66.2	66.2	NA	0.1
<i>Taurulus bubalis</i>	Long spined sea scorpion	2	2	10.2	10.4	10	0.3	0.1
<i>Pleuronectes platessa</i>	Plaice	5	5	7.7	9.1	6.2	1.1	0.3
<i>Pollachius pollachius</i>	Pollack	5	5	14.6	17.2	12.3	1.8	0.3
<i>Pomatoschistus minutus</i>	Sand goby	196	63	7.0	8.6	4.3	1.0	11.4
<i>Atherina presbyter</i>	Sand smelt	13	13	10.3	15.8	5	4.4	0.8
<i>Sprattus sprattus</i>	Sprat	17	17	4.8	5.3	4	0.3	1.0
<i>Chelon labrosus</i>	Thick lipped grey mullet	66	46	5.7	12.1	2.1	2.8	3.8
<i>Chelon ramada</i>	Thin lipped grey mullet	1	1	14.2	14.2	14.2	NA	0.1
<i>Gasterosteus aculeatus</i>	Three spined stickleback	1	1	3.5	3.5	3.5	NA	0.1

**Table 1:** List of species captured during the 2017 WFD survey of the Argideen estuary.

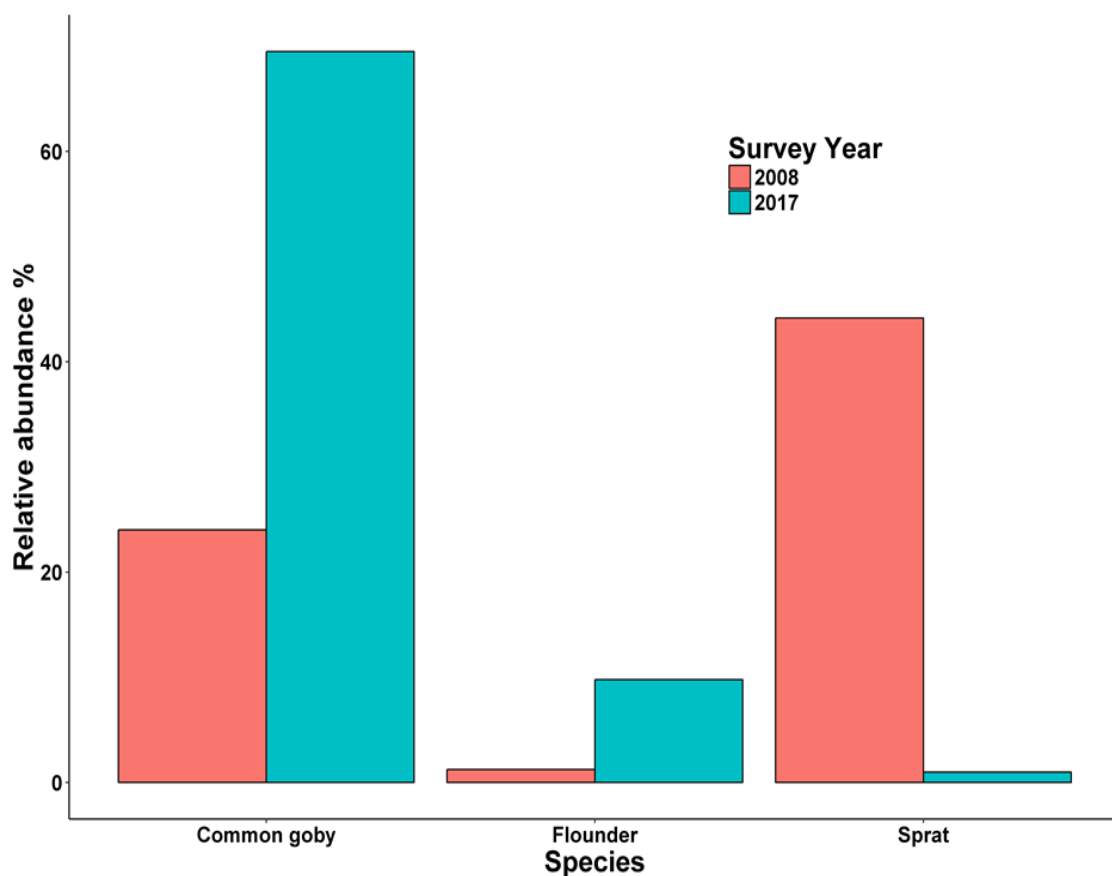


## 4.2 Comparative analyses

### 4.2.1 *Abundant species*

Common goby were the most abundant species within the estuary in 2017, making up over 69% of the total catch (Fig. 2). Flounder and sand goby were also common, making up

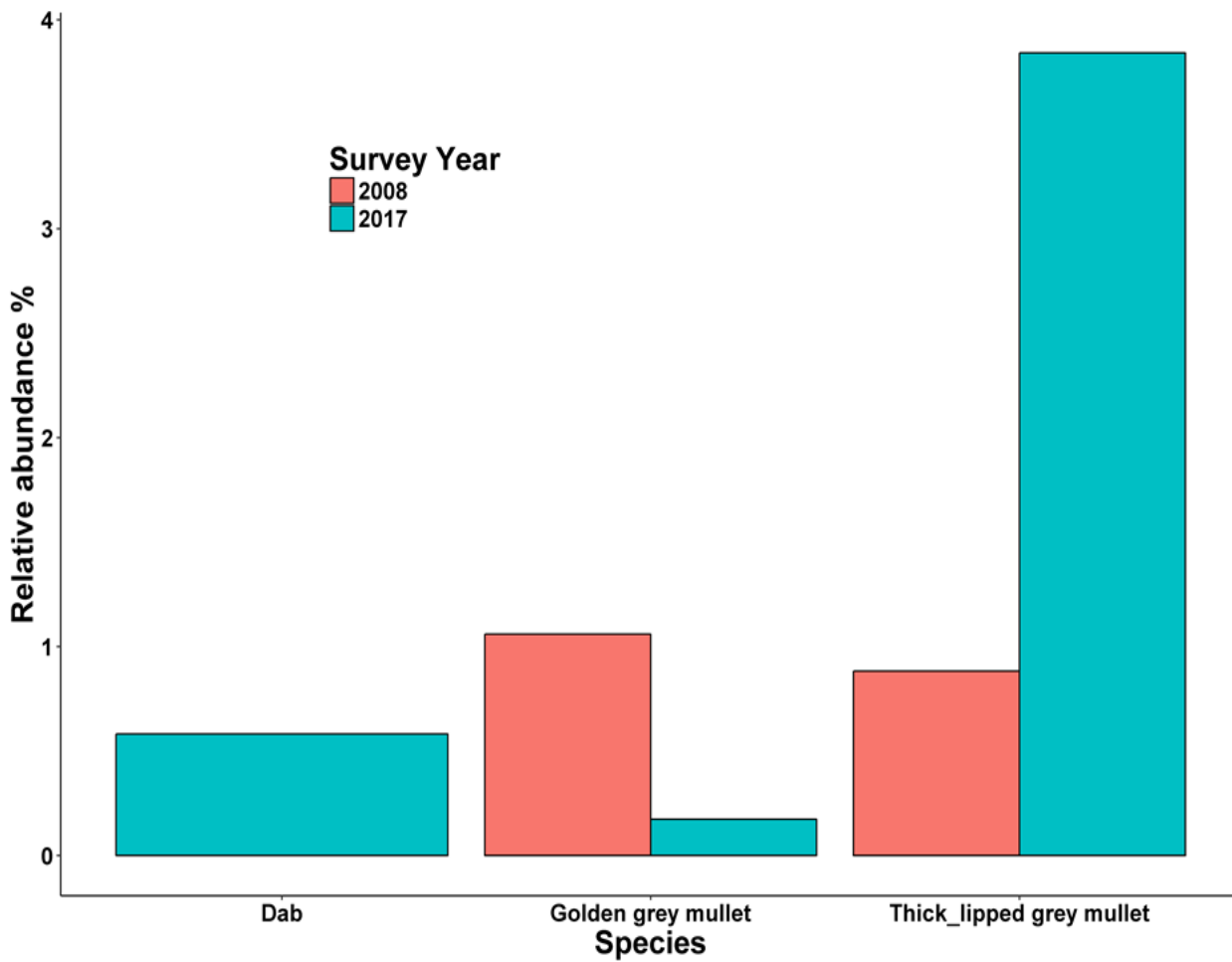
9.8 and 11.4 % of the total catch respectively. Sprat were not present in large numbers in 2017, unlike 2008, where they made up nearly half of the catch (Fig. 2)



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

#### 4.2.2 Key species

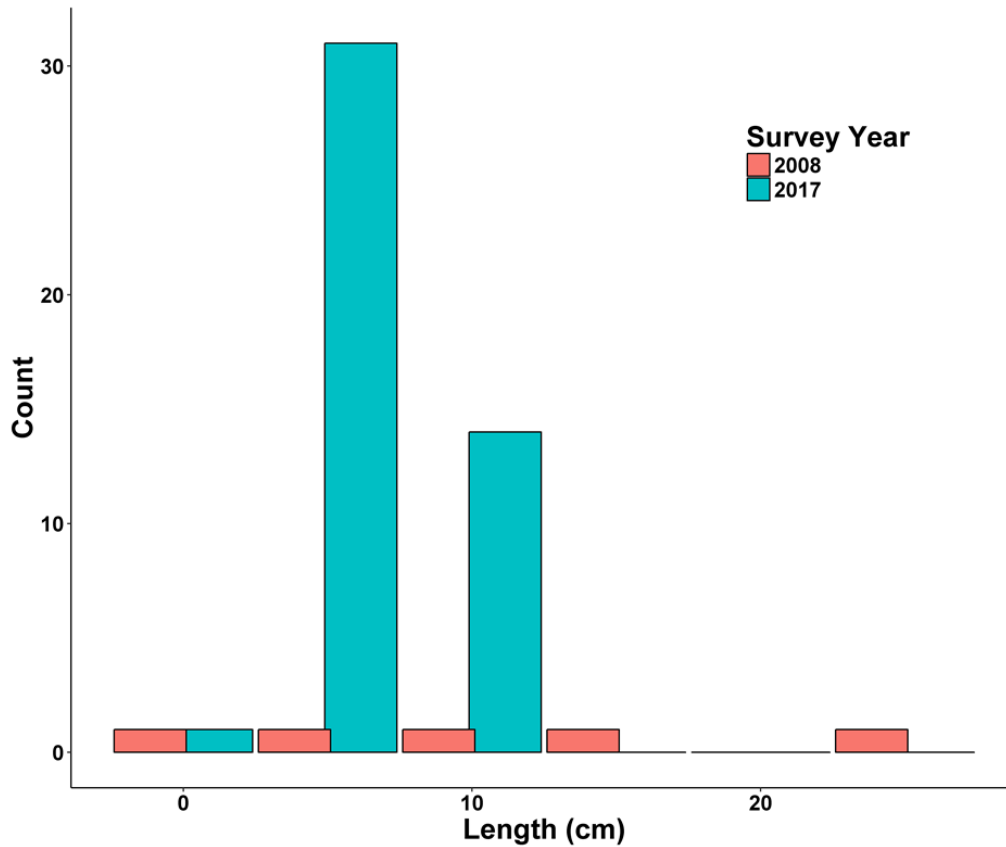
Juvenile dab and mullet made up 0.6 and 3.8% of the total catch respectively (Fig.3), indicating a possible nursery function for these popular angling species. Some specimens of adult golden grey mullet were caught in the lower section of the estuary.



**Fig 3:** Relative abundance of some species of angling interest captured during the 2017 WFD survey of the Argideen estuary and comparison with the 2008 survey.

#### 4.2.3 Length frequency analyses

Juvenile mullet were caught in greater numbers than in the previous survey (Fig. 4).



**Fig 4:** Length frequency analyses of: Thick Lipped Grey mullet captured during the last two WFD surveys of the Argideen Estuary.

#### 4.2.4 EMFI quality rating

The Argideen estuary achieved good status in 2017, an improvement on the 2008 survey (Table 2).

System	Year	EMFI	EQR	Intercal Class
Argideen Estuary	2017	51	0.660714	G
Argideen Estuary	2008	49	0.625	M

**Table 5.** EMFI (Estuarine multi-metric fish index) quality ratings of the Argideen estuary in 2017 and 2008.

## 5. Discussion

The EMFI rating increased slightly between 2008 and the current survey. Although the index rated the transitional water body as “good” (EQR = 0.66) due to fish populations present at the time of the survey, this rating is just above an EQR of 0.65 which denotes the moderate/good boundary. Pressures on fish populations in the system is to be expected as the Argideen catchment has been impacted by eutrophication due to agricultural runoff for many years (EPA 2016).

The high relative abundance of common goby (70%) in the estuary, indicates that fish populations in the estuary continue to be under environmental stress to some extent (Harrison and Kelly 2013). The substrate, particularly in the upper part of the estuary is largely fine sand/mud associated with surface runoff. Common gobys are associated with muddy substrates caused by fluvial deposition, where they feed on plant matter and invertebrates associated with mud (Aarnio *et al.* 1996). Although the dominance of this type of habitat does afford an advantage to some estuary dwelling species above others, their presence may provide an abundant and important food source for piscivorous fish feeding within the shelter of the estuary.

A substantive increase in juvenile mullet was noted between surveys. All samples were measured in the field and returned alive. It was assumed that these were thick lipped mullet. However, it is likely that some of the specimens were from different mullet species, especially considering the adult golden grey specimens caught during the survey and that angling for golden grey mullet in Courtmacsherry bay, towards the mouth of the estuary is popular. In future surveys, it may be useful to take a sub sample of juvenile mullet back to the lab so that they can be positively identified and subsequently confirmed that the Argideen estuary is a golden grey mullet nursery as well as an angling hotspot.

Courtmacsherry bay is also a popular angling venue for European sea bass, gilthead bream and sea trout. Its possible that these mobile species feed within the estuary environs, taking advantage of the feeding opportunities provided by the nutrient enriched substrate.

## 6. References

Aarnio, K., Bonsdorff, E., & Rosenback, N. (1996). Food and feeding habits of juvenile flounder *Platichthys flesus* (L.), and turbot *Scophthalmus maximus* (L.) in the åland archipelago, northern Baltic Sea. *Journal of Sea Research*, 36, 311-320.

EPA (Environmental Protection Agency), (2016). Assessing Recent Trends in Nutrient Inputs to Estuarine Waters and Their Ecological Effect). EPA, Johnstown Castle, Ireland.

Harrison, T. D., & Kelly, F. L. (2013). Development of an estuarine multi-metric fish index and its application to Irish transitional waters. *Ecological indicators*, 34, 494-506.