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

Colligan Estuary

IFI/2020/1-4531

Iascach Intíre Éireann
Inland Fisheries Ireland

Inland Fisheries Ireland

National Research Survey Programme

Fish Stock Survey of Transitional Waters in the South Eastern River Basin District 2020– Colligan estuary

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

CITATION: Wightman, G. Corcoran, W. and Roche, W. (2020). Fish Stock Survey of Transitional Waters in the South Eastern River Basin District 2020 – Colligan estuary. Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24, Ireland.

Acknowledgements

The authors wish to gratefully acknowledge the help and co-operation of all their colleagues in Inland Fisheries Ireland.

Project team

Senior Research Officer	Dr. William Roche
Project Manager	Mr. Glen Wightman
Technician	Mr. Will Corcoran
Technician	Mr. Colm Casserly

Contents

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 Colligan estuary on the south east coast 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 22 species and 1445 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.

The estuary has maintained its WFD Fish 'Good' status as recorded during the previous survey in 2008.

2. Introduction

The Colligan Estuary is located in County Waterford, on the south-east coast of Ireland (Fig. 1). The estuary covers an area of 10.03km². The estuary is almost split into two by a long (approximately 2.5km) narrow sand bar called the Cunnigar (Fig. 1). The estuary empties at low water with little depth prepsent even in the main channels (Plate 1). The dominant habitat in the lower estuary was mixed sand while fine mud predominated in the upper channels of the Colligan and Glendine. The estuary receives the waters of the Colligan, Brickey and Glendine rivers which rise in the Monavallagh Mountains of south Waterford.

The estuary is subjected to anthropogenic impacts from the town of Dungarvan with its associated sea walls in the inner part of the estuary. The sand flats to the east of the Cunnigar support an extensive oyster farming operation. There is also some commercial exploitation of dogfish and mullet using gillnets in the estuary. This estuary is one of the most important sea angling locations in the southeast with bass and gilt-head bream caught regularly by anglers. The Colligan River is noted for having excellent runs of sea trout. A major part of the ecological importance of the bay is the over wintering birdlife which is present in large numbers. The estuary receives untreated municipal wastewater as well as substantial inputs from industry and landfill run-off (Marine Institute, 1999). The estuary was previously surveyed in 2008.

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

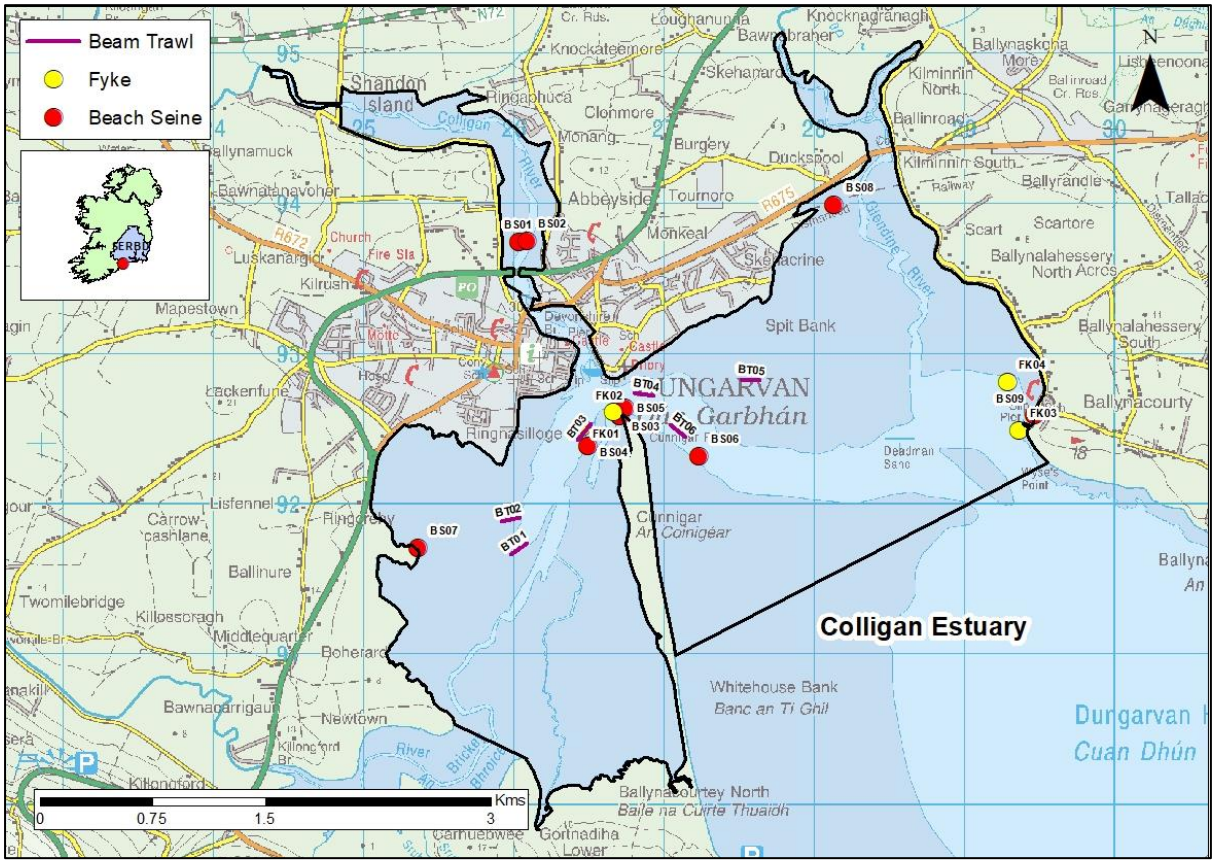

Fig. 1: Map of the Colligan Estuary showing all samples taken during the October 2020 survey.

3. Methods

The Colligan estuary covers an area of 10.03km^2. Fish stock surveys were conducted to ensure sufficient coverage of the water body so that stocks could be assessed using the standard WFD fish classification tools. Sampling took place between 5th - 7th October 2020. Habitat type across the sites ranges from soft mud to sandy beaches to shingle beaches and brackish to fully saline and all in between. 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 each beach seine site.

4. Results

4.1 Data summary – 2020 survey

A total of 19 samples were taken using three different sampling methods (9 beach seine, 4 fykes and 6 beam trawls), over the course of the sampling programme (Fig.1). Temperatures

ranged from 11.9 - 14.5 °C (mean = 13.2°C) and salinity (PPT) ranged from 25.3 to 33.3 (mean= 31.2).

In the Colligan estuary, 1,445 individual fish were captured, counted and identified to species level prior to release. Twenty two different fish species were encountered over the course of the survey (Table 1).

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

Species	Total count	Count measured	Ave length(cm)	Max length(cm)	Min length(cm)	Standard deviation (cm)	Relative abundance %	% abundance without sprat
Brill	2	2	10.4	10.5	10.2	0.2	0.1	0.2
Common sole	1	1	7.5	7.5	7.5	N/A	0.1	0.1
Corkwing wrasse	1	1	5.9	5.9	5.9	N/A	0.1	0.1
European eel	1	1	48.5	48.5	48.5	N/A	0.1	0.1
European seabass	13	13	18.9	20.1	16.8	1.2	0.9	1.6
Five-bearded rockling	14	14	14.8	17.8	12.2	1.4	1.0	1.7
Flounder	9	9	17.4	35.4	12.1	7.3	0.6	1.1
Gunnel	1	1	12.0	12	12	N/A	0.1	0.1
Lesser sandeel	20	20	9.3	11	8.2	0.7	1.4	2.4
Lesser spotted dogfish	1	1	58.2	58.2	58.2	N/A	0.1	0.1
Long-spined sea scorpion	3	3	9.4	9.6	9.1	0.3	0.2	0.4
Nilsson's pipefish	7	7	12.0	14	10	1.6	0.5	0.9
Painted goby	3	3	3.7	4.2	2.7	0.8	0.2	0.4
Plaice	6	6	6.9	7.6	5.2	0.9	0.4	0.7
Pollack	4	4	13.5	14.7	12.1	1.1	0.3	0.5
Sand goby	611	165	5.9	8.6	2.1	1.5	42.3	74.6
Sand smelt	59	57	6.4	13.3	4.4	1.5	4.1	7.2
Sea trout	2	2	39.2	52.2	26.2	18.4	0.1	0.2
Sprat	626	149	5.2	13.8	4	0.9	43.3	
Thick-lipped grey mullet	54	54	13.8	46.1	2.8	11.8	3.7	6.6
Tub gurnard	4	4	6.3	8	5.1	1.3	0.3	0.5
Whiting	3	3	13.8	14.8	13.2	0.9	0.2	0.4

4.2 Comparative analyses

4.2.1 Abundant species

Sprat were the most abundant species within the estuary in 2020, making up over 43% of the total catch (Fig. 2). Sand goby and sand smelt were also common, making up 42.3 and 4.1 % of the total catch, respectively. The relative abundance of sprat increased dramatically from 2008 where they only made up 0.3% of the catch (Fig. 2). The relative abundance of sand goby was relatively stable and there was a slight decrease in the relative abundance of sand smelt.

Sprat, especially juvenile sprat, can be found in vast shoals in inshore waters and estuaries. This shoaling behaviour is a key aspect of their ecology and survival and their presence in surveys like this occurs periodically. Where they dominate a sample sprat can influence status.

Excluding sprat from the analysis further emphasises the dominance by sand goby to 75% and increases the relative abundance of sand smelt to 7.2%.

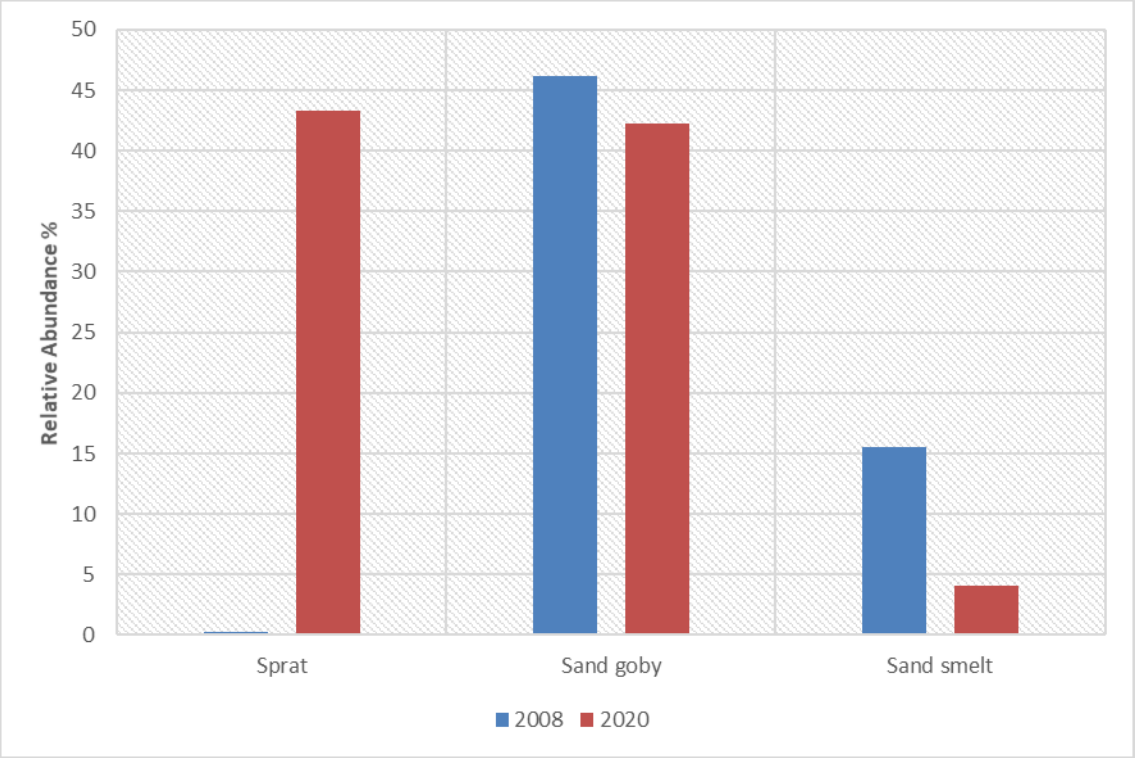

Fig 2: Relative abundance of the most abundant species captured during the 2020 WFD survey of the Colligan estuary and comparison with the 2008 surveys.

4.2.2 Key species

The Colligan estuary is noted angling venue for mullet, flounder, and bass, with the occasional seatrout and gilt-head bream caught. A wide range of thick lipped grey mullet and a group of bass in the 16-20cm size range were captured during the survey (Fig. 3). Bass in this size range are often referred to as school bass or "schoolies" by anglers. Two sea trout were captured with the largest one measuring 52.2cm (Plate 1).

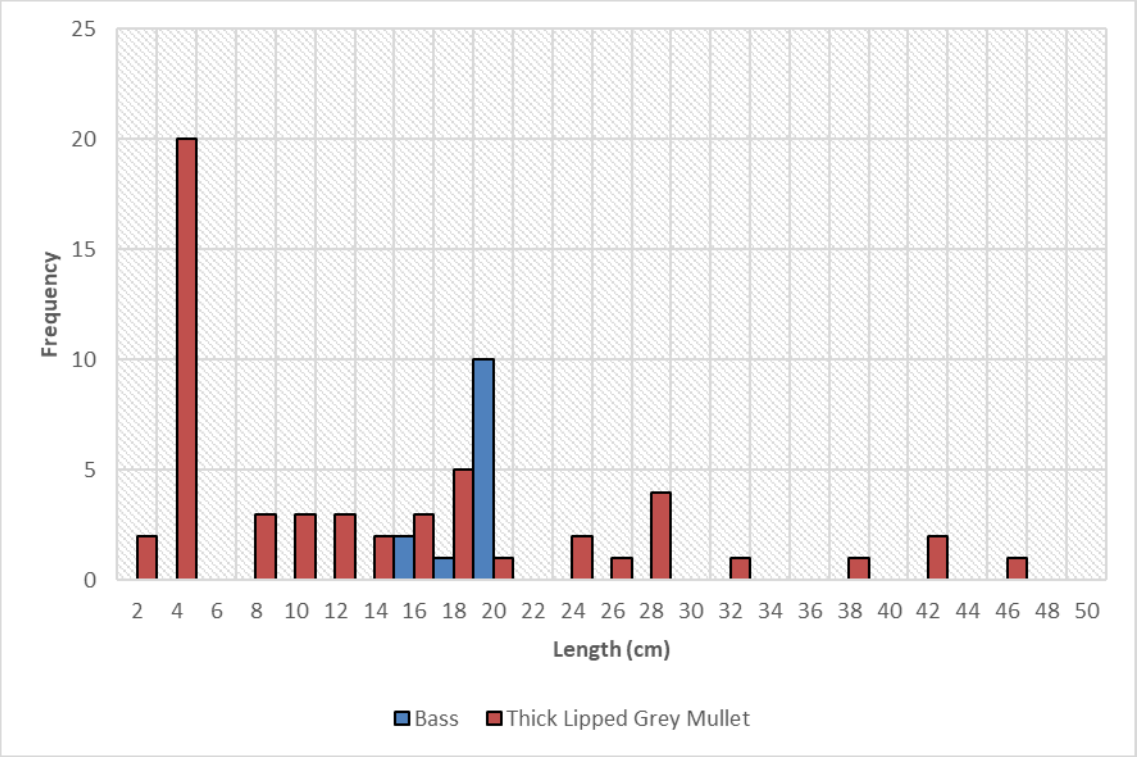

Fig 3: Length frequency for bass and thick lipped grey mullet captured during the 2020 WFD survey of the Colligan estuary.

Plate 1. 52 cm sea trout captured during the 2020 WFD survey of the Colligan estuary.

4.2.3 EMFI quality rating

The Colligan estuary achieved good status in 2020 which was the same status as in 2008 (Table 2). It had a slight increase in its EMF and EQR score which is an increase from the 2008 survey and positive sign.

Table 2. EMFI quality ratings of the Colligan estuary 2008 and 2020

System	Year	EMFI	EQR	Classification
Colligan	2008	51	0.66	Good
Colligan	2020	61	0.84	Good

5. Discussion

Sprat, sand goby and sand smelt made up over 89% of the catch. Sprat and sand gobies each comprised over 40% of the catch, they are an important prey species (Keinänen *et al.* 2017, Souza et al. 2015).

The estuary has wide range of different habitats ranging from mud flats, sandy beaches, and cobble shores. Habitat complexity and variability plays a significant role in promoting abundance, diversity, and persistence of species in a wide array of ecosystems (Moyle *et al.* 2010). The wide range of habitats of varying depth observed in the Colligan estuary contributes to a wide range of fish species inhabiting this complex estuary. The survey encountered 22 species which is one of the factors driving the EQR score, ultimately driving the estuary's good WFD Fish status.

The estuary has retained its 'Good' WFD Fish status. There was an increase in the EQR score as it increased from 0.66 to 0.84 (Table 2) which is a positive sign. A transitional waterbody is classified as good with an EQR score of 0.65 to >0.92. An EQR score of ≥0.92 would classify as high. The results suggest that, based on WFD Fish status, the Colligan estuary is moving in the right direction.

6. References

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

Keinänen, M., Käkelä, R., Ritvanen, T., Myllylä, T., Pönni, J. and Vuorinen, P.J., 2017. Fatty acid composition of sprat (*Sprattus sprattus*) and herring (*Clupea harengus*) in the Baltic Sea as potential prey for salmon (*Salmo salar*). Helgoland Marine Research, 71(1), p.4.

Marine Institute (Dublin, Ireland), Ireland. Department of the Marine, Ireland. Department of the Environment and Local Government, 1999. Ireland's marine and coastal areas and adjacent seas: an environmental assessment. Marine Institute.

Moyle, P.B., Lund, J.R., Bennett, W.A. and Fleenor, W.E., 2010. Habitat variability and complexity in the upper San Francisco Estuary. San Francisco Estuary and Watershed Science, 8(3).

Souza, A.T., Dias, E., Marques, J.C., Antunes, C. and Martins, I., 2015. Population structure, production and feeding habit of the sand goby *Pomatoschistus minutus* (Actinopterygii: Gobiidae) in the Minho estuary (NW Iberian Peninsula). Environmental biology of fishes, 98(1), pp.287-300.

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

www.fisheriesireland.ie
info@fisheriesireland.ie

+353 1 8842 600