Fish Stock Survey of Transitional Waters in the South Western River Basin District – Drongawn Lough

2016

Iascach Intíre Éireann
Inland Fisheries Ireland

Inland Fisheries Ireland

National Research Survey Programme

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

Acknowledgements

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

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1. Introduction

A fish stock survey was conducted on Drongawn Lough in the South Western River Basin District (SWRBD) as part of the programme of fish monitoring for the Water Framework Directive (WFD), between the 29th and 30th of October 2016 by staff from Inland Fisheries Ireland. Drongawn was surveyed previously in 2013 and 2010.

Drongawn Lough is a small transitional water body, covering an area of 0.12km², situated on Ireland's south-west coast, approximately 4.7km south-east of Sneem Village in Co. Kerry (Fig. 1.1). The estuary is connected to Coongar Harbour and the Kenmare River Estuary by a very narrow and silled inlet that restricts tidal exchange. As a result this transitional water is classified as a lagoon. Drongawn Lough is deep in places, with a maximum depth of 18m recorded (NPWS 2000). Access to this site is difficult due to its remote location, with little or no agricultural or anthropogenic activity in the surrounding area.

This water body lies within the Drongawn Lough SAC and, as a moderately sized saline lake lagoon, is listed in Annex I of the EU Habitats Directive as a priority habitat for protection (NPWS, 2000).
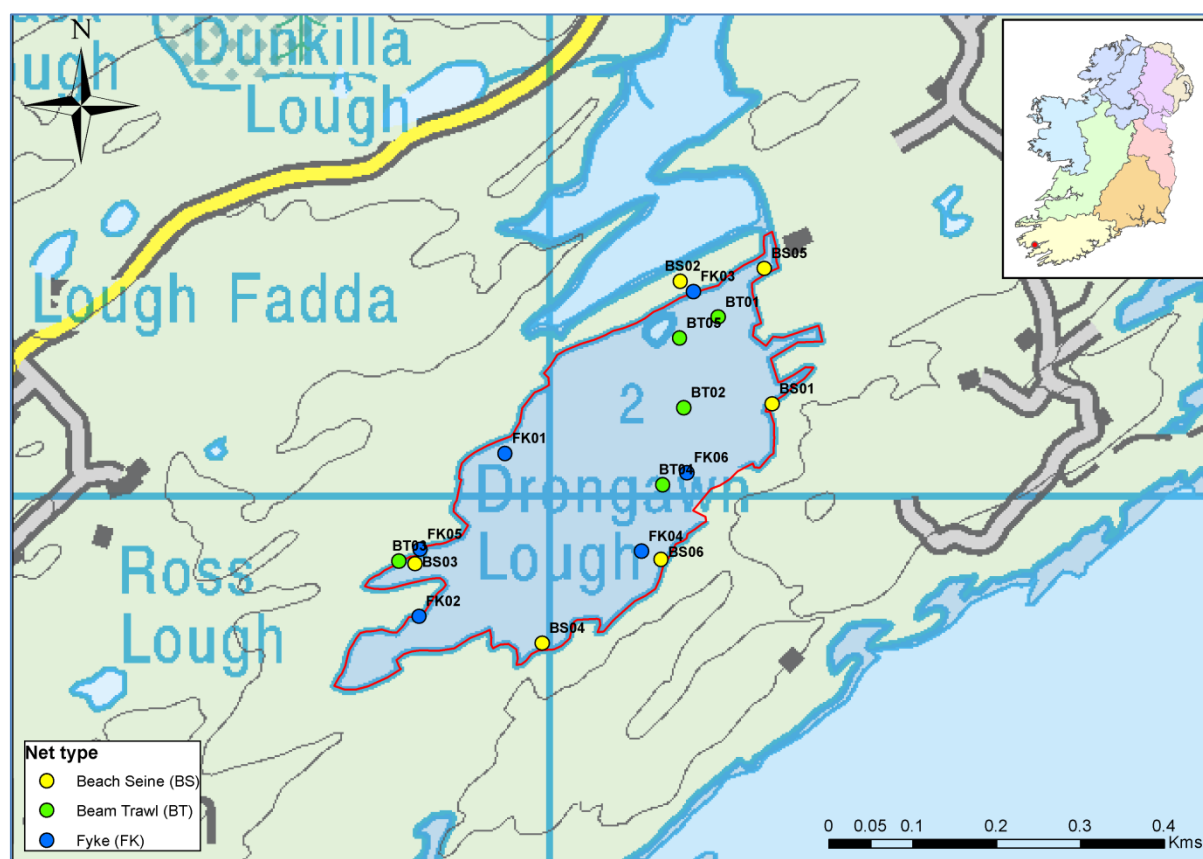

Fig 1.1: Location map of Drongawn indicating sample sites.

2. Methods

Current work in the UK and ROI indicates the need for a multi-method (combined 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.

The samples from all nets are processed on-site by identifying the fish 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 are retained for subsequent identification in the laboratory.

A total of six beach seines, six fyke nets and five beam trawls were deployed in Dromgawn lough in September 2016 (Fig 1.1).

3. Results

A total of 15 fish species were recorded in Drongawn Lough in September 2016 (Table 3.1). Species composition was notably different from the previous survey in 2013 (Table 3.1). Salinity values taken at beach seine sites ranged from 23ppt to 40ppt. Three-spined stickleback dominated the fish fauna, accounting for 75% of all captures during the survey. The majority of these (86%) were caught in the south-western section of the lagoon (BS03 and BS04, fig. 1.1). Three-spined sticklebacks capture numbers were far lower during the last survey in 2013 (Table 3.1). There was a notable reduction in European eel numbers, a critically endangered species (King et al., 2011), compared to 2013 (Fig: 3.1).

Table 3.1: Number of each fish species captured by each gear type in Drongawn Lough, September 2016 and comparison with the previous survey in 2013. Number of samples in brackets.

species scientific	Species common	Beach Seine 2016(6)	Beach Seine 2013(4)	Beam Trawl 2016(6)	Beam Trawl 2013(3)	Fyke net 2016(6)	Fyke net 2013(6)	Total 2016	Total 2013
Labrus bergylta	Ballan wrasse	3	0	0	0	47	0	50	0
Gobius niger	Black goby	28	6	0	0	6	6	34	12
Pollachius virens	Coalfish (Saithe)	1	0	0	0	5	0	6	0
Crenilabrus melops	Corkwing wrasse	0	0	0	0	2	4	2	4
Syngnathus typhle	Deep-snouted pipefish	12	2	0	0	0	0	12	2
Anguilla anguilla	European eel	0	0	0	0	10	33	10	33
Dicentrarchus labrax	European seabass	0	0	0	0	0	4	0	4
Spinachia spinachia	Fifteen-spined stickleback	5	0	0	0	0	0	5	0
Syngnathus rostellatus	Nilsson's pipefish	0	1	0	0	0	0	0	1
Scyliorhinus canicula	Lesser spotted dogfish	0	0	0	0	2	0	2	0
Pomatoschistus pictus	Painted goby	2	23	0	6	0	0	2	29
Pleuronectes platessa	Plaice	0	0	0	1	0	0	0	1
Pollachius pollachius	Pollack	0	0	0	0	1	3	1	3
Centrolabrus exoletus	Rock cook wrasse	0	2	0	0	0		0	2
Pomatoschistus minutus	Sand goby	1	4	0	0	0	0	1	4
Atherina presbyter	Sand smelt	22	182	0	0	0	0	22	182
Sprattus sprattus	Sprat	0	7	0	0	0	0	0	7
Lipophrys pholis	Blenny	0	0	0	0	1	0	1	0
Chelon labrosus	Thick-lipped grey mullet	5	19	0	0	1	0	6	19
Gasterosteus aculeatus	Three-spined stickleback	459	28	0	0	0	0	459	28

4. Discussion

A total of 15 fish species were among 613 fish recorded in Drongawn Lough in September 2016. Diversity and abundance could be considered low compared to other transitional water bodies around Ireland. However, small saline lagoons with limited access to the open sea would not be expected to have dense populations. The dominance of three-spined stickleback in the lough was unexpected. However the vast majority were caught at the furthest point from the entrance to the lagoon in a small shallow bay, where salinities are likely to be lower on average than the rest of the lagoon. No streams enter Drongawn Lough so any freshwater input is due to surface runoff. The average length of the catch was small

(3.7cm), indicating that it was made up of juveniles. It is likely that this population is endemic to the lough. It is possible that abundance varies greatly from year to year depending on rainfall, food availability and other factors. It is worth noting that when this site was sampled in 2013 and three-spined stickleback were present in far lower numbers than during the current survey, salinity was particularly high (53-54ppt). This was attributed to the dry summer of 2013 (Kelly *et al.* 2013). However, this is just speculation and further study would be required. Interestingly, Lough Gill, another coastal lagoon, albeit with very different characteristics, was sampled in September 2016 and three-spined stickleback dominated the fish fauna also. However it is impossible to conclude if these observations are related without data at finer temporal scales.

Although species richness in Drongawn Lough was the same as in 2013, population composition was quite different, which was unexpected, considering its isolated location and a lack of any obvious anthropogenic impacts. However, unlike other Irish lagoons such as Lough Gill, there is direct access to Drongawn lough around each high tide. This allows marine migrants such as coalfish, bass and sand smelt to enter and exit the lough during each tidal cycle. This is the most likely reason for the difference in population composition between two specific days three years apart. Further sampling at much finer temporal scales is required to confirm this. The presence of black gobies and wrasse species are typical of a rocky, saline habitat such as Drongawn lough. As expected, their presence was recorded during sampling in 2013 and 2016.

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 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).). Using this tool, Drongawn Lough has been assigned a draft ecological status classification of "moderate" (EQR=0.48) based on the fish populations present (Table 3.1). In addition, a second classification tool has been developed (Harrison and Kelly, 2013) known as the Estuarine Multimetric Fish Index (EMFI), which has also classified the estuary as achieving "moderate" status (EQR=6.4). This classification means that its status, based on both fish metric tools, has been downgraded since it was surveyed in 2013. This change is due to the dominance of three-spined stickleback in the 2016 survey.

Drongawn lough is in a very isolated location in the southwest of Ireland and there was no sign of anthropogenic impacts which could affect fish populations. The most likely explanation is simply that if conditions are right, the three-spined stickleback population in the lough can flourish. As it is a very small waterbody with limited habitat and foraging opportunities, it is understandable that a single species with a short life cycle could dominate over short time scales. Therefore expert opinion would suggest that this reduction

in status more due to sampling rather than any reduction in habitat quality. Increased sampling would confirm this.
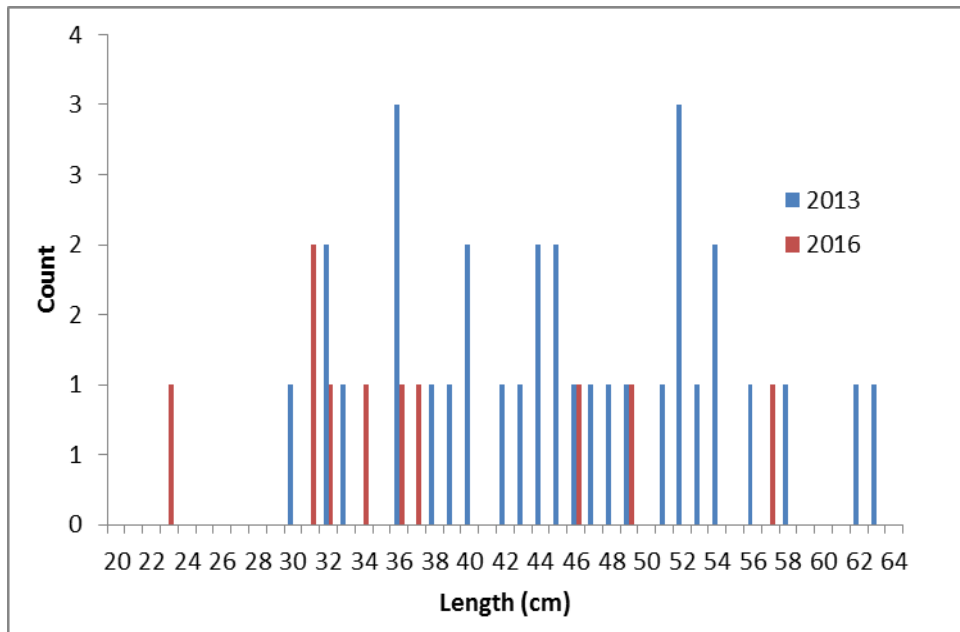

Fig. 3.1: Length frequency distribution for a subsample of eel in Drongawn lough, 2013 and 2015.

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