Kinvarra Bay and Bridge Lough

Sampling Fish for the Water Framework Directive - Transitional Waters 2009

The Central and Regional Fisheries Boards

ACKNOWLEDGEMENTS

The authors wish to gratefully acknowledge the help and co-operation of the CEO Dr. Greg Forde, the Assistant CEO Ms. Amanda Mooney and the staff of the Western Regional Fisheries Board. The authors would also like to gratefully acknowledge the help and cooperation from all their colleagues in the Central Fisheries Board and especially Dr. Jimmy King for his guidance with the transitional waters surveys.

We would like to thank the landowners and angling clubs that granted us access to their land and respective fisheries.

PROJECT STAFF

Project Director/Senior Research officer:	Dr. Fiona Kelly
Project Manager:	Dr. Andrew Harrison
Research Officer:	Dr. Ronan Matson
Research Officer:	Ms. Lynda Connor
Technician:	Ms. Róisín O'Callaghan
Technician	Ms. Gráinne Hanna
Technician	Mr. Rory Feeney
Technician:	Mrs. Ciara Wögerbauer
Technician:	Ms. Emma Morrissey
GIS Officer:	Mr. Kieran Rocks

The authors would also like to acknowledge the funding provided for the project from the Department of Communications Energy and Natural Resources for 2009.

TABLE OF CONTENTS

1. INTRODUCTION **3**

2. METHODS **5**

3. RESULTS **6**

3.1 Kinvarra Bay 6

3.2 Bridge Lough 8

4. SUMMARY **10**

5. REFERENCES **11**

1. INTRODUCTION

Fish stock surveys were conducted on two Kinvarra Bay transitional water bodies as part of the programme of fish monitoring for the Water Framework Directive (WFD), between the 12th and the 16th of October 2009 by staff from the Central Fisheries Board (CFB) and the Western Regional Fisheries Board (WRFB) (Table 1.1).

Kinvarra Bay is located on the south-eastern corner of Galway Bay, with Bridge Lough entering it on the north-western side (Plates. 1.1 and 1.2). For the purposes of WFD monitoring and reporting, this estuary system has been split into two separate water bodies, further details of which are given in each individual results section (Table 1.1).

Table 1.1. Transitional water bodies surveyed for the WFD fish surveillance monitoring programme, October 2009 (TW=transitional, L=Lagoon)

Transitional Water body	MS Code	Easting	Northing	Type	Area (km^2)
Kinvarra Bay	WE_160_0100	136233	212338	TW	5.73
Bridge Lough	WE_160_0200	133901	213038	L	0.08

Fig. 1.1. Location map of the two transitional water bodies on the Kinvarra Bay system surveyed for WFD fish monitoring, October 2009

Plate 1.1. Shoreline composed of rock and seaweed in Kinvarra Bay, October 2009

Plate 1.2. The main section of Bridge Lough. The causeway to the east of the lagoon along with some large rocks can be seen in the rear of the photo.

2. METHODS

Current work in the UK and ROI 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 CFB methodology for fish stock surveys in transitional waters for the WFD monitoring program.

Beach seining (Plate 2.1) 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.

Plate. 2.1. Hauling a seine net in Kinvarra Bay, October 2009

3. RESULTS

3.1 Kinvarra Bay

Kinvarra Bay covers an area of 5.73km² and is situated on Ireland's west coast, approximately 13km south-west of Galway City, on the southern end of Galway Bay (Fig. 3.1 and Plate 3.1). The surrounding land remains largely undeveloped.

This water body is situated within the Galway Bay Complex SAC, which is important for a number of salt marshes, a habitat listed in Annex I of the EU Habitats Directive. Annex II listed species present include the common seal (NPWS, 2006).

A total of six beach seines, six beam trawls and four fyke nets were deployed in Kinvarra Bay in October 2009. Due to the rocky shoreline beach seining proved to be very difficult.

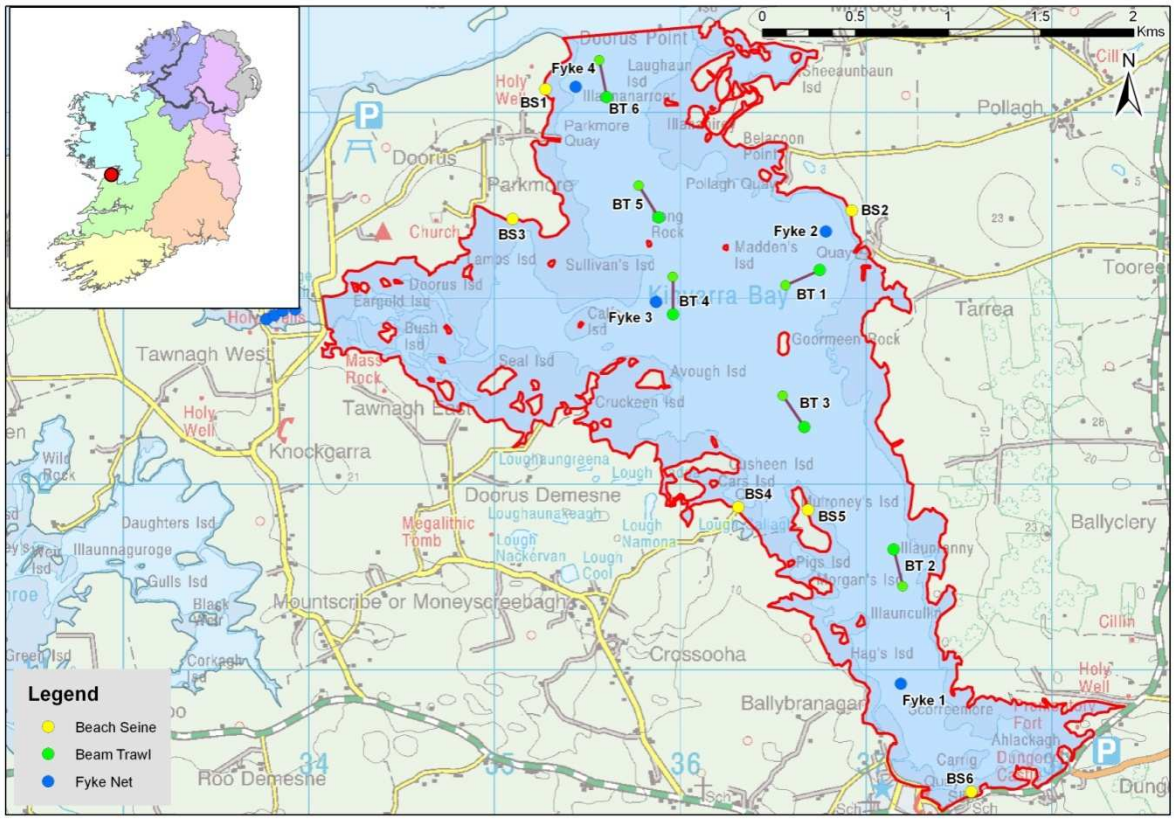

Fig 3.1. Location map of Kinvarra Bay indicating sampling sites, October 2009

A total of 18 fish species were recorded in the Kinvarra Bay in October 2009 (Table 3.1). Sand goby was the most abundant species captured, followed by cod and sand smelt (Table 3.1). Greater numbers of short-spined sea scorpion, blenny, ballan wrasse and corkwing wrasse were captured in Kinvarra Bay than in any other WFD transitional water body surveyed in 2009.

Cod ranged in length from 8.9cm to 22.5cm (Fig. 3.2)

Salinity values taken at each beach seine site ranged from 17.6ppt to 23.1ppt.

Table 3.1. Number of each fish species captured by each gear type in Kinvarra Bay, October 2009

Scientific name	Common Name	Beach seine (6)	Fyke net (4)	Beam trawl (6)	Total
Pomatoschistus minutus	Sand goby	8	-	46	54
Gadus morhua	Cod	-	22	1	23
Atherina presbyter	Sand smelt	18	-	-	18
Myoxocephalus scorpius	Short-spined sea scorpion	-	-	14	14
Lipophrys pholis	Blenny	-	-	12	12
Spinachia spinachia	Fifteen-spined stickleback	4	-	7	11
Ciliata mustela	Five-bearded rockling	2	7	-	9
Taurulus bubalis	Long-spined sea scorpion	-	1	5	6
Pholis gunnellus	Gunnel (Butterfish)	-	-	6	6
Labrus bergylta	Ballan wrasse	2	3	-	5
Pollachius pollachius	Pollack	2	3	-	5
Merlangius merlangus	Whiting	-	4	-	4
Symphodus melops	Corkwing wrasse	1	1	1	3
Anguilla anguilla	Eel	-	1	1	2
Limanda limanda	Dab	-	-	1	1
Platichthys flesus	Flounder	-	-	1	1
Pleuronectes platessa	Plaice	-	-	1	1
Trisopterus minutus	Poor cod	-	1	-	1

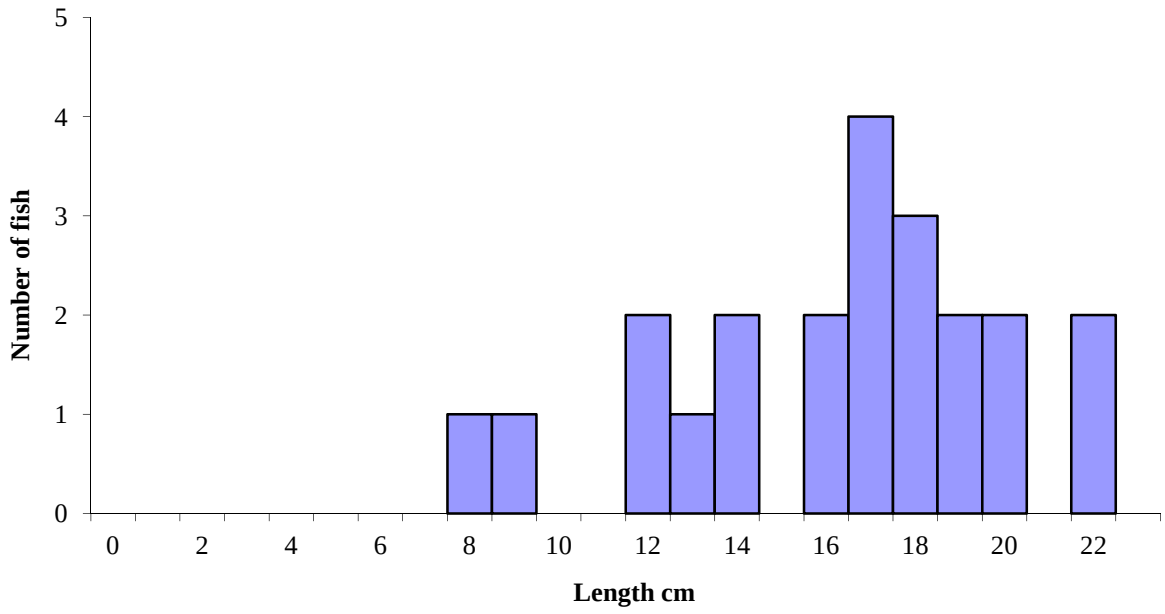

Fig. 3.2. Length frequency distribution of a sub-sample of cod captured in Kinvarra Bay, October 2009 (n = 22)

3.2 Bridge Lough

Bridge Lough is a small, shallow water body, covering an area of 0.08km^2, that joins the north-western side of Kinvarra Bay (Fig. 3.3 and Plate 3.2). It is a shallow lagoon, with large submerged rocks spread throughout, making access for sampling difficult. Bridge Lough is divided into two areas; the main section (approximately 5ha) of the lagoon is situated between a causeway on the eastern shore and a road on the western shore (Fig. 3.2). The smaller section of the lagoon lies to the west of the road and is very shallow and much rockier. Bridge Lough appears to be highly eutrophic, with deep layers of anoxic sediment and thick growths of filamentous algae evident during the time of the survey. This is likely due to the lagoon being impounded by a causeway, with very limited tidal exchange through a small outlet running under the road at the southern end.

A total of four fyke nets were deployed in Bridge Lough in October 2009. Beach seines and beam trawls could not be conducted due to the shallow and rocky nature of the lagoon.

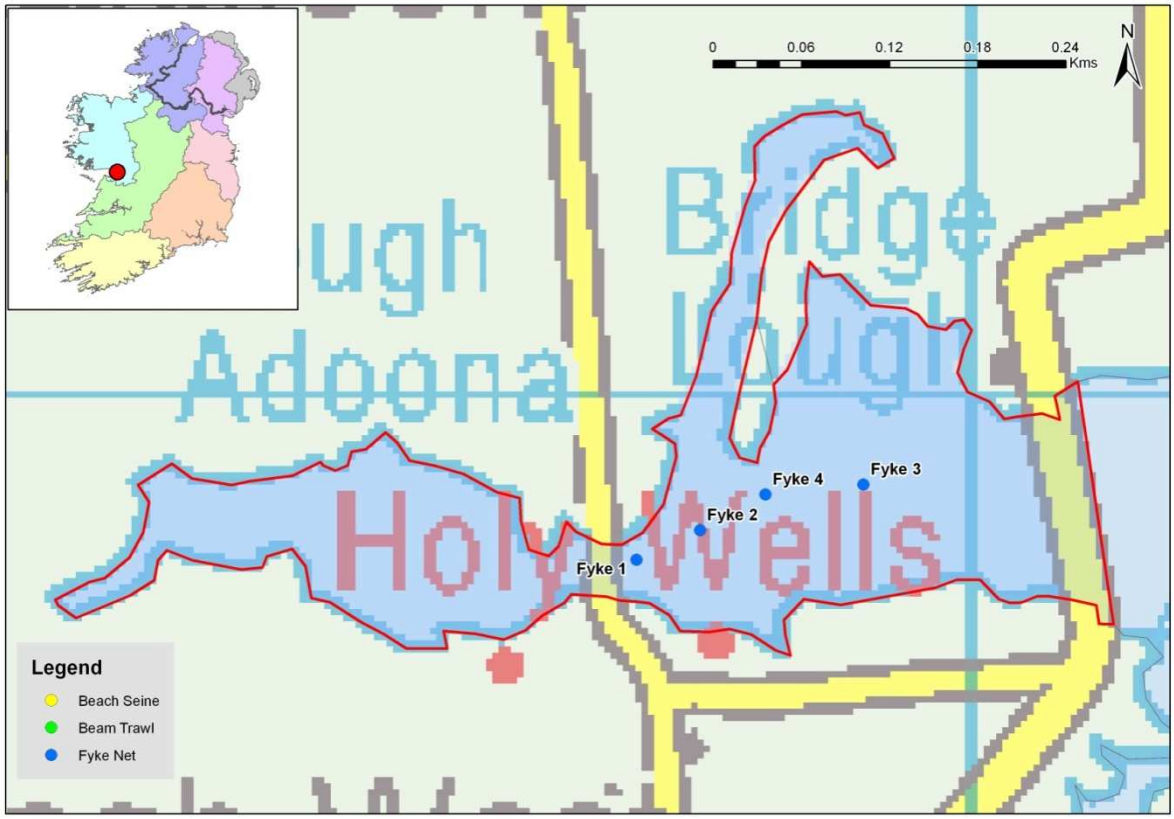

Fig. 3.3. Location map of Bridge Lough indicating sample sites, October 2009

A total of three fish species were recorded in Bridge Lough in October 2009 (Table 3.2). Thick-lipped grey mullet was the most abundant species captured, followed by eels and three-spined stickleback (Table 3.2).

Thick-lipped grey mullet ranged in length from 13.4m to 30.2m (Fig. 3.4).

Table 3.2. Number of each species captured by each gear type in Bridge Lough, October 2009

Scientific name	Common Name	Beach seine (0)	Fyke net (4)	Beam trawl (0)	Total
Chelon labrosus	Thick-lipped grey mullet	-	102	-	102
Anguilla anguilla	Eel	-	21	-	21
Gasterosteus aculeatus	Three-spined stickleback	-	8	-	8

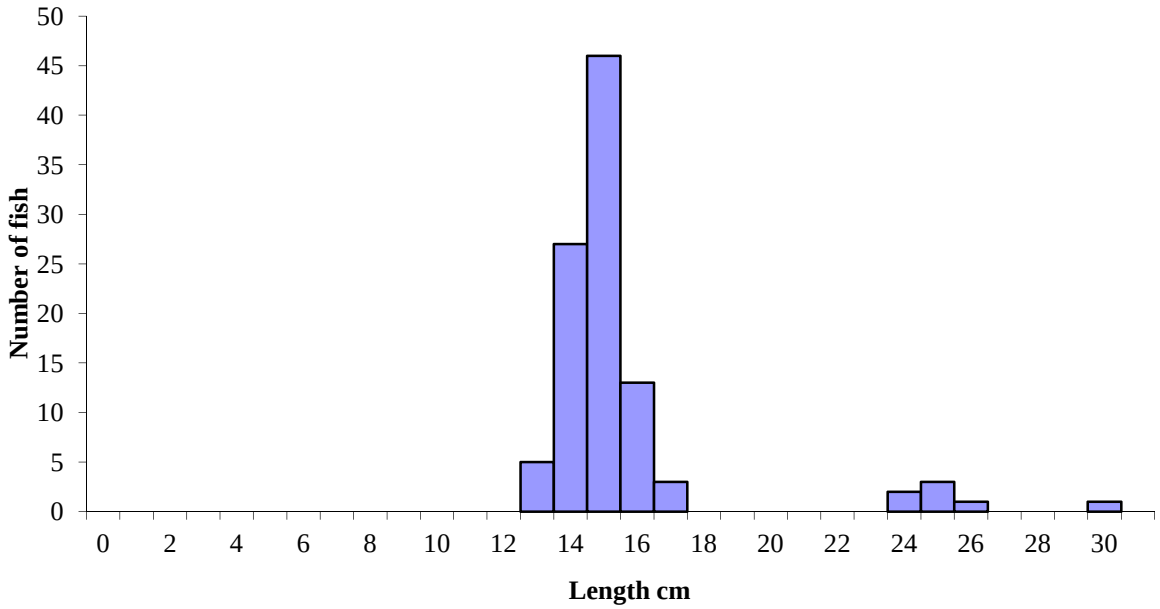

Fig. 3.4. Length frequency distribution of a sub-sample of thick-lipped grey mullet captured in Bridge Lough, October 2009 (n = 101)

4. SUMMARY

A total of 18 and 3 fish species were recorded in Kinvarra Bay and Bridge Lough, respectively. Kinvarra Bay had the second highest species richness of all WFD transitional water bodies surveyed in the WRFB in 2009, whereas Bridge Lough had the second lowest. Species richness and distribution among all transitional water bodies surveyed during 2009 can be seen in the 2009 WFD summary report (Kelly *et al.*, 2010).

The species composition recorded in Kinvarra Bay reflected a more marine type of environment, with little freshwater influence and a greater variety of habitat available. In contrast, the relatively low number of species recorded in Bridge Lough may be attributed to a number of factors: only one method, fyke nets, could be deployed, thereby resulting ina reduced sampling effort; Bridge Lough has little variety of habitat because it is a small lagoon— in fact, it is the smallest transitional water body surveyed as part of the WFD; and the causeway separating this water body from Kinvarra Bay may impede the movement of fish and the influx of seawater into Bridge Lough.

An essential step in the WFD monitoring process is the classification of the 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 Northern Ireland Environment Agency (NIEA) and CFB 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, Kinvarra Bay has been assigned a draft ecological status classification of “Good” and Bridge Lough has been assigned a draft ecological status classification of “Poor” based on the fish populations present.

The EPA have assigned Kinvarra Bay an overall interim draft classification of “Good” status, based on general physico-chemical elements, phytoplankton and macroalgal growths.

5. REFERENCES

Coates, S., Waugh A., Anwar A. and Robson M. (2007) Efficacy of a multi-metric fish index as an analysis tool for the transitional fish component of the Water Framework Directive. *Marine Pollution Bulletin*, **55**, 225-240.

Harrison, T.D. and Whitfield, A.K. (2004) A multi-metric index to assess the environmental condition of estuaries. *Journal of Fish Biology*, **65**, 683-710

Kelly, F., Harrison, A., Connor, L., Matson, R., Wightman, G., Morrissey, E., O'Callaghan, R., Feeney, R., Hanna, G., Wögerbauer, C. and Rocks, K. (2010) *Sampling Fish for the Water Framework Directive – Summary Report 2009*. Central and Regional Fisheries Boards.

King, J.J., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., Fitzpatrick, Ú., Gargan, P.G., Kelly, F.L., O' Grady, M.F., Poole, R., Roche, W.K. and Cassidy, D. (2011) *Ireland Red List No. 5: Amphibians, Reptiles and Freshwater Fish*. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

NPWS (2006) Galway Bay Complex, *Site synopsis, site code: 000268*. Available at: http://www.npws.ie/media/npwsie/content/images/protectedsites/sitesynopsis/SY000268.pdf

The Central Fisheries Board
Swords Business Campus,
Swords,
Co. Dublin,
Ireland.

Web: www.wfdfish.ie
www.cfb.ie
Email: info@cfb.ie
Tel: +353 1 8842600
Fax: +353 1 8360060

The Central and Regional Fisheries Boards