



# Sampling Fish for the Water Framework Directive

Transitional Waters 2010

**Greater Cork Harbour**



Iascach Intíre Éireann  
Inland Fisheries Ireland

## ACKNOWLEDGEMENTS

The authors wish to gratefully acknowledge the help and co-operation of the Director Dr. Pat Buck and staff from IFI, Macroom as well as other offices throughout the region. The authors also gratefully acknowledge the help and cooperation of their colleagues in IFI, Swords.

The landowners and angling clubs that granted access to their land and respective fisheries are also gratefully acknowledged.

We would also like to thank Dr. Martin O' Grady (IFI) and No. 3 Operational Wing, Irish Air Corps (Aer Chór na hÉireann) for the aerial photographs and Staff from the IFI's Large Patrol Vessel, An Cosantóir Brádan who provided support during these surveys.

## 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	Mr. Rory Feeney
Technician:	Ms. Emma Morrissey
Technician:	Mrs. Ciara Wögerbauer
GIS Officer:	Mr. Kieran Rocks
Fisheries Assistant:	Ms. Gráinne Hanna (Oct 2010 – Dec 2010)
Fisheries Assistant:	Mr. Kevin Gallagher (Oct 2010 – Dec 2010)

The authors would also like to acknowledge the funding provided for the project from the Department of Communications Energy and Natural Resources for 2010.

*The report includes Ordnance Survey Ireland data reproduced under OSI Copyright Permit No. MP 007508.*

*Unauthorised reproduction infringes Ordnance Survey Ireland and Government of Ireland copyright.  
© Ordnance Survey Ireland, 2010*

## TABLE OF CONTENTS

<b>1. INTRODUCTION.....</b>	<b>1</b>
<b>2. METHODS .....</b>	<b>2</b>
<b>3. RESULTS .....</b>	<b>4</b>
<b>3.1 Water body surveys .....</b>	<b>4</b>
<b>3.1.1 Glashaboy Estuary .....</b>	<b>4</b>
<b>3.1.2 Lower Lee Estuary.....</b>	<b>7</b>
<b>3.1.3 Upper Lee Estuary .....</b>	<b>9</b>
<b>3.1.4 Lough Mahon .....</b>	<b>11</b>
<b>3.1.5 Lough Mahon (Harper's Island) .....</b>	<b>13</b>
<b>3.1.6 North Channel Great Island .....</b>	<b>15</b>
<b>3.1.7 Owenacurra Estuary .....</b>	<b>18</b>
<b>3.2 Species richness.....</b>	<b>21</b>
<b>4. SUMMARY .....</b>	<b>22</b>
<b>5. REFERENCES.....</b>	<b>24</b>

## 1. INTRODUCTION

Fish stock surveys were conducted in Greater Cork Harbour, as part of the programme of fish monitoring for the Water Framework Directive (WFD) between the 18<sup>th</sup> and the 22<sup>nd</sup> of October 2010 by staff from Inland Fisheries Ireland (Table 1.1, Fig.1.1).

Greater Cork Harbour comprises a large, complex estuary system on the south-west coast of Ireland. For the purposes of WFD monitoring and reporting, this large estuary system has been split into seven separate water bodies (Table 1.1), further details of which are given in each individual results section.

**Table 1.1. Transitional water bodies surveyed for the WFD fish surveillance monitoring programme, October 2010 (TW=transitional)**

Transitional water body	MS Code	Easting	Northing	Type	Area (km <sup>2</sup> )
Glashaboy Estuary	SW_060_0800	172449	73470	TW	0.12
Lee (Cork) Estuary, Lower	SW_060_0900	172082	72051	TW	0.89
Lee (Cork) Estuary, Upper	SW_060_0950	165903	71693	TW	0.25
Mahon, Lough	SW_060_0750	177107	69092	TW	12.23
Mahon, Lough (Harper's Island)	SW_060_0700	180271	72382	TW	2.05
North Channel Great Island	SW_060_0300	183669	69611	TW	7.96
Owenacurra Estuary	SW_060_0400	188010	71718	TW	1.12



**Fig. 1.1. Location map of the seven transitional water bodies in the Greater Cork Harbour estuary system surveyed for WFD fish monitoring, October 2010**

## 2. METHODS

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.

Beach seining is conducted using a 30m x 3m net (10mm mesh size) to capture fish in littoral areas (Plate 2.1). 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, while scales are only collected for certain species, such as salmon and sea trout. Unidentified specimens were retained for subsequent identification in the laboratory.

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.



**Plate 2.1. Retrieving a beach seine in the Glashaboy Estuary**

### **3. RESULTS**

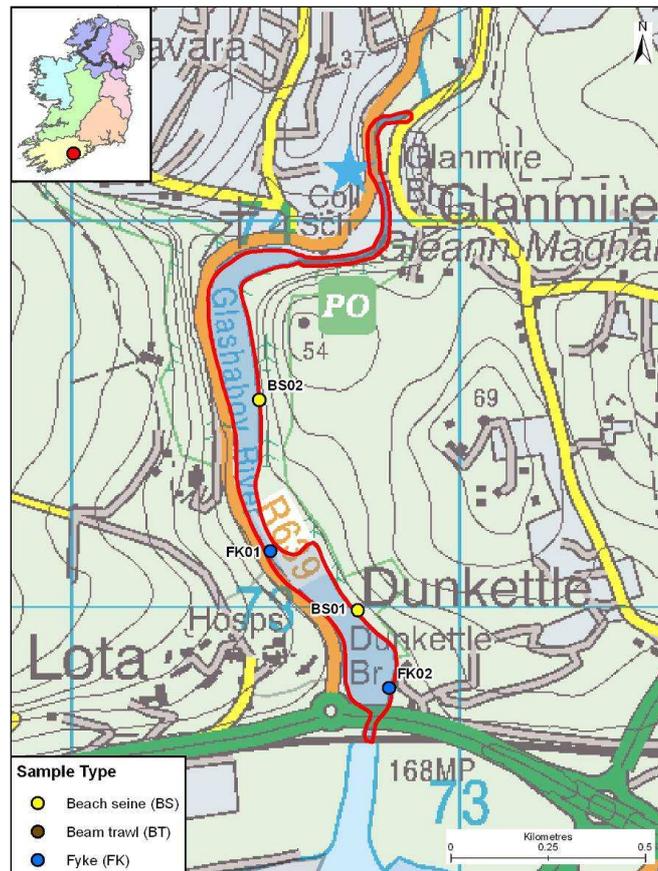
#### **3.1 Water body surveys**

##### ***3.1.1 Glashaboy Estuary***

The Glashaboy Estuary is a small estuary covering an area of 0.12km<sup>2</sup>, located approximately 5km east of Cork City on Ireland's south coast (Fig. 3.1). The estuary receives freshwater from the Glashaboy River which runs south through the town of Glanmire. Both sides of the estuary are heavily wooded, with the Glanmire Road separating the forestry from the channel on the right-hand bank. The Glashaboy Estuary is long and narrow with mainly riverine influences characterising it. Its substrate is predominantly composed of a thin layer of mud covering a mix of gravel and stones. Significant amounts of fallen trees and branches also litter its bottom, making navigation difficult, particularly at low tide.

The Glashaboy Estuary is a part of the Cork Harbour SPA and is important for its wetland habitats that support large numbers of wintering wildfowl (NPWS, 2004).

A total of two beach seines and two fyke nets were deployed in the Glashaboy Estuary in October 2010. No beam trawls were used due to the nature of the substrate and the obstacles presented by fallen trees and submerged branches.



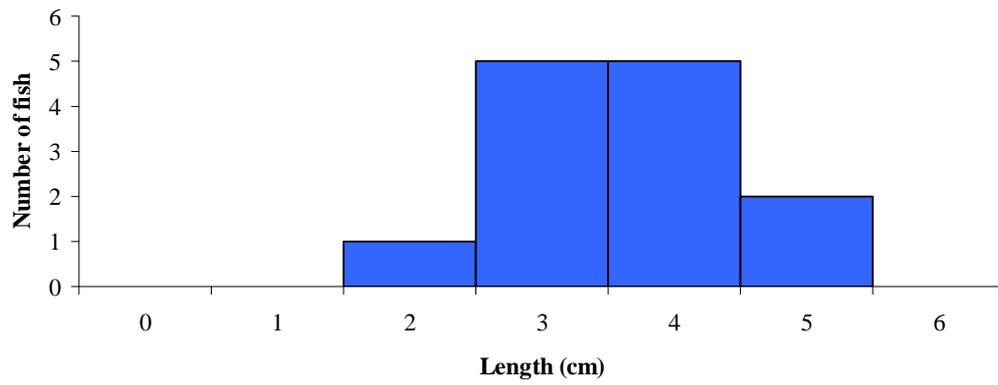
**Fig. 3.1. Location map of the Glashaboy Estuary indicating sample sites, October 2010**

A total of three fish species were recorded in the Glashaboy Estuary in October 2010 (Table 3.1). Sand goby was the most abundant species, followed by thick-lipped grey mullet and flounder (Table 3.1). Thick-lipped grey mullet, a popular species targeted by anglers, ranged in length from 2.9cm to 5.2cm, indicating the presence of a cohort of juveniles (Fig. 3.2). A similar number of fish was caught in this transitional water body when it was sampled in 2008, although no eels were recorded on this occasion (Kelly *et al.*, 2009a).

Salinity values taken at beach seine and beam trawl sites ranged from 21.6ppt to 23.3ppt.

**Table 3.1. Number of each species captured by each gear type in Glashaboy Estuary, October 2010**

Scientific name	Common name	Beach seine (2)	Fyke net (2)	Beam trawl (0)	Total
<i>Pomatoschistus minutus</i>	Sand goby	178	-	-	178
<i>Chelon labrosus</i>	Thick-lipped grey mullet	13	-	-	13
<i>Platichthys flesus</i>	Flounder	2	6	-	8

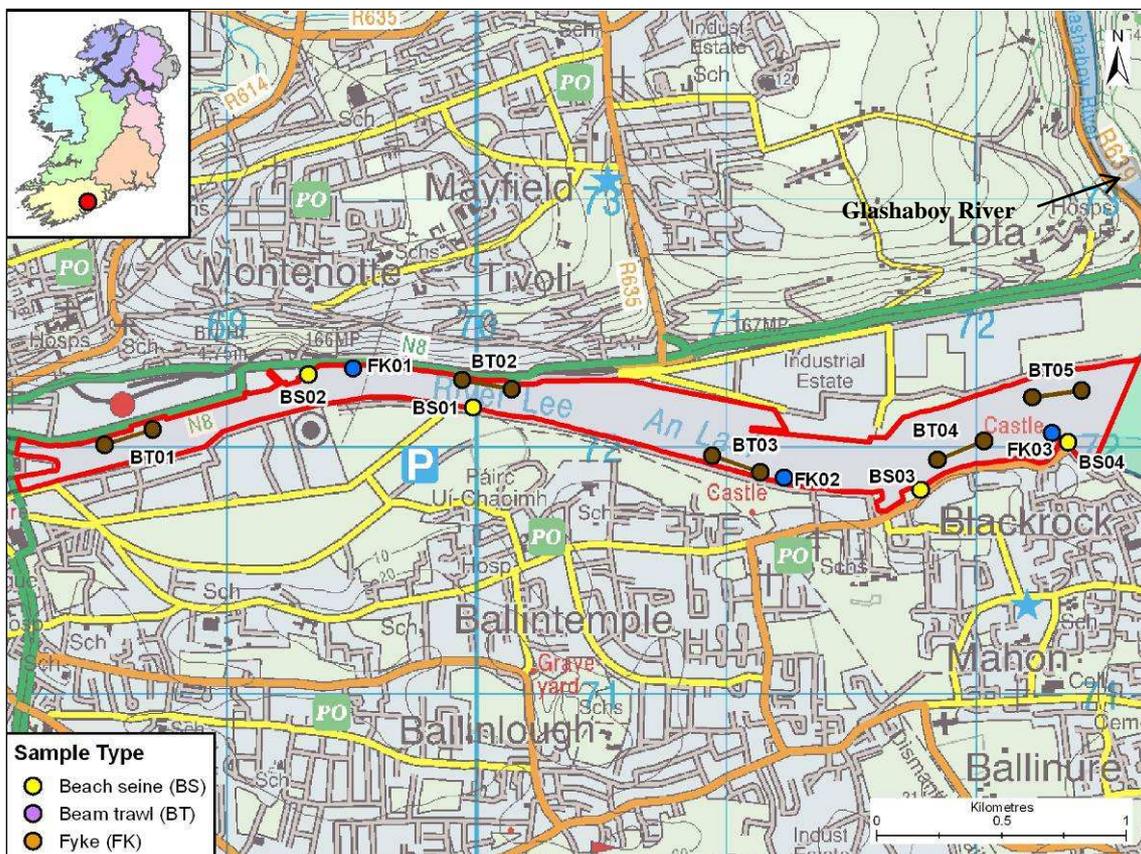


**Fig. 3.2. Length frequency distribution of thick-lipped grey mullet in the Glashaboy Estuary, October 2010 (n=13)**

### 3.1.2 Lower Lee Estuary

The Lee Estuary (Fig. 3.3) covers an area of 0.89 km<sup>2</sup>. It is located in Cork, separating the south side from the north side of the city. The vast majority of river bank in this water body has been modified and manipulated over time to allow for urban development, including activities such as river channelisation, dredging, wall building and pier construction. The River Lee is the main river entering the estuary and primarily drains small farms and moorlands. The Lower Lee Estuary begins at the Albert Street Bridges and extends downstream for approximately 4.2km to the mouth of the Glashaboy River.

A total of four beach seines, three fyke nets and four beam trawls were deployed in the Lower Lee Estuary in October 2010.



**Fig. 3.3. Location map of the Lower Lee Estuary indicating sample sites, October 2010**

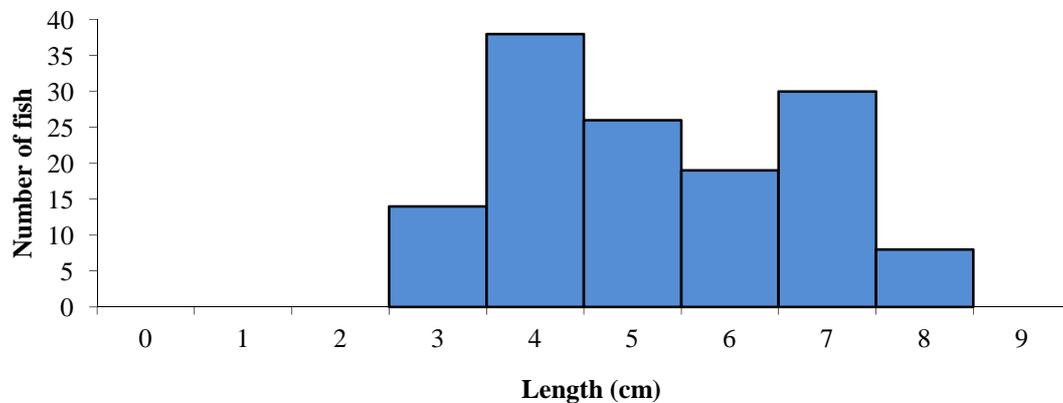
A total of nine fish species were recorded in the Lower Lee Estuary in October 2010 (Table 3.2). Sand goby was the most abundant species followed by common goby and thick-lipped grey mullet (Table 3.2). No species was recorded using all three netting methods, although large numbers of sand gobies were captured using both beach seines and beam trawls.

Sand goby ranged in length from 3.0cm to 8.9cm, with two age classes (0+ and 1+) dominant (Fig. 3.4). A similar species complement was recorded, when this water body was surveyed in 2008 (Kelly *et al.*, 2009b) although no beam trawl nets were deployed on that occasion.

Salinity values taken at beach seine and beam trawl sites ranged from 0.50ppt to 18.70ppt.

**Table 3.2. Number of each species captured by each gear type in the Lower Lee Estuary, October 2010**

Scientific name	Common name	Beach seine (4)	Fyke net (3)	Beam trawl (4)	Total
<i>Pomatoschistus minutus</i>	Sand goby	192	-	280	472
<i>Pomatoschistus microps</i>	Common goby	143	-	-	143
<i>Chelon labrosus</i>	Thick-lipped grey mullet	8	-	-	8
<i>Gadus morhua</i>	Cod	-	3	-	3
<i>Platichthys flesus</i>	Flounder	1	2	-	3
<i>Spinachia spinachia</i>	Fifteen-spined stickleback	3	-	-	3
<i>Ciliata mustela</i>	Five-bearded rockling	-	1	-	1
<i>Pleuronectes platessa</i>	Plaice	-	1	-	1
<i>Pollachius pollachius</i>	Pollack	-	1	-	1

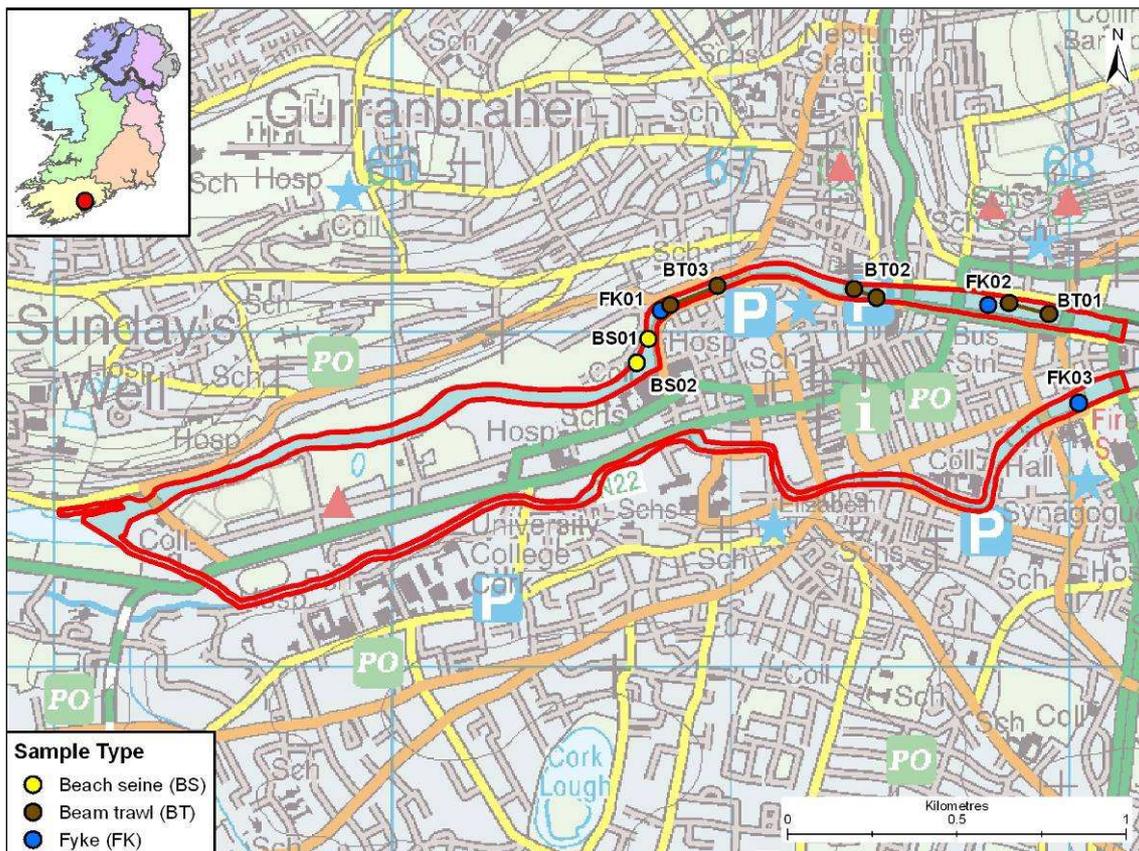


**Fig. 3.4. Length frequency distribution of a sub-sample of sand goby in the Lower Lee Estuary, October 2010 (n=135)**

### 3.1.3 Upper Lee Estuary

The Upper Lee Estuary (Fig. 3.5) covers an area of 0.25 km<sup>2</sup>, beginning at the weir in Lee Fields and extending downstream for approximately 3km to the Albert Street Bridges. As with the Upper Lee Estuary, the vast majority of the Lower Lee's banks have been modified to allow for urban development.

A total of two beach seines, three fyke nets and three beam trawls were deployed in the Upper Lee Estuary in October 2010.



**Fig. 3.5. Location map of the Upper Lee Estuary indicating sample sites, October 2010**

A total of nine fish species (sea trout are included as a separate ‘variety’ of trout) were recorded in the Upper Lee Estuary in October 2010 (Table 3.3). Common goby was the most abundant species, followed by sand goby and flounder (Table 3.3). A greater species diversity was recorded in 2011 than in the previous survey done in 2008 (Kelly *et al.*, 2009b), although no beam trawl nets were deployed on that occasion.

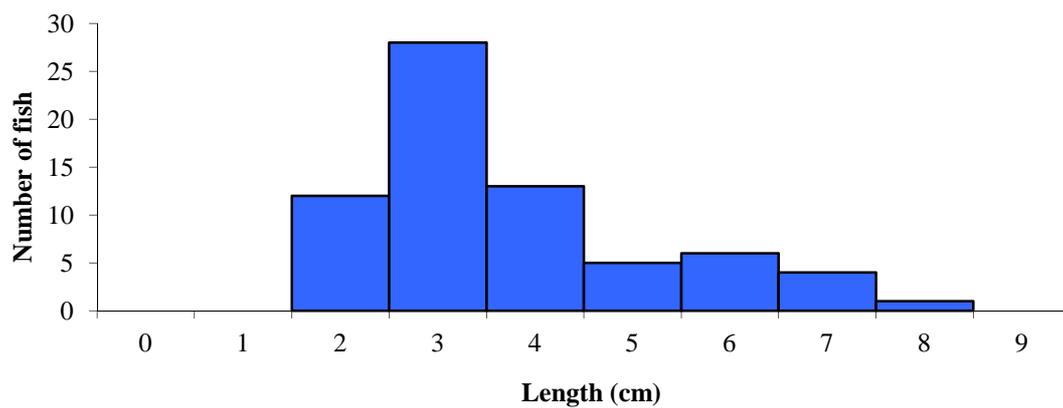
No species was recorded using all three netting methods, however, flounder appeared to be the most well distributed species being caught using both beach seines and beam trawls, albeit in low numbers.

Sand goby ranged in length from 2.4cm to 8.7cm (Fig. 3.6).

Salinity values taken at beach seine and beam trawl sites ranged from 3.4ppt to 11.2ppt.

**Table 3.3. Number of each species captured by each gear type in the Upper Lee Estuary, October 2010**

Scientific name	Common name	Beach seine (2)	Fyke net (3)	Beam trawl (3)	Total
<i>Pomatoschistus microps</i>	Common goby	128	-	-	128
<i>Pomatoschistus minutus</i>	Sand goby	-	-	69	69
<i>Platichthys flesus</i>	Flounder	2	-	6	8
<i>Syngnathus rostellatus</i>	Nilsson's pipefish	-	-	4	4
<i>Anguilla anguilla</i>	European eel	-	2	-	2
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	2	-	-	2
<i>Trachurus trachurus</i>	Scad	-	2	-	2
<i>Pleuronectes platessa</i>	Plaice	-	1	-	1
<i>Salmo trutta</i>	Sea trout	-	1	-	1



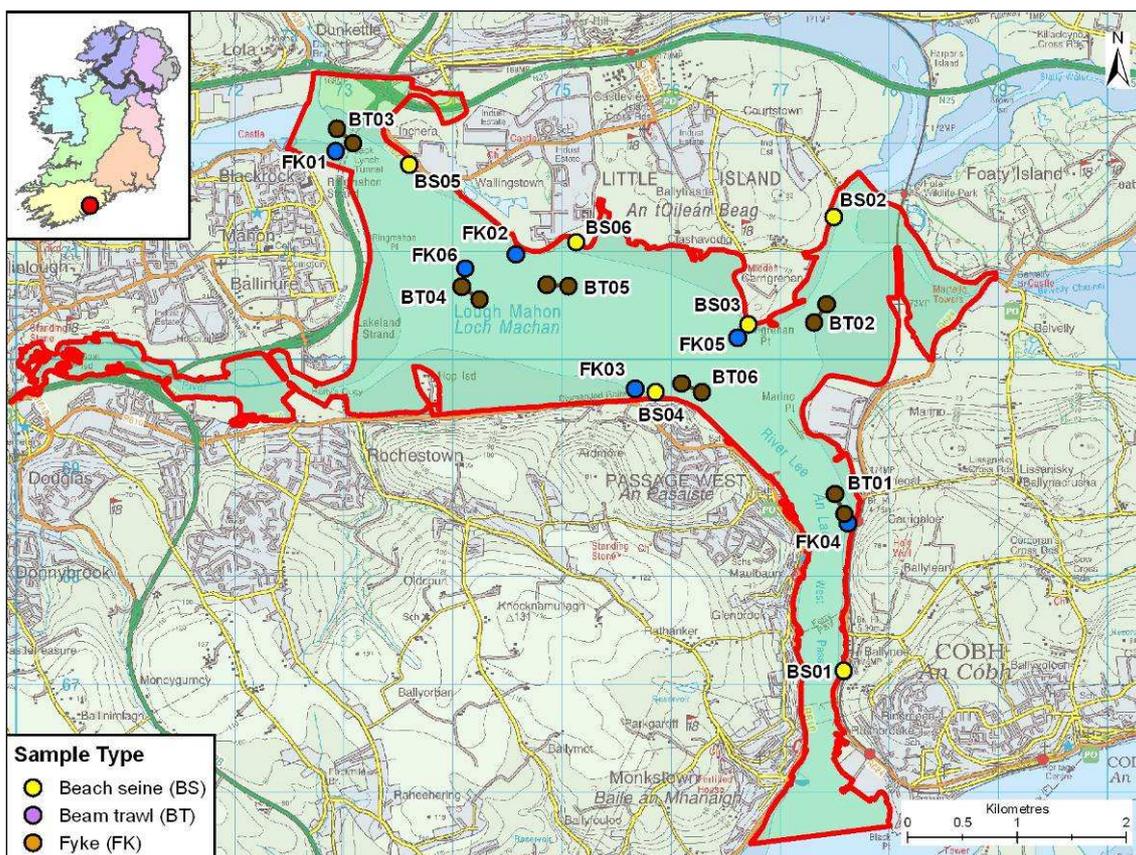
**Fig. 3.6. Length frequency distribution of sand goby in the Upper Lee Estuary, October 2010 (n=69)**

### 3.1.4 Lough Mahon

Lough Mahon (Fig. 3.7) is a relatively large water body, covering an area of 12.23km<sup>2</sup>. It stretches from Blackrock to Passage West and incorporates the Douglas River Estuary. Several of Cork City's southern suburbs, including Blackrock, Mahon, Douglas and Rochestown lie along its shores. The estuary is strongly influenced by the marine environment and receives water from the Rivers Lee, Glashaboy and Douglas.

This water body lies partially within the Cork Harbour SPA (see Section 3.1.1). The far eastern end of this transitional water body is also included in the Great Island Channel SAC, an important SAC for sheltered tidal sand/mudflats and Atlantic salt meadows, two Annex I listed habitats in the EU Habitats Directive (NPWS, 2001).

A total of six beach seines, six fyke nets and six beam trawls were deployed in Lough Mahon in October 2010.



**Fig. 3.7. Location map of Lough Mahon Estuary indicating sample sites, October 2010**

A total of 16 fish species were recorded in Lough Mahon in October 2010 (Table 3.4). Sprat was by far the most abundant species, followed by sand goby and two-spotted goby (69). Red Data Book listed (King *et al.*, 2011) species that were recorded included eels and flounder. Flounder was the

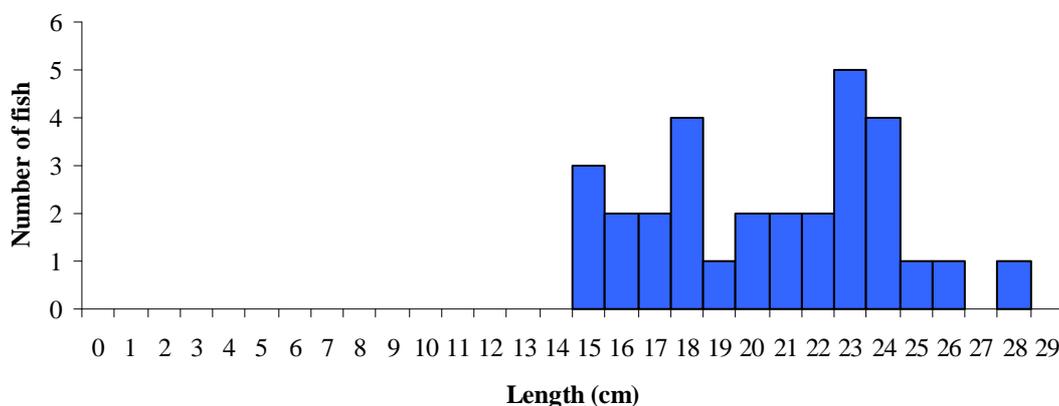
only species captured using all three netting methods, although relatively low numbers were caught in comparison with other species. A slightly higher species diversity was recorded in Lough Mahon in 2011 than during the previous survey in 2008 (Kelly *et al.*, 2009c), although no beam trawl nets were deployed on the earlier occasion.

Cod, an important species for both anglers and commercial fisheries, ranged in length from 15.7cm to 28.0cm (Fig. 3.8).

Salinity values taken at beach seine and beam trawl sites ranged from 16.8ppt to 25.3ppt.

**Table 3.4. Number of each species captured by each gear type in Lough Mahon Estuary, October 2010**

Scientific name	Common name	Beach seine (6)	Fyke net (6)	Beam trawl (6)	Total
<i>Sprattus sprattus</i>	Sprat	4118	-	-	4118
<i>Pomatoschistus minutus</i>	Sand goby	348	-	17	365
<i>Gobiusculus flavescens</i>	Two-spot goby	69	-	-	69
<i>Atherina presbyter</i>	Sand smelt	35	-	-	35
<i>Gadus morhua</i>	Cod	-	33	-	33
<i>Platichthys flesus</i>	Flounder	8	3	2	13
<i>Pleuronectes platessa</i>	Plaice	7	-	3	10
<i>Trachurus trachurus</i>	Scad	5	-	-	5
<i>Anguilla anguilla</i>	European eel	-	2	-	2
<i>Chelon labrosus</i>	Thick-lipped grey mullet	2	-	-	2
<i>Pomatoschistus microps</i>	Common goby	2	-	-	2
<i>Callionymus lyra</i>	Common dragonet	-	-	1	1
<i>Ciliata mustela</i>	Five-bearded rockling	-	1	-	1
<i>Pholis gunnellus</i>	Gunnel (Butterfish)	1	-	-	1
<i>Spinachia spinachia</i>	Fifteen-spined stickleback	1	-	-	1
<i>Syngnathus acus</i>	Greater pipefish	1	-	-	1



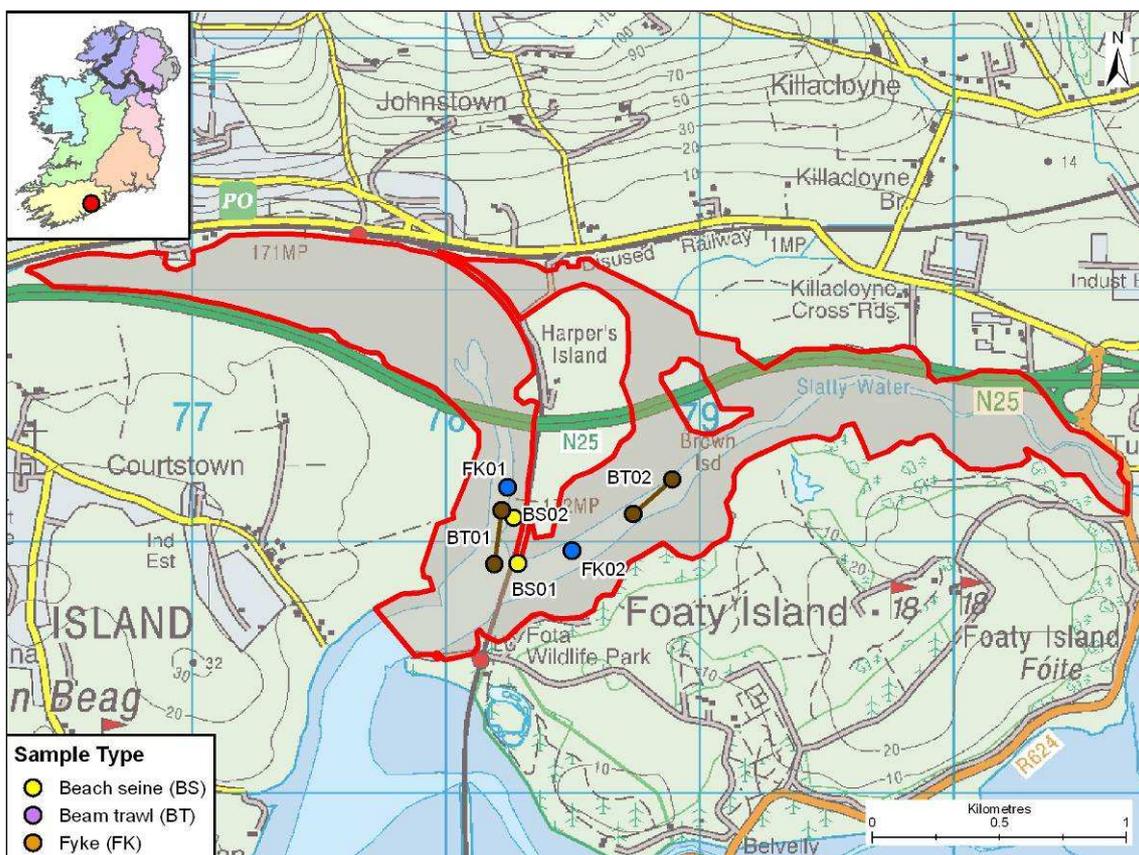
**Fig. 3.8. Length frequency distribution of a sub-sample of cod in Lough Mahon, October 2010 (n=30)**

### 3.1.5 Lough Mahon (Harper's Island)

The Harper's Island transitional water body is relatively small in size, covering an area of 2.1km<sup>2</sup>. It is located north-east of Lough Mahon, approximately 6km east of Cork City and completely surrounds Harper's Island (Fig. 3.9). The predominant bed type in the estuary is mud with some areas of gravel and stones. Freshwater is supplied to this water body by the Slatty Water, which drains the area around Carrigtohill, 1km to the east (Fig. 3.9). Wastewater from this town discharges into the Slatty Water.

Lough Mahon (Harper's Island) lies within both the Great Island Channel SAC (see Section 3.1.4) and Cork Harbour SPA (see Section 3.1.1).

A total of two beach seines, two fyke nets and two beam trawls were deployed in Lough Mahon (Harper's Island) in October 2010. The upper estuary contains extensive mud flats and was not accessible even at high tide, thus restricting sampling to lower parts of the estuary.



**Fig. 3.9. Location map of Lough Mahon (Harper's Island) indicating sample sites, October 2010**

A total of 10 fish species were recorded in Lough Mahon (Harper's Island) in October 2010 (Table 3.5). Sand goby was the most abundant species followed by sprat (Table 3.5). No species was captured using all three netting methods, however, sand goby and flounder were caught using both

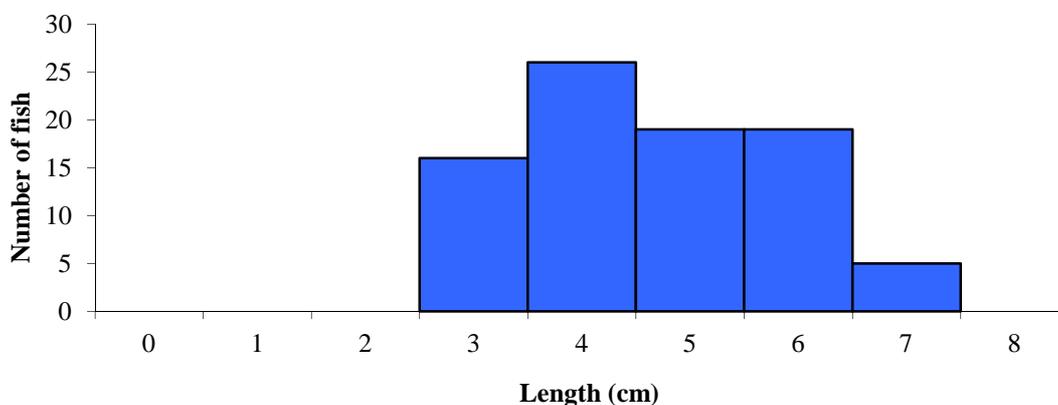
beach seines and fyke nets. Several species of commercial or angling importance, including cod, flounder, eel and European sea bass, were recorded in relatively low numbers. Again a slightly higher number of species was recorded in this water body in 2011, than in the previous 2008 survey (Kelly *et al.* 2009d), although no beam trawl nets were deployed during that survey.

Sand goby ranged in length from 2.4cm to 9.0cm (Fig. 3.10).

Salinity values taken at beach seine and beam trawl sites ranged from 20.60ppt to 24.40ppt.

**Table 3.5. Number of each species captured by each gear type in Lough Mahon (Harper's Island), October 2010**

Scientific name	Common name	Beach seine (2)	Fyke net (2)	Beam trawl (2)	Total
<i>Pomatoschistus minutus</i>	Sand goby	242	-	40	282
<i>Sprattus sprattus</i>	Sprat	30	-	-	30
<i>Gadus morhua</i>	Cod	-	4	-	4
<i>Platichthys flesus</i>	Flounder	2	2	-	4
<i>Gobiusculus flavescens</i>	Two-spot goby	3	-	-	3
<i>Atherina presbyter</i>	Sand smelt	2	-	-	2
<i>Anguilla anguilla</i>	European eel	-	1	-	1
<i>Ciliata mustela</i>	Five-bearded rockling	-	1	-	1
<i>Dicentrarchus labrax</i>	European seabass	1	-	-	1
<i>Syngnathus acus</i>	Greater pipefish	-	-	1	1



**Fig. 3.10. Length frequency distribution of a sub-sample of sand goby in Lough Mahon (Harper's Island), October 2010 (n=85)**

### 3.1.6 North Channel Great Island

The North Channel Great Island transitional water body covers an area of 7.96km<sup>2</sup> and is located approximately 15km east of Cork City (Fig. 3.11, Plate 3.1). It is strongly influenced by the marine environment and has a substrate composed of mainly mud, with some areas of gravel and stones. The water body receives freshwater from the Owenacurra and Dungourney Rivers which run south through predominantly agricultural land, before joining in Middleton. This river then flows for a further 3.5km into the North Channel Great Island via the Owenacurra Estuary.

The North Channel Great Island transitional water body is part of the Great Island Channel SAC (see Section 3.1.4) and Cork Harbour SPA (see Section 3.1.1).

A total of six beach seines, four fyke nets and four beam trawls were deployed in the North Channel Great Island transitional water body in October 2010. The west side of the upper estuary contains extensive mud flats and was not accessible for sampling, even at high tide.

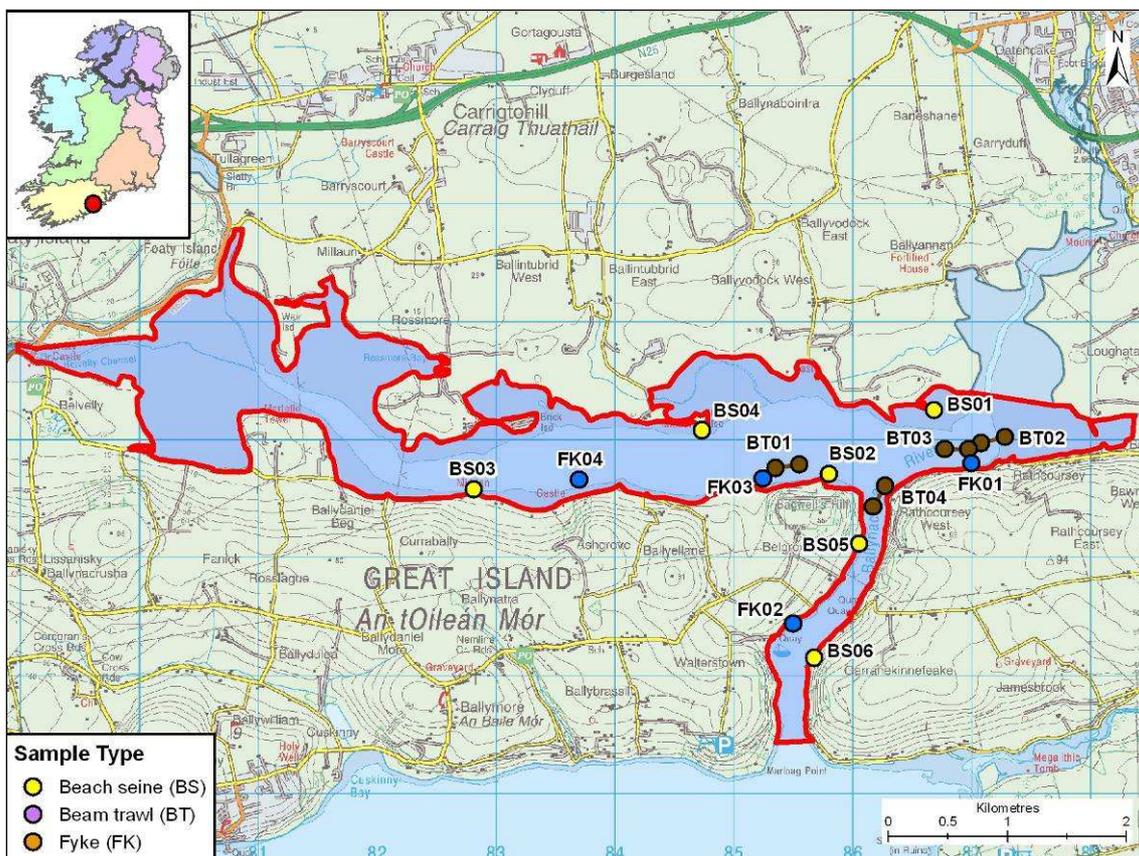


Fig. 3.11. Location map of North Channel Great Island Estuary indicating sample sites, October 2010



**Plate 3.1. Aerial photo of the North Channel Great Island Estuary looking north-westwards towards Foaty Island. (Photo courtesy of IFI and No. 3 Operational Wing, Irish Air Corps [Aer Chór na hÉireann])**

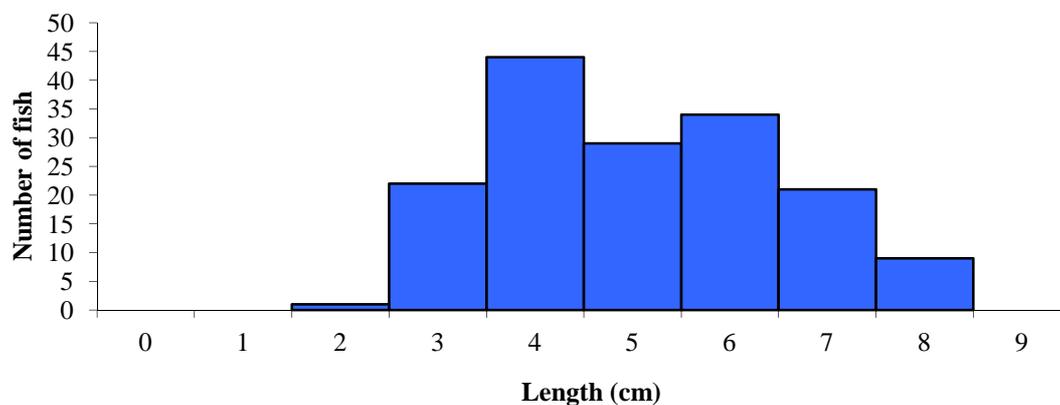
A total of 23 fish species were recorded in North Channel Great Island in October 2010 (Table 3.6). This was the highest species richness recorded for any transitional water body surveyed in 2010. Sand goby was the most abundant species followed by common goby, sand melt and thick-lipped grey mullet (Table 3.6). The vast majority of species were caught in both the beach seine and fyke net samples, with very little diversity captured in the beam trawls. Plaice was the only species captured using all three netting methods, although their numbers were low. A slightly higher number of species was recorded during this survey in contrast to the previous survey in 2008 (Kelly *et al.*, 2009e), however, no beam trawl nets were deployed during the earlier survey. Although a relatively large number of sprat were recorded this year, their numbers were very low in comparison to the 2008 figures (Kelly *et al.*, 2009e).

Sand goby ranged in length from 2.1cm to 8.7cm (Fig. 3.12)

Salinity values taken at beach seine and beam trawl sites ranged from 24.6ppt to 25.7ppt.

**Table 3.6. Number of each species captured by each gear type in North Channel Great Island Estuary, October 2010**

Scientific name	Common name	Beach seine (6)	Fyke net (4)	Beam trawl (4)	Total
<i>Pomatoschistus minutus</i>	Sand goby	671	-	47	718
<i>Pomatoschistus microps</i>	Common goby	40	-	-	40
<i>Atherina presbyter</i>	Sand smelt	14	-	-	14
<i>Chelon labrosus</i>	Thick-lipped grey mullet	14	-	-	14
<i>Pleuronectes platessa</i>	Plaice	7	2	2	11
<i>Gobiusculus flavescens</i>	Two-spot goby	10	-	-	10
<i>Crenilabrus melops</i>	Corkwing wrasse	1	8	-	9
<i>Gadus morhua</i>	Cod	-	9	-	9
<i>Ciliata mustela</i>	Five-bearded rockling	-	7	-	7
<i>Taurulus bubalis</i>	Long-spined sea scorpion	2	5	-	7
<i>Platichthys flesus</i>	Flounder	2	3	-	5
<i>Pomatoschistus pictus</i>	Painted goby	5	-	-	5
<i>Labrus bergylta</i>	Ballan wrasse	1	3	-	4
<i>Spinachia spinachia</i>	Fifteen-spined stickleback	3	-	1	4
<i>Anguilla anguilla</i>	European eel	1	1	-	2
<i>Melanogrammus aeglefinus</i>	Haddock	-	2	-	2
<i>Pollachius pollachius</i>	Pollack	-	2	-	2
<i>Scyliorhinus canicula</i>	Lesser spotted dogfish	-	2	-	2
<i>Ctenolabrus rupestris</i>	Goldsinny wrasse	-	1	-	1
<i>Limanda limanda</i>	Dab	-	1	-	1
<i>Myoxocephalus scorpius</i>	Short-spined sea scorpion	-	1	-	1
<i>Sprattus sprattus</i>	Sprat	1	-	-	1
<i>Syngnathus acus</i>	Greater pipefish	1	-	-	1



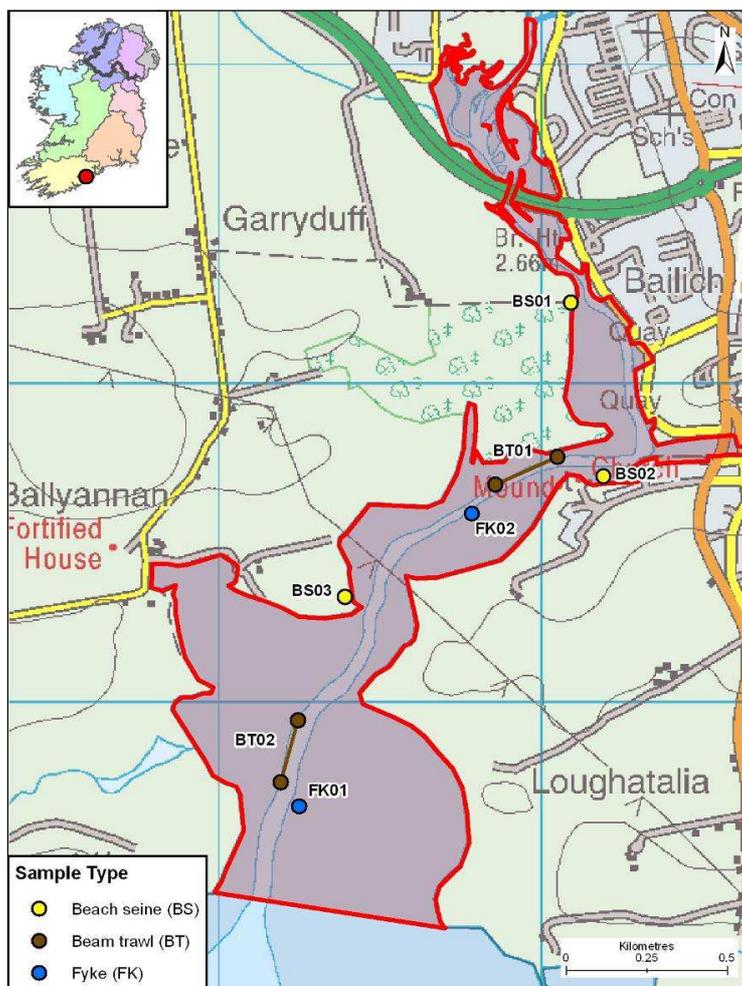
**Fig. 3.12. Length frequency distribution of a sub-sample of sand goby in the North Channel Great Island Estuary, October 2010 (n=160)**

### 3.1.7 Owenacurra Estuary

The Owenacurra Estuary covers an area of 1.12km<sup>2</sup> and is located approximately 22km east of Cork (Fig. 3.14). The Owenacurra and Dungourney Rivers flow south through areas of agricultural land before joining together in Middleton to supply the estuary with freshwater. This estuary is a sheltered and relatively shallow and narrow water body that completely empties at low tide, leaving behind large mudflats and a channel that is difficult to navigate. Being quite a distance from the open sea, it lacks the strong marine influence that affects other parts of Cork Harbour.

Owenacurra Estuary is part of the Great Island Channel SAC (see Section 3.1.4) and Cork Harbour SPA (see Section 3.1.1).

A total of three beach seines, two fyke nets and two beam trawls were deployed in the Owenacurra Estuary in October 2010.



**Fig. 3.14. Location map of the Owenacurra Estuary indicating sample sites, October 2010**

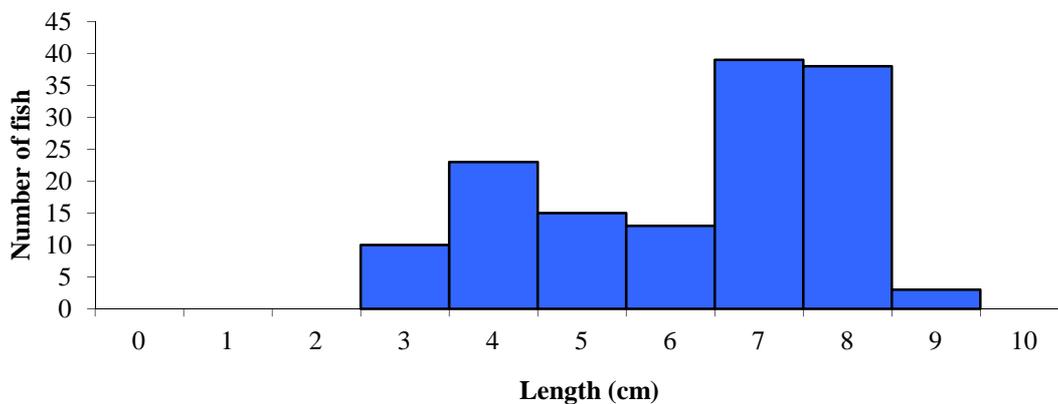
A total of 11 fish species were recorded in the Owenacurra Estuary in October 2010 (Table 3.7). Sand goby was the most abundant species followed by thick-lipped grey mullet. No species was captured using all three netting methods, however, sand goby were caught in relatively high numbers using both beach seines and beam trawls (Table 3.7). A slightly higher species richness was also recorded in this water body in 2011, when compared with the 2008 survey (Kelly *et al.*, 2009f), although no beam trawl nets were deployed at that time. Sprat again appeared to be present in much lower numbers in 2011.

Sand goby ranged in length from 3.2cm to 9.2cm (Fig. 3.15). Thick-lipped grey mullet ranged in length from 2.4cm to 6.2cm, apart from one individual that measured 51.0cm in length, indicating the presence of both juvenile and adult thick-lipped grey mullet in the Owenacurra Estuary (Fig 3.16). A single adult salmon measuring 73cm in length was also recorded during the survey.

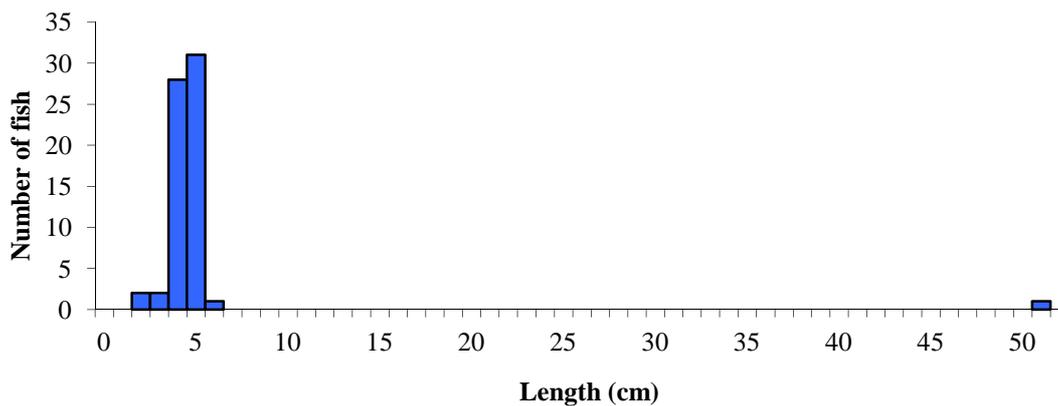
Salinity values taken at beach seine and beam trawl sites ranged from 15ppt to 25.1ppt.

**Table 3.7. Number of each species captured by each gear type in Owenacurra Estuary, October 2010**

Scientific name	Common name	Beach seine (3)	Fyke net (2)	Beam trawl (2)	Total
<i>Pomatoschistus minutus</i>	Sand goby	134	-	225	359
<i>Chelon labrosus</i>	Thick-lipped grey mullet	287	-	-	287
<i>Syngnathus acus</i>	Greater pipefish	2	-	3	5
<i>Sprattus sprattus</i>	Sprat	3	-	-	3
<i>Trachurus trachurus</i>	Scad	3	-	-	3
<i>Atherina presbyter</i>	Sand smelt	2	-	-	2
<i>Platichthys flesus</i>	Flounder	-	1	1	2
<i>Pleuronectes platessa</i>	Plaice	-	-	2	2
<i>Anguilla anguilla</i>	European eel	-	1	-	1
<i>Liza aurata</i>	Golden grey mullet	1	-	-	1
<i>Salmo salar</i>	Salmon	1	-	-	1



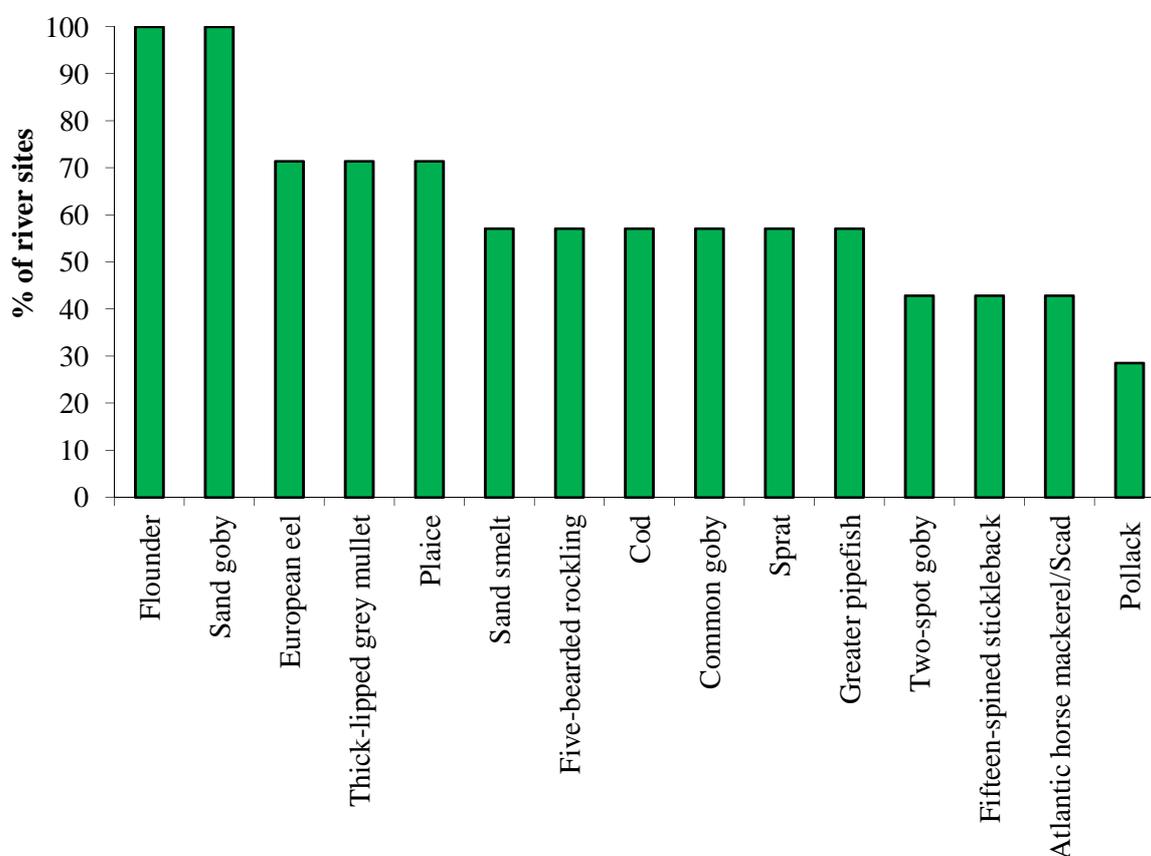
**Fig. 3.15. Length frequency distribution of a sub-sample of sand goby in the Owenacurra Estuary, October 2010 (n=141)**



**Fig. 3.16. Length frequency distribution of a sub-sample of thick-lipped grey mullet in the Owenacurra Estuary, October 2010 (n=65)**

### 3.2 Species richness

A total of 32 fish species were recorded (sea trout are counted as a separate variety of brown trout) within the seven transitional water bodies surveyed in the Greater Cork Harbour area during 2010. Only species that were recorded in at least two individual water bodies are shown in (Fig. 3.17). Flounder and sand goby were the most common fish species recorded, occurring in all seven water bodies. European eel, thick-lipped grey mullet and plaice were the next most common species, recorded in five water bodies each. Other important species recorded included cod, pollack and scad. Salmon and sea trout were also recorded, but only in one water body each.



**Fig. 3.17. Percentage of water bodies where selected fish species were recorded in the Greater Cork Harbour transitional waters for WFD SM monitoring 2010**

#### 4. SUMMARY

The seven transitional water bodies comprising the Greater Cork Harbour estuary system vary greatly in size, environmental and physical characteristics. This was reflected in the fish species composition recorded in each water body. The greatest species diversity was recorded in the North Channel Great Island and Lough Mahon water bodies. Their close proximity to the open sea and higher salinity levels suited the high number of marine species recorded in each. In contrast to some of the more riverine transitional water surveys completed during 2010 (e.g. Barrow, Nore and Suir), salinity levels throughout the Greater Cork Harbour area were most likely too high to allow for high numbers of freshwater species. Sand goby, flounder and sprat were among the most abundant and widespread species recorded. Species richness and distribution for selected species among all transitional water bodies surveyed can be seen in the 2010 WFD summary report (Kelly *et al.*, 2011).

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 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). 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.

The interim draft classifications assigned by the EPA, along with the draft ecological status classifications based on the fish populations for 2008 and 2010 are given in Table 3.8 below. According to the TFCI system, both the Glashaboy Estuary and Lough Mahon have shown some level of deterioration.

The EPA have assigned an overall interim draft classification to each water body, based on general physico-chemical elements, phytoplankton, fish and macroalgal growths (Table 3.8).

**Table 3.8. Greater Cork harbour transitional water body fish ecological status classifications, 2008 and 2010. The overall interim status is also shown.**

<b>Transitional Water body</b>	<b>Ecological status (TFCI) 2008</b>	<b>Ecological status (TFCI) 2010</b>	<b>Overall interim status (EPA)</b>
Glashaboy Estuary	Poor	Bad	Moderate
Lee (Cork) Estuary, Lower	Poor	Poor	Moderate
Lee (Cork) Estuary, Upper	Poor	Poor	Moderate
Mahon, Lough	Good	Moderate	Good
Mahon, Lough (Harper's Island)	Moderate	Moderate	Moderate
North Channel Great Island	Good	Good	Moderate
Owenacurra Estuary	Moderate	Moderate	Moderate

## 5. REFERENCES

- Coates, S., Waugh A., Anwar A. & 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 ([www.blackwell-synergy.com](http://www.blackwell-synergy.com))
- Kelly, F., Harrison, A., Connor, L., Matson, R., Morrissey, E., Feeney, R., Wogerbauer, C., O'Callaghan, R. and Rocks, K. (2011) *Sampling Fish for the Water Framework Directive – Summary Report 2010*. Inland Fisheries Ireland.
- Kelly, F., Harrison, A., Connor, L., Wightman, G., Matson, R., Morrissey, E., O'Callaghan, R., Feeney, R., Hanna, G., Lordan, M. and Rocks, K. (2009a) *Sampling Fish for the Water Framework Directive – Transitional Waters 2008 - Glashaboy Estuary*. Central and Regional Fisheries Boards.
- Kelly, F., Harrison, A., Connor, L., Wightman, G., Matson, R., Morrissey, E., O'Callaghan, R., Feeney, R., Hanna, G., Lordan, M. and Rocks, K. (2009b) *Sampling Fish for the Water Framework Directive – Transitional Waters 2008 - Lee (Cork) Estuary*. Central and Regional Fisheries Boards.
- Kelly, F., Harrison, A., Connor, L., Wightman, G., Matson, R., Morrissey, E., O'Callaghan, R., Feeney, R., Hanna, G., Lordan, M. and Rocks, K. (2009c) *Sampling Fish for the Water Framework Directive – Transitional Waters 2008 - Lough Mahon*. Central and Regional Fisheries Boards.
- Kelly, F., Harrison, A., Connor, L., Wightman, G., Matson, R., Morrissey, E., O'Callaghan, R., Feeney, R., Hanna, G., Lordan, M. and Rocks, K. (2009d) *Sampling Fish for the Water Framework Directive – Transitional Waters 2008 - Harper's Island*. Central and Regional Fisheries Boards.
- Kelly, F., Harrison, A., Connor, L., Wightman, G., Matson, R., Morrissey, E., O'Callaghan, R., Feeney, R., Hanna, G., Lordan, M. and Rocks, K. (2009e) *Sampling Fish for the Water Framework Directive – Transitional Waters 2008 - North Channel Great Island*. Central and Regional Fisheries Boards.
- Kelly, F., Harrison, A., Connor, L., Wightman, G., Matson, R., Morrissey, E., O'Callaghan, R., Feeney, R., Hanna, G., Lordan, M. and Rocks, K. (2009f) *Sampling Fish for the Water Framework Directive – Transitional Waters 2008 - Owenacurra Estuary*. 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 (2001) *Great Island Channel. Site synopsis, site code: 001058*. Available at: <http://www.npws.ie/media/npwsie/content/images/protectedsites/sitesynopsis/SY001058.pdf>

NPWS (2004) *Cork Harbour SPA. Site synopsis, site code: 004030*. Available at: <http://www.npws.ie/media/npwsie/content/images/protectedsites/sitesynopsis/SY004030.pdf>



**Inland Fisheries Ireland  
Swords Business Campus,  
Swords,  
Co. Dublin,  
Ireland.**

**Web: [www.fisheriesireland.ie](http://www.fisheriesireland.ie)  
Email: [info@fisheriesireland.ie](mailto:info@fisheriesireland.ie)  
Tel: +353 1 8842 600  
Fax: +353 1 8360 060**