Sampling Fish for the Water Framework Directive

Transitional Waters 2010

Barrow, Nore and Suir Estuaries

Iascach Intíre Éireann
Inland Fisheries Ireland

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1. INTRODUCTION

Fish stock surveys were conducted on the Barrow, Nore and Suir Estuaries as part of the programme of fish monitoring for the Water Framework Directive (WFD), between the 7th and the 27th of September 2010 by staff from Inland Fisheries Ireland (Table 1.1, Fig. 1.1).

The Barrow, Nore and Suir estuaries comprise a large, complex estuary system on the south-east coast of Ireland. For the purposes of WFD monitoring and reporting, this large estuary system has been split into eight 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, September 2010 (FT=freshwater tidal, TW=transitional)

Transitional water body	MS Code	Easting	Northing	Type	Area (km^2)
Barrow Estuary, Upper	SE_100_0300	273066	137640	TW	1.15
Barrow Nore Estuary, Upper	SE_100_0250	272129	128644	TW	0.64
Barrow Suir Nore Estuary	SE_100_0100	271527	107512	TW	28.21
New Ross Port	SE_100_0200	267862	117105	TW	6.71
Nore Estuary	SE_100_0400	265312	135294	TW	1.26
Suir Estuary, Lower	SE_100_0500	266073	112602	TW	4.32
Suir Estuary, Middle	SE_100_0550	249824	114070	TW	7.03
Suir Estuary, Upper	SE_100_0600	243887	121066	FT	1.09

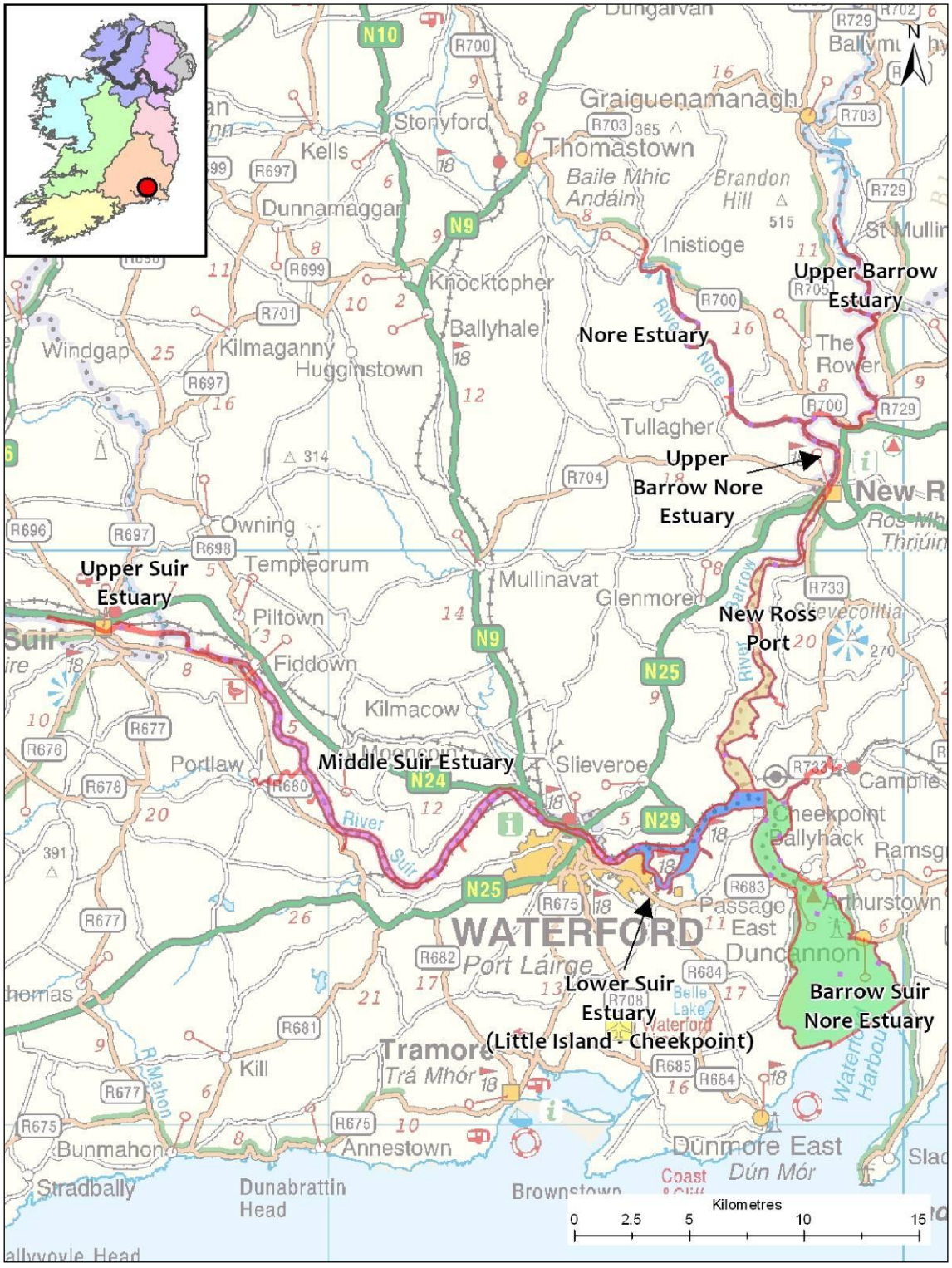

Fig. 1.1. Location map of the eight transitional water bodies on the Barrow, Nore and Suir estuary system surveyed for WFD fish monitoring, September 2010

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. Beach seining the Upper Barrow Estuary

3. RESULTS

3.1 Water body surveys

3.1.1 Upper Barrow Estuary

Plate 3.1. Aerial photo of the Upper Barrow Estuary looking northwards. Photo courtesy of IFI and No. 3 Operational Wing, Irish Air Corps [Aer Chór na hÉireann])

The Upper Barrow Estuary (Fig. 3.1, Plate 3.1) covers an area of 1.15km^2. It starts approximately 1km north of St. Mullins and stretches for approximately 15.5km downstream before joining the River Nore approximately 3km north of New Ross (Fig. 3.1). This narrow and muddy section of the estuary is situated in an area where the land is predominantly used for agriculture.

This water body is situated within the River Barrow and River Nore SAC. A number of important habitats are present within this SAC, including tidal mudflats, estuary and floating vegetation, all of which are listed in Annex I of the EU Habitats Directive. Annex II listed species present include lamprey, Atlantic salmon, freshwater pearl mussel, crayfish and twaite shad (NPWS, 2003). This SAC represents one of only a few spawning grounds for twaite shad in Ireland (NPWS, 2003).

A total of six beach seines, four fyke nets and six beam trawls were deployed in the Upper Barrow Estuary in September 2010 (Fig. 3.1).

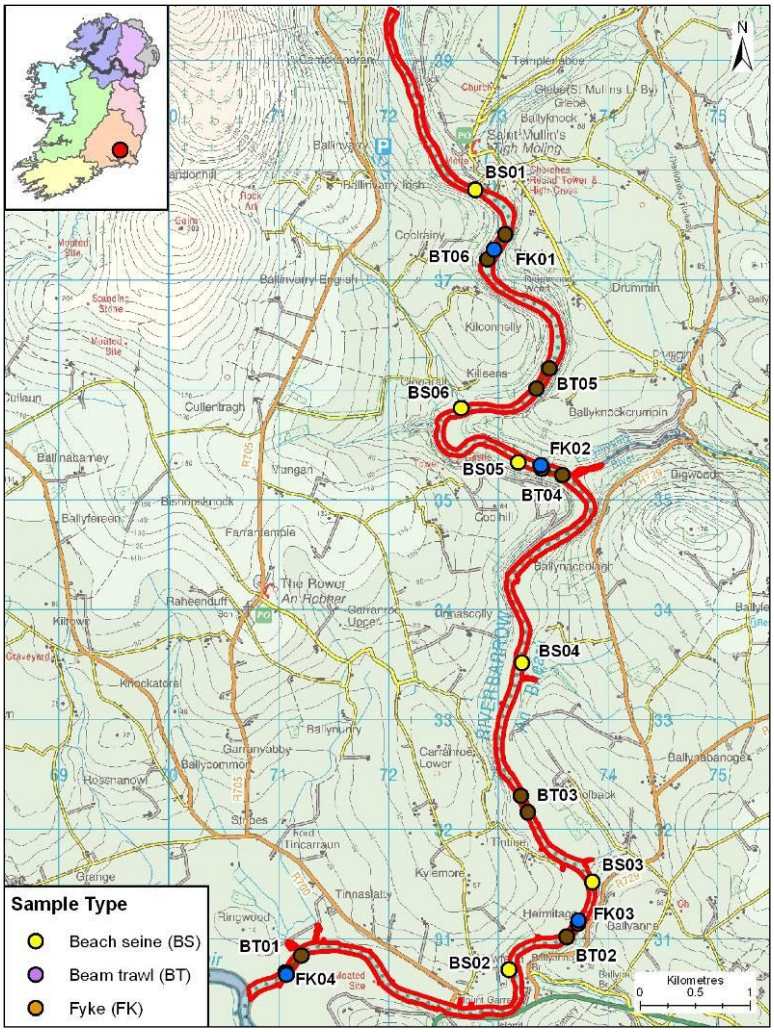

Fig. 3.1. Location map of the Upper Barrow Estuary indicating sample sites, September 2010

A total of 10 fish species (sea trout are included as a separate 'variety' of trout) were recorded in the Upper Barrow Estuary in September 2010 (Table 3.1). Flounder was the most abundant species, followed by dace and sand goby (Table 3.1). Flounder and sand goby were well distributed throughout the water body being captured using all three netting methods, while other species such as minnow and three-spined stickleback were more localised, only being recorded in the shallow marginal areas using beach seines.

Two endangered fish species; salmon, listed in Annex II and V of the EU Habitats Directive and also listed as vulnerable in the Irish Red Data book and eels, listed as critically endangered in the Irish Red Data Book (King *et al*., 2011) were recorded at one and four sites respectively

Brown trout, sea trout, three-spined stickleback, nine-spined stickleback, eels and flounder were also recorded (Table 3.1).

Flounder ranged in length from 3.0cm to 20.8cm, with the 0+ and 1+ age classes dominant (Fig. 3.2).

Dace, which are a non-native species of fish, ranged in length from 2.6cm to 24.8cm, with the 0+ age class dominant (Fig. 3.3).

Salinity values taken at beach seine and beam trawl sites ranged from 0.271ppt to 0.283ppt.

Table 3.1. Number of each species captured by each gear type in the Upper Barrow Estuary, September 2010

Scientific name	Common name	Beach seine (6)	Fyke net (4)	Beam trawl (6)	Total
Platichthys flesus	Flounder	104	94	221	419
Leuciscus leuciscus	Dace	316	4	-	320
Pomatoschistus minutus	Sand goby	82	2	114	198
Phoxinus phoxinus	Minnow	61	-	-	61
Anguilla anguilla	European eel	-	26	-	26
Gasterosteus aculeatus	Three-spined stickleback	14	-	-	14
Salmo trutta	Brown trout	4	-	-	4
Pungitius pungitius	Nine-spined stickleback	1	-	-	1
Salmo salar	Salmon	-	-	1	1
Salmo trutta	Sea trout	-	1	-	1

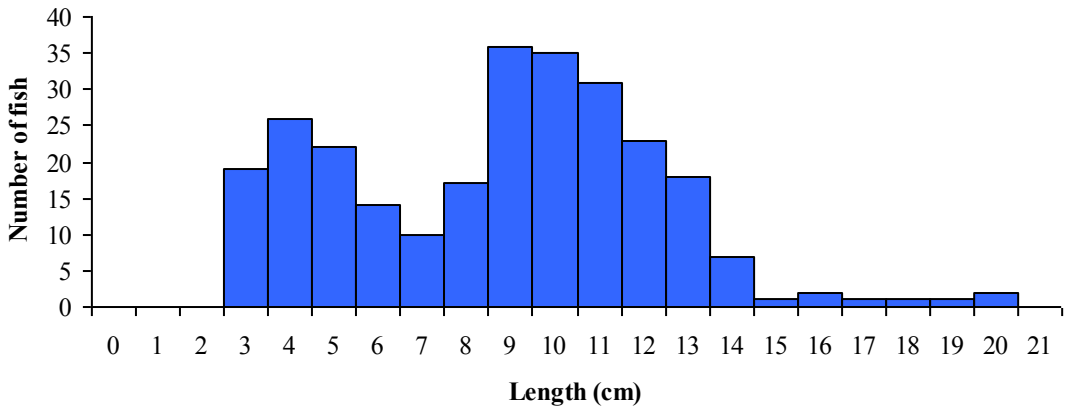

Fig. 3.2. Length frequency distribution of a subsample of flounder in the Upper Barrow Estuary, September 2010 (n=266)

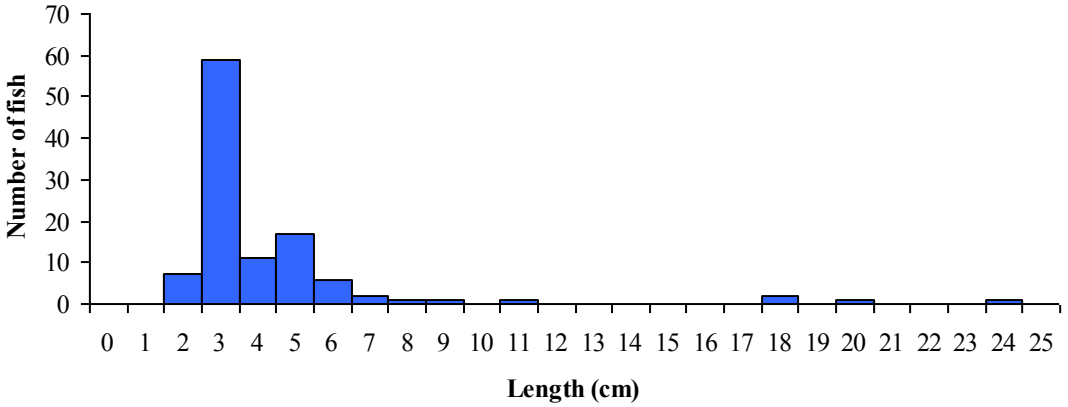

Fig.3.3. Length frequency distribution of a sub-sample of dace in the Upper Barrow Estuary, September 2010 (n-109)

3.1.2 Upper Barrow Nore Estuary

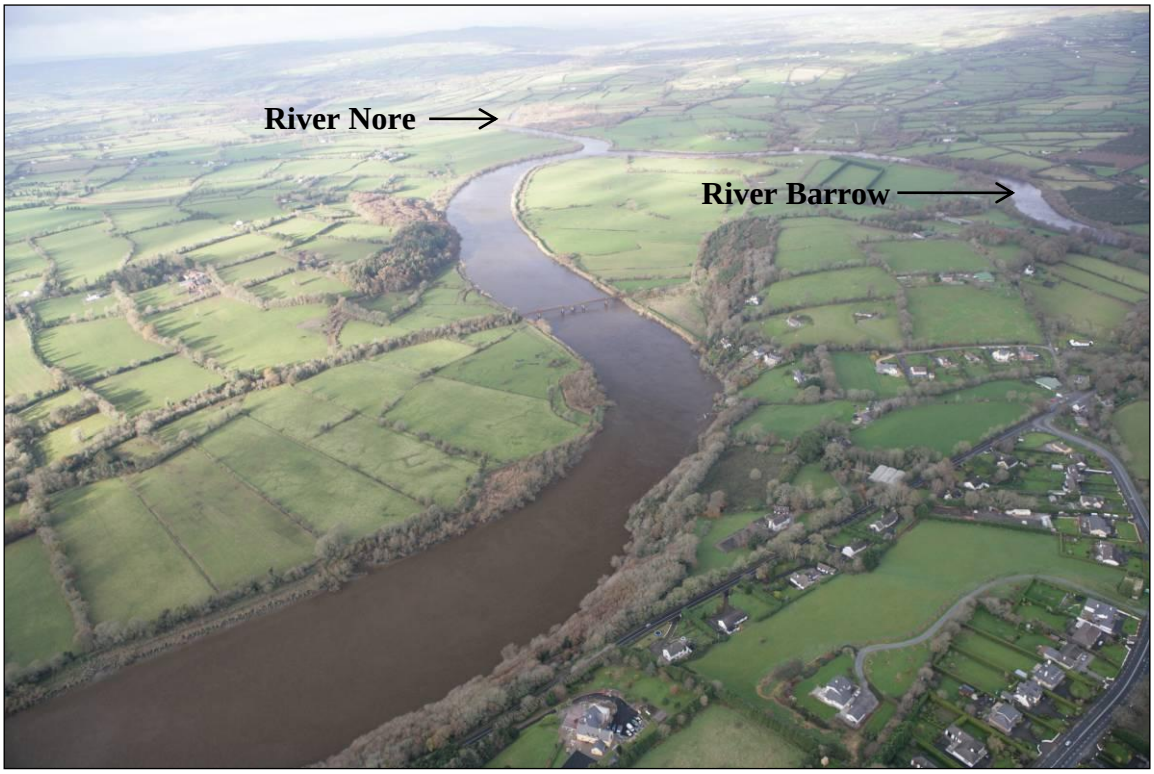

Plate 3.2. Aerial photo of the Upper Barrow Nore Estuary lowing upstream towards the confluence of both rivers. (Photo courtesy of IFI and No. 3 Operational Wing, Irish Air Corps [Aer Chór na hÉireann])

The Upper Barrow Nore Estuary is a relatively short transitional water body stretching for approximately 4km from the Barrow and Nore confluence to New Ross and covering an area of 0.64 km^2 (Fig. 3.4, Plate 3.2). The water body is mainly bordered by agricultural land but also has a significant amount of urban development on the southern end, much of which is buffered by a long strip of deciduous woodland. On a low tide deep muddy banks become exposed

This water body is situated within the Barrow and River Nore SAC (See Section 3.1.1).

A total of two beach seines, two fyke nets and two beam trawls were deployed in the Upper Barrow Nore Estuary in September 2010.

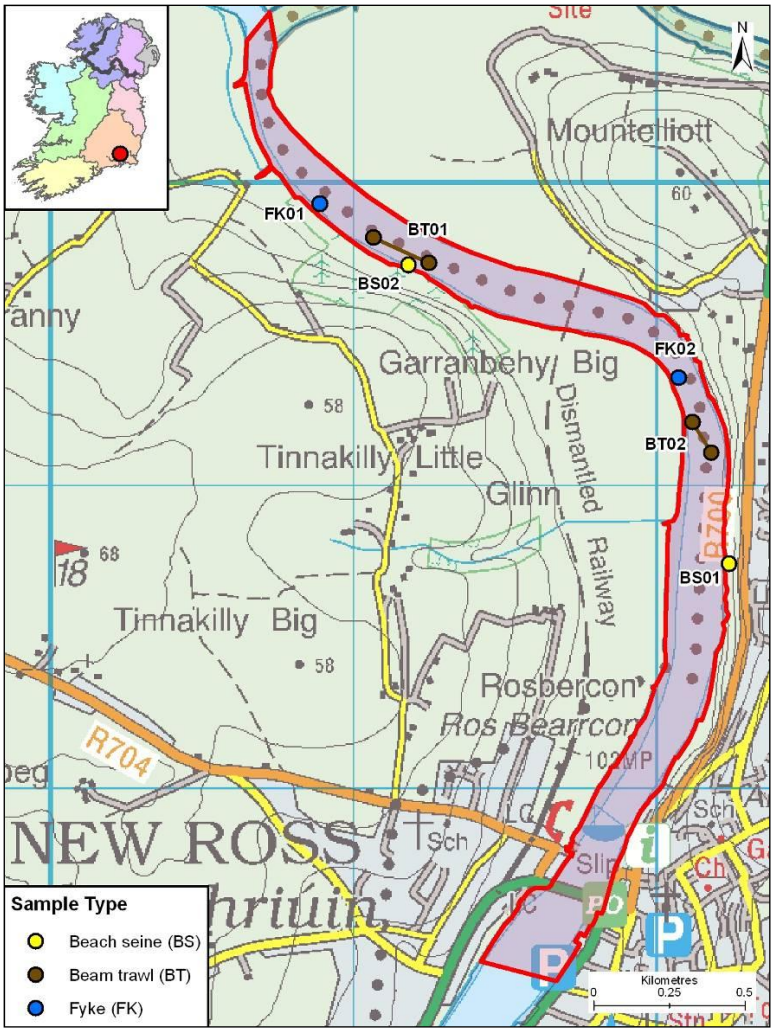

Fig. 3.4. Location map of the Upper Barrow Nore Estuary indicating sample sites, September 2010

A total of 11 fish species (sea trout are included as a separate 'variety' of trout) were recorded in the Upper Barrow Nore Estuary in September 2010 (Table 3.2). Sand goby and flounder were well distributed throughout this water body, being captured using all three netting methods. Sand goby was the most abundant species, followed by flounder and dace (Table 3.2).

Two endangered fish species; salmon, listed in Annex II and V of the EU Habitats Directive and also listed as vulnerable in the Irish Red Data book and eels, listed as critically endangered in the Irish Red Data Book (King *et al*., 2011) were recorded at one and two sites respectively

Brown trout, sea trout, smelt and flounder were also recorded. A large number of juvenile dace, an invasive fish species in Ireland, were recorded in the two beach seines deployed.

Flounder ranged in length from 3.1cm to 23.8cm, with two age classes (0+ and 1+) dominant (Fig. 3.5). Dace ranged in length from 2.7cm to 11.5cm, with the 0+ age class dominant (Fig. 3.6).

Salinity values taken at beach seine and beam trawl sites ranged from 0.240ppt to 0.284ppt.

Table 3.2. Number of each species captured by each gear type in the Upper Barrow Nore Estuary, September 2010

Scientific name	Common name	Beach seine (2)	Fyke net (2)	Beam trawl (2)	Total
Pomatoschistus minutus	Sand goby	350	6	17	373
Platichthys flesus	Flounder	99	61	10	170
Leuciscus leuciscus	Dace	50	-	-	50
Alosa fallax	Twaite shad	28	-	-	28
Anguilla anguilla	European eel	-	21	-	21
Perca fluviatilis	Perch	3	-	-	3
Rutilus rutilus	Roach	3	-	-	3
Salmo trutta	Sea trout	-	3	-	3
Osmerus eperlanus	Smelt	2	-	-	2
Salmo salar	Salmon	1	-	-	1
Salmo trutta	Brown trout	1	-	-	1

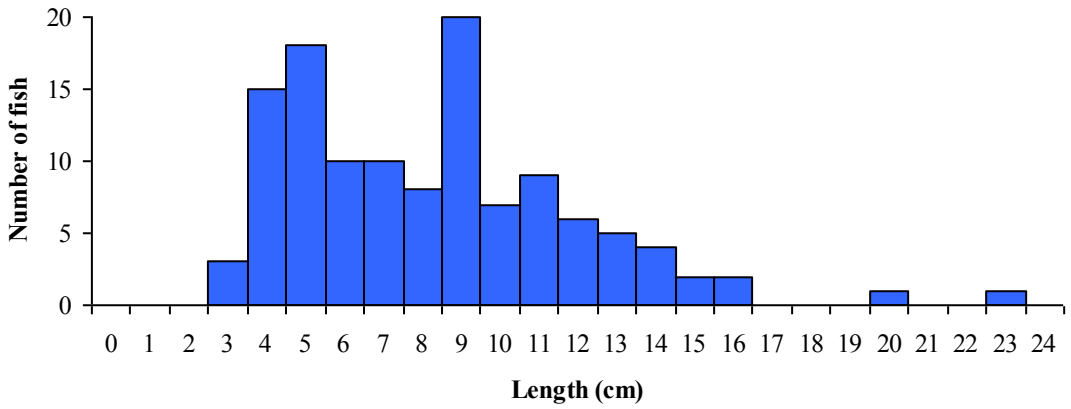

Fig. 3.5. Length frequency distribution of a sub-sample of flounder in the Upper Barrow Nore Estuary, October 2010 (n = 121)

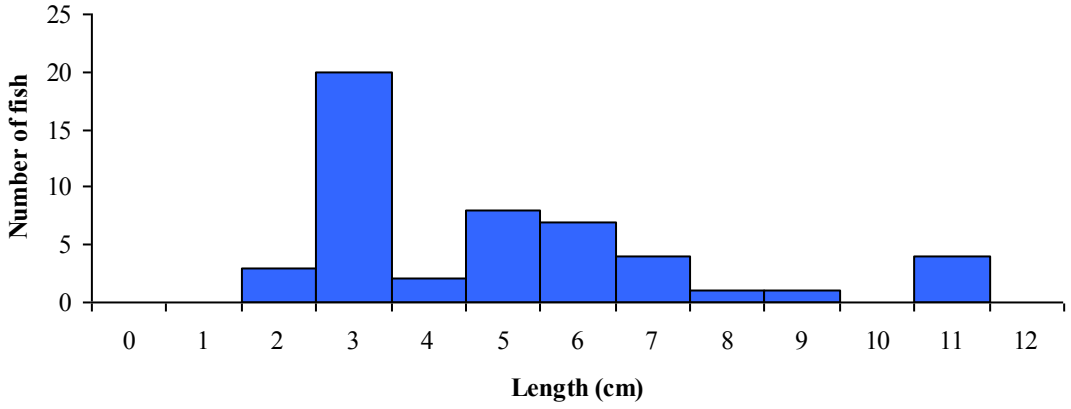

Fig. 3.6. Length frequency distribution of dace in the Upper Barrow Nore Estuary, September 2010 (n = 50)

3.1.3 Barrow Suir Nore Estuary

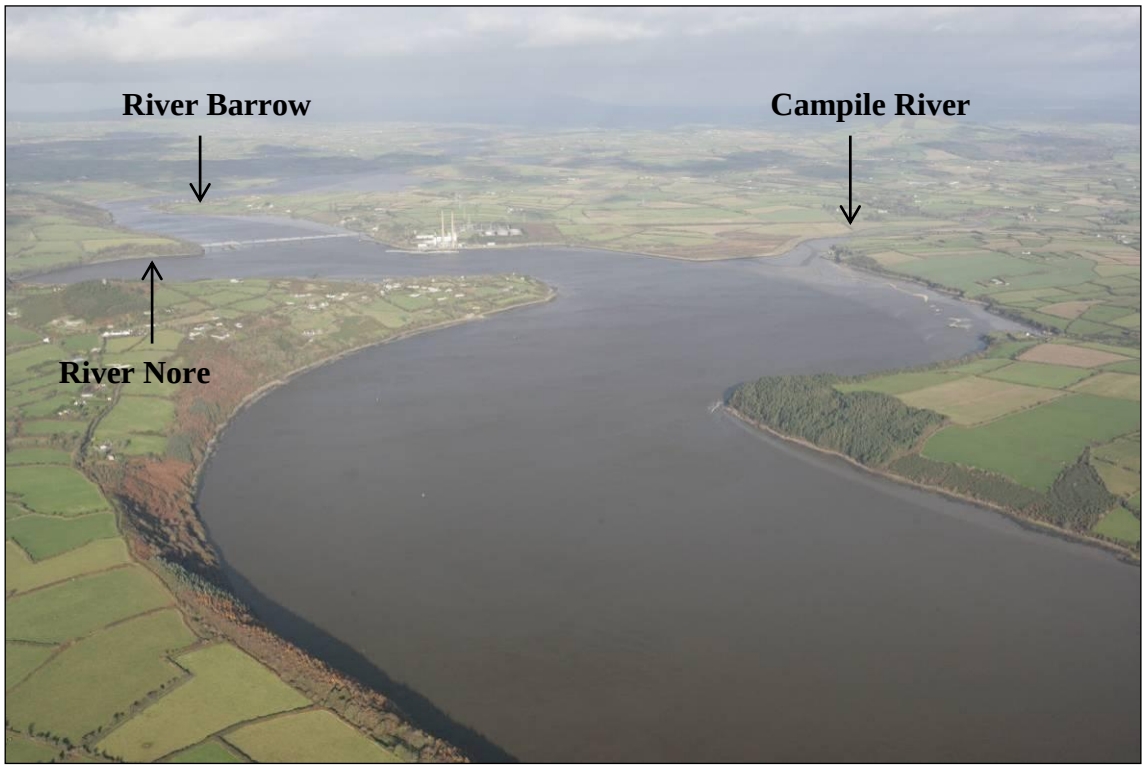

Plate 3.3. Aerial photo of the Barrow, Suir, Nore Estuary looking north towards the Great Island power station (Photo courtesy of IFI and No. 3 Operational Wing, Irish Air Corps [Aer Chór na hÉireann])

The Barrow Suir Nore Estuary is a large water body, covering an area of 28.21km^2 and is situated in the south-east of Ireland, where the Barrow, Suir and Nore rivers enter the sea at Waterford Harbour (Fig. 3.7, Plate 3.3). It stretches from the village of Campile in Co. Wexford as far as the sea, ending between Creadan Head and Broomhill Point (Fig. 3.12). This water body contains the deepest and widest sections of any water body surveyed along the Barrow, Suir, Nore estuarine network.

This portion of the estuary is also situated within the River Barrow and Nore SAC (See Section 3.1.1).

A total of six beach seines, four fyke nets and nine beam trawls were deployed in the Barrow Suir Nore Estuary in September 2010.

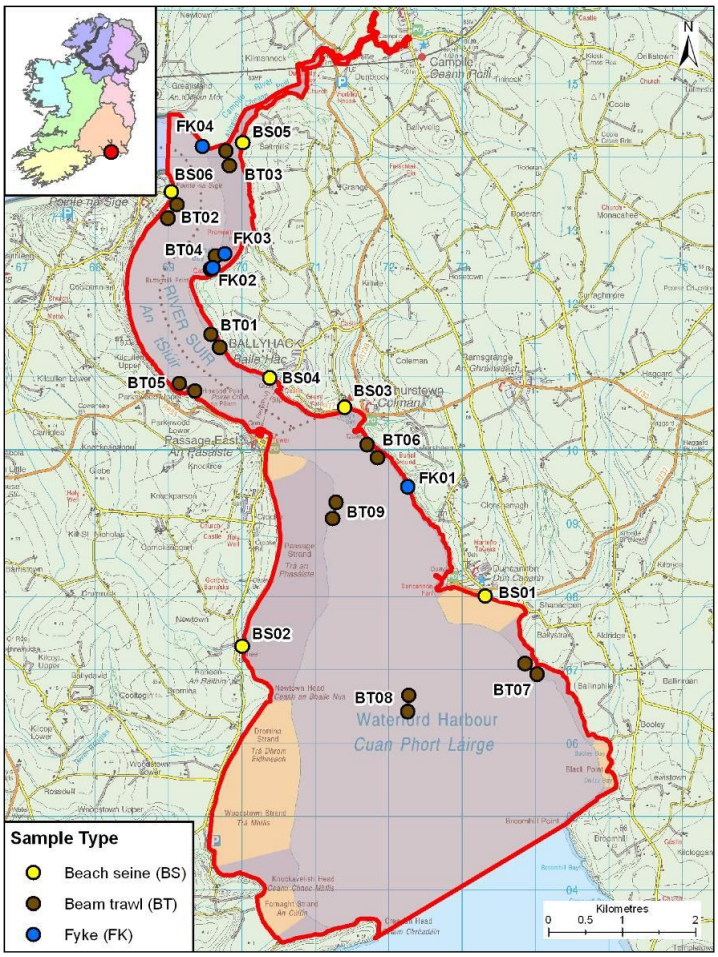

Fig. 3.7. Location map of the Barrow Suir Nore estuary indicating sample sites, September 2010

A total of 22 fish species were recorded in the Barrow Suir Nore Estuary in September 2010 (Table 3.3). Sprat was the most abundant species, followed by sand goby and thick-lipped grey mullet (Table 3.3). Large numbers of sprat and juvenile thick-lipped grey mullet were captured using seine nets along the shallow margins, suggesting that this water body is utilised as a nursery habitat for these species.

Two endangered fish species; twaite shad, listed in Annex II and V of the EU Habitats Directive and also listed as vulnerable in the Irish Red Data book and eels, listed as critically endangered in the Irish Red Data Book (King *et al*., 2011) were recorded at three and four sites respectively.

Five species of the gadoid family (cod, poor cod, haddock and five-bearded rockling) were recorded in fyke nets only, whilst flounder were distributed throughout the water body, being captured by all three sampling methods. Smelt and three-spined stickleback were also present. This was the only water body surveyed during 2010 in which the lesser weever fish was recorded.

Flounder ranged in length from 5.5cm to 30.5cm, with the majority of fish within the 0+ and 1+ age class (Fig. 3.8).

Salinity values taken at beach seine and beam trawl sites ranged from 10.80ppt to 22.50ppt.

Table 3.3. Number of each fish species captured by each gear type in the Barrow Suir Nore Estuary, September 2010

Scientific name	Common name	Beach seine (6)	Fyke net (4)	Beam trawl (9)	Total
Sprattus sprattus	Sprat	665	-	-	665
Pomatoschistus minutus	Sand goby	131	-	51	182
Chelon labrosus	Thick-lipped grey mullet	94	-	-	94
Platichthys flesus	Flounder	23	54	13	90
Anguilla anguilla	European eel	-	21	-	21
Gadus morhua	Cod	-	20	1	21
Ciliata mustela	Five-bearded rockling	-	18	-	18
Pleuronectes platessa	Plaice	5	-	12	17
Atherina presbyter	Sand smelt	11	-	2	13
Alosa fallax	Twaite shad	11	-	-	11
Ammodytes tobianus	Lesser sandeel	8	-	-	8
Scophthalmus rhombus	Brill	4	-	-	4
Agonus cataphractus	Pogge	-	2	-	2
Echiichthys vipera	Lesser Weever	-	-	2	2
Osmerus eperlanus	Smelt	2	-	-	2
Syngnathus rostellatus	Nilsson's pipefish	-	-	2	2
Callionymus maculatus	Spotted dragonet	-	-	1	1
Gasterosteus aculeatus	Three-spined stickleback	1	-	-	1
Limanda limanda	Dab	-	-	1	1
Melanogrammus aeglefinus	Haddock	-	1	-	1
Syngnathus typhle	Deep-snouted pipefish	1	-	-	1
Trisopterus minutus	Poor cod	-	1	-	1

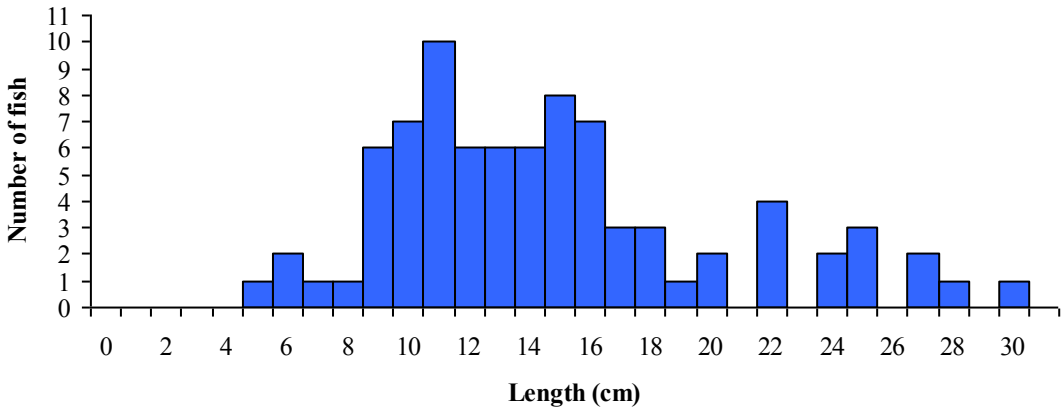

Fig. 3.8. Length frequency distribution of a sub-sample of flounder in the Barrow Suir Nore Estuary, September 2010 (n =83)

3.1.4 New Ross Port

Plate 3.4. Aerial photo of a section of New Ross Port Estuary. (Photo courtesy of IFI and No. 3 Operational Wing, Irish Air Corps [Aer Chór na hÉireann])

New Ross Port covers an area of 6.71km^2 (Fig. 3.9, Plate 3.4). It begins in the town of New Ross and continues downstream for approximately 16km before joining the River Suir at Cheekpoint (Fig. 3.9). Along its length it is bordered mainly by agricultural land, with most urban activity in New Ross itself. This water body contains water deep enough for small ships to access the inland port at New Ross.

This water body is also situated within the River Barrow and Nore SAC (See Section 3.1.1).

A total of six beach seines, four fyke nets and three beam trawls were deployed in New Ross Port in September 2010.

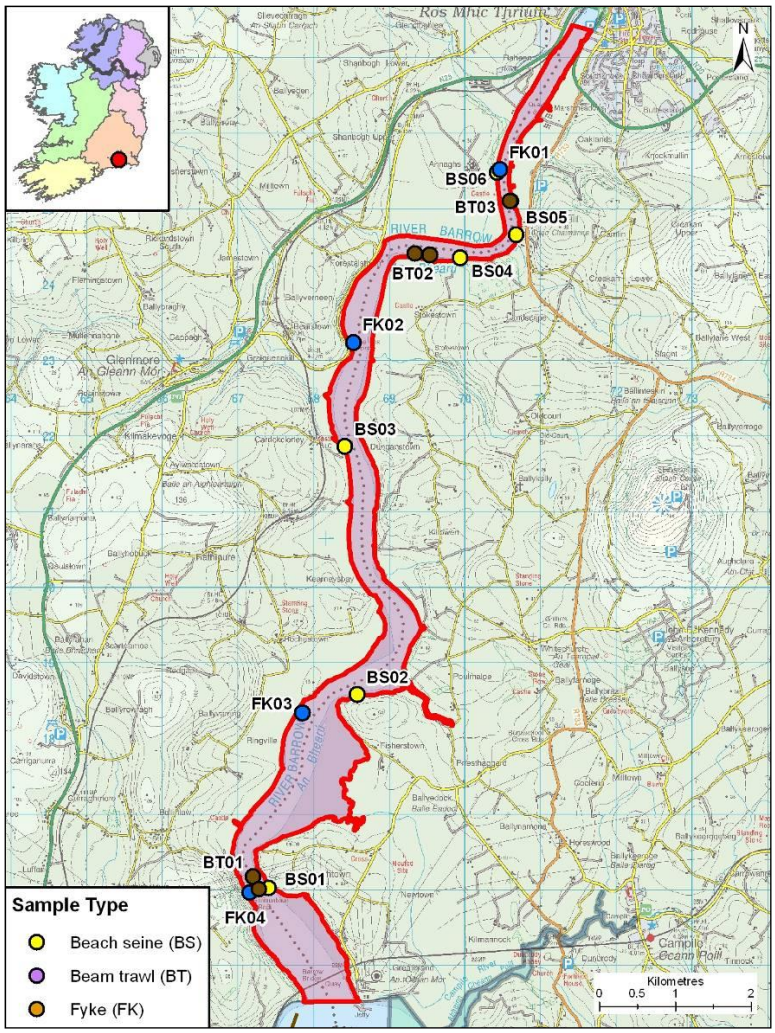

Fig. 3.9. Location map of New Ross port Estuary indicating sample sites, September 2010

A total of 15 fish species were recorded in New Ross Port in September 2010 (Table 3.4). Sprat was the most abundant species, followed by sand goby and flounder (Table 3.4). Sprat were captured in large numbers in seine nets, providing a potential food source for larger fish, such as adult cod, which were also captured in this survey.

In a similar trend to many of the other transitional water surveys, flounder were recorded in relatively high numbers using all three netting methods. With the exception of a single individual, all of the gadoids (three-bearded rockling, five bearded rockling, cod and pollack) were captured using fyke nets. Other noteworthy species recorded during this survey included eels (listed as critically endangered in the Irish Red Data Book (King *et al*., 2011)) and dace (an invasive fish species in Ireland).

Two protected fish species were recorded during the survey; twaite shad and salmon, both listed in Annex II and V of the EU Habitats Directive and listed as vulnerable in the Irish Red Data Book (King *et al*., 2011). Smelt and flounder were also recorded.

Flounder ranged in length from 4.2cm to 28.1cm, with the majority of individuals within the 0+ and 1+ age classes (Fig. 3.10). Eels were relatively abundant in this water body and ranged in length from 9.0cm to 62.0cm, with a number of age classes represented (Fig. 3.11).

Salinity values taken at beach seine and beam trawl sites ranged from 0.27ppt to 6.96ppt.

Table 3.4. Number of each species captured by each gear type in New Ross Port, September 2010

Scientific name	Common name	Beach seine (6)	Fyke net (4)	Beam trawl (3)	Total
Sprattus sprattus	Sprat	3454	1	-	3455
Pomatoschistus minutus	Sand goby	1021	-	89	1110
Platichthys flesus	Flounder	126	55	41	222
Anguilla anguilla	European eel	12	140	-	152
Alosa fallax	Twaite shad	58	-	-	58
Leuciscus leuciscus	Dace	25	-	-	25
Osmerus eperlanus	Smelt	7	1	7	15
Ciliata mustela	Five-bearded rockling	1	4	-	5
Gadus morhua	Cod	-	3	-	3
Chelon labrosus	Thick-lipped grey mullet	1	-	-	1
Gaidropsarus vulgaris	Three-bearded rockling	-	1	-	1
Pleuronectes platessa	Plaice	1	-	-	1
Pollachius pollachius	Pollack	-	1	-	1
Salmo salar	Salmon	1	-	-	1
Trachurus trachurus	Scad	1	-	-	1

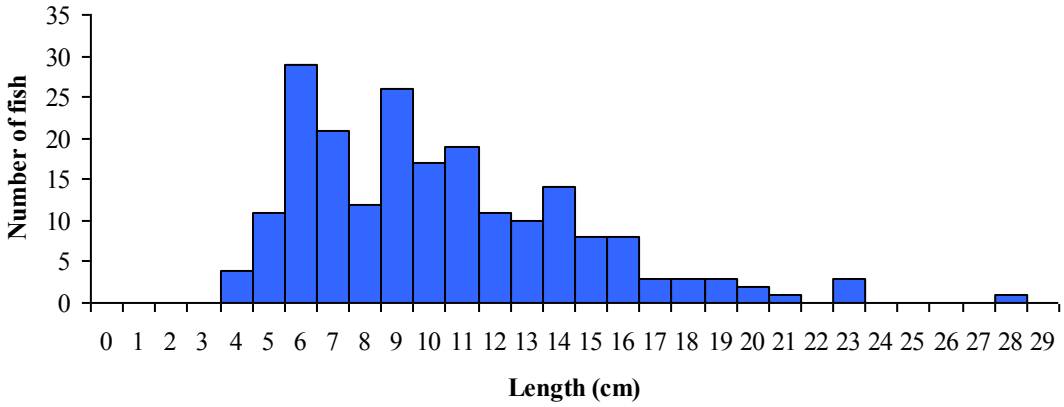

Fig. 3.10. Length frequency distribution of a sub-sample of flounder in New Ross Port, September 2010 (n=206)

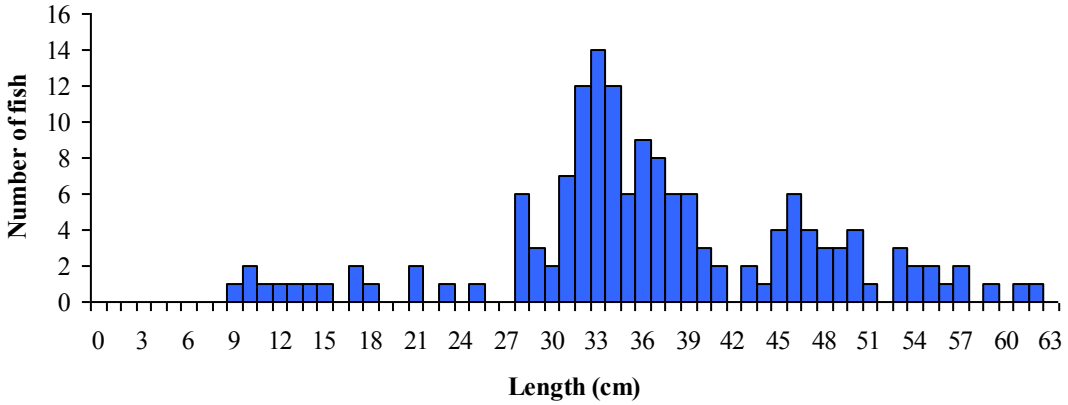

Fig. 3.11. Length frequency distribution of eels in New Ross Port, September 2010 (n=152)

3.1.5 Nore Estuary

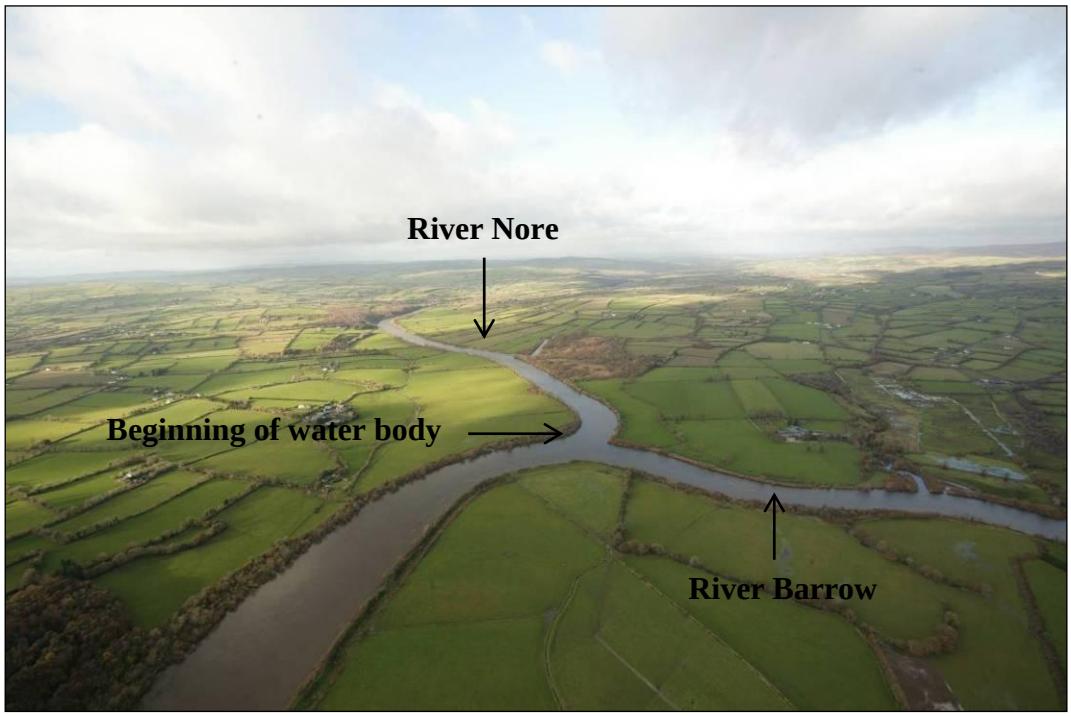

Plate 3.5. Aerial photo showing the confluence between the Nore Estuary (top left) and Upper Barrow Estuary (bottom right) to form the Upper Barrow Nore Estuary (Photo courtesy of IFI and No. 3 Operational Wing, Irish Air Corps [Aer Chór na hÉireann])

Plate 3.6. The Nore Estuary on a low tide showing its exposed muddy banks

The Nore Estuary covers an area of 1.26km^2 (Fig. 3.12, Plates 3.5 and 3.6). It begins just north of Inistioge, Co. Kilkenny and continues for approximately 15km until its confluence with the River Barrow 3km north of New Ross, Co. Wexford. This water body occupies an area of land used mainly for agriculture and forestry. On a low tide the banks become exposed to reveal deep muddy banks (Plate 3.6).

This water body is also situated within the Barrow and River Nore SAC (See Section 3.1.1).

A total of five beach seines, four fyke nets and six beam trawls were deployed in the Nore Estuary in September 2010.

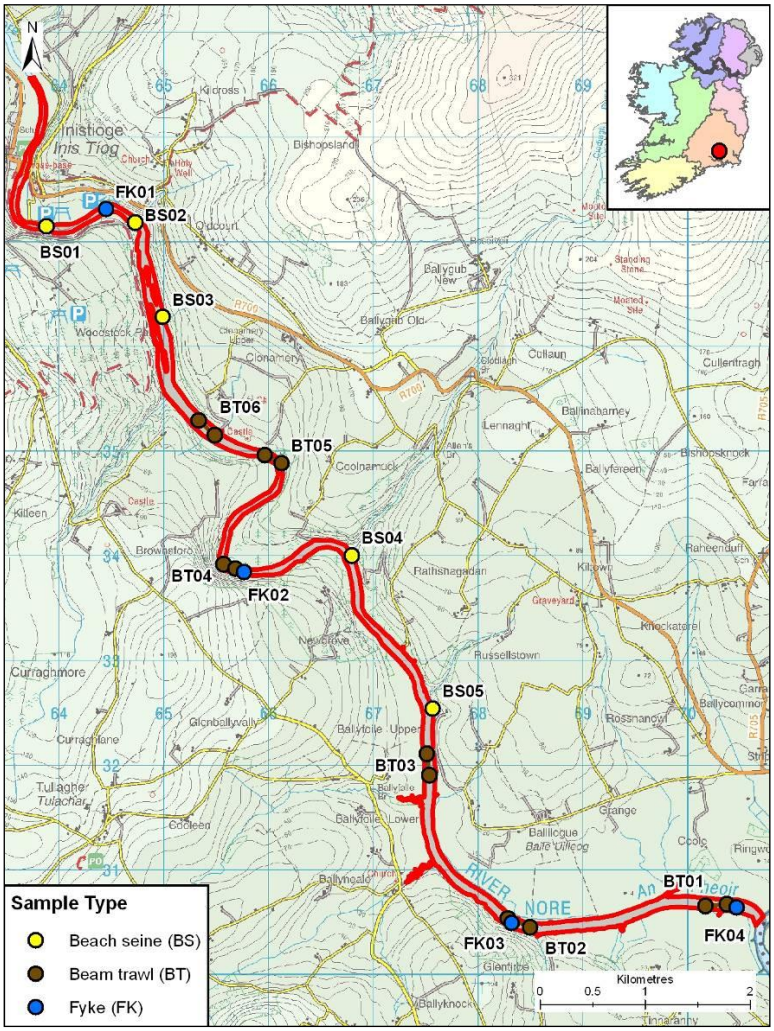

Fig. 3.12. Location map of the Nore Estuary indicating sample sites, September 2010

A total of 10 fish species were recorded in the Nore Estuary in September 2010 (Table 3.5). Flounder was the most abundant species, followed by dace and minnow (Table 3.5). Flounder were well distributed throughout the water body, being captured in relatively high numbers using all three

netting methods. Dace (an invasive fish species in Ireland) and minnow were mostly present in the shallow margins, captured using seine nets. Brown trout, sea trout, smelt and three-spined stickleback were also recorded.

Two protected fish species were recorded during the survey; salmon (listed in Annex II and V of the EU Habitats Directive and listed as vulnerable in the Irish Red Data Book (King *et al*., 2011) and eel (listed as critically endangered in the Irish Red data Book).

A subsample of flounder was measured and these ranged in length from 3.1cm to 22.3cm, with the majority of individuals within the 0+ and 1+ age classes (Fig. 3.13).

Salinity values taken at beach seine and beam trawl sites ranged from 0.174ppt to 0.274ppt.

Table 3.5. Number of each species captured by each gear type in the Nore Estuary, September 2010

Scientific name	Common name	Beach seine (5)	Fyke net (4)	Beam trawl (6)	Total
Platichthys flesus	Flounder	81	44	148	273
Leuciscus leuciscus	Dace	213	1	-	214
Phoxinus phoxinus	Minnow	203	-	-	203
Pomatoschistus minutus	Sand goby	41	-	107	148
Anguilla anguilla	European eel	-	13	1	14
Salmo trutta	Brown trout	-	10	-	10
Gasterosteus aculeatus	Three-spined stickleback	3	-	-	3
Salmo salar	Salmon	1	1	-	2
Osmerus eperlanus	Smelt	-	1	-	1
Rutilus rutilus	Roach	-	1	-	1

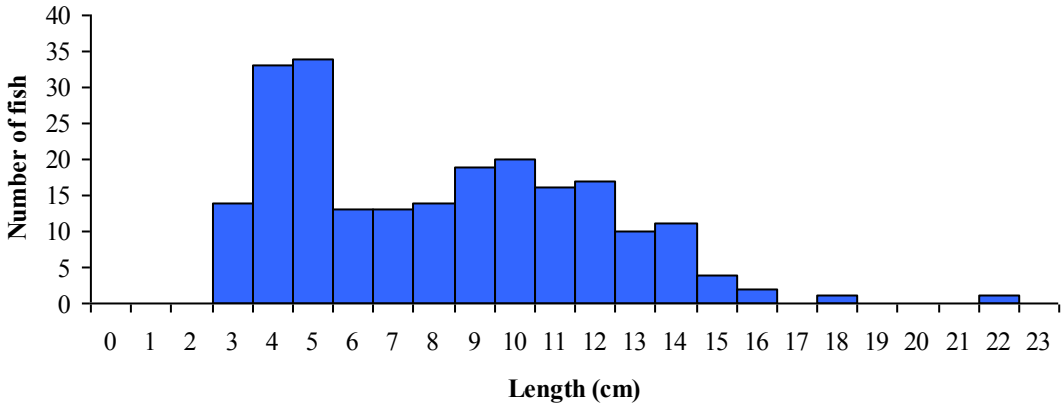

Fig. 3.13. Length frequency distribution of a sub-sample of flounder in the Nore Estuary, September 2010 (n=222)

3.1.6 Lower Suir Estuary

Plate 3.7. Aerial photo of the Lower Suir Estuary showing Little Island. (Photo courtesy of IFI and No. 3 Operational Wing, Irish Air Corps [Aer Chór na hÉireann])

The Lower Suir Estuary covers an area of 4.32 km^2 and is located between Co. Kilkenny and County Waterford, on Ireland's south-east coast (Fig. 3.14, Plate 3.7). It stretches approximately 6.5km from Ballynakill on the outskirts of Waterford City, splitting in two around Little Island, and ending at Cheek Point at the confluence with the River Barrow (Fig. 3.14). There are a number of anthropogenic impacts on this water body, including urban runoff and flood defences for Waterford City, as well as a deep-water port situated along the city quays. Further downstream activities include the Cheekpoint power station and jetty, along with a number of small commercial fishing boat operations. Although some patchy areas of seaweed do exist, the majority of this channel appears to be unvegetated, with only a fine muddy substrate exposed on a low tide,

The Lower Suir Estuary is part of the Lower Suir SAC. This SAC covers an extensive area encompassing most of the River Suir itself and large sections of its major tributaries. Important habitats within the area include floating vegetation, Atlantic salt meadows and Mediterranean salt meadows which are all listed in Annex I of the EU Habitats Directive (NPWS, 2005). A number of Annex II species are also present, including sea lamprey, river lamprey, brook lamprey, twaite shad and salmon (NPWS, 2005).

A total of six beach seines, four fyke nets and four beam trawls were deployed in the Lower Suir Estuary in September 2010.

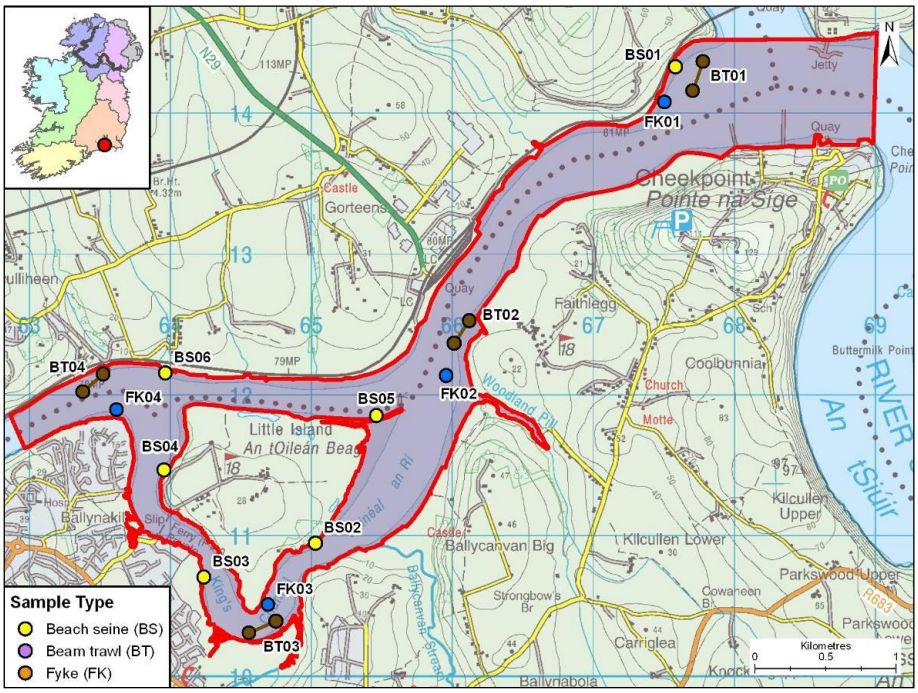

Fig. 3.14. Location map of the Lower Suir Estuary indicating sample sites, September 2010

A total of 15 fish species were recorded in the Lower Suir Estuary in September 2010 (Table 3.6). Sand goby was the most abundant species, followed by sprat and flounder (Table 3.6). This water body was one of only three locations surveyed during 2010 where European seabass was recorded.

Two protected fish species were recorded during the survey; salmon (listed in Annex II and V of the EU Habitats Directive and listed as vulnerable in the Irish Red Data Book (King *et al*., 2011) and eel (listed as critically endangered in the Irish Red data Book).

Flounder and eels were well distributed throughout this water body, with individuals captured using all three netting methods. Brown trout and smelt were also recorded (Table 3.6).

Flounder ranged in length from 6.5cm to 27cm, with the majority of individuals probably representing the 1+ age class (Fig. 3.15). Eels ranged in length from 21.0cm to 64.0cm and were spread across a range of age classes (Fig. 3.16).

Salinity values taken at beach seine and beam trawl sites ranged from 6.80ppt to 16.00ppt.

Table 3.6. Number of each species captured by each gear type in the Lower Suir Estuary, September 2010

Scientific name	Common name	Beach seine (6)	Fyke net (4)	Beam trawl (4)	Total
Pomatoschistus minutus	Sand goby	1017	-	31	1048
Sprattus sprattus	Sprat	760	-	-	760
Platichthys flesus	Flounder	12	105	1	118
Anguilla anguilla	European eel	1	84	2	87
Chelon labrosus	Thick-lipped grey mullet	69	-	-	69
Alosa fallax	Twaite shad	27	-	3	30
Gadus morhua	Cod	-	12	1	13
Osmerus eperlanus	Smelt	4	1	5	10
Pleuronectes platessa	Plaice	-	-	7	7
Ciliata mustela	Five-bearded rockling	-	4	-	4
Dicentrarchus labrax	European seabass	-	2	-	2
Agonus cataphractus	Pogge	-	1	-	1
Merlangius merlangus	Whiting	-	-	1	1
Salmo trutta	Brown trout	-	1	-	1
Trachurus trachurus	Scad	1	-	-	1

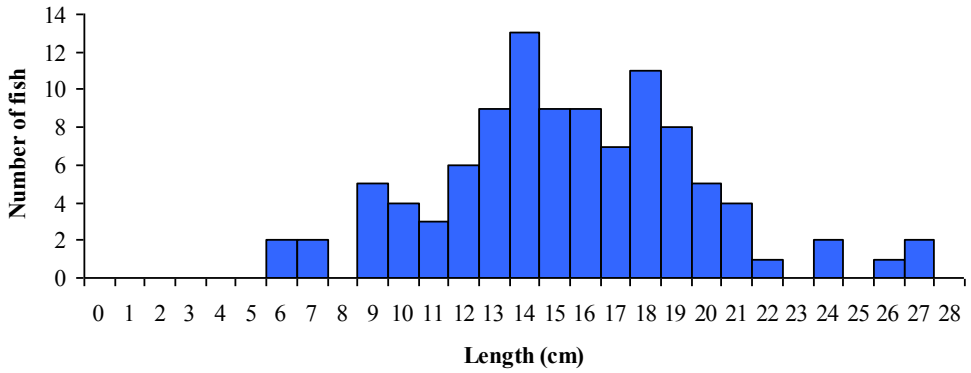

Fig. 3.15. Length frequency distribution of a sub-sample of flounder in the Lower Suir Estuary, September 2010 (n=103)

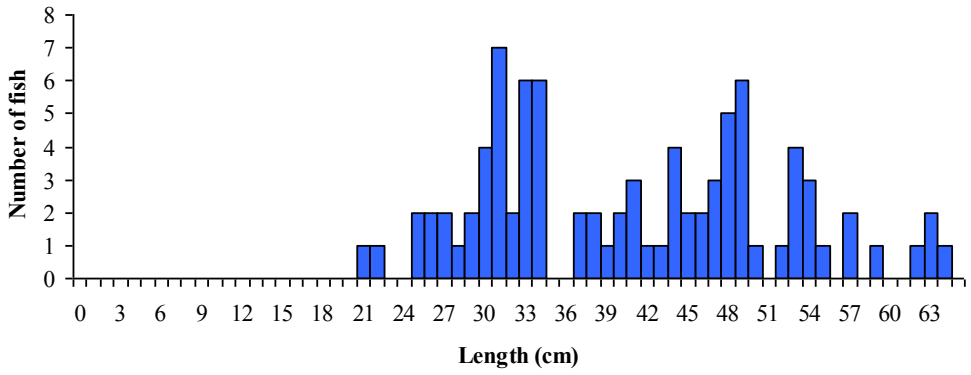

Fig. 3.16. Length frequency distribution of eels in the Lower Suir Estuary, September 2010 (n=87)

3.1.7 Middle Suir Estuary

Plate 3.8. Aerial photo of the Middle Suir Estuary, east of Waterford City, looking north towards Co. Kilkenny. (Photo courtesy of IFI and No. 3 Operational Wing, Irish Air Corps [Aer Chór na hÉireann])

The Middle Suir Estuary covers an area of 7.03 km^2. It is a long transitional water body, stretching approximately 25km from Fiddown on the border between Co. Kilkenny and Co. Waterford as far as Ballynakill on the eastern edge of Waterford City (Fig. 3.17, Plate 3.8).

This water body forms part of the Lower Suir SAC (see Section 3.1.6).

A total of six beach seines, six fyke nets and seven beam trawls were deployed in the Middle Suir Estuary in September 2010.

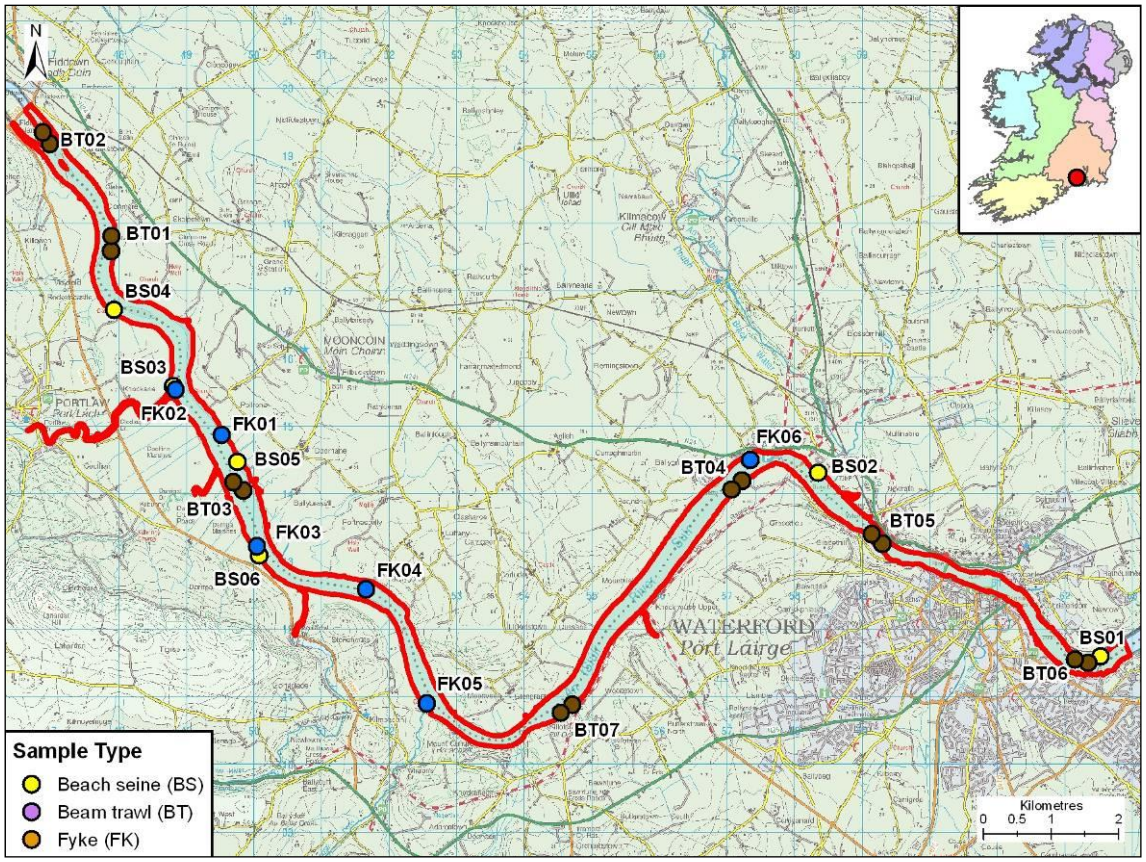

Fig. 3.17. Location map of the Middle Suir Estuary indicating sample sites, September 2010

A total of 13 fish species (sea trout are included as a separate 'variety' of trout) were recorded in the Middle Suir Estuary in September 2010 (Table 3.7). Sand goby was the most abundant species, followed by flounder and smelt (Table 3.7). Flounder were abundant throughout the whole water body, being captured in relatively high numbers using all three sampling methods. Eels (listed as critically endangered in the Irish Red Data Book (King *et al*., 2011)) were common throughout the waterbody and were mainly captured in fyke nets. Twaite shad (listed in Annex II and V of the EU Habitats Directive and listed as vulnerable in the Irish Red Data Book (King *et al*., 2011)) were recorded at four of the six beach seine sites. Other noteworthy species recorded were brown trout, sea trout, three-spined stickleback and smelt. Dace (an invasive fish species in Ireland) were also recorded at one beach seine site.

Flounder ranged in length from 3cm to 24cm, with the majority of individuals within the 0+ and 1+ age classes (Fig. 3.18). Eels ranged in length from 11.0cm to 51.0cm, with a number of different age classes represented (Fig. 3.19).

Salinity values taken at beach seine and beam trawl sites ranged from 0.213ppt to 2.04ppt.

Table 3.7. Number of each species captured by each gear type in the Middle Suir Estuary, September 2010

Scientific name	Common name	Beach seine (6)	Fyke net (6)	Beam trawl (7)	Total
Pomatoschistus minutus	Sand goby	1272	12	352	1636
Platichthys flesus	Flounder	351	104	159	614
Osmerus eperlanus	Smelt	70	4	2	76
Alosa fallax	Twaite shad	62	-	-	62
Anguilla anguilla	European eel	2	55	-	57
Chelon labrosus	Thick-lipped grey mullet	15	-	-	15
Sprattus sprattus	Sprat	10	-	-	10
Salmo trutta	Brown trout	-	6	-	6
Scardinius erythrophthalmus	Rudd	2	1	-	3
Gasterosteus aculeatus	Three-spined stickleback	2	-	-	2
Atherina presbyter	Sand smelt	-	-	1	1
Leuciscus leuciscus	Dace	1	-	-	1
Salmo trutta	Sea trout	-	-	1	1

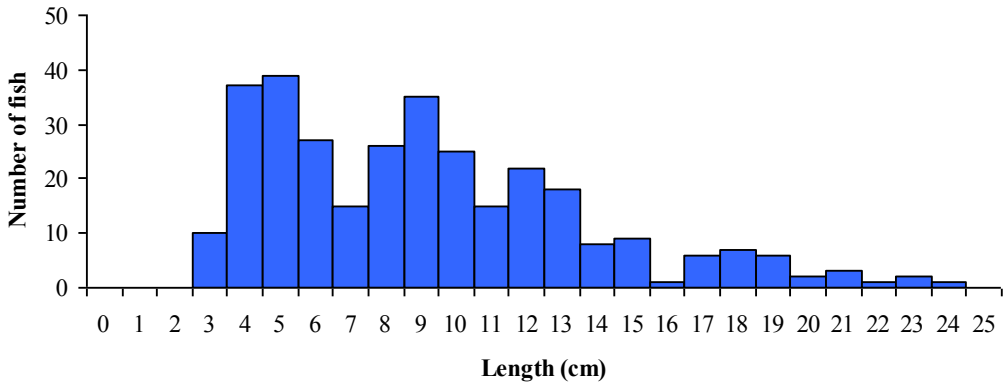

Fig. 3.18. Length frequency distribution of a sub-sample of flounder in the Middle Suir Estuary, September 2010 (n=315)

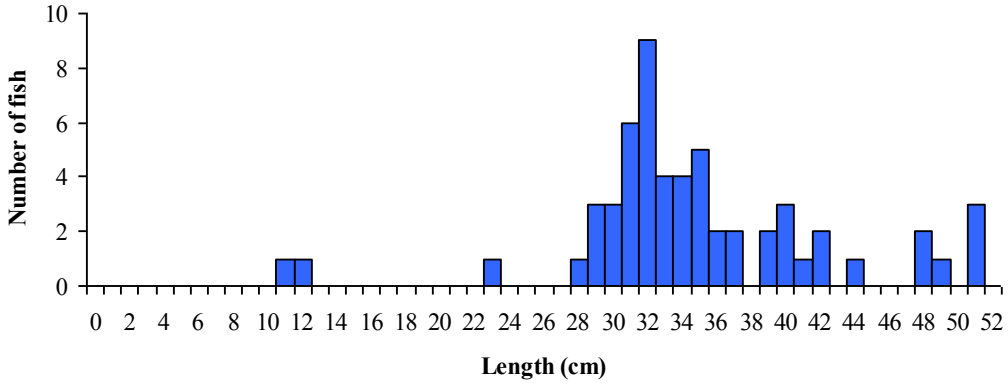

Fig. 3.19. Length frequency distribution of eels in the Middle Suir Estuary, September 2010 (n=57)

3.1.8 Upper Suir Estuary

Plate 3.9. Aerial photo of the Upper Suir Estuary looking north over Carrick-on-Suir. (Photo courtesy of IFI and No. 3 Operational Wing, Irish Air Corps [Aer Chór na hÉireann])

The Upper Suir Estuary covers an area of 1.09km^{2}and begins at the salmon weir approximately 1km west of Carrick-on-Suir and stretches downstream for approximately 9km through the town, ending at Fiddown (Fig. 3.20, Plate 3.9). It is joined on its northern bank by the Pil, Lingaun and Glen Rivers, all of which drain extensive areas of agricultural land in south Co. Kilkenny.

This water body is part of the Lower Suir SAC (see Section 3.1.6). The Upper Suir Estuary (near Carrick-on-Suir) is one of the few known spawning grounds in the country for twaite shad (J. King, *pers.comm*).

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

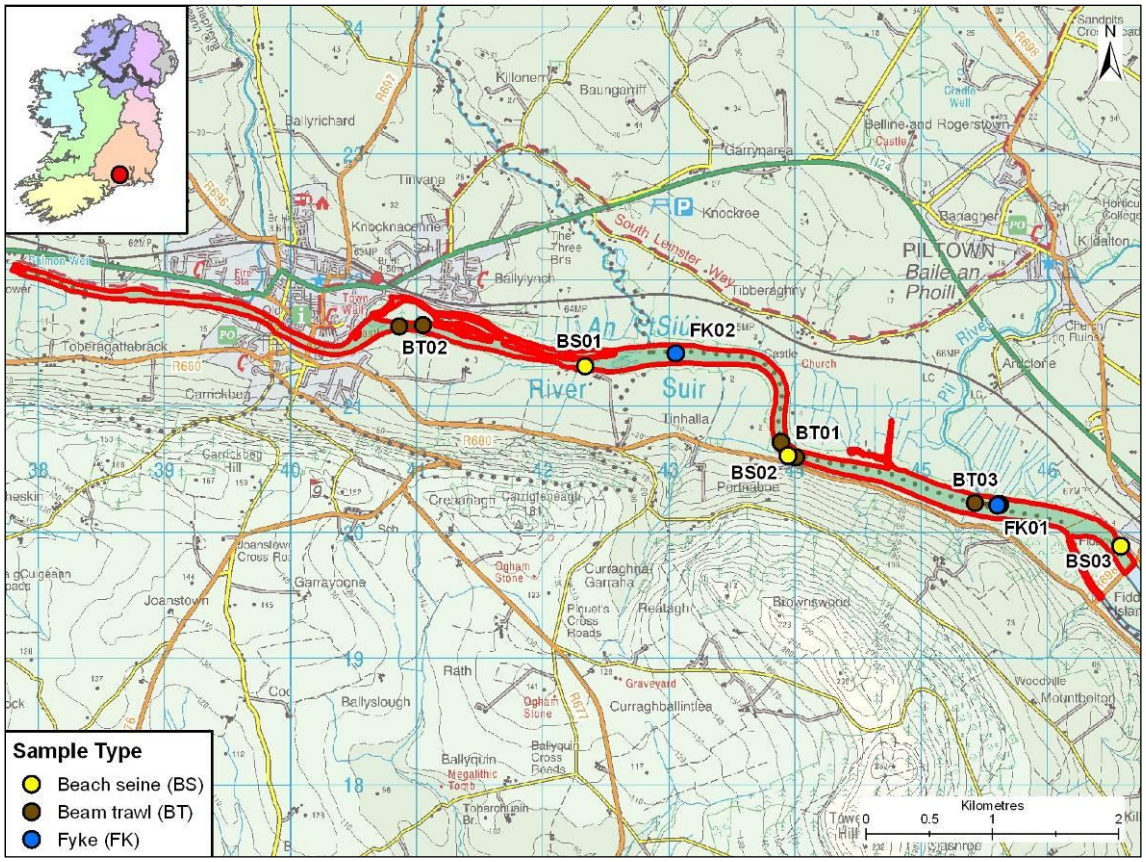

Fig. 3.20. Location map of the Upper Suir Estuary indicating sample sites, September 2010

A total of ten fish species were recorded in the Upper Suir Estuary in September 2010 (Table 3.8). Flounder was the most abundant species, followed by sand goby and three-spined stickleback (Table 3.8). Flounder and sand goby were well distributed throughout this water body, with all three netting methods catching these species. Two fish species, twaite shad and salmon, both listed in Annex II and V of the EU Habitats Directive and in the Irish Red Data Book species (King *et al*., 2011) as vulnerable; were captured at beach seine sites. Smelt, dace (an invasive fish species in Ireland) and brown trout were also recorded.

Flounder ranged in length from 2cm to 22cm, with the 0+ and 1+ age classes dominant (Fig. 3.21). Dace ranged in length from 3.1cm to 22.9cm, with a number of different age classes represented (Fig. 3.22).

Salinity values taken at beach seine and beam trawl sites ranged from 0.199ppt to 0.273ppt.

Table 3.8. Number of each species captured by each gear type in the Upper Suir Estuary, September 2010

Scientific name	Common name	Beach seine (3)	Fyke net (2)	Beam trawl (3)	Total
Platichthys flesus	Flounder	130	837	306	1273
Pomatoschistus minutus	Sand goby	317	92	19	428
Gasterosteus aculeatus	Three-spined stickleback	196	-	-	196
Osmerus eperlanus	Smelt	62	6	1	69
Alosa fallax	Twaite shad	52	-	-	52
Leuciscus leuciscus	Dace	50	-	-	50
Anguilla anguilla	European eel	1	2	2	5
Salmo salar	Salmon	3	-	-	3
Salmo trutta	Brown trout	-	2	-	2
Perca fluviatilis	Perch	1	-	-	1

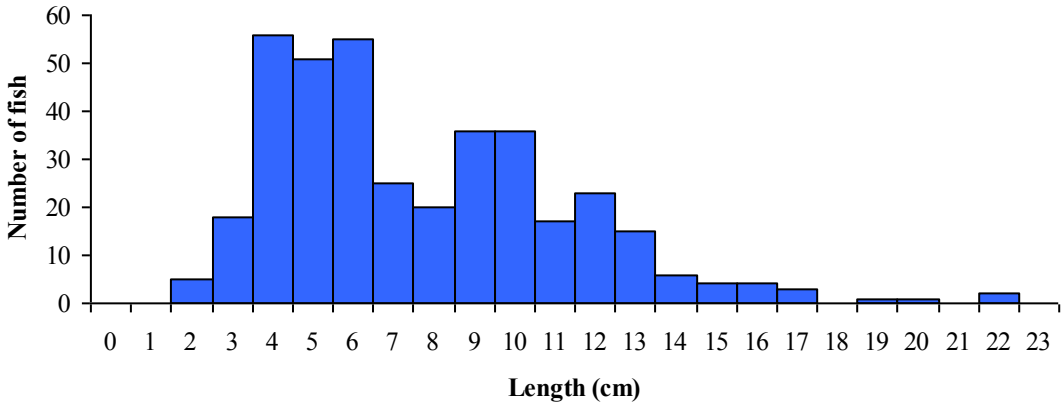

Fig. 3.21. Length frequency distribution of a sub-sample of flounder in the Upper Suir Estuary, September 2010 (n=378)

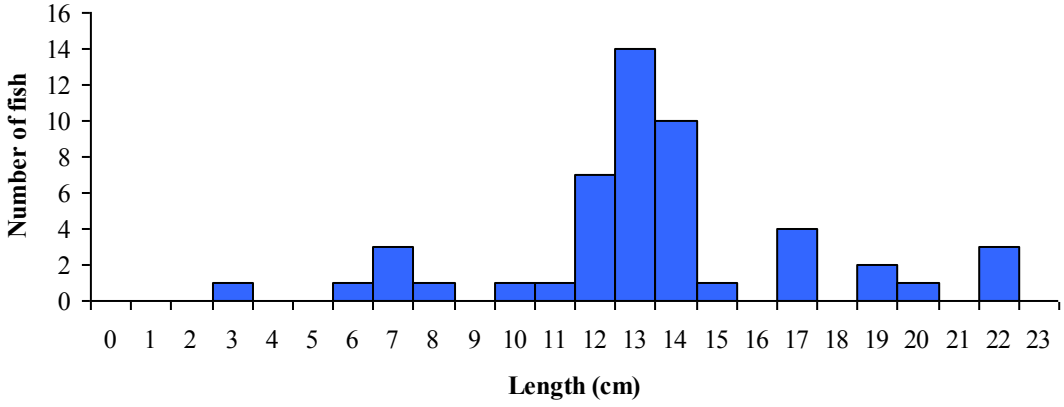

Fig. 3.22. Length frequency distribution of dace in the Upper Suir Estuary, September 2010 (n=50)

3.2 Species richness

A total of 36 fish species were recorded (sea trout are counted as a separate variety of brown trout) within the eight Barrow, Nore, Suir transitional water bodies surveyed during 2011. Only species that were recorded in at least three individual water bodies are shown in (Fig. 3.23). European eels, flounder and sand gobies were the three most common fish species recorded, occurring in all eight water bodies. Smelt was recorded in seven water bodies, while brown trout and dace (a non-native species) were encountered in six. Salmon and sea trout were caught in five and three water bodies respectively (Fig. 3.23).

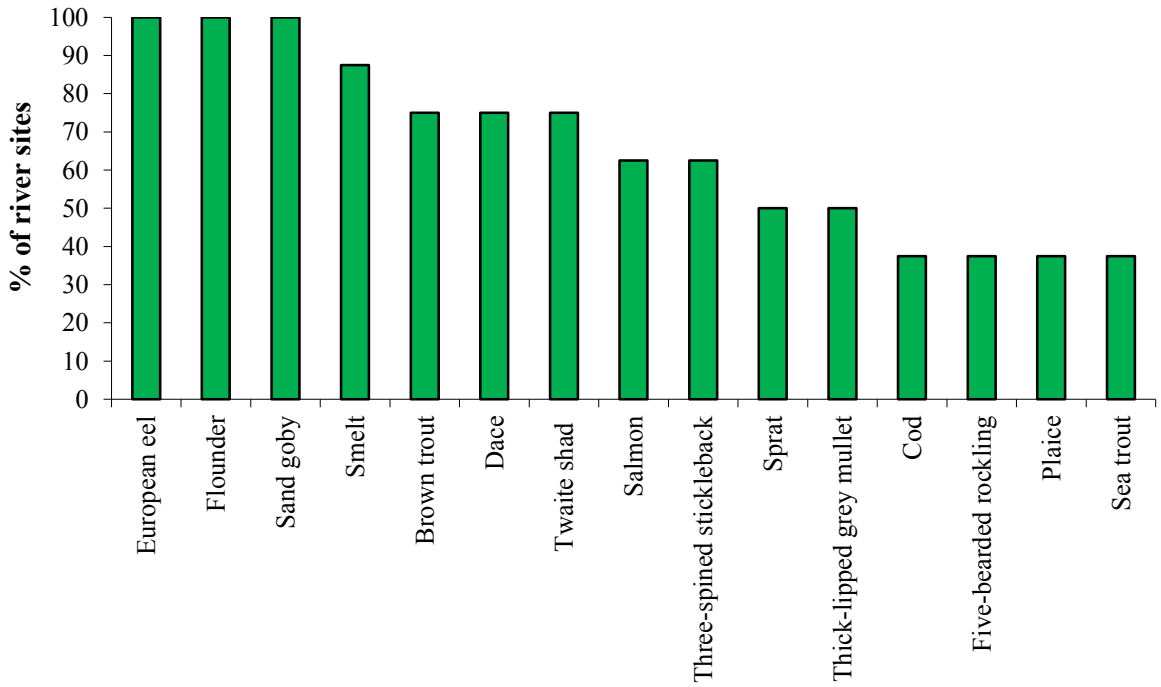

Fig. 3.23. Percentage of water bodies where selected fish species were recorded in the Barrow, Nore and Suir transitional waters for WFD SM monitoring 2011

4. SUMMARY

The eight transitional water bodies comprising the Barrow, Nore and Suir estuary system vary greatly in size, environmental and physical characteristics. This is reflected in the fish species composition recorded in each water body. As expected, with decreasing salinity levels, higher numbers of freshwater fish were recorded in the upper estuaries, while in contrast more marine species were recorded in the water bodies further down the system. This was a trend that was also observed in other transitional water bodies surveyed during 2011. Sand goby and flounder were among the most abundant and widespread species recorded, while other fish such as European eel and dace (an invasive fish species in Ireland) were also common. Three vulnerable fish species, salmon, twaite shad and eel were recorded throughout the estuary system. Species richness and distribution maps for selected species captured across all transitional water bodies surveyed during 2010 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 present are given in Table 3.9 below.

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 3.9. Ecological status classifications for the Barrow, Nore and Suir transitional water bodies

Transitional Water body	Fish Ecological Status (TFCI)	Overall Interim Status (EPA)
Barrow Estuary, Upper	Good	Moderate
Barrow Nore Estuary, Upper	Moderate	Moderate
Barrow Suir Nore Estuary	Good	Moderate
New Ross Port	Good	Good
Nore Estuary	Good	Moderate
Suir Estuary, Lower	Good	Good
Suir Estuary, Middle	Moderate	Moderate
Suir Estuary, Upper	Good	Moderate

5. REFERENCES

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