



Sampling Fish for the Water Framework Directive

Transitional Waters 2013

Barrow, Nore & Suir Estuaries



Iascach Intíre Éireann
Inland Fisheries Ireland

Water Framework Directive Fish Stock Survey of Transitional Waters in the South Western River Basin District – Barrow, Nore, Suir Estuary 2013

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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 30th of September and the 11th of October 2013 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, October 2013 (FT=freshwater tidal, TW=transitional)

| Transitional water body | MS Code | Easting | Northing | Type | Area (km²) |
|--------------------------------|----------------|----------------|-----------------|-------------|------------------------------|
| 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 |

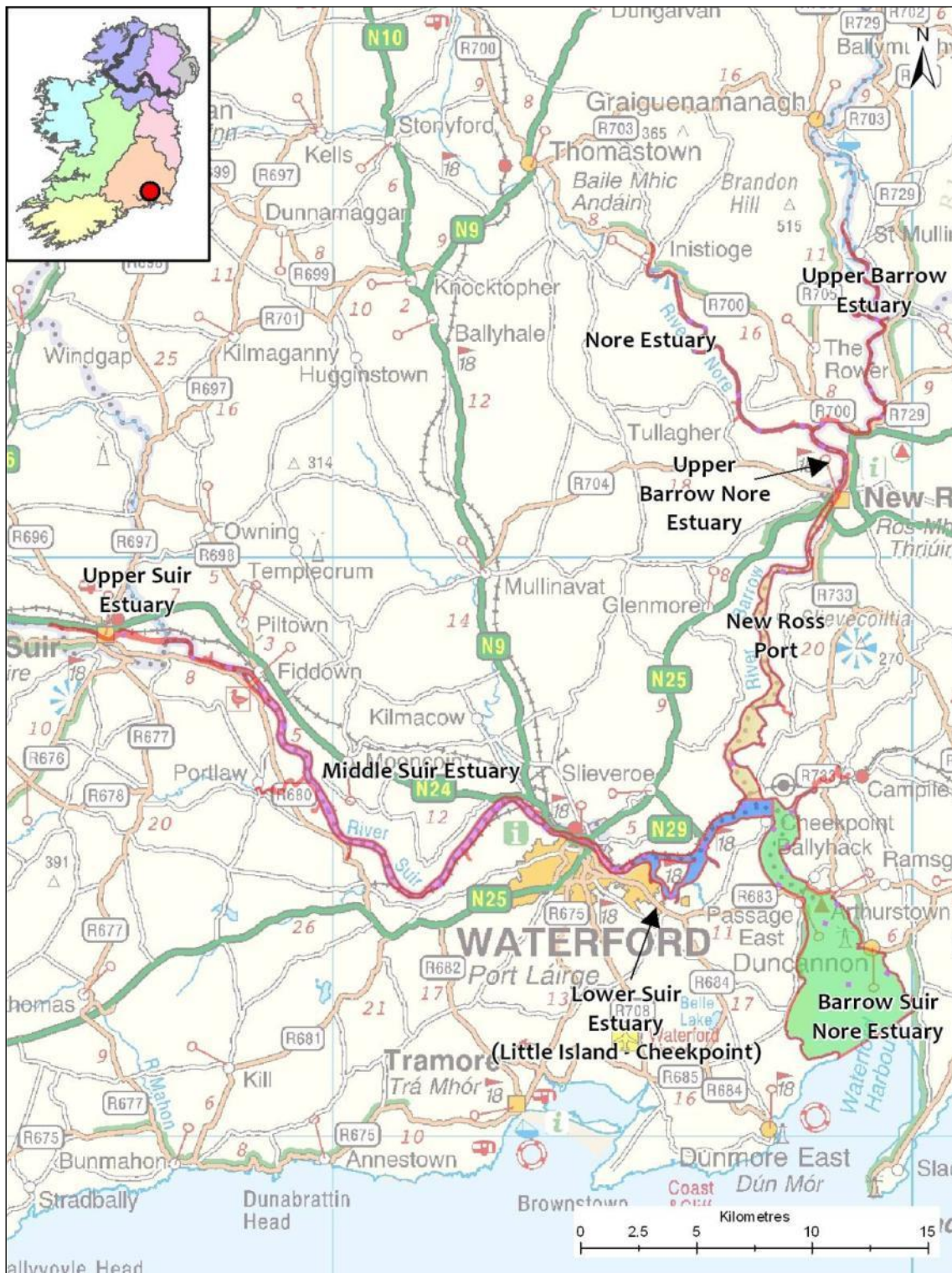


Fig. 1.1. Location map of the eight transitional water bodies on the Barrow, Nore and Suir estuary system surveyed for WFD fish monitoring, September-October 2013

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 fish 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 on the Barrow-Suir-Nore Estuary waterbody, October 2013



Plate 2.2. Beam trawling on the Barrow-Suir-Nore Estuary waterbody, October 2013

3. RESULTS

3.1 Water body surveys

3.1.1 Upper Barrow Estuary

The Upper Barrow Estuary covers an area of 1.15km² (Fig. 3.1, Plates 3.1 to 3.3). It begins 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).



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]



Plate 3.2: Upper Barrow Estuary close to the tidal limit, St. Mullins Co. Carlow, October 2013.



Plate 3.3: Upper Barrow Estuary, upstream of ferry bridge near Mount Garrett, October 2013.

Seven beach seines, six fyke nets and six beam trawls were deployed in the Upper Barrow Estuary in September-October 2013 (Fig. 3.1).

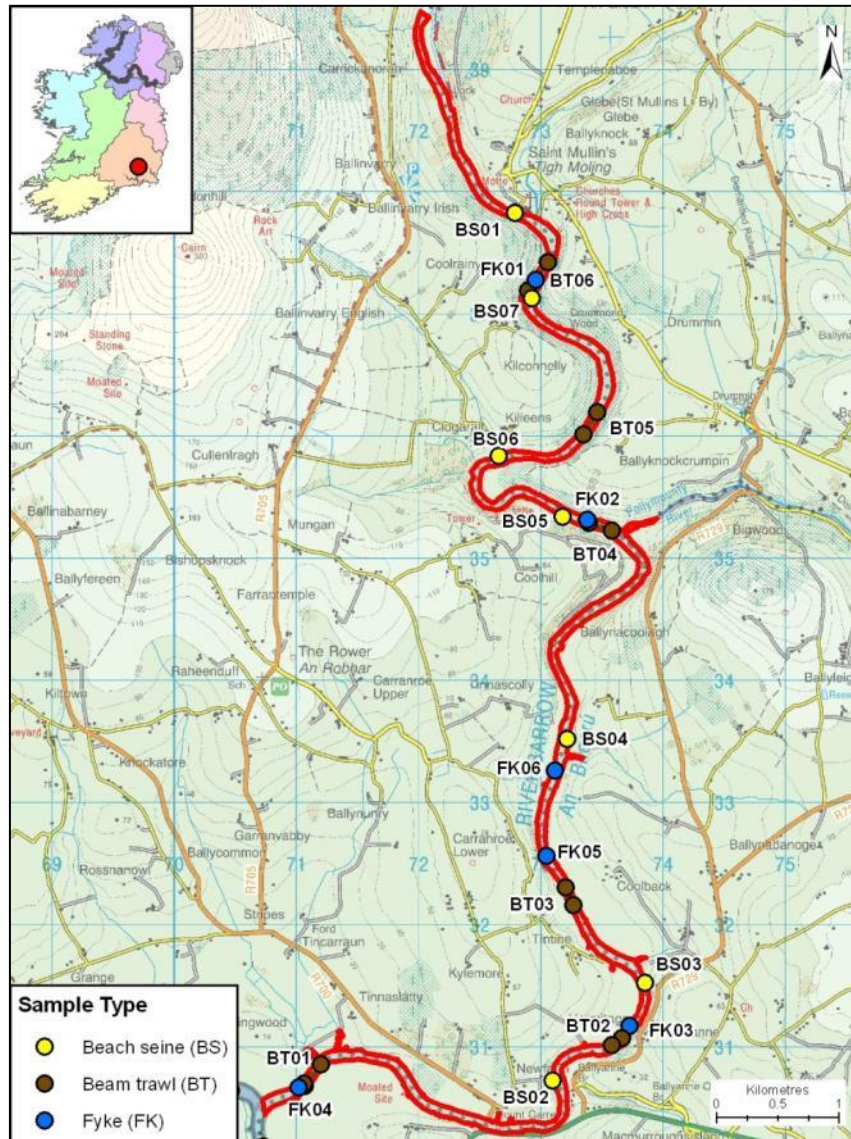


Fig. 3.1. Location map of the Upper Barrow Estuary indicating sample sites, September-October 2013

A total of ten fish species (sea trout are included as a separate ‘variety’ of trout) were recorded in the Upper Barrow Estuary in October 2013. Table 3.1 shows a comparison between 2013 and the previous survey in 2010. A number of species were newly recorded in 2013, including roach, smelt and stone loach. Minnow, three-spined stickleback and salmon were previously caught in 2010 but absent in the 2013 survey. Dace was the most abundant species, followed by flounder and sand goby. Flounder were widely distributed throughout the water body being captured using all three netting

methods, while other species such as three-spined stickleback were more localised, only recorded in the shallow marginal areas using beach seines.

Eels, which are listed as critically endangered in the Irish Red Data Book (King *et al.*, 2011) were recorded during this survey.

Table 3.1. Number of each species captured by each gear type in the Upper Barrow Estuary, September-October 2010 and 2013

| Common name | Beach seine | | Fyke net | | Beam trawl | | Total | |
|--------------------------|-------------|----------|----------|----------|------------|----------|-------|------|
| | 2010 (6) | 2013 (7) | 2010 (4) | 2013 (6) | 2010 (6) | 2013 (6) | 2010 | 2013 |
| Dace | 316 | 479 | 4 | 4 | - | - | 320 | 483 |
| Flounder | 104 | 113 | 94 | 89 | 221 | 99 | 419 | 301 |
| Sand goby | 82 | 210 | 2 | - | 114 | 16 | 198 | 226 |
| European eel | - | 2 | 26 | 36 | - | - | 26 | 38 |
| Three-spined stickleback | 14 | 26 | - | - | - | - | 14 | 26 |
| Roach | - | 12 | - | 5 | - | - | - | 17 |
| Smelt | - | 3 | - | 1 | - | 10 | - | 14 |
| Sea trout | - | - | 1 | 3 | - | - | 1 | 3 |
| Brown trout | 4 | 1 | - | - | - | - | 4 | 1 |
| Stone loach | - | 1 | - | - | - | - | - | 1 |
| Minnow | 61 | - | - | - | - | - | 61 | - |
| Nine-spined stickleback | 1 | - | - | - | - | - | 1 | - |
| Salmon | - | - | - | - | 1 | - | 1 | - |

Flounder captured during the 2013 survey ranged in length from 2.1cm to 20.5cm (mean = 7.5cm) (Fig. 3.2). Flounder captured during the 2010 survey were similar in length ranging in length from 3.0cm to 20.0cm (mean = 9.2cm).

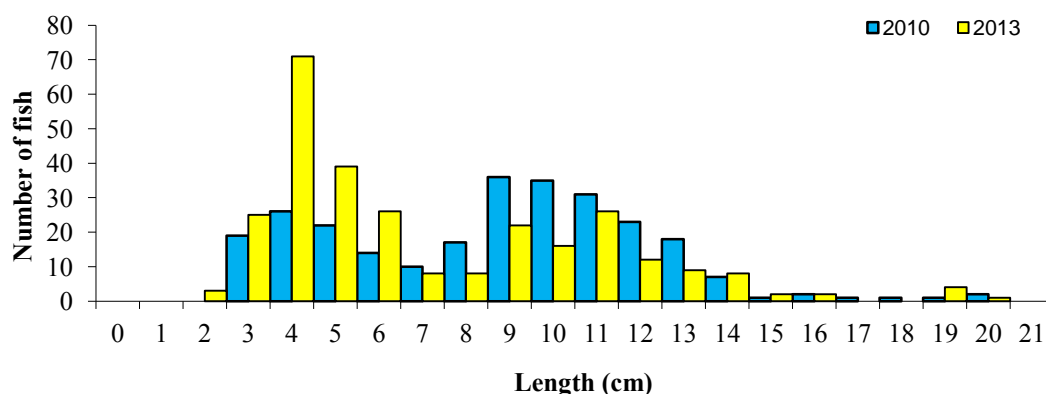


Fig. 3.2. Length frequency distribution of flounder in the Upper Barrow Estuary, September 2010 (sub-sample, n = 266) and October 2013 (sub-sample, n=282)

Dace captured during the 2013 survey ranged in length from 3.8cm to 24.1cm (mean = 7.0cm) (Fig. 3.3). Flounder captured during the 2010 survey ranged in length from 2.6cm to 24.8cm (mean = 4.7cm).

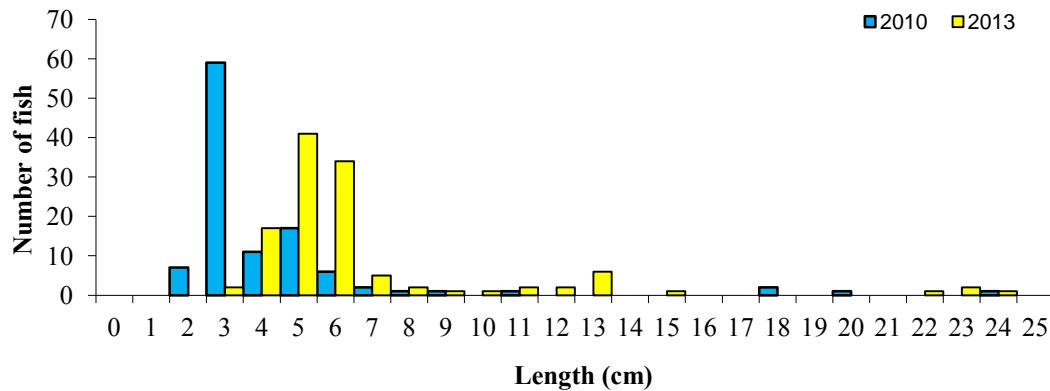


Fig.3.3. Length frequency distribution of dace in the Upper Barrow Estuary, September 2010 (sub-sample, n = 109) and October 2013 (sub-sample, n=118)

3.1.2 Upper Barrow Nore Estuary waterbody

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 km² (Fig. 3.4, Plate 3.4). 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).

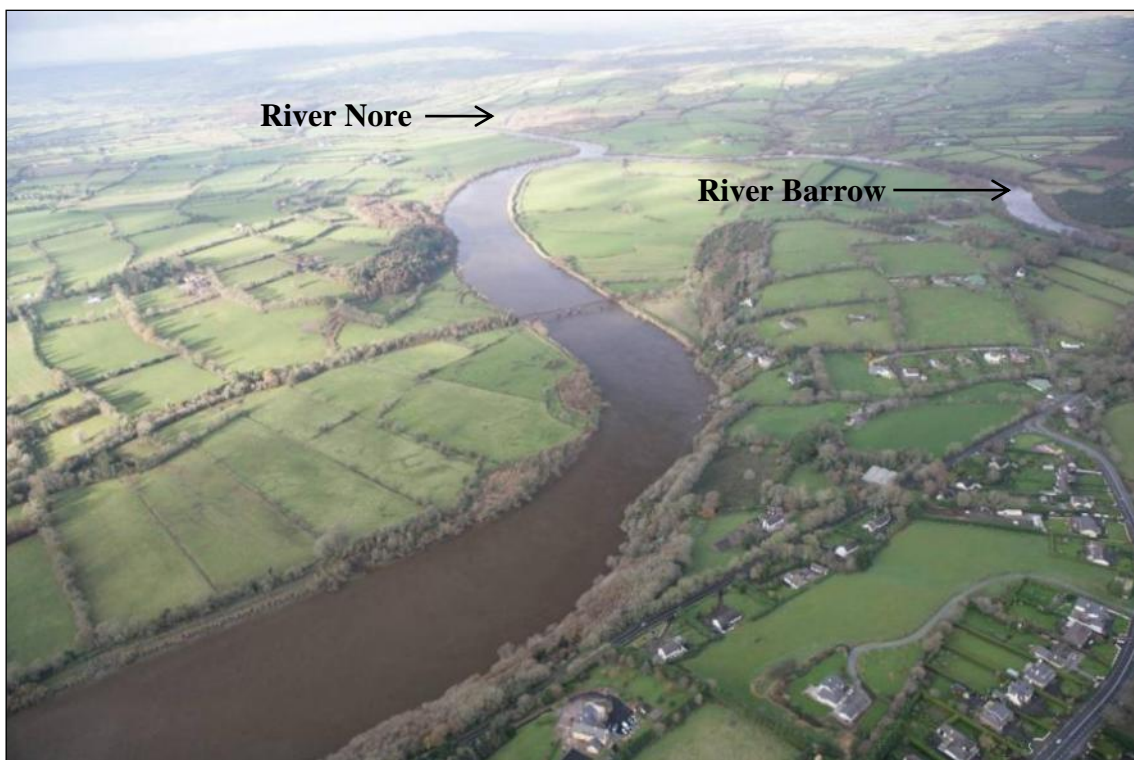


Plate 3.4. Aerial photo of the Upper Barrow Nore Estuary looking upstream towards the confluence of both rivers. (Photo courtesy of IFI and No. 3 Operational Wing, Irish Air Corps [Aer Chór na hÉireann])

Two beach seines, two fyke nets and four beam trawls were deployed in the Upper Barrow Nore Estuary in October 2013.



Fig. 3.4. Location map of the Upper Barrow Nore Estuary indicating sample sites, October 2013

A total of seven fish species were recorded in the Upper Barrow Nore Estuary in October 2013. Table 3.2 shows a comparison between 2013 and the previous survey in 2010. Three-spined stickleback was newly recorded in 2013, however, five species including twaite shad, perch, roach, sea trout and salmon were not recorded. Sand goby was the most abundant species, followed by flounder and eel. Flounder were well distributed throughout this waterbody, being captured using all three netting methods.

One endangered fish species; eels, listed as critically endangered in the Irish Red Data Book (King *et al.*, 2011), was recorded during this survey as well as dace, an invasive species to this country.

Table 3.2. Number of each species captured by each gear type in the Upper Barrow Nore Estuary, October 2013

| Common name | Beach seine | | Fyke net | | Beam trawl | | Total | |
|--------------------------|-------------|----------|----------|----------|------------|----------|-------|------|
| | 2010 (2) | 2013 (2) | 2010 (2) | 2013 (2) | 2010 (2) | 2013 (4) | 2010 | 2013 |
| Sand goby | 350 | 818 | 6 | - | 17 | 5 | 373 | 823 |
| Flounder | 99 | 129 | 61 | 11 | 10 | 3 | 170 | 143 |
| European eel | - | 3 | 21 | 59 | - | - | 21 | 62 |
| Dace | 50 | 9 | - | 2 | - | - | 50 | 11 |
| Smelt | 2 | 1 | - | - | - | 3 | 2 | 4 |
| Brown trout | 1 | - | - | 1 | - | - | 1 | 1 |
| Three-spined stickleback | - | 1 | - | - | - | - | - | 1 |
| Twaite shad | 28 | - | - | - | - | - | 28 | - |
| Perch | 3 | - | - | - | - | - | 3 | - |
| Roach | 3 | - | - | - | - | - | 3 | - |
| Sea trout | - | - | 3 | - | - | - | 3 | - |
| Salmon | 1 | - | - | - | - | - | 1 | - |

Flounder captured during the 2013 survey ranged in length from 3.0cm to 13.0cm (mean = 7.1cm) (Fig. 3.5). Flounder captured during the 2010 survey ranged in length from 3.1cm to 23.8cm (mean = 8.7cm).

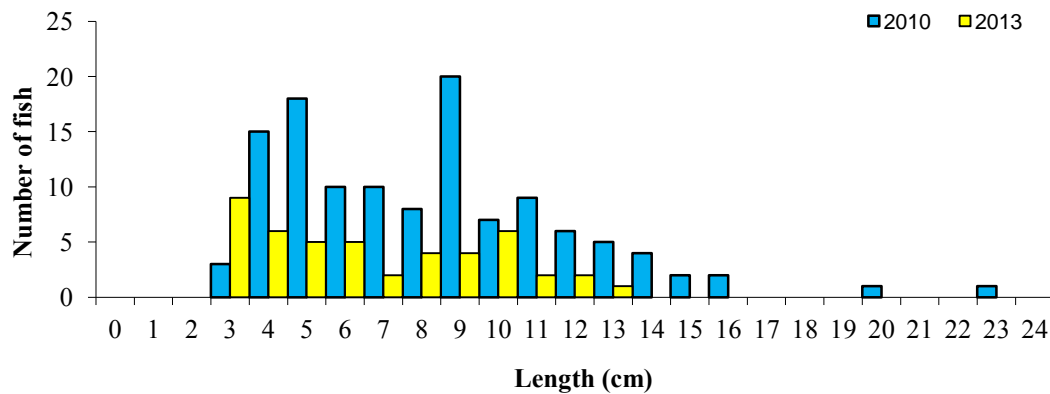


Fig. 3.5. Length frequency distribution of flounder in the Upper Barrow Nore Estuary, September 2010 (sub-sample, n = 121) and September 2013 (sub-sample, n = 46)

Eels captured during the 2013 survey ranged in length from 11.0cm to 74.4cm (mean = 36.0cm) (Fig. 3.6). Eels captured during the 2010 survey ranged in length from 30.0cm to 67.0cm (mean = 46.8cm).

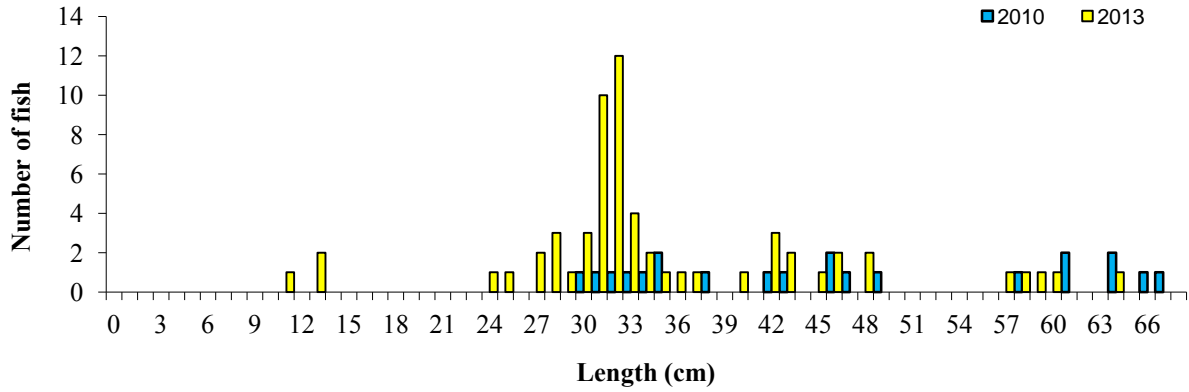


Fig. 3.6. Length frequency distribution of eels in the Upper Barrow Nore Estuary, September 2010 (n = 21) and September 2013 (n = 62)

3.1.3 Barrow-Suir-Nore Estuary waterbody

The Barrow-Suir-Nore Estuary is a large water body, covering an area of 28.21km² and is situated where the Barrow, Suir and Nore rivers enter the sea at Waterford Harbour (Fig. 3.7, Plate 3.5 and 3.6). 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).

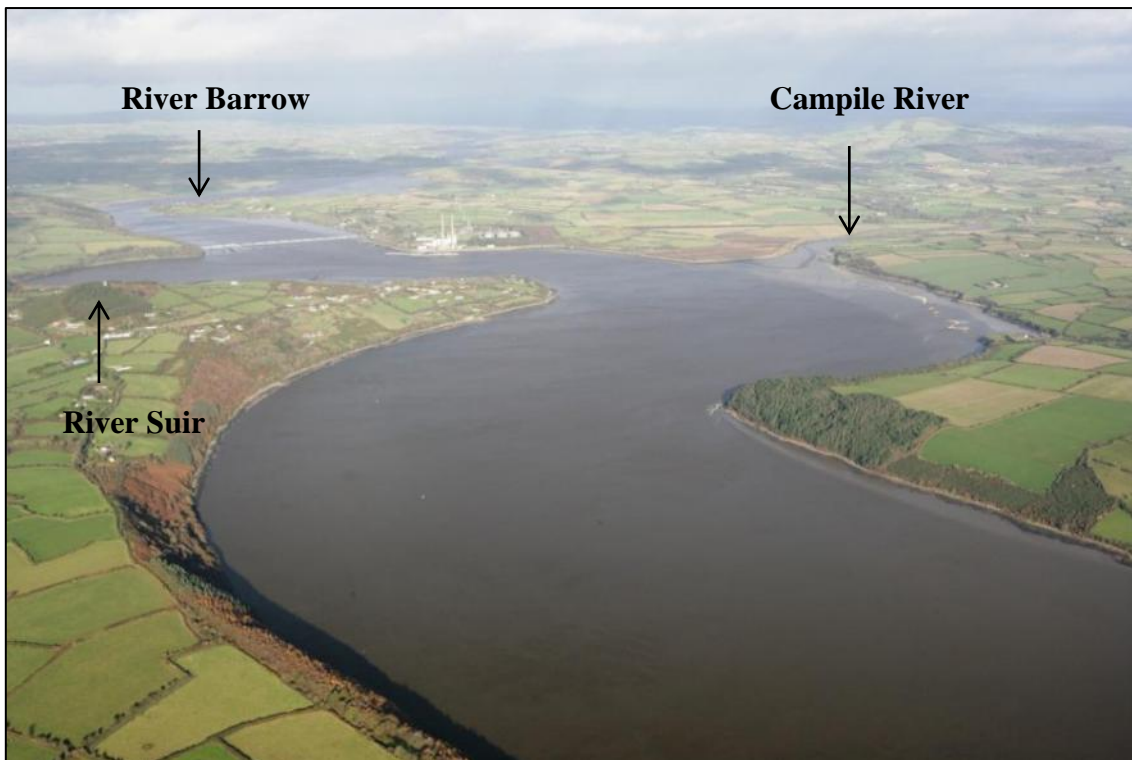


Plate 3.5. Aerial photo of the northern part of the Barrow-Suir-Nore Estuary looking north towards the Great Island power station and Barrow Bridge (Photo courtesy of IFI and No. 3 Operational Wing, Irish Air Corps [Aer Chór na hÉireann])



Plate 3.6. The Barrow-Suir-Nore Estuary waterbody looking north towards the Great Island power station, October 2013

A total of six beach seines, four fyke nets and nine beam trawls were deployed in the Barrow-Suir-Nore Estuary in October 2013.

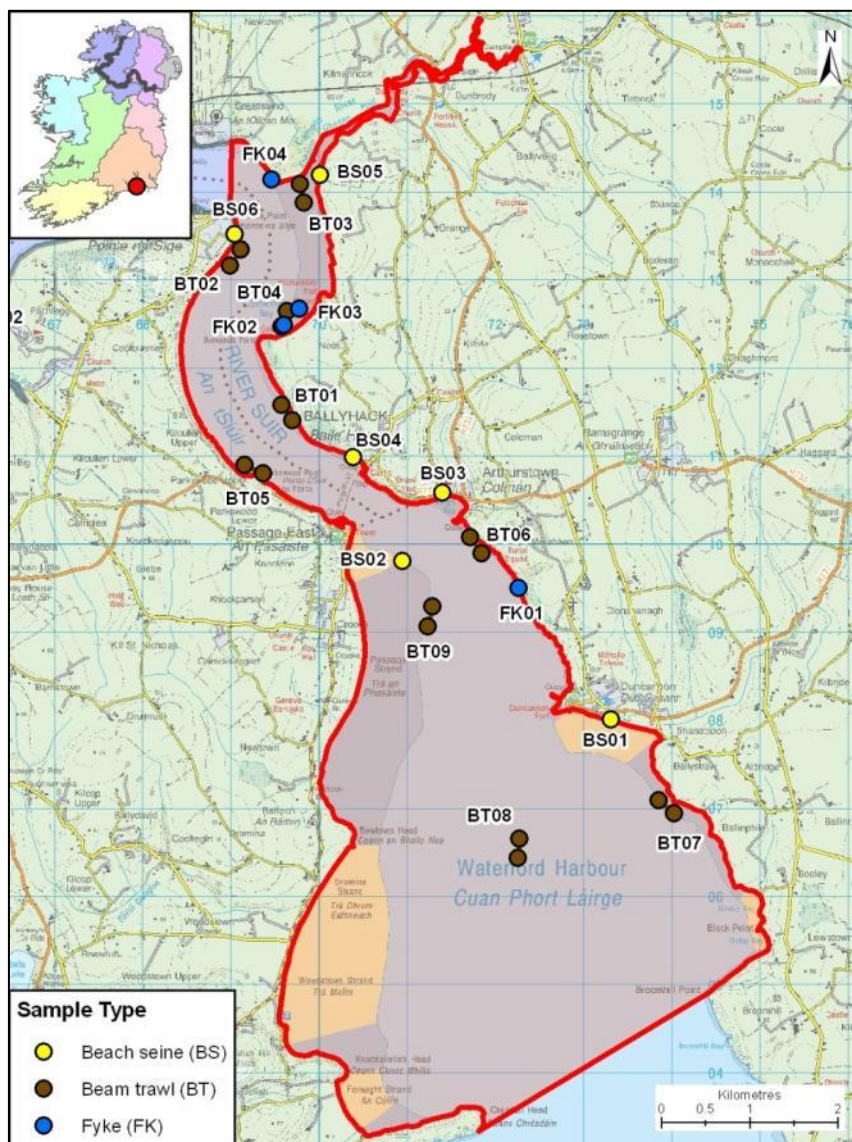


Fig. 3.7. Location map of the Barrow-Suir-Nore estuary waterbody indicating sample sites, October 2013

A total of 22 fish species were recorded in the Barrow-Suir-Nore Estuary waterbody in October 2013. Table 3.3 shows a comparison between 2013 and the previous survey in 2010. A number of species were newly recorded in 2013, including Atlantic horse mackerel, herring, pollack, long rough dab, whiting, black goby and turbot. European eel, sand smelt, lesser sandeel, brill, spotted dragonet, three-spined stickleback and haddock were previously caught in 2010 but absent in the 2013 survey. Plaice was the most abundant species, followed by sand goby and flounder. Three species of the gadoid family (cod, poor cod, and five-bearded rockling) were recorded in fyke nets and beam trawls,

whilst flounder were distributed throughout the water body, being captured by all three sampling methods. Pollack, horse mackerel, dab and pogge were also present. This was the only water body surveyed during 2013 in which the lesser weever fish was recorded.

One endangered fish species; twaite shad, listed in Annex II and Annex V of the EU Habitats Directive and also listed as vulnerable in the Irish Red Data book (King *et al.*, 2011) was recorded in this waterbody.

Table 3.3. Number of each fish species captured by each gear type in the Barrow-Suir-Nore Estuary, October 2013

| Common name | Beach seine | | Fyke net | | Beam trawl | | Total | |
|------------------------------|-------------|----------|----------|----------|------------|----------|-------|------|
| | 2010 (6) | 2013 (6) | 2010 (4) | 2013 (4) | 2010 (9) | 2013 (9) | 2010 | 2013 |
| Plaice | 5 | 107 | - | 1 | 12 | 1 | 17 | 109 |
| Sand goby | 131 | 103 | - | - | 51 | 1 | 182 | 104 |
| Flounder | 23 | 39 | 54 | 31 | 13 | - | 90 | 70 |
| Five-bearded rockling | - | - | 18 | 15 | - | - | 18 | 15 |
| Pogge | - | - | 2 | 13 | - | - | 2 | 13 |
| Poor cod | - | - | 1 | 9 | - | 1 | 1 | 10 |
| Sprat | 665 | 8 | - | - | - | - | 665 | 8 |
| Thick-lipped grey mullet | 94 | 8 | - | - | - | - | 94 | 8 |
| Atlantic horse mackerel/Scad | - | 1 | - | 4 | - | - | - | 5 |
| Herring | - | 5 | - | - | - | - | - | 5 |
| Pollack | - | 2 | - | 3 | - | - | - | 5 |
| Cod | - | - | 20 | 4 | 1 | - | 21 | 4 |
| Long rough dab | - | - | - | 2 | - | 1 | - | 3 |
| Nilsson's pipefish | - | 3 | - | - | 2 | - | 2 | 3 |
| Smelt | 2 | 3 | - | - | - | - | 2 | 3 |
| Twaite shad | 11 | 3 | - | - | - | - | 11 | 3 |
| Dab | - | - | - | - | 1 | 2 | 1 | 2 |
| Deep-snouted pipefish | 1 | 2 | - | - | - | - | 1 | 2 |
| Whiting | - | - | - | 1 | - | 1 | - | 2 |
| Black goby | - | 1 | - | - | - | - | - | 1 |
| Lesser weever | - | 1 | - | - | 2 | - | 2 | 1 |
| Turbot | - | 1 | - | - | - | - | - | 1 |
| European eel | - | - | 21 | - | - | - | 21 | - |
| Sand smelt | 11 | - | - | - | 2 | - | 13 | - |
| Lesser sandeel | 8 | - | - | - | - | - | 8 | - |
| Brill | 4 | - | - | - | - | - | 4 | - |
| Spotted dragonet | - | - | - | - | 1 | - | 1 | - |
| Three-spined stickleback | 1 | - | - | - | - | - | 1 | - |
| Haddock | - | - | 1 | - | - | - | 1 | - |

Flounder captured during the 2013 survey ranged in length from 5.2cm to 32.0cm (mean = 15.7cm) (Fig. 3.8). Those captured in 2010 ranged in length from 5.5cm to 30.5cm (mean = 15.0cm).

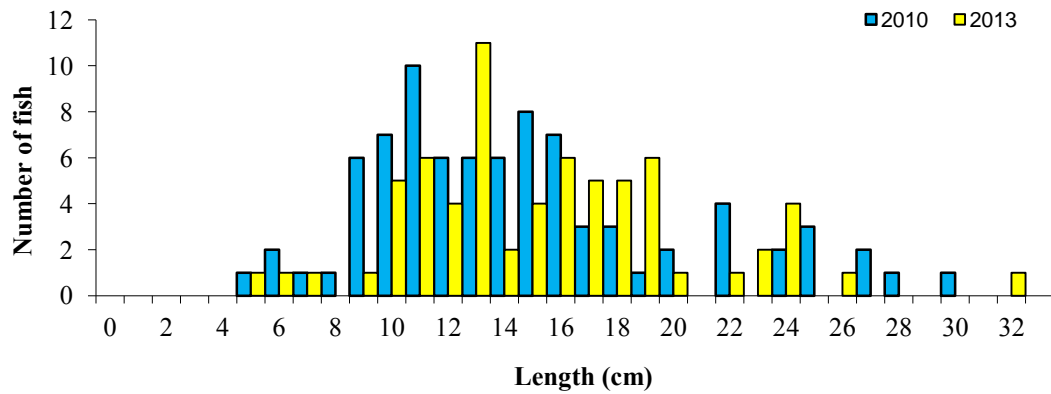


Fig. 3.8. Length frequency distribution of a sub-sample of flounder in the Barrow Suir Nore Estuary, September 2010 (sub-sample, n = 83) and October 2013 (sub-sample, n = 68)

3.1.4 New Ross Port waterbody

New Ross Port waterbody covers an area of 6.71km² (Fig. 3.9, Plate 3.7 and 3.8). It begins in the town of New Ross and continues downstream for approximately 16.0km 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).



Plate 3.7. 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])



Plate 3.8. Beach seining in New Ross port waterbody, October 2013



Plate 3.9. A juvenile Twaite shad, captured in New Ross Port, October, 2013

A total of six beach seines, four fyke nets and four beam trawls were deployed in New Ross Port waterbody in October 2013 (Fig. 3.9).

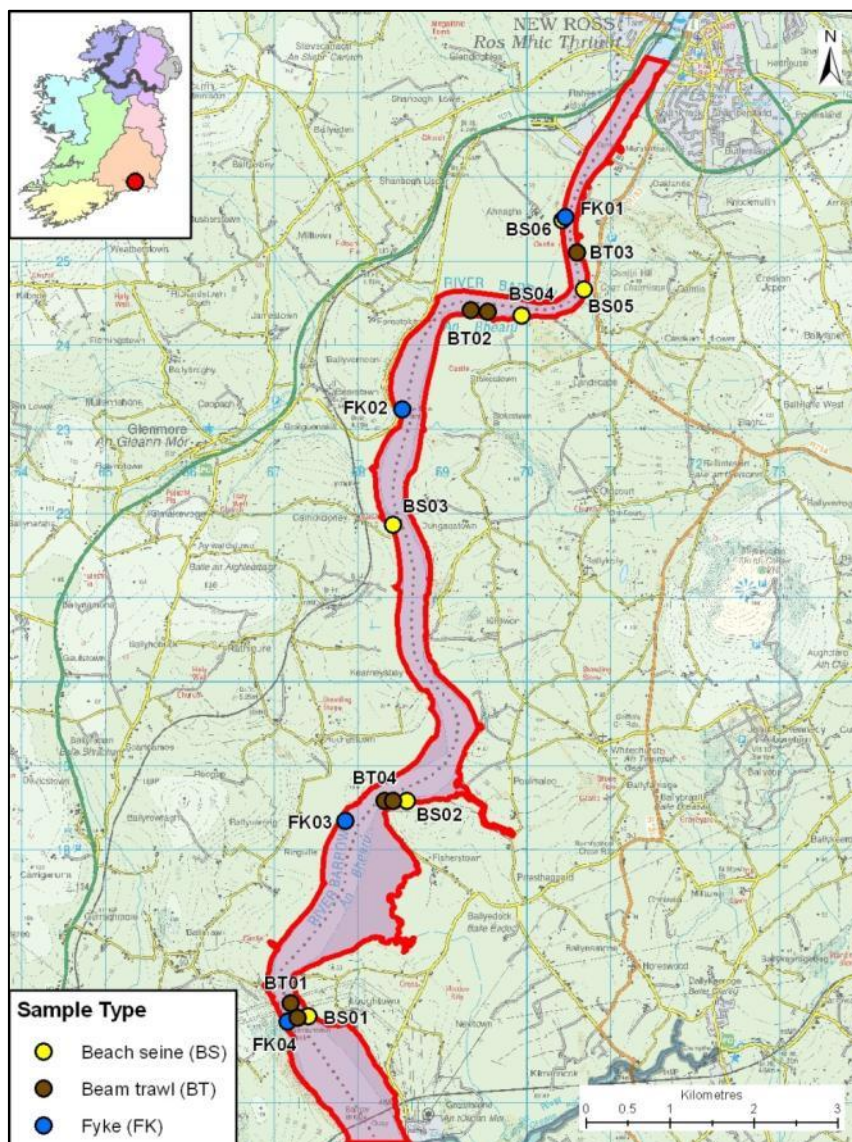


Fig. 3.9. Location map of New Ross port Estuary indicating sample sites, October 2013

A total of 17 fish species were recorded in New Ross Port in October 2013. Table 3.4 shows a comparison between 2013 and the previous survey in 2010. A number of species were newly recorded in 2013, including brown trout, poor cod, whiting, common sole, European seabass and sea lamprey. Cod, three-bearded rockling, pollack and salmon were previously caught in 2010 but not captured in the 2013 survey. Sand goby was the most abundant species, followed by European eel and flounder. Sand goby were captured in large numbers in seine nets, providing a potential source of

food for larger fish in shallow sections of the waterbody. In a similar trend to many of the other transitional water surveys, flounder were widespread, being recorded using all three netting methods.

Eels, listed as critically endangered in the Irish Red Data Book (King *et al.*, 2011), were recorded during this survey as well as dace, an invasive species to this country. Twaité shad, another important species, was recorded during the survey. This species is listed an Annex II and Annex V of the EU Habitats Directive, and also listed as vulnerable in the Irish Red Data Book (King *et al.*, 2011).

Salinity values taken at beach seine and beam trawl sites ranged from 0.535ppt to 5.710ppt.

Table 3.4. Number of each species captured by each gear type in New Ross Port, October 2013

| Common name | Beach seine | | Fyke net | | Beam trawl | | Total | |
|------------------------------|-------------|----------|----------|----------|------------|----------|-------|------|
| | 2010 (6) | 2013 (6) | 2010 (4) | 2013 (4) | 2010 (3) | 2013 (4) | 2010 | 2013 |
| Sand goby | 1021 | 511 | - | - | 89 | 8 | 1110 | 519 |
| European eel | 12 | 14 | 140 | 21 | - | - | 152 | 35 |
| Flounder | 126 | 14 | 55 | 14 | 41 | 5 | 222 | 33 |
| Sprat | 3454 | 27 | 1 | - | - | 1 | 3455 | 28 |
| Smelt | 7 | - | 1 | - | 7 | 22 | 15 | 22 |
| Twaité shad | 58 | 14 | - | - | - | - | 58 | 14 |
| Atlantic horse mackerel/Scad | 1 | 2 | - | 2 | - | - | 1 | 4 |
| Brown trout | - | - | - | 2 | - | - | - | 2 |
| Five-bearded rockling | 1 | - | 4 | 2 | - | - | 5 | 2 |
| Poor cod | - | - | - | 2 | - | - | - | 2 |
| Whiting | - | - | - | - | - | 2 | - | 2 |
| Common sole | - | - | - | - | - | 1 | - | 1 |
| Dace | 25 | 1 | - | - | - | - | 25 | 1 |
| European seabass | - | 1 | - | - | - | - | - | 1 |
| Plaice | 1 | - | - | - | - | 1 | 1 | 1 |
| Sea lamprey | - | - | - | - | - | 1 | - | 1 |
| Thick-lipped grey mullet | 1 | 1 | - | - | - | - | 1 | 1 |
| Cod | - | - | 3 | - | - | - | 3 | - |
| Three-bearded rockling | - | - | 1 | - | - | - | 1 | - |
| Pollack | - | - | 1 | - | - | - | 1 | - |
| Salmon | 1 | - | - | - | - | - | 1 | - |

Flounder captured during the 2013 survey ranged in length from 5.1cm to 25.0cm (mean = 13.4cm) (Fig. 3.10). Flounder captured during the 2010 survey ranged in length from 4.2cm to 28.1cm (mean = 10.7cm).

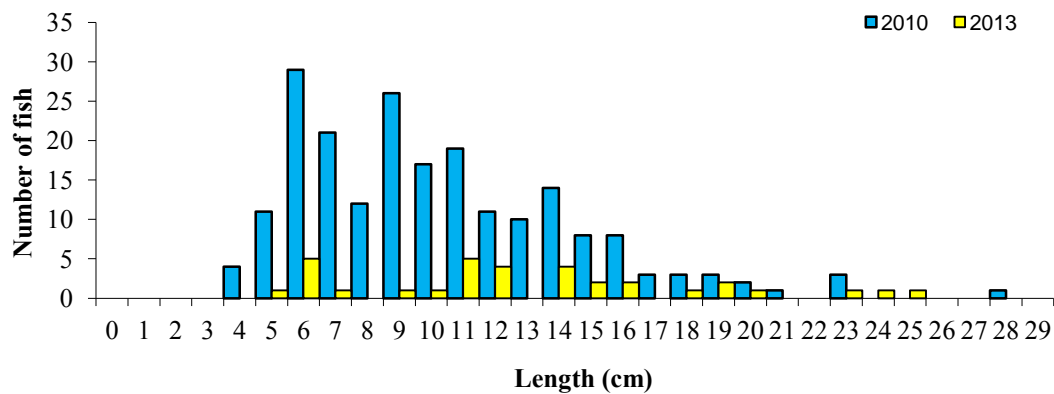


Fig. 3.10. Length frequency distribution of flounder in New Ross Port, September 2010 (sub-sample, n = 206) and October 2013 (n= 33)

3.1.5 Nore Estuary

The Nore Estuary covers an area of 1.26km² (Fig. 3.12, Plates 3.10 to 3.12). It begins just north of Inistioge, Co. Kilkenny and continues for approximately 15km until its confluence with the River Barrow three kilometres 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 3.11 and 3.12).

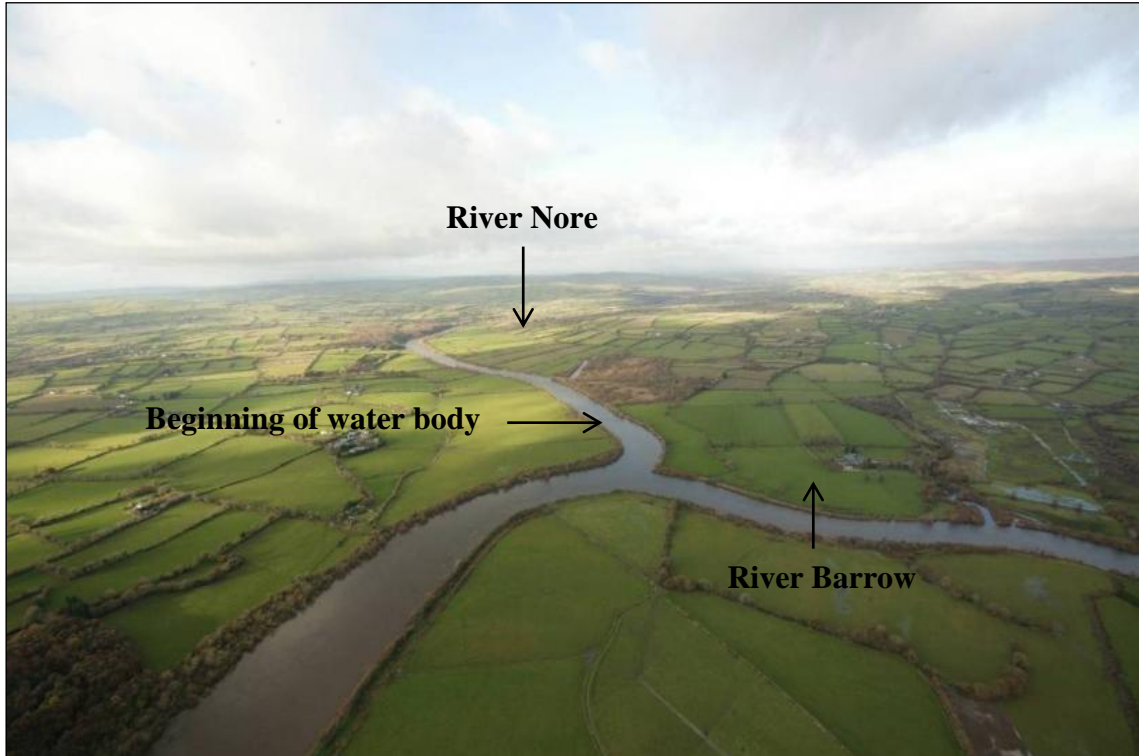


Plate 3.10. Aerial photo showing the confluence between the Nore Estuary (top left) and Upper Barrow Estuary (bottom right) to form the Upper Barrow Nore Estuary (Photo courtesy of IFI and No. 3 Operational Wing, Irish Air Corps [Aer Chór na hÉireann])



Plate 3.11. Seine netting the Nore Estuary on a low tide, October 2013



Plate 3.12. The Nore Estuary, September 2010

A total of six beach seines, four fyke nets and six beam trawls were deployed in the Nore Estuary in October 2013.

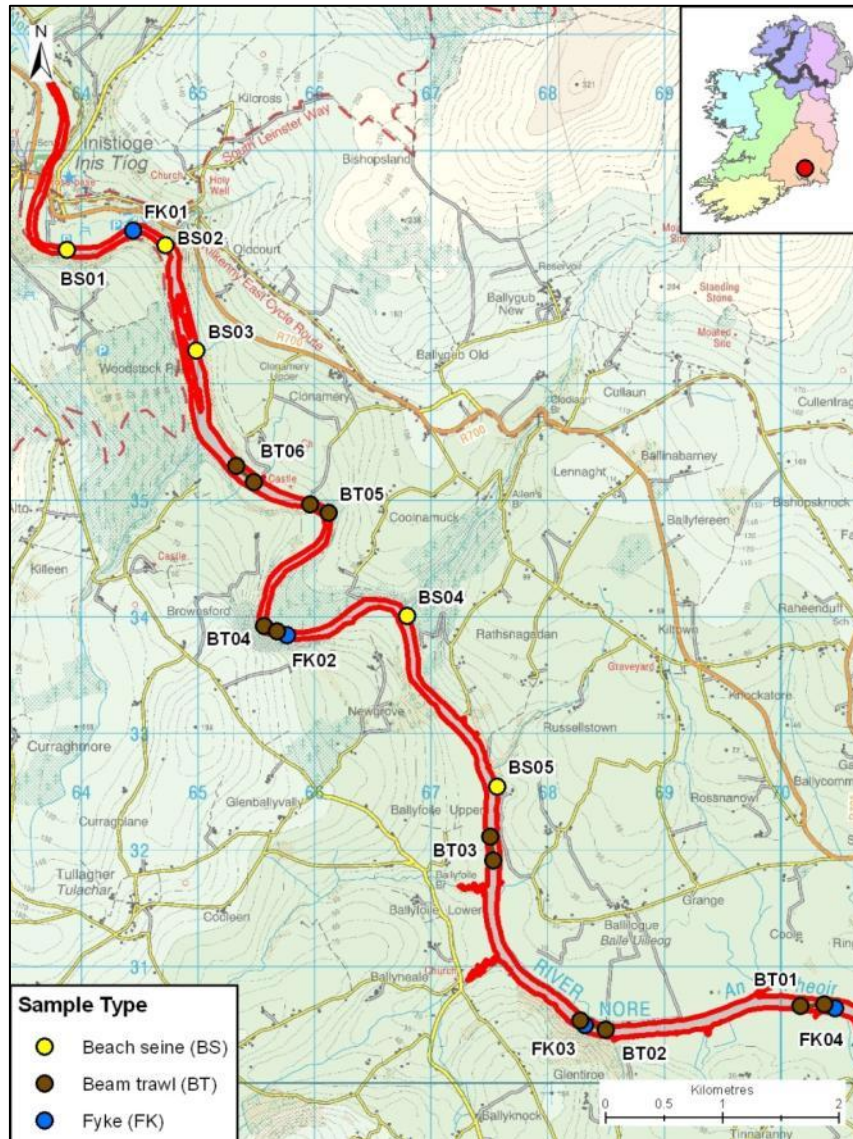


Fig. 3.11. Location map of the Nore Estuary indicating sample sites, October 2013

A total of 13 fish species (sea trout are included as a separate ‘variety’ of trout) were recorded in the Nore Estuary in October 2013. Table 3.5 shows a comparison between 2013 and the previous survey in 2010. A number of species were newly recorded in 2013, including sprat, deep-snouted pipefish, sea trout, stone loach and twaite shad. Minnow and roach were previously caught in 2010 but were not captured in the 2013 survey. Sand goby was the most abundant species, followed by dace and flounder. Flounder were widely distributed throughout the whole waterbody, being captured in relatively high numbers using all three netting methods.

Salmon and twaite shad, both of which are listed in Annex II and Annex V of the EU Habitats Directive and also listed as vulnerable in the Irish Red Data Book (King *et al.*, 2011) were recorded in this waterbody. European eels, also listed as critically endangered in the Irish Red Data Book (King *et al.*, 2011) were recorded, as well as dace, an invasive species to this country.

Table 3.5. Number of each species captured by each gear type in the Nore Estuary, October 2013

| Common name | Beach seine | | Fyke net | | Beam trawl | | Total | |
|--------------------------|-------------|----------|----------|----------|------------|----------|-------|------|
| | 2010 (5) | 2013 (6) | 2010 (4) | 2013 (4) | 2010 (6) | 2013 (6) | 2010 | 2013 |
| Sand goby | 41 | 421 | - | - | 107 | 46 | 148 | 467 |
| Dace | 213 | 269 | 1 | 3 | - | - | 214 | 272 |
| Flounder | 81 | 45 | 44 | 47 | 148 | 91 | 273 | 183 |
| European eel | - | 3 | 13 | 73 | 1 | - | 14 | 76 |
| Smelt | - | - | 1 | - | - | 20 | 1 | 20 |
| Brown trout | - | - | 10 | 11 | - | - | 10 | 11 |
| Three-spined stickleback | 3 | 4 | - | - | - | - | 3 | 4 |
| Salmon | 1 | 3 | 1 | - | - | - | 2 | 3 |
| Sprat | - | - | - | - | - | 3 | - | 3 |
| Deep-snouted pipefish | - | - | - | - | - | 1 | - | 1 |
| Sea trout | - | - | - | 1 | - | - | - | 1 |
| Stone loach | - | 1 | - | - | - | - | - | 1 |
| Twaite shad | - | 1 | - | - | - | - | - | 1 |
| Minnow | 203 | - | - | - | - | - | 203 | - |
| Roach | - | - | 1 | - | - | - | 1 | - |

Flounder captured during the 2013 survey ranged in length from 3.1cm to 22.3cm (mean = 8.5cm) (Fig. 3.12). Flounder captured during the 2010 survey ranged in length from 2.5cm to 16.4cm (mean = 6.7cm).

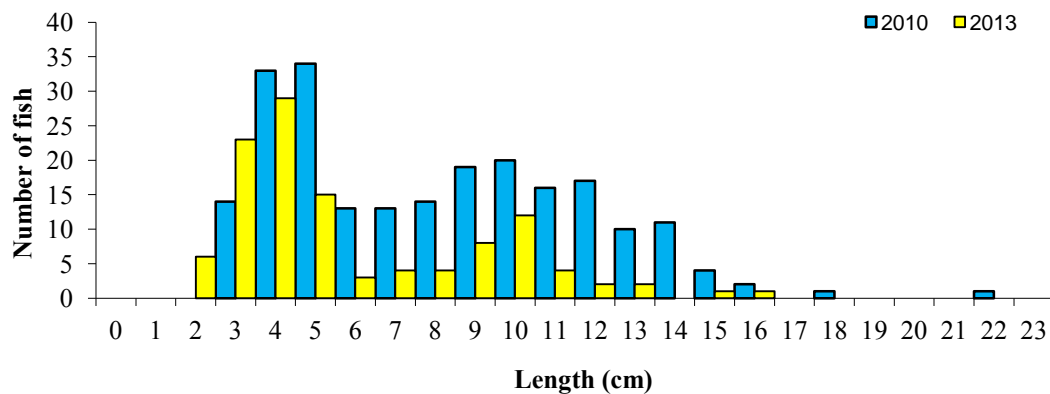


Fig. 3.12. Length frequency distribution of flounder in the Nore Estuary, September 2010 (sub-sample, n = 222) and October 2013 (sub-sample, n = 114)

Dace captured during the 2013 survey ranged in length from 3.2cm to 19.5cm (mean = 7.7cm) (Fig. 3.13). Dace captured during the 2010 survey ranged in length from 3.0cm to 21.4cm (mean = 5.3cm).

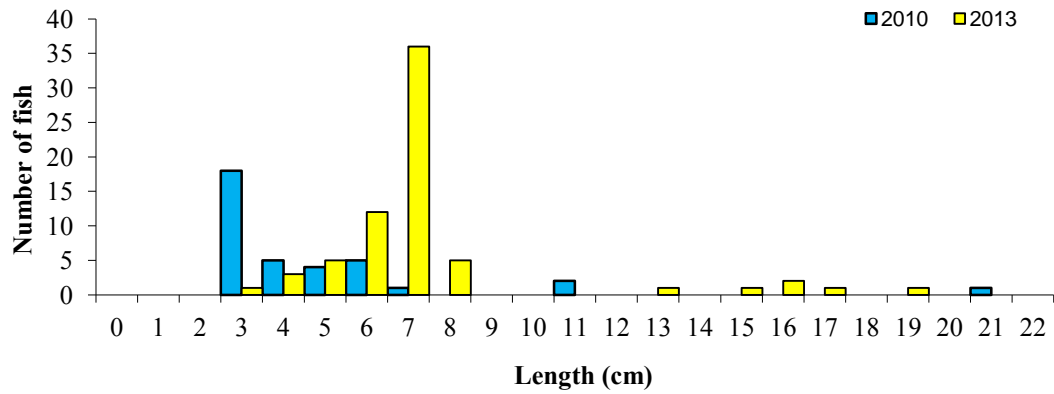


Fig. 3.13. Length frequency distribution of dace in the Nore Estuary, September 2010 (sub-sample, n = 36) and October 2013 (n=68)

3.1.6 Lower Suir Estuary

The Lower Suir Estuary covers an area of 4.32 km² and is located between Co. Kilkenny and County Waterford, on Ireland's south-east coast (Fig. 3.14, Plate 3.13). 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 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).



Plate 3.13. Aerial photo of the Lower Suir Estuary showing Little Island, Waterford. (Photo courtesy of IFI and No. 3 Operational Wing, Irish Air Corps [Aer Chór na hÉireann])

A total of six beach seines, four fyke nets and four beam trawls were deployed in the Lower Suir Estuary in October 2013 (Fig. 3.14).

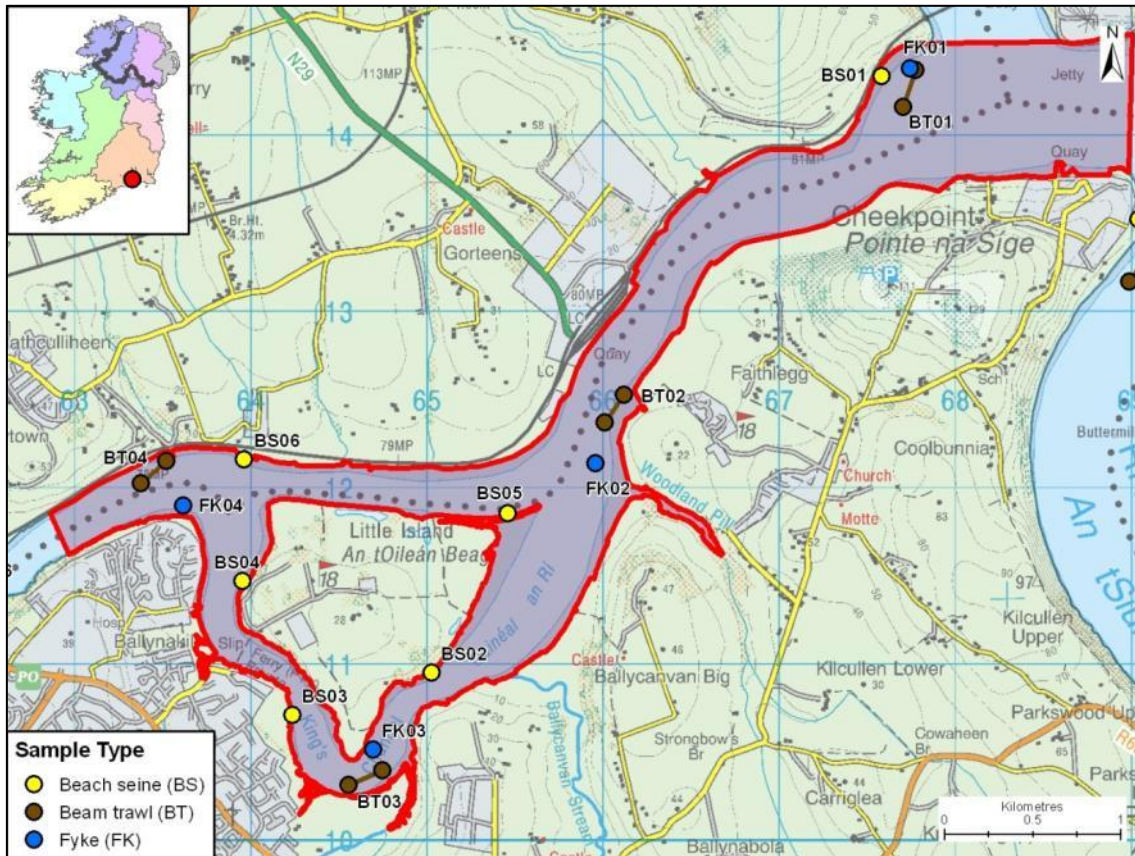


Fig. 3.14. Location map of the Lower Suir Estuary indicating sample sites, October 2013

A total of 18 fish species (sea trout are included as a separate ‘variety’ of trout) were recorded in the Lower Suir Estuary in October 2013. Table 3.6 shows a comparison between 2013 and the previous survey in 2010. A number of species were newly recorded in 2013, including herring, poor cod, long rough dab, pollack and sea trout. Pogge and brown trout were previously caught in 2010 but were not captured in the 2013 survey. Sprat was the most abundant species, followed by sand goby and flounder. Flounder and eels were the only species recorded using all three netting methods

Two protected fish species were recorded during the survey; 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) and eel (listed as critically endangered in the Irish Red data Book).

Salinity values taken at beach seine and beam trawl sites ranged from 5.40ppt to 6.12ppt.

Table 3.6. Number of each species captured by each gear type in the Lower Suir Estuary, September 2013

| Common name | Beach seine | | Fyke net | | Beam trawl | | Total | |
|------------------------------|-------------|----------|----------|----------|------------|----------|-------|------|
| | 2010 (6) | 2013 (6) | 2010 (4) | 2013 (4) | 2010 (4) | 2013 (4) | 2010 | 2013 |
| Sprat | 760 | 249 | - | - | - | - | 760 | 249 |
| Sand goby | 1017 | 210 | - | - | 31 | 6 | 1048 | 216 |
| Flounder | 12 | 15 | 105 | 56 | 1 | 8 | 118 | 79 |
| European eel | 1 | 5 | 84 | 62 | 2 | 2 | 87 | 69 |
| Twaite shad | 27 | 40 | - | - | 3 | - | 30 | 40 |
| Smelt | 4 | 20 | 1 | - | 5 | - | 10 | 20 |
| Herring | - | 17 | - | - | - | - | - | 17 |
| Atlantic horse mackerel/Scad | 1 | 10 | - | - | - | - | 1 | 10 |
| Plaice | - | 3 | - | 1 | 7 | 5 | 7 | 9 |
| Poor cod | - | - | - | 5 | - | 1 | - | 6 |
| Thick-lipped grey mullet | 69 | 4 | - | - | - | - | 69 | 4 |
| Cod | - | - | 12 | 2 | 1 | - | 13 | 2 |
| Five-bearded rockling | - | - | 4 | 1 | - | 1 | 4 | 2 |
| Whiting | - | - | - | 2 | 1 | - | 1 | 2 |
| European seabass | - | 1 | 2 | - | - | - | 2 | 1 |
| Long rough dab | - | - | - | - | - | 1 | - | 1 |
| Pollack | - | 1 | - | - | - | - | - | 1 |
| Sea trout | - | 1 | - | - | - | - | - | 1 |
| Pogge | - | - | 1 | - | - | - | 1 | - |
| Brown trout | - | - | 1 | - | - | - | 1 | - |

Flounder captured during the 2013 survey ranged in length from 6.0cm to 23.5cm (mean = 15.5cm) (Fig. 3.15). Flounder captured during the 2010 survey ranged in length from 6.5cm to 27.0cm (mean = 15.8cm).

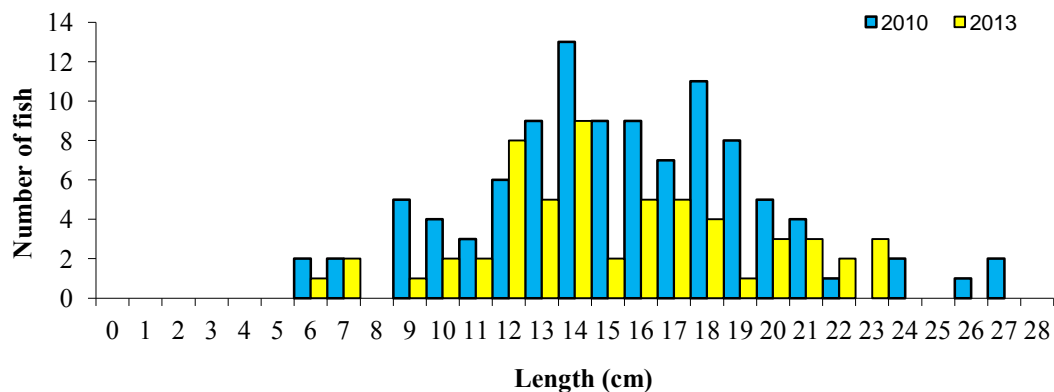


Fig. 3.15. Length frequency distribution of flounder in the Lower Suir Estuary, September 2010 (sub-sample, n = 103) and September 2013 (sub-sample, n=58)

Twaite shad captured during the 2013 survey ranged in length from 7.1cm to 10.4cm (mean = 8.5cm) (Fig. 3.16). Twaite shad captured during the 2010 survey ranged in length from 6.4cm to 15.3cm (mean = 8.6cm).

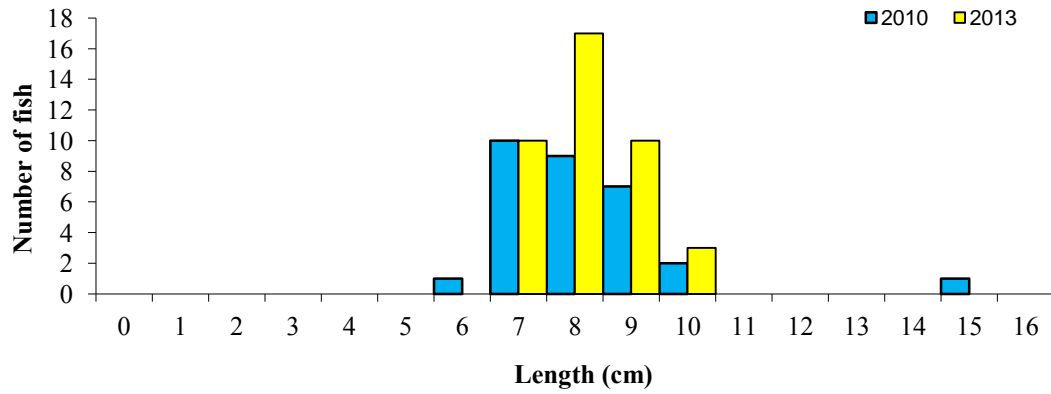


Fig. 3.16. Length frequency distribution of twaite shad in the Lower Suir Estuary, September 2010 (sub-sample, n = 30) and September 2013 (sub-sample, n=40)

3.1.7 Middle Suir Estuary

The Middle Suir Estuary covers an area of 7.03 km². 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, Plates 3.14 to 3.16). This water body forms part of the Lower Suir SAC (see Section 3.1.6).



Plate 3.14. Aerial photo of the Middle Suir Estuary, upstream of Waterford City. (Photo courtesy of IFI and No. 3 Operational Wing, Irish Air Corps [Aer Chór na hÉireann])



Plate 3.15. Aerial photo of the Middle Suir Estuary, at Fiddown, Co. Kilkenny. (Photo courtesy of IFI and No. 3 Operational Wing, Irish Air Corps [Aer Chór na hÉireann])



Plate 3.16. The Middle Suir Estuary waterbody at low tide, Granny, Co. Waterford.

A total of six beach seines, six fyke nets and seven beam trawls were deployed in the Middle Suir Estuary in September 2013.

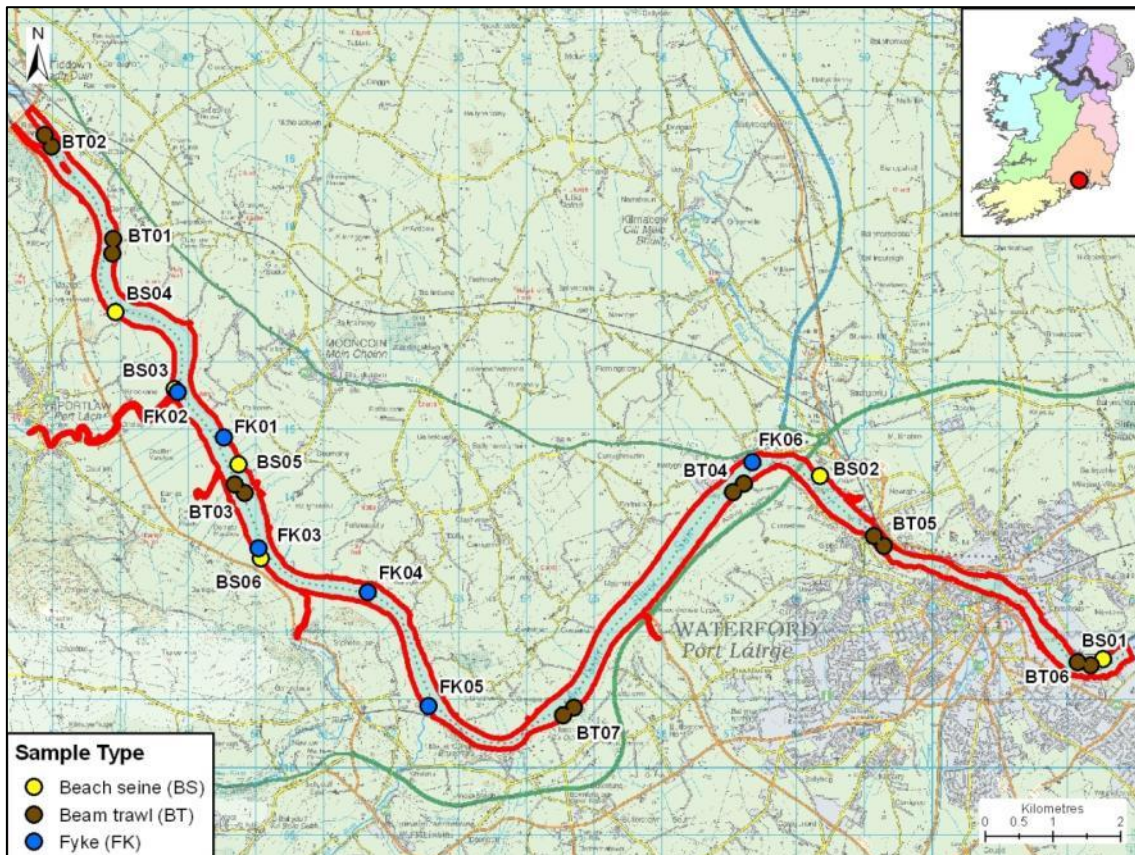


Fig. 3.17. Location map of the Middle Suir Estuary indicating sample sites, September 2013

A total of 18 fish species were recorded in the Middle Suir Estuary in September 2013. Table 3.7 shows a comparison between 2013 and the previous survey in 2010. A number of species were newly recorded in 2013, including herring, plaice, European sea bass, perch, roach, whiting, cod and poor cod. Rudd, sand smelt and sea trout were previously caught in 2010 but not captured in the 2013 survey. Flounder was the most abundant species recorded, followed by sand goby and European eels (Table 3.7). Flounder, sand goby, smelt and sprat were well distributed throughout the waterbody, being recorded using all three netting methods.

Twaiite shad, listed in Annex II and Annex V of the EU Habitats Directive and listed as vulnerable in the Irish Red Data Book (King *et al.*, 2011) were recorded in this waterbody, as well as eels, which are listed as critically endangered in the Irish Red Data Book. Other noteworthy species recorded, include brown trout, European seabass, and smelt. Dace, an invasive species to this country, were also recorded.

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

| Common name | Beach seine | | Fyke net | | Beam trawl | | Total | |
|--------------------------|-------------|----------|----------|----------|------------|----------|-------|------|
| | 2010 (6) | 2013 (6) | 2010 (6) | 2013 (6) | 2010 (7) | 2013 (7) | 2010 | 2013 |
| Flounder | 351 | 267 | 104 | 175 | 159 | 10 | 614 | 452 |
| Sand goby | 1272 | 249 | 12 | 3 | 352 | 1 | 1636 | 253 |
| European eel | 2 | 2 | 55 | 141 | - | - | 57 | 143 |
| Smelt | 70 | 105 | 4 | 6 | 2 | 2 | 76 | 113 |
| Sprat | 10 | 82 | - | 1 | - | 22 | 10 | 105 |
| Thick-lipped grey mullet | 15 | 98 | - | 3 | - | - | 15 | 101 |
| Twaite shad | 62 | 39 | - | - | - | - | 62 | 39 |
| Dace | 1 | 34 | - | 3 | - | - | 1 | 37 |
| Brown trout | - | - | 6 | 29 | - | - | 6 | 29 |
| Herring | - | 25 | - | - | - | - | - | 25 |
| Plaice | - | 7 | - | - | - | - | - | 7 |
| European seabass | - | 6 | - | - | - | - | - | 6 |
| Perch | - | 6 | - | - | - | - | - | 6 |
| Roach | - | - | - | 6 | - | - | - | 6 |
| Whiting | - | - | - | 2 | - | - | - | 2 |
| Cod | - | - | - | 1 | - | - | - | 1 |
| Poor cod | - | - | - | 1 | - | - | - | 1 |
| Three-spined stickleback | 2 | 1 | - | - | - | - | 2 | 1 |
| Rudd | 2 | - | 1 | - | - | - | 3 | - |
| Sand smelt | - | - | - | - | 1 | - | 1 | - |
| Sea trout | - | - | - | - | 1 | - | 1 | - |

Flounder captured during the 2013 survey ranged in length from 2.4cm to 23.6cm (mean = 10.7cm) (Fig. 3.18). Flounder captured during the 2010 survey ranged in length from 3.0cm to 24.6cm (mean = 9.6cm).

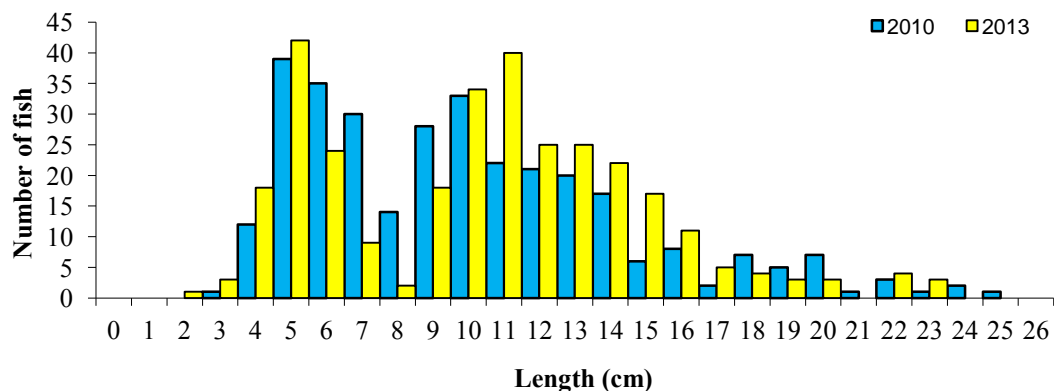


Fig. 3.18. Length frequency distribution of flounder in the Middle Suir Estuary, September 2010 (sub-sample, n = 315) and September 2013 (sub-sample, n = 313)

Twaite shad captured during the 2013 survey ranged in length from 6.2cm to 9.8cm (mean = 8.2cm) (Fig. 3.19). Twaite shad captured during the 2010 survey ranged in length from 5.2cm to 9.4cm (mean = 6.9cm).

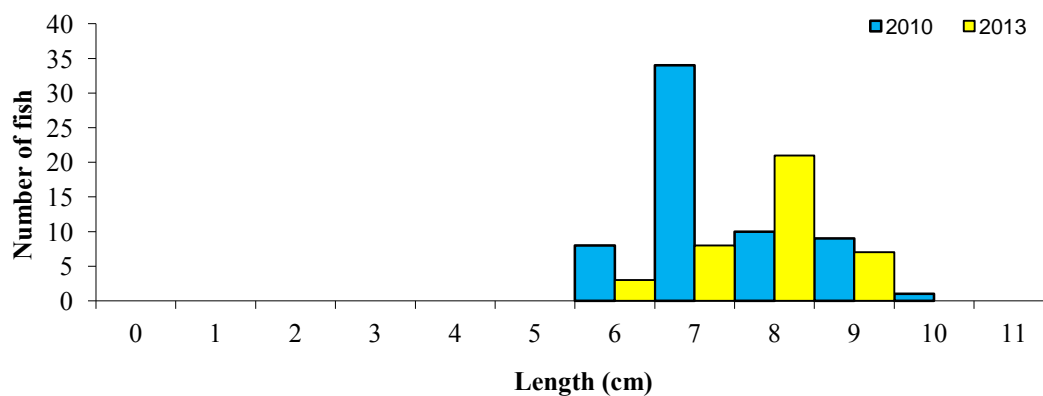


Fig. 3.19. Length frequency distribution of twaite shad in the Middle Suir Estuary, September 2010 (n = 62) and September 2013 (n = 39)

Dace captured during the 2013 survey ranged in length from 3.5cm to 16.5cm (mean = 7.9cm) (Fig. 3.20). No dace were recorded at this site during the 2010 survey.

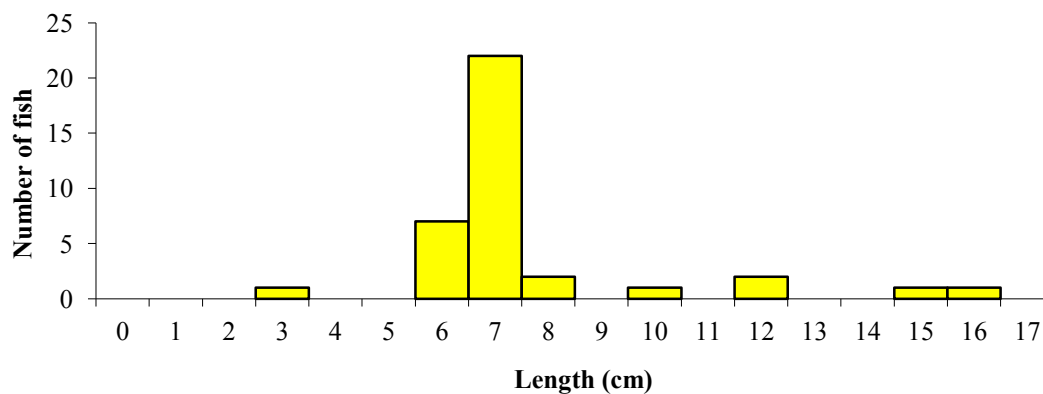


Fig. 3.20. Length frequency distribution of dace in the Middle Suir Estuary, 2013 (n = 37)

3.1.8 Upper Suir Estuary

The Upper Suir Estuary covers an area of 1.09km² 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, Plates 3.17 to 3.19). 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*).



Plate 3.17. 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])



Plate 3.18. Upper Suir waterbody downstream of Carrick on Suir, October 2013



Plate 3.19. Exposed muddy banks along the Upper Suir waterbody, September, 2010

A total of three beach seines, two fyke nets and three beam trawls were deployed in the Upper Suir Estuary in October 2013.

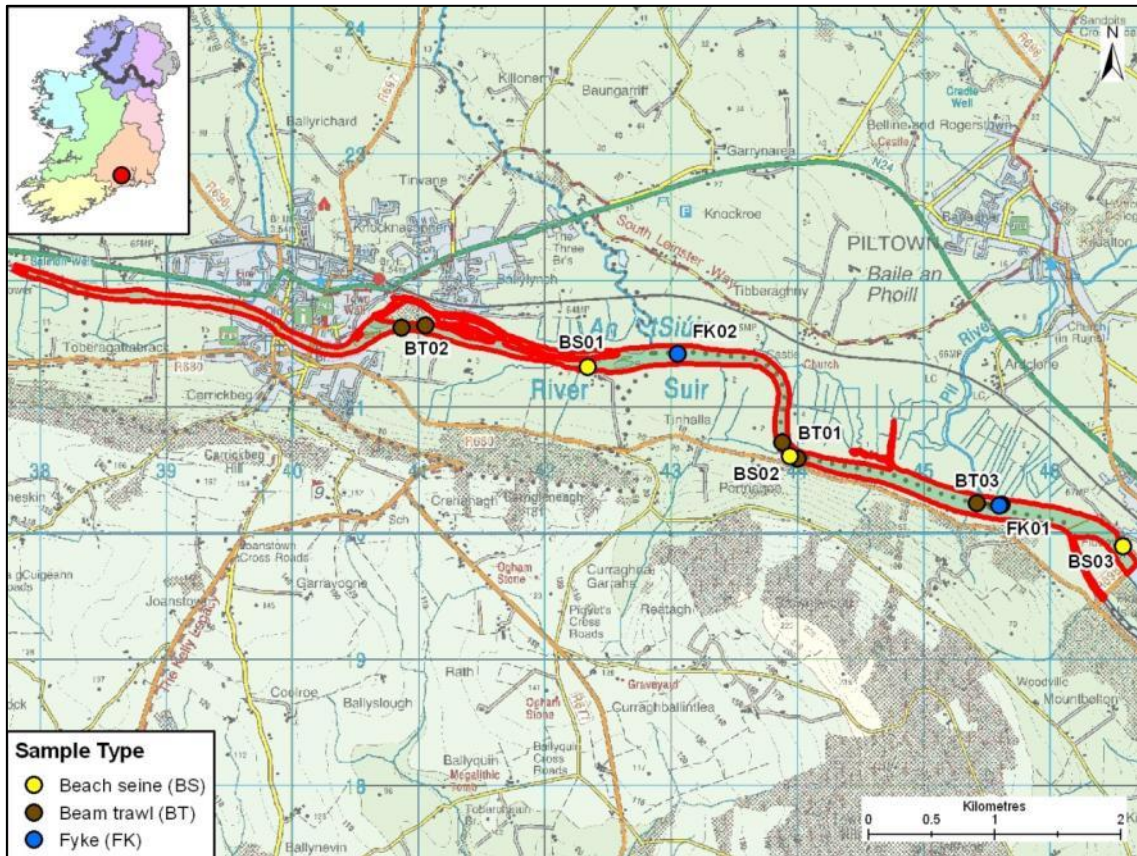


Fig. 3.21. Location map of the Upper Suir Estuary indicating sample sites, October 2013

Nine fish species were recorded in the Upper Suir Estuary in October 2013. Table 3.8 shows a comparison between 2013 and the previous survey in 2010. Roach were newly recorded in 2013, while both salmon and perch that were previously caught in 2010 were not captured in the 2013 survey. Flounder was by far the most abundant species, followed by dace and sand goby. Flounder were well distributed throughout the waterbody, being recorded by all three fishing methods.

Twaite shad, listed in Annex II and Annex V of the EU Habitats Directive and listed as vulnerable in the Irish Red Data Book (King *et al.*, 2011) were recorded in this waterbody, as well as eels, which are listed as critically endangered in the Irish Red Data Book. Other species recorded included smelt, brown trout and the invasive species, dace.

Table 3.8. Number of each species captured by each gear type in the Upper Suir Estuary, September 2013

| Common name | Beach seine | | Fyke net | | Beam trawl | | Total | |
|--------------------------|-------------|----------|----------|----------|------------|----------|-------|------|
| | 2010 (3) | 2013 (3) | 2010 (2) | 2013 (1) | 2010 (3) | 2013 (3) | 2010 | 2013 |
| Flounder | 130 | 253 | 837 | 320 | 306 | 6 | 1273 | 579 |
| Dace | 50 | 364 | - | - | - | 2 | 50 | 366 |
| Sand goby | 317 | 93 | 92 | 1 | 19 | - | 428 | 94 |
| Smelt | 62 | 31 | 6 | - | 1 | - | 69 | 31 |
| Brown trout | - | 5 | 2 | 10 | - | - | 2 | 15 |
| Three-spined stickleback | 196 | 13 | - | - | - | - | 196 | 13 |
| Twaite shad | 52 | 3 | - | 1 | - | - | 52 | 4 |
| European eel | 1 | 1 | 2 | - | 2 | - | 5 | 1 |
| Roach | - | - | - | 1 | - | - | - | 1 |
| Salmon | 3 | - | - | - | - | - | 3 | - |
| Perch | 1 | - | - | - | - | - | 1 | - |

Flounder captured during the 2013 survey ranged in length from 3.0cm to 23.0cm (mean = 8.6cm) (Fig. 3.22). Flounder captured during the 2010 survey ranged in length from 2.6cm to 22.9cm (mean = 8.1cm).

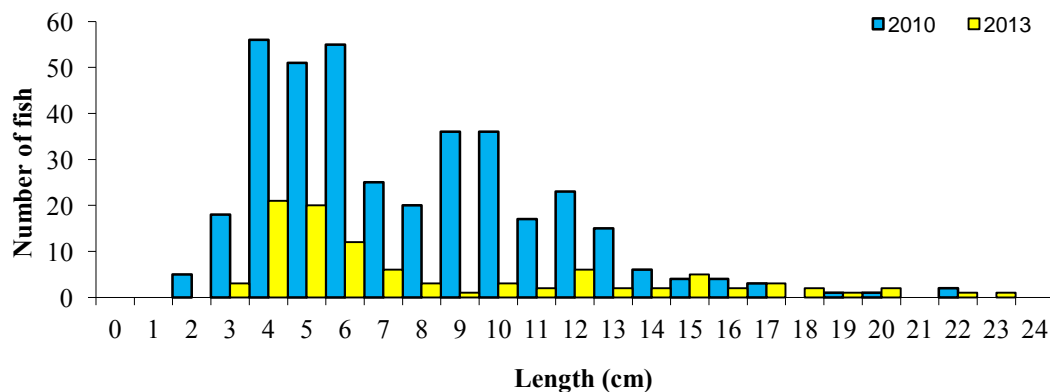


Fig. 3.22. Length frequency distribution of flounder in the Upper Suir Estuary, September 2010 (sub-sample, n = 378) and September 2013 (sub-sample, n = 98)

Dace captured during the 2013 survey ranged in length from 5.1cm to 18.8cm (mean = 7.2cm) (Fig. 3.23). Dace captured during the 2010 survey ranged in length from 3.1cm to 22.9cm (mean = 13.8cm).

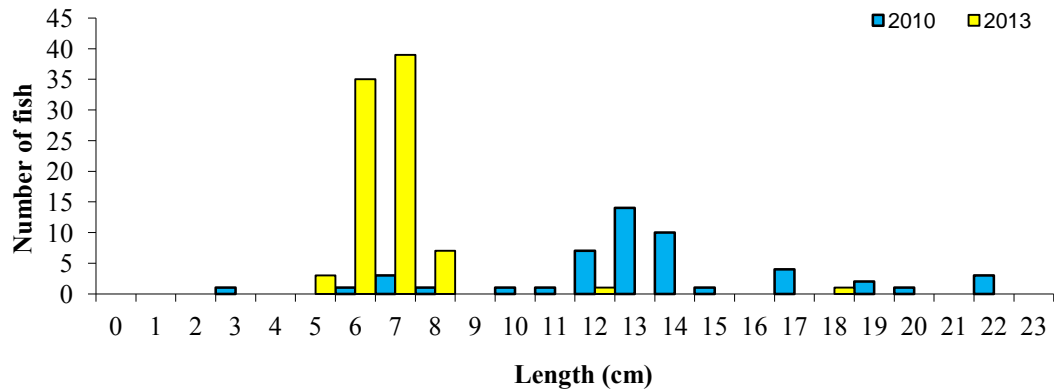


Fig. 3.23. Length frequency distribution of dace in the Upper Suir Estuary, September 2010 (n = 50) and September 2013 (sub-sample, n = 86)

Twaite shad captured during the 2013 survey ranged in length from 7.9cm to 33.2cm (mean = 8.3cm) (Fig. 3.24). Twaite shad captured during the 2010 survey ranged in length from 4.3cm to 8.1cm (mean = 6.4cm).

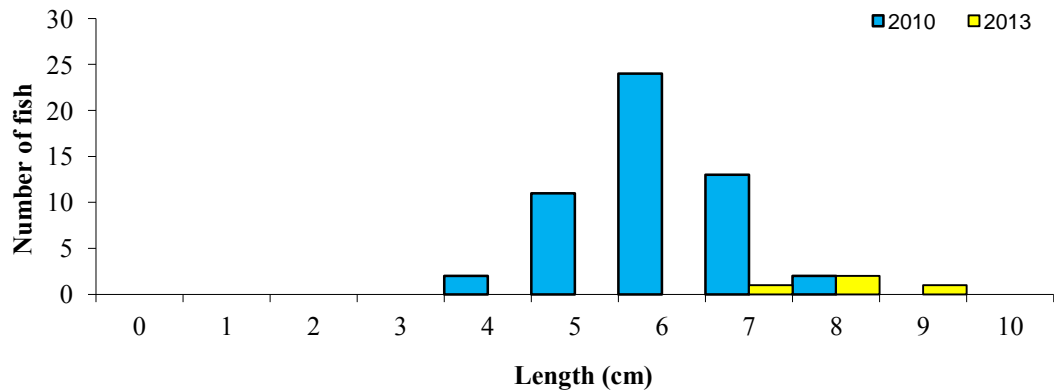


Fig. 3.24. Length frequency distribution of twaite shad in the Upper Suir Estuary, September 2010 (n = 52) and September 2013 (n = 4)

3.2 Species richness

A total of 34 fish species were recorded (sea trout are counted as a separate variety of brown trout) within the eight Barrow, Nore and Suir transitional water bodies surveyed during 2013. Only species that were recorded in at least two individual water bodies are shown in (Fig. 3.25). Flounder, sand gobies and smelt were the three most common fish species recorded, occurring in all eight water bodies. European eels were recorded in seven water bodies, while brown trout and dace (a non-native, invasive species) were encountered in six.

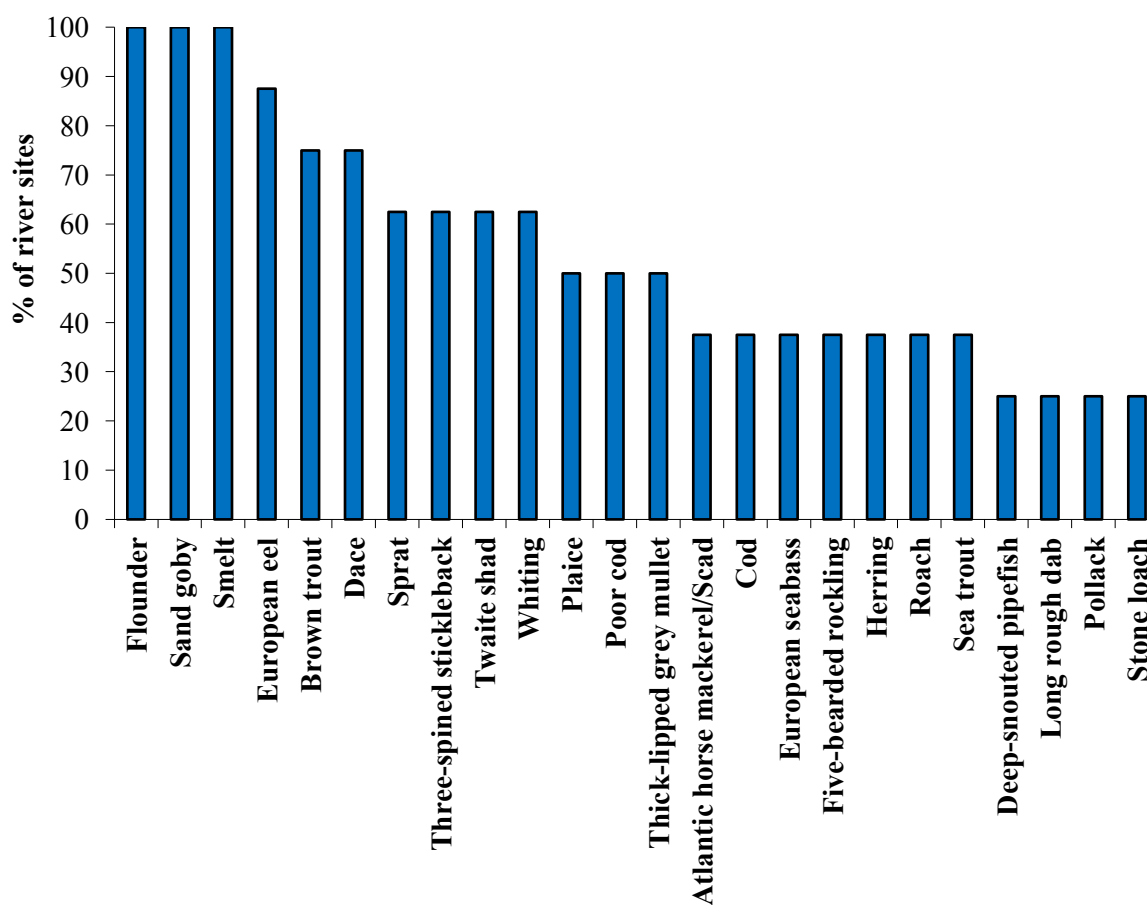


Fig. 3.25. Percentage of water bodies where selected fish species were recorded in the Barrow, Nore and Suir transitional waters for WFD SM monitoring 2013

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 previously for the WFD surveillance monitoring programme. 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.

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 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 has recently completed the intercalibration process.

Using this approach, the eight individual Barrow-Suir-Nore transitional waterbodies have been assigned draft ecological status classifications based on the fish populations present (Table 3.2). The Upper Barrow Estuary, Upper Barrow Nore Estuary, Nore Estuary and Upper Suir Estuary were classed as “Moderate”, while the Barrow-Suir-Nore Estuary, New Ross Port, Lower Suir Estuary and Middle Suir Estuary were classed as “Good”.

Some waterbodies were also combined together for more practical classifications. These include the Suir (Lower Suir Estuary, Middle Suir Estuary, Upper Suir Estuary and Barrow-Suir-Nore Estuary), the Barrow-Suir-Nore (all eight waterbodies together), the Barrow (Upper Barrow Estuary, Upper Barrow Nore Estuary, New Ross Port and Barrow-Suir-Nore Estuary), the Barrow Nore T (Upper Barrow Estuary, Upper Barrow Nore Estuary, New Ross Port and Nore Estuary) and Suir T (Lower Suir Estuary, Middle Suir Estuary and Upper Suir Estuary). All combined waterbodies were classed as “Good” (Table 3.2).

Table 3.9. Draft ecological status classifications for the Barrow, Nore and Suir transitional water bodies, 2013

| Waterbody | TFCI | |
|-----------------------------|-------------|-------------------------|
| | EQR | Class (& EO) |
| Barrow Estuary Upper | 0.35 | Moderate |
| Barrow Nore Estuary Upper | 0.30 | Moderate |
| Barrow Suir Nore Estuary | 0.73 | Good |
| New Ross Port | 0.60 | Good |
| Nore Estuary | 0.45 | Moderate |
| Suir Estuary, Lower | 0.75 | Good |
| Suir Estuary, Middle | 0.73 | Good |
| Suir Estuary, Upper | 0.33 | Moderate |
| Combined waterbodies | | |
| Suir | 0.85 | Good |
| Barrow Suir Nore | 0.88 | Good |
| Barrow | 0.83 | Good |
| Barrow NoreT | 0.68 | Good |
| SuirT | 0.78 | Good |

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