



# Sampling Fish for the Water Framework Directive

Rivers 2010

**South Eastern  
River Basin District**



Iascach Intíre Éireann  
Inland Fisheries Ireland

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## 1. INTRODUCTION

Fish stock surveys were undertaken in 43 river sites throughout Ireland during the summer of 2010 as part of the programme of sampling fish for the Water Framework Directive (WFD). These surveys are required by both national and European law, with Annex V of the WFD stipulating that rivers are included within the monitoring programme and that the composition, abundance and age structure of fish fauna are examined (Council of the European Communities, 2000). Nine of the 43 surveys were conducted at river sites in the South Eastern River Basin District (SERBD) between May and August 2010 by staff from Inland Fisheries Ireland (Table 2.1, 2.2 and Fig. 2.1).

Although fish survey work has been carried out in Ireland in the past, no project to date has been as extensive as the current on-going monitoring programme in providing data appropriate for WFD compliance. Continued surveying of these and additional river sites will provide a useful baseline and time-series dataset for future monitoring of water quality. This in turn will provide information for River Basin District (RBD) managers to compile and implement programmes of measures to improve degraded water bodies.

The SERBD is the second largest RBD in Ireland, covering a land area of approximately 13,000km<sup>2</sup> (Fig 2.1). It also encompasses a further 1,000km<sup>2</sup> of marine waters off the coast of Counties Wexford and Waterford. Approximately half a million people live within the SERBD, spread between numerous different counties, including Carlow, Kildare, Kilkenny, Laois, Offaly, Wexford, Wicklow, Cork, Limerick, Tipperary and Waterford. Waterford City is the largest urban centre within the SERBD but the population is also increasing due to the expansion of northern commuter towns serving the Dublin City area. The main river systems within the SERBD include the Barrow, Nore, Suir and Slaney. Other important features include the bays of Dungarvan, Bannow and Rosslare, as well as two coastal lagoons: Our Lady's Island and Tacumshin Lake. There are fewer lakes within this RBD than in any other throughout the country (SERBD, 2009).

This report summarizes the main findings of the fish stock surveys in the nine river water bodies surveyed in the SERBD during 2010 and reports on the current ecological status of the fish stocks in each.

## 2. STUDY AREA

Nine river sites were surveyed in four river catchments within the SERBD; the Barrow, Nore, Slaney and Suir catchments. The sites ranged in surface area from 215m<sup>2</sup> for the Gowran River to 32,634 for the River Suir (Kilsheelan). Sites were divided into two categories for reporting purposes: wadeable sites, which were surveyed with bank-based electric fishing units, and non-wadeable sites, which were surveyed with boat-based electric fishing units.

Summary details of each site's location and physical characteristics are given in Tables 2.1 and 2.2, and the distribution of sites throughout the SERBD is shown in Figure 2.1.

**Table 2.1. Location and codes of river sites surveyed for WFD surveillance monitoring, 2010**

River	Site name	Catchment	Site Code	Waterbody code
<b>SERBD Wadeable sites</b>				
Gowran	Br N of Goresbridge (S Channel)	Barrow	14G030300F	SE_14_1879
Slaney	Waterloo Br.	Slaney	12S020400F	SE_12_1524
<b>SERBD Non-wadeable-sites</b>				
Aherlow	Killardy Br.	Suir	16A010900F	SE_16_540
Ara	Ara Br.	Suir	16A030600F	SE_a6_2303
Barrow	Graiguenamanagh Br.	Barrow	14B013500F	SE_14_1909
Nore	Brownsbarn Br.	Nore	15N012400F	SE_15_1994_7
Nore	Quakers' Br.	Nore	15N010300F	SE_15_1018
Suir	Kilsheelan Br.	Suir	16S022700F	SE_16_4181_5
Suir	Knocknageragh Br.	Suir	16S020200F	SE_16_3997

**Table 2.2. Details of river sites surveyed for WFD surveillance monitoring, 2010**

River	Upstream catchment (km <sup>2</sup> )	Wetted width (m)	Surface area (m <sup>2</sup> )	Mean depth (m)	Max depth (m)
<b>SERBD Wadeable sites</b>					
Gowran (N of Goresbridge)	42.1	4.77	215	0.20	0.55
Slaney (Waterloo)	77.7	11.59	522	0.20	0.58
<b>SERBD Non-wadeable sites</b>					
Aherlow (Killardy)	272.5	14.00	3248	0.65	1.80
Ara (Ara)	83.2	6.80	864	0.90	0.80
Barrow (Graiguenamanagh)	2777.7	45.00	31365	1.75	2.00
Nore (Brownsbarn)	2419.3	40.50	23693	2.17	3.00
Nore (Quakers')	84.4	8.00	2184	1.10	1.40
Suir (Kilsheelan)	2636.6	55.50	32634	1.75	3.00
Suir (Knocknageragh)	94.1	6.28	622	0.33	0.62



**Fig. 2.1. Location map of river sites surveyed throughout the SERBD for WFD fish surveillance monitoring 2010**

### 3. METHODS

Electric-fishing is the method of choice for surveillance monitoring of fish in rivers to obtain a representative sample of the fish assemblage at each sampling site (Plates 3.1 and 3.2). This technique complies with European Committee for Standardisation (CEN) guidelines for fish stock assessment in wadeable rivers (CEN, 2003). At each site, where possible, the stretch sampled was isolated using stop nets and one to three fishing passes were conducted using bank-based electric fishing units or boat-based electric fishing units. Each survey encompassed all habitat types: riffle, glide and pool. A number of physical habitat variables were measured at each site. Water samples for chemical analyses were also taken, along with a multi-habitat kick-sample of macroinvertebrates. Macrophyte surveys were conducted on a selected number of wadeable streams.

Fish from each pass were sorted and processed separately. Fish were identified and lengths and weights were recorded; sub-samples were measured when large numbers of fish were present. For the purpose of species identification, where recorded, juvenile river lamprey (*Lampetra fluviatilis*), brook lamprey (*Lampetra planeri*) and sea lamprey (*Petromyzon marinus*) were recorded as 'Lamprey sp.'. Sea trout and brown trout were recorded separately. For aging analyses, scales were taken from salmonids and most non-native fish species greater than 8.0cm in length. These fish were held in a large bin of oxygenated water after processing until they were fully recovered before being returned to the water. When present in a survey, a sub-sample of perch were retained for aging using opercular bones.

Three fishing passes were not possible or practical at all sites. Therefore in order to standardise abundance estimates across all sites, fish densities were calculated using data from the first fishing pass only. The number captured in the first fishing pass was divided by the total area surveyed to give a minimum population density for each species.

A sub-sample of the dominant fish species were aged (five fish from each 1cm size class). Fish scales were aged using a microfiche, and opercular bones were aged using an Olympus SZX10 microscope/digital camera system. Growth was determined by back-calculating lengths at the end of each winter (e.g. L1 is the mean length at the end of the first winter, L2 is the mean length at the end of the second winter, etc.).



**Plate 3.1. Electric-fishing using bank-based units on the Owenriff River (WRBD)**



**Plate 3.2. Electric-fishing using boat-based units on the River Shannon (Clonmacnoise)**

## 4. RESULTS

### 4.1 Wadeable sites

#### 4.1.1 *The Gowran River*



**Plate 4.1. The Gowran River upstream of the River Barrow confluence at Goresbridge, Co. Kilkenny**

The Gowran River is a tributary of the River Barrow, rising in the hills north-west of the village of Gowran in Co. Kilkenny (Plate 4.1, Fig. 4.1). It flows southwards from its source for approximately 10km before turning eastwards towards Gowran and eventually joining the River Barrow at Goresbridge.

This site is located only a few hundred metres outside the River Barrow and River Nore Special Area of Conservation (SAC). This is a large SAC, consisting of the two main Barrow and Nore channels, as well as many of their major tributaries. Important habitats within the area include alluvial wet woodlands and petrifying springs, both of which are listed in Annex I of the Habitats Directive (NPWS, 2006a). The Gowran River itself is not noted for angling, but the River Barrow into which it flows is popular for salmon, trout and coarse fishing (O' Reilly, 2002).



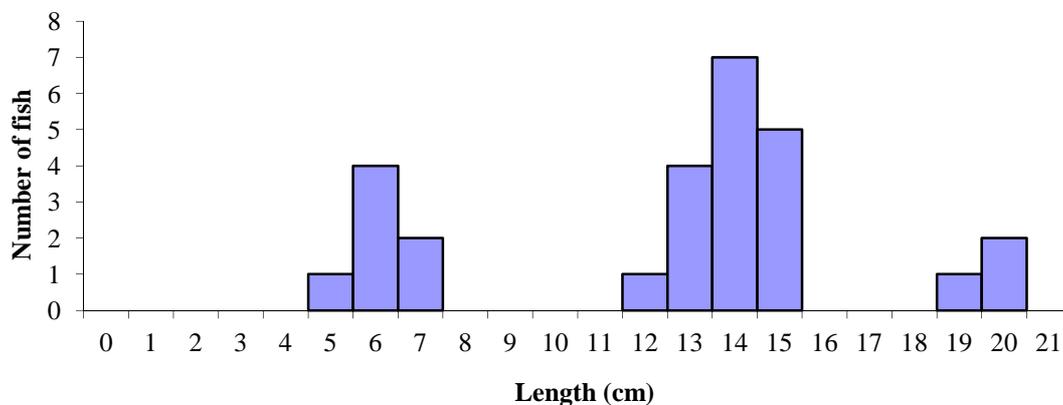
**Table 4.1. Minimum density of each fish species (no./m<sup>2</sup>) captured on the Gowran River site, July 2010**

scientific name	Common name	0+	1+ & older	Total minimum density
<i>Barbatula barbatula</i>	Stone loach	-	-	0.131
<i>Salmo trutta fario</i>	Brown trout	0.023	0.084	0.107
<i>Salmo salar</i>	Salmon	0.019	0.075	0.093
<i>Anguilla anguilla</i>	Eel	-	-	0.051
<i>Lampetra</i> sp.	Lamprey sp.	-	-	0.005
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	-	-	0.005
All Fish	All Fish	-	-	0.392

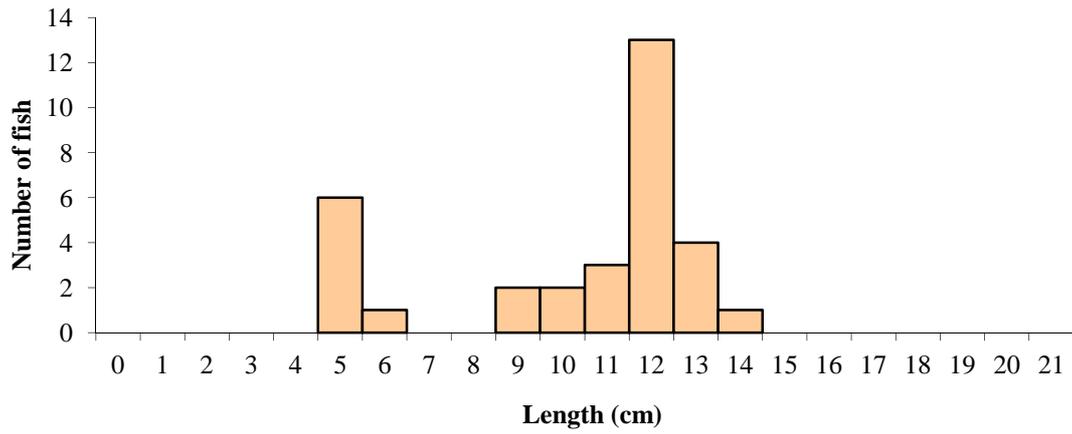
Brown trout ranged in length from 5.9cm to 20.8cm (Fig. 4.2). Three age classes (0+, 1+ and 2+) were present, accounting for approximately 26%, 63% and 11% of the total brown trout catch respectively. The mean brown trout L1 and L2 were 9.1cm and 17.3cm respectively (Appendix 1). This indicates that the rate of growth for brown trout in this river site is ‘fast’ according to the classification scheme of Kennedy and Fitzmaurice (1971).

Salmon ranged in length from 5.2cm to 14.0cm (Fig. 4.3). Three age classes (0+, 1+ and 2+) were present, accounting for 22%, 75% and 3% of the total salmon catch respectively. The mean salmon L1 and L2 were 5.9cm and 8.9cm respectively (Appendix 2).

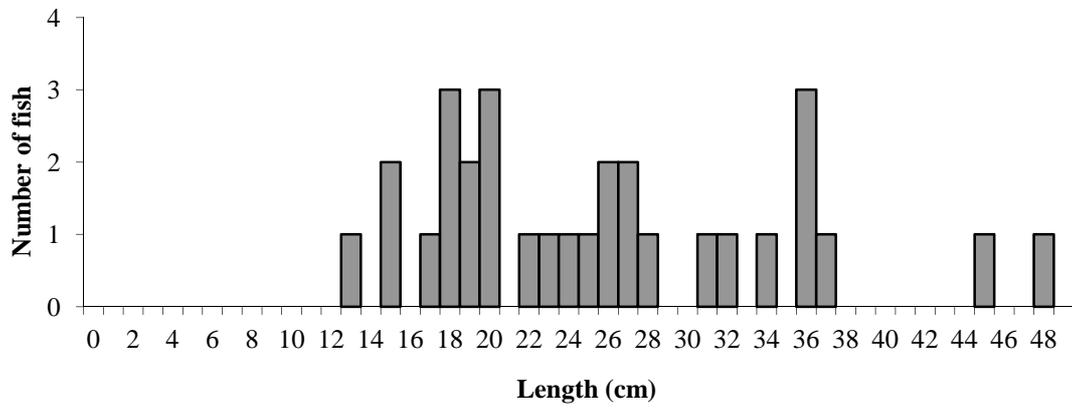
Other species recorded included eels (Fig. 4.4) ranging in length from 13.5cm to 48.7cm and stone loach ranging in length from 5.4cm to 9.8cm. Two three-spined stickleback measuring 1.9 and 5.9 in length and one lamprey measuring 11.6cm were also captured.



**Fig. 4.2. Length frequency distribution of brown trout in the Gowran River site, July 2010 (n = 27)**



**Fig. 4.3. Length frequency distribution of salmon in the Gowran River site, July 2010 (n = 32)**



**Fig. 4.4. Length frequency distribution of eels in the Gowran River site, July 2010 (n = 30)**

#### 4.1.2 The River Slaney



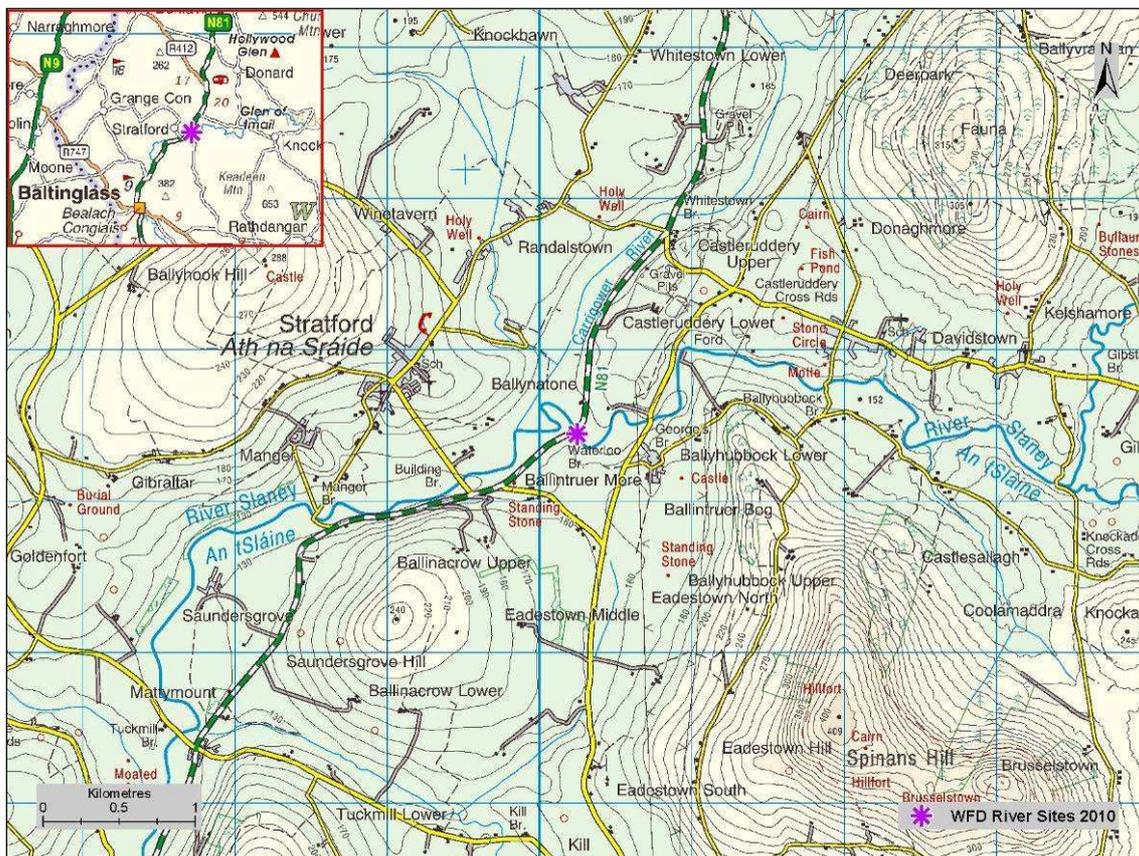
**Plate 4.2. The River Slaney at Waterloo Bridge, Co. Wicklow**

The River Slaney is a large river located in south-east Leinster (Plate 4.2, Fig. 4.5). It rises in the Wicklow Mountains on Lugnaquilla Mountain, within the Glen of Imall Artillery Range. It flows in a southward direction through a number of towns including Baltinglass, Tullow, Bunclody and Enniscorthy, until it reaches the sea at Wexford Town. Salmon angling is historically popular on the River Slaney; however, in recent years a reduced stock of salmon and relatively small sized brown trout have made it less appealing (O' Reilly, 2009).

This site is located within the Slaney River Valley SAC. This is a candidate SAC, selected for a number of habitats listed in Annex I of the Habitats Directive, including alluvial wet woodland, floating vegetation, tidal mudflats and estuaries (NPWS, 2006b). Several species listed in Annex II of the same Directive are also present, including sea, river and brook lamprey, freshwater pearl mussels, twaite shad, salmon and otters (NPWS, 2006b).

The survey site was located upstream of Waterloo Bridge, approximately 5km west of the Glen of Imall, Co. Wicklow (Fig. 4.5). The site was previously surveyed by Inland Fisheries Ireland in August 2009 (Kelly *et al.*, 2010a). Three electric-fishing passes were conducted using one boat-based

electric-fishing unit on the 18<sup>th</sup> of August 2009 along a 94m length of channel. The mean wetted width of the surveyed stretch was 9.0m and the mean depth was 56.0cm. A total wetted area of 846m<sup>2</sup> was surveyed. Riffle and pool were the dominant habitats present, with a substrate of mainly mud and silt.



**Fig. 4.5. Location of the River Slaney surveillance monitoring site**

A total of five fish species were recorded in the River Slaney site. Salmon was the most abundant species, followed by brown trout, eels, stone loach and lamprey (Table 4.2).

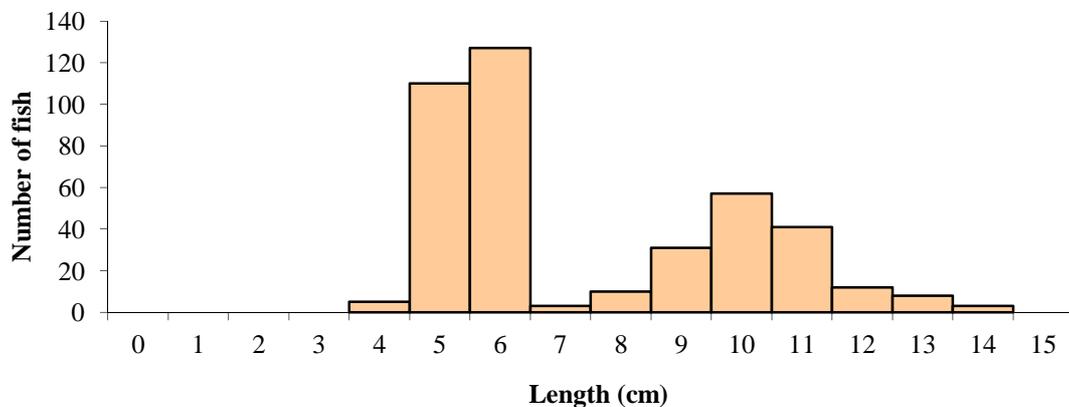
**Table 4.2. Minimum density of each fish species (no./m<sup>2</sup>) captured on the River Slaney site, July 2010**

Scientific name	Common name	0+	1+ & older	Total minimum density
<i>Salmo salar</i>	Salmon	0.211	0.161	0.372
<i>Salmo trutta fario</i>	Brown trout	0.004	0.038	0.042
<i>Anguilla anguilla</i>	Eel	-	-	0.013
<i>Barbatula barbatula</i>	Stone loach	-	-	0.013
<i>Lampetra</i> sp.	Lamprey sp.	-	-	0.010
All Fish	All Fish	-	-	0.441

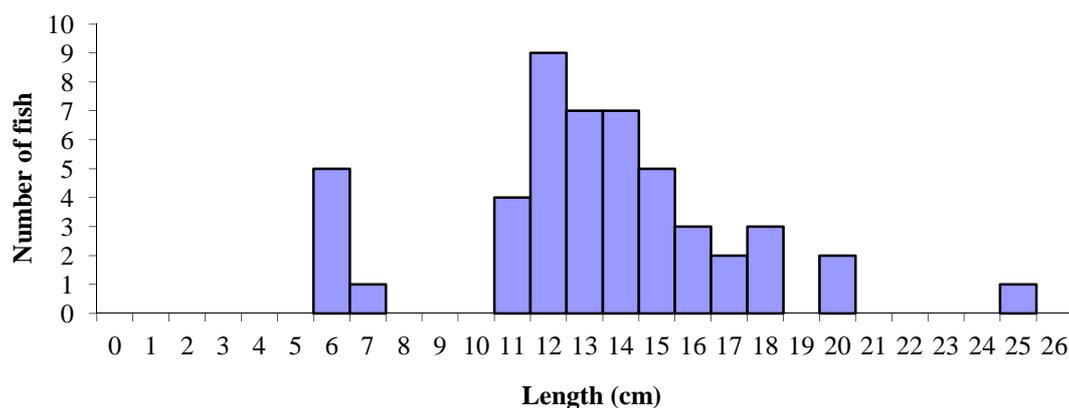
Salmon ranged in length from 4.2cm to 14.8cm (Fig. 4.6). Three age classes (0+, 1+ and 2+) were present, accounting for 60%, 37% and 3% of the total salmon catch respectively. The mean salmon L1 and L2 were 4.7cm and 8.6cm respectively (Appendix 2).

Brown trout ranged in length from 6.0cm to 25.1cm (Fig. 4.7). Four age classes (0+, 1+, 2+ and 3+) were present, accounting for approximately 12%, 59%, 27% and 2% of the total brown trout catch respectively. The mean brown trout L1, L2 and L3 were 6.0cm, 12.2cm and 19.1cm respectively (Appendix 1). This indicates that the rate of growth for brown trout in this river site is ‘slow’ according to the classification scheme of Kennedy and Fitzmaurice (1971).

Other species recorded included, eels ranging in length from 16.6cm to 35.1cm, stone loach from 3.6cm to 11.5cm and lamprey from 7.4cm to 10.2cm.



**Fig. 4.6. Length frequency distribution of salmon in the River Slaney site, July 2010 (n = 407)**



**Fig. 4.7. Length frequency distribution of brown trout in the River Slaney site, July 2010 (n = 49)**

## 4.2 Non-wadeable sites

### 4.2.1 *The River Aherlow*



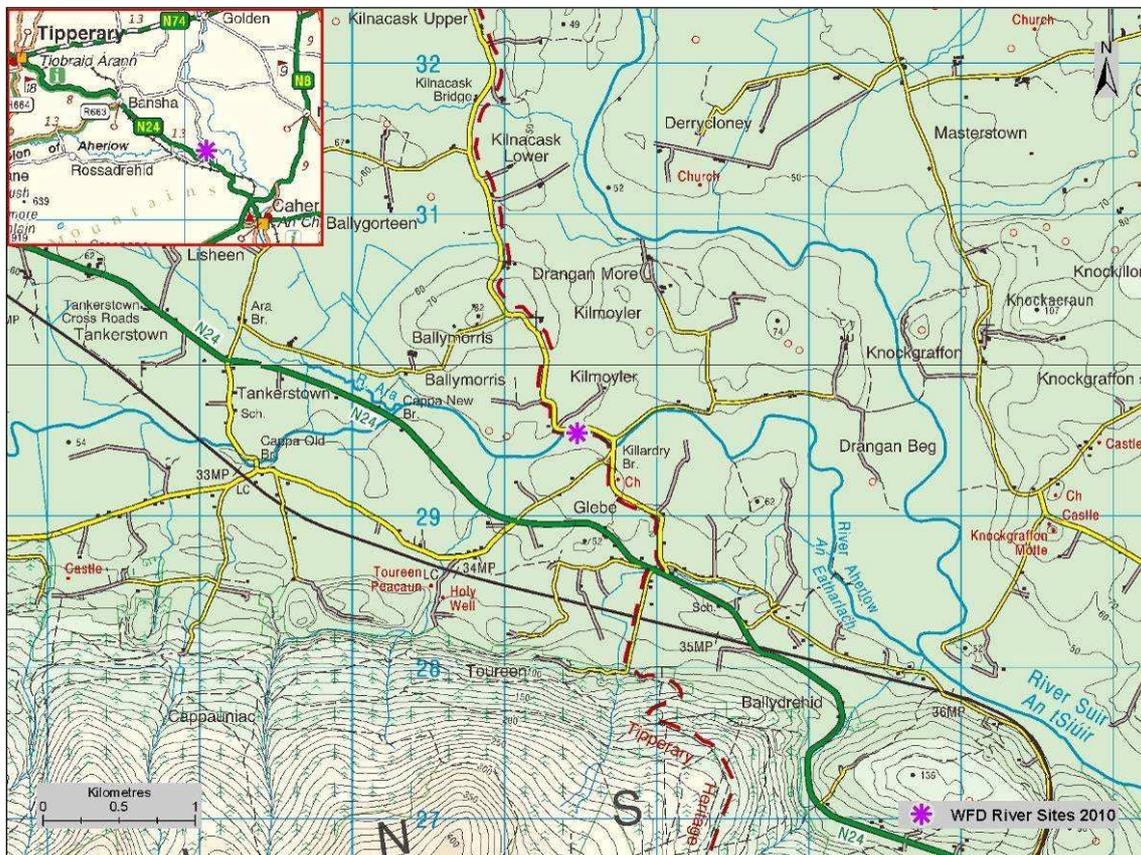
**Plate 4.3. The River Aherlow at Killardry Bridge, Co. Tipperary**

The River Aherlow rises near the village of Anglesborough in the Galty Mountains, Co. Limerick (Plate 4.3, Fig. 4.8). It flows in a north-easterly direction, around the north end of the Galty Mountains, until it joins with the River Suir, just a few kilometres north of Caher in Co. Tipperary. The Aherlow River is of interest to anglers as it holds large numbers of small brown trout (O' Reilly, 2002).

This site is located within the Lower River Suir SAC, which contains important habitats including alluvial wet woodland and yew wood, both of which are listed in Annex I of the Habitats Directive (NPWS, 2006c). A number of species listed in Annex II of the Directive are also present, including otter, freshwater pearl mussels, crayfish, twaite shad, and salmon, as well as river, brook and sea lamprey (NPWS, 2006c).

The survey site was located upstream of Killardry Bridge, approximately 4km upstream of the river's confluence with the River Suir (Fig. 4.8). One electric-fishing pass were conducted using two boat-

based electric-fishing units on the 13<sup>th</sup> of July 2010 along a 232m length of channel. The mean wetted width of the surveyed stretch was 14.0m and the mean depth was 65.0cm. A total wetted area of 3,248m<sup>2</sup> was surveyed. Glide was the dominant habitat present, with a substrate of mainly gravel.



**Fig. 4.8. Location of the River Aherlow surveillance monitoring site**

A total of five fish species were recorded in the River Aherlow site. Salmon was the most abundant species, followed by brown trout, stone loach, roach and three-spined stickleback (Table 4.3).

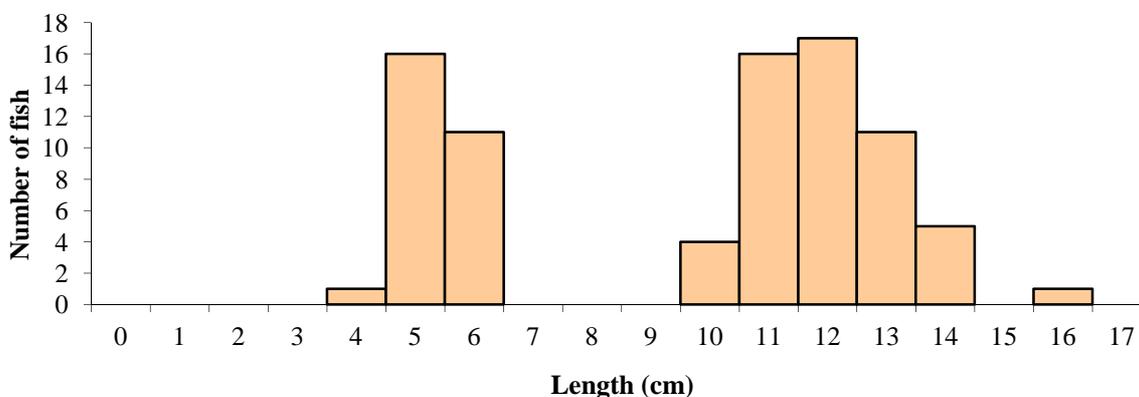
**Table 4.3. Minimum density of each fish species (no./m<sup>2</sup>) captured on the River Aherlow site, July 2010**

Scientific name	Common name	0+	1+ & older	Total minimum density
<i>Salmo salar</i>	Salmon	0.0086	0.0166	0.0253
<i>Salmo trutta fario</i>	Brown trout	0.0009	0.0240	0.0249
<i>Barbatula barbatula</i>	Stone loach	-	-	0.0009
<i>Rutilus rutilus</i>	Roach	-	-	0.0006
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	-	-	0.0003
All Fish	All Fish	-	-	0.0520

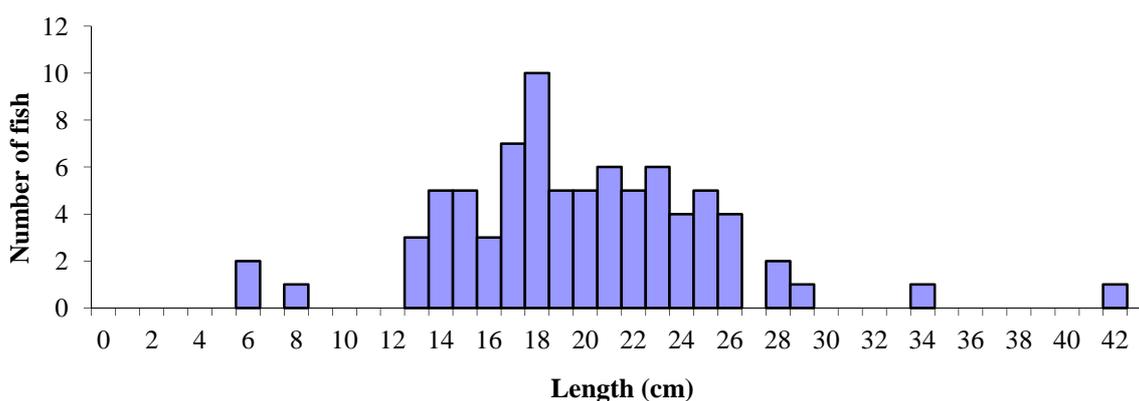
Salmon ranged in length from 4.5cm to 16.7cm (Fig. 4.9). Three age classes (0+, 1+ and 2+) were present, accounting for 34%, 65% and 1% of the total salmon catch respectively. The mean salmon L1 and L2 were 5.8cm and 9.7cm respectively (Appendix 2).

Brown trout ranged in length from 6.4cm to 42.6cm (Fig. 4.10). Five age classes (0+, 1+, 2+, 3+ and 4+) were present, accounting for approximately 4%, 17%, 36%, 36% and 7% of the total brown trout catch respectively. The mean brown trout L1, L2, L3 and L4 were 7.9cm, 14.5cm, 19.7cm and 20.4cm respectively (Appendix 1). This indicates that the rate of growth for brown trout in this river site is 'slow' according to the classification scheme of Kennedy and Fitzmaurice (1971).

Other species recorded included, stone loach ranging in length from 2.9cm to 3.4cm, two roach measuring 20.4cm and 20.9cm and one three-spined stickleback measuring 3.3cm.



**Fig. 4.9 Length frequency distribution of salmon in the River Aherlow site, July 2010 (n = 82)**



**Fig. 4.10. Length frequency distribution of brown trout in the River Aherlow site, July 2010 (n = 81)**

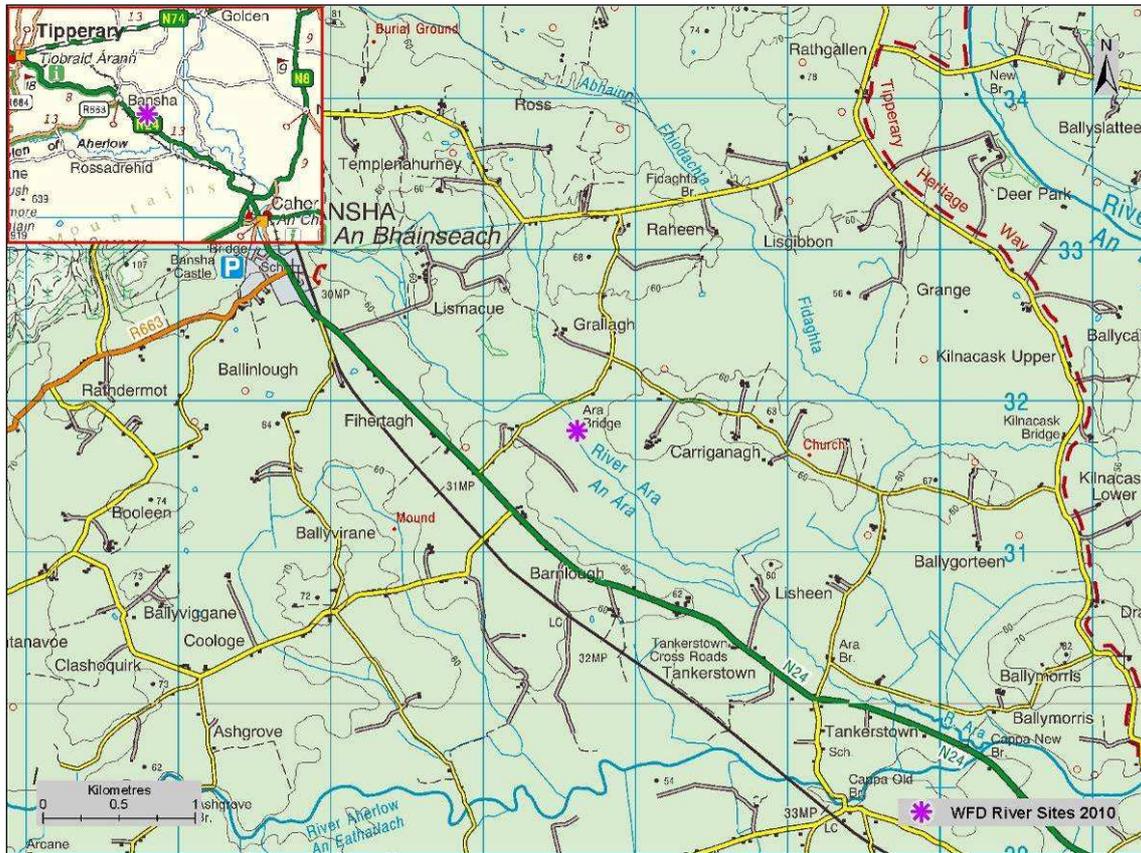
#### 4.2.2 *The River Ara*



**Plate 4.4. The River Ara at Ara Bridge near Bansha, Co. Tipperary**

The River Ara rises approximately 12km west of Tipperary Town and flows in a south-easterly direction until it joins the River Aherlow approximately 4km north-west of Caher, Co. Tipperary (Plate 4.4, Fig. 4.11). The River Ara is known to contain good stocks of brown trout (O' Reilly, 2002).

The survey site was located at Ara Bridge, approximately 2.5km south of Bansha (Fig. 4.11). One electric-fishing pass was conducted using one boat-based electric-fishing unit on the 13<sup>th</sup> of July 2010 along a 127m length of channel. The mean wetted width of the surveyed stretch was 6.8m and the mean depth was 90.0cm. A total wetted area of 864m<sup>2</sup> was surveyed. Riffle and glide were the dominant habitat types present, with a substrate of mainly cobble and gravel.



**Fig. 4.11. Location of the River Ara surveillance monitoring site**

A total of five fish species were recorded in the River Ara site. Brown trout was the most abundant species, followed by salmon, three-spined stickleback, stone loach, and eels (Table 4.4).

**Table 4.4. Minimum density of each fish species (no./m<sup>2</sup>) captured on the River Ara site, July 2010**

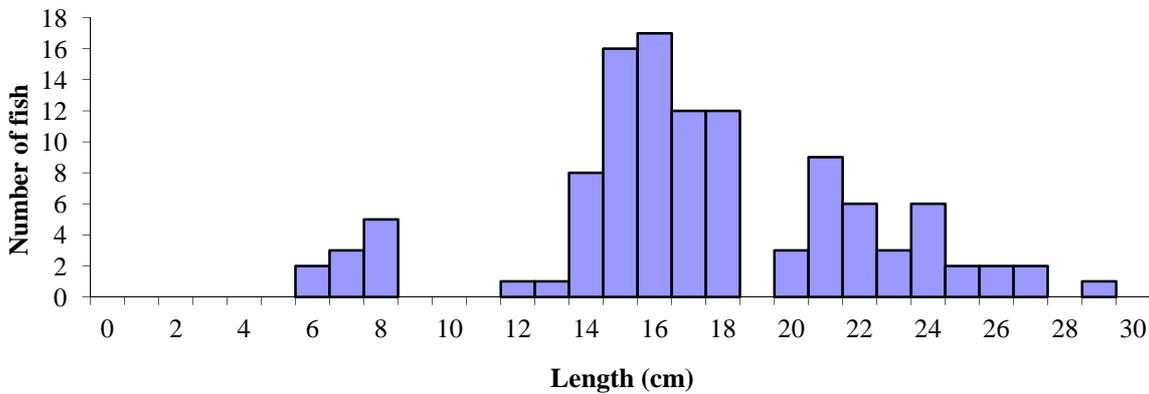
Scientific name	Common name	0+	1+ & older	Total minimum density
<i>Salmo trutta fario</i>	Brown trout	0.012	0.117	0.129
<i>Salmo salar</i>	Salmon	0.005	0.029	0.034
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	-	-	0.003
<i>Barbatula barbatula</i>	Stone loach	-	-	0.003
<i>Anguilla anguilla</i>	Eel	-	-	0.002
All Fish	All Fish	-	-	0.171

Brown trout ranged in length from 6.2cm to 29.2cm (Fig. 4.12). Four age classes (0+, 1+, 2+ and 3+) were present, accounting for approximately 9%, 50%, 35% and 5% of the total brown trout catch respectively. The mean brown trout L1, L2 and L3 were 8.9cm, 16.4cm and 21.6cm respectively

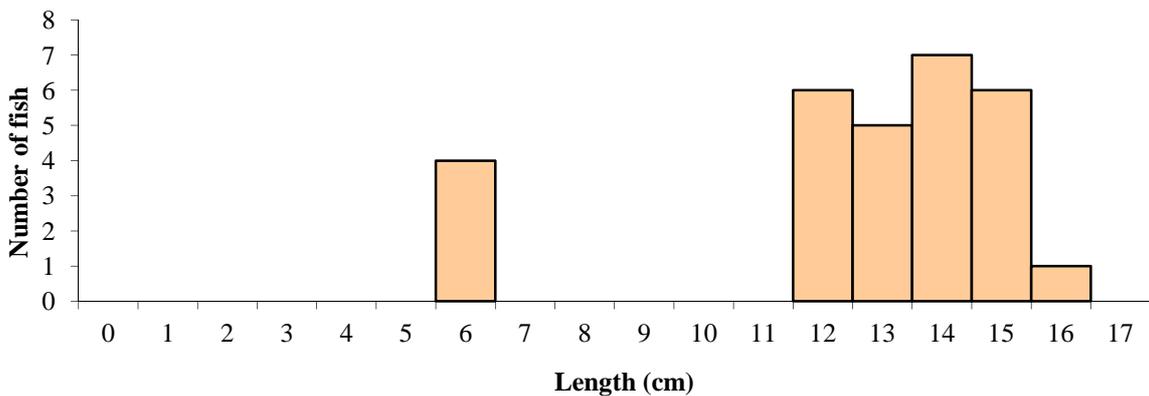
(Appendix 1). This indicates that the rate of growth for brown trout in this river site is ‘slow’ according to the classification scheme of Kennedy and Fitzmaurice (1971).

Salmon ranged in length from 6.1cm to 16.9cm (Fig. 4.13). Three age classes (0+, 1+ and 2+) were present, accounting for 14%, 83% and 3 % of the total salmon catch respectively. The mean salmon L1 and L2 were 6.3cm and 7.7cm respectively (Appendix 2).

Other species recorded included three-spined stickleback ranging in length from 2.4cm to 6.9cm, stone loach from 8.5cm to 9.9cm and two eels measuring 27.8cm and 30.4cm.



**Fig. 4.12. Length frequency distribution of brown trout in the River Ara, July 2010 (n = 111)**



**Fig. 4.13. Length frequency distribution of salmon in the River Ara, July 2010 (n = 29)**

#### 4.2.3 The River Barrow (Graiguenamanagh)



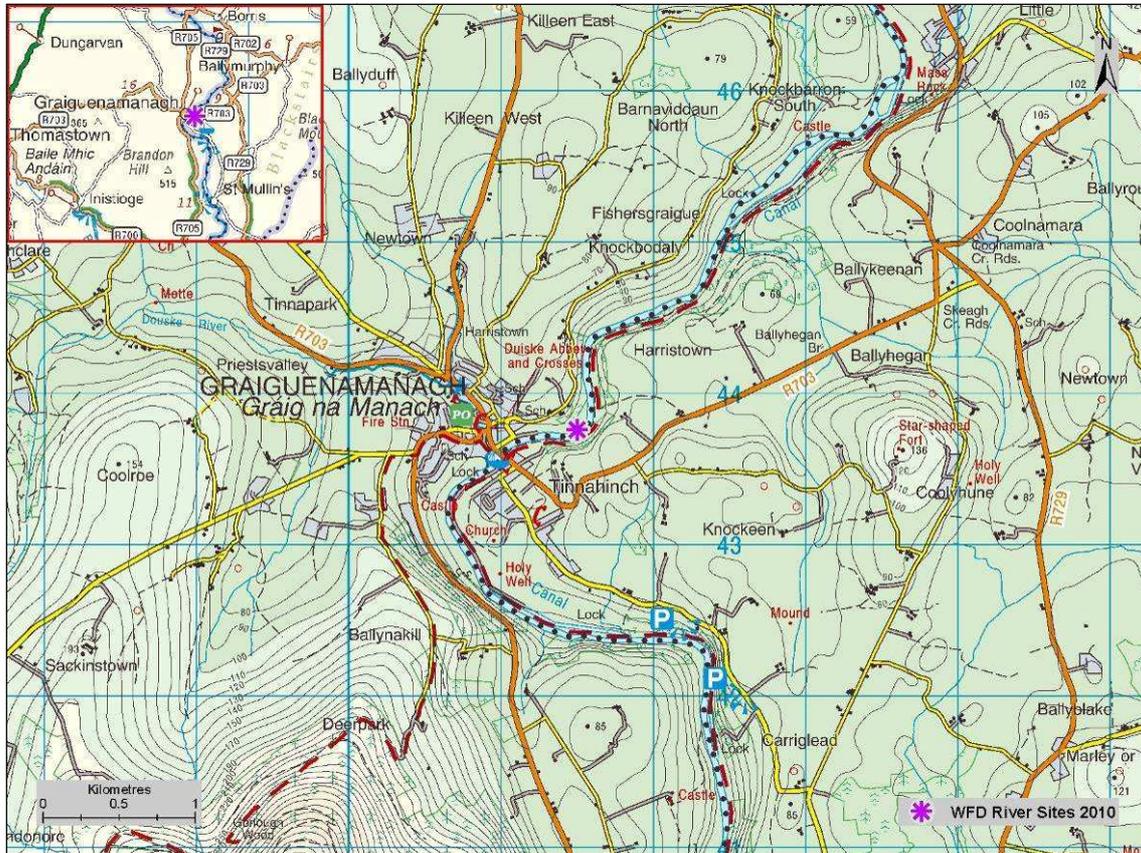
**Plate 4.5. The River Barrow upstream of Graiguenamanagh Bridge, Co. Carlow**

The River Barrow is a large river located in south Leinster (Plate 4.5, Fig. 4.14). It rises in the Slieve Bloom Mountains in County Laois and flows eastwards towards Monasterevin, before heading south through a number of towns including Athy, Carlow, Leighlinbridge, Bagenalstown, Graiguenamanagh and New Ross. It joins with the River Suir a few kilometres east of Waterford City, before joining the sea at Waterford Harbour. Game fishing is popular along the River Barrow, with brown trout fishing best upstream of Monasterevin and along the tributaries (O' Reilly, 2009).

This section of the channel, together with most of the River Barrow and its main tributaries, are within the River Barrow and River Nore SAC. A number of Annex II listed species are present in this SAC, including sea, river and brook lamprey, salmon, twaite shad, otters, crayfish and freshwater pearl mussels (NPWS, 2006a).

The survey site was located approximately 500m us/s of Graiguenamanagh, Co. Kilkenny (Fig. 4.14). One electric-fishing pass was conducted using four boat-based electric-fishing units on the 31<sup>st</sup> of May 2010 along a 697m length of channel. The mean wetted width of the surveyed stretch was 45m and the mean depth was 175.0cm. A total wetted area of 31365m<sup>2</sup> was surveyed. Glide was the

dominant habitat present, with a substrate of mainly gravel and boulder. Macrophyte vegetation consisted mostly of riparian grasses but some submerged species were also present.



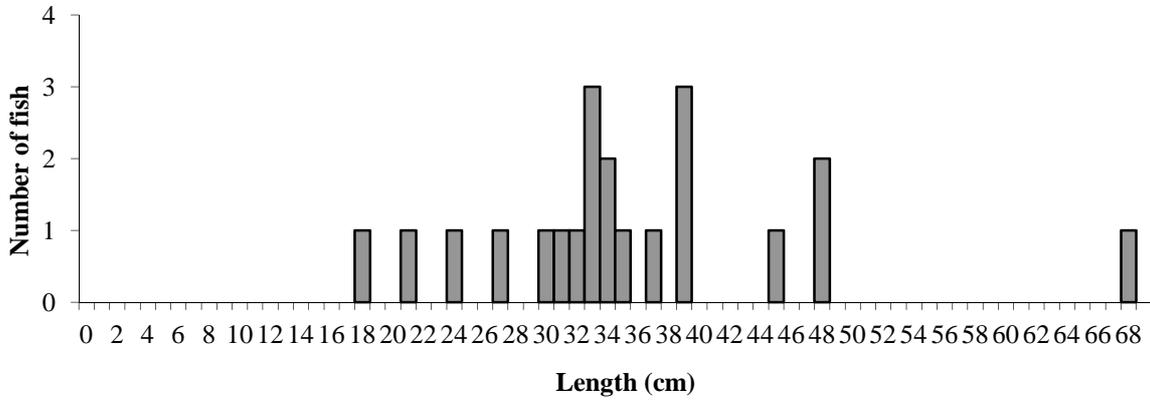
**Fig. 4.14. Location of the River Barrow surveillance monitoring site**

A total of five fish species were recorded in the River Barrow (Graiguenamanagh) site. Minnow was the most abundant species, followed by eels, dace, pike and perch (Table 4.5).

**Table 4.5. Minimum density of each fish species (no./m<sup>2</sup>) captured on the River Barrow (Graiguenamanagh) site, May 2010**

Scientific name	Common name	0+	1+ & older	Total minimum density
<i>Phoxinus phoxinus</i>	Minnow	-	-	0.00070
<i>Anguilla anguilla</i>	Eel	-	-	0.00067
<i>Leuciscus leuciscus</i>	Dace	-	-	0.00010
<i>Esox lucius</i>	Pike	-	-	0.00010
<i>Perca fluviatilis</i>	Perch	-	-	0.00003
All Fish	All Fish	-	-	0.00159

Eels ranged in length from 18.3cm to 68.5cm, with their length frequency distribution shown in Figure 4.15. Other species recorded included minnow ranging in length from 1.3cm to 4.2cm, dace from 4.0cm to 4.5cm, pike from 25.8cm to 55.5cm and a single perch measuring 15.4cm.



**Fig. 4.15. Length frequency distribution of eels in the River Barrow (Graigenamanagh) site, May 2010 (n = 21)**

#### **4.2.4 The River Nore (Brownsbarn)**



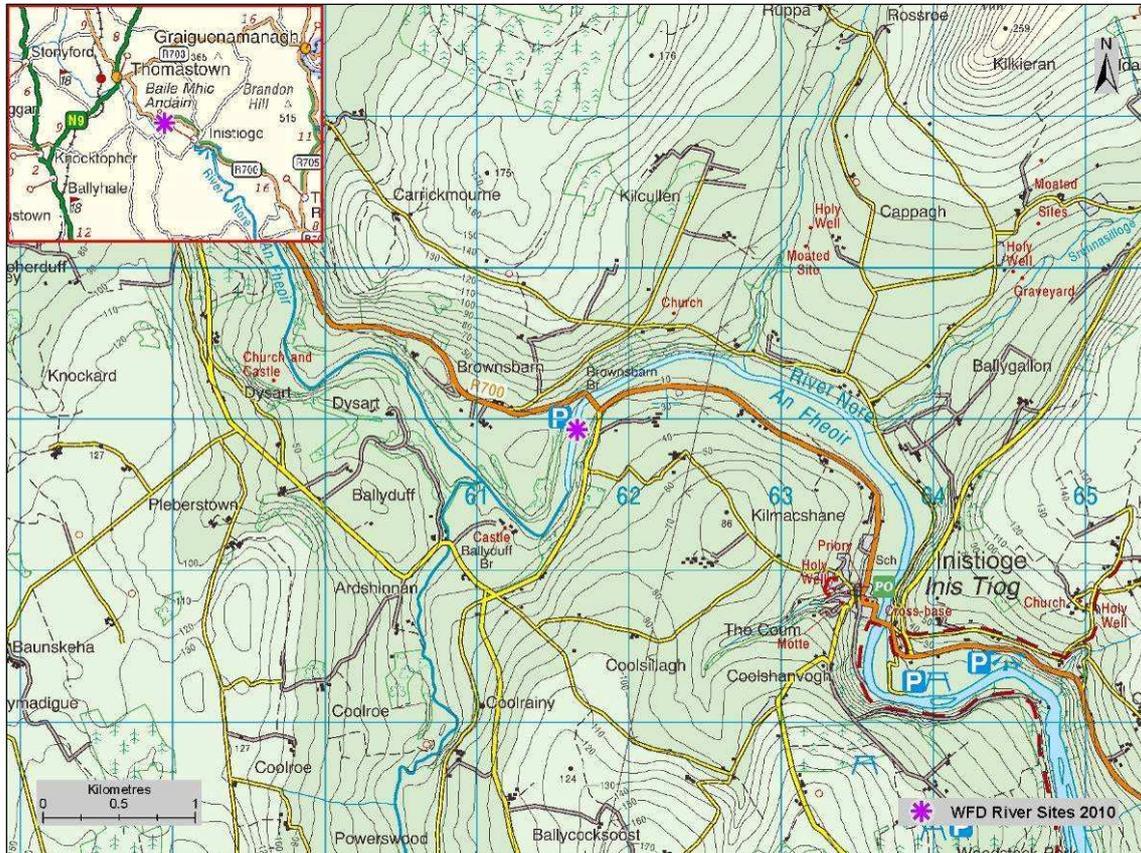
**Plate 4.6. The River Nore upstream of Brownsbarn Bridge, Co. Kilkenny**

The River Nore rises in north Tipperary and flows in a south-easterly direction into Co. Laois and Co. Kilkenny (Plate 4.6, Fig. 4.16). It eventually joins with the River Barrow just north of New Ross in Co. Wexford, before entering the sea at Waterford Harbour. Although the Nore is a good trout fishery, it has declined as a salmon fishery in recent years, with uncertain grilse and autumn runs (O'Reilly, 2002). The best of the salmon fishing extends as far upstream as the confluence with the River Dinin, Co. Kilkenny (O' Reilly, 2002).

This site is within the River Barrow and River Nore SAC, which is designated to protect several Annex I habitats and Annex II species listed in the Habitats Directive, including twaite shad, salmon, freshwater pearl mussel and crayfish, as well as river lamprey, brook lamprey and sea lamprey (NPWS, 2006a).

The survey site was located just upstream of Brownsbarn Bridge, north-west of Inistioge in Co. Kilkenny (Fig. 4.16). One electric-fishing pass was conducted using four boat-based electric-fishing units on the 1<sup>st</sup> of June 2010 along a 585m length of channel. The mean wetted width of the surveyed

stretch was 40.5m and the mean depth was 200.0cm. A total wetted area of 23,692m<sup>2</sup> was surveyed. Glide was the dominant habitat type present, with a substrate of mainly cobble and gravel.



**Fig. 4.16. Location of the River Nore (Brownsbarn Br.) surveillance monitoring site**

A total of seven fish species were recorded in the River Nore (Brownsbarn) site. Flounder was the most abundant species, followed by eel, salmon, brown trout, dace, minnow and stone loach (Table 4.6).

**Table 4.6. Minimum density of each fish species (no./m<sup>2</sup>) captured on the River Nore (Brownsbarn) site, June 2010**

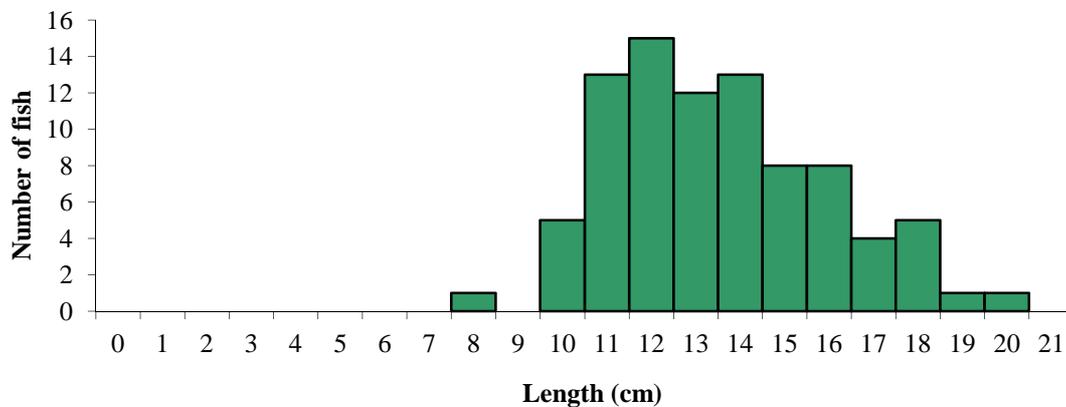
Scientific name	Common name	0+	1+ & older	Total minimum density
<i>Platichthys flesus</i>	Flounder	-	-	0.00363
<i>Anguilla anguilla</i>	Eel	-	-	0.00215
<i>Salmo salar</i>	Salmon	-	0.00186	0.00186
<i>Salmo trutta fario</i>	Brown trout	-	0.00148	0.00148
<i>Leuciscus leuciscus</i>	Dace	-	-	0.00089
<i>Phoxinus phoxinus</i>	Minnow	-	-	0.00046
<i>Barbatula barbatula</i>	Stone loach	-	-	0.00004
All Fish	All Fish	-	-	0.01051

The abundance of flounder captured in the River Nore (Brownsbarn) site reflects the proximity of this site to the tidal limit of the River Nore, which is approximately 2.5km downstream. Flounder ranged in length from 8.5cm to 20.6cm (Fig. 4.17). Eels were also relatively abundant, ranging in length from 9.9cm to 40.7cm (Fig. 4.18).

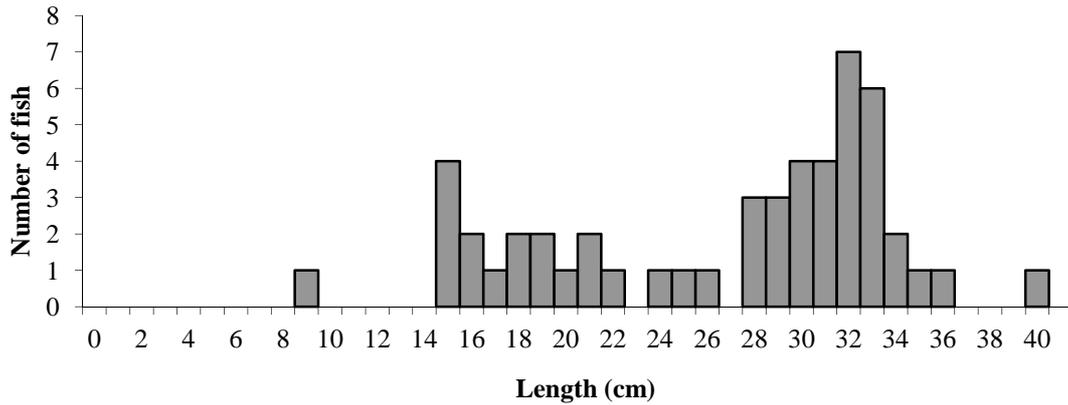
Salmon ranged in length from 8.9cm to 12.2cm (Fig. 4.19). Two age classes (1+ and 2+) were present, accounting for approximately 98% and 2% of the total salmon catch respectively. The mean salmon L1 and L2 were 4.8cm and 8.1cm respectively (Appendix 2).

Brown trout ranged in length from 15.0cm to 29.5cm (Fig. 4.20). Four age classes (1+, 2+, 3+ and 4+) were present, accounting for approximately 6%, 54%, 37% and 3% of the total brown trout catch respectively. The mean brown trout L1, L2, L3 and L4 were 7.4cm, 15.3cm, 20.5cm and 24.3cm respectively (Appendix 1). This indicates that the rate of growth for brown trout in this river site is ‘slow’ according to the classification scheme of Kennedy and Fitzmaurice (1971).

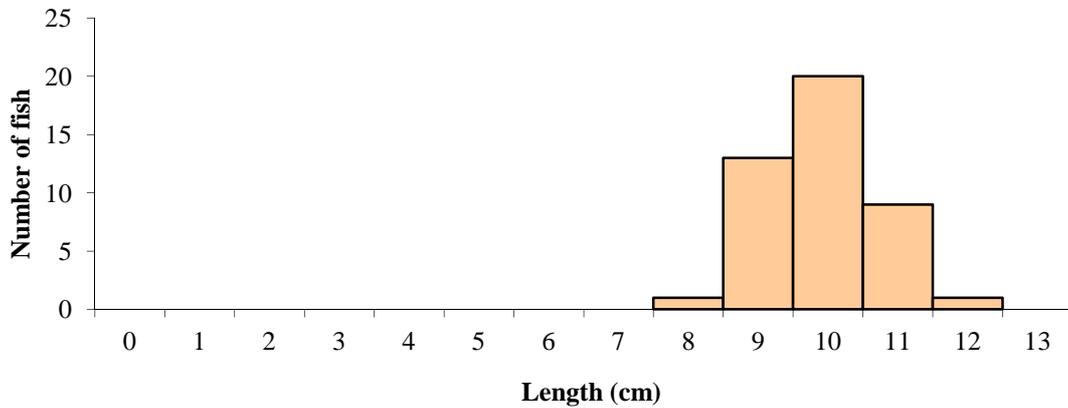
Other species recorded included eels ranging in length from 9.9cm to 40.7cm, dace from 7.0cm to 26.5cm, minnow from 4.0cm to 6.2cm and a single stone loach measuring 9.8cm. In addition, adult sea lamprey were observed at the site.



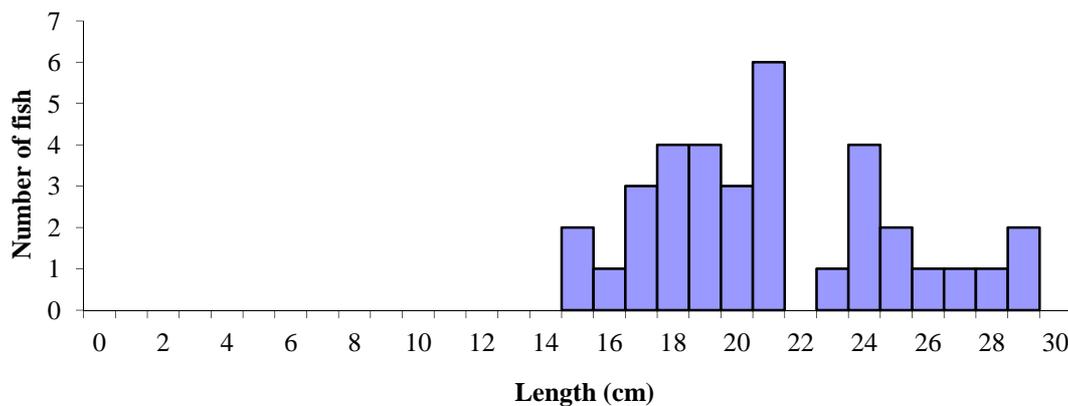
**Fig. 4.17. Length frequency distribution of flounder in the River Nore (Brownsbarn) site, June 2010 (n = 86)**



**Fig. 4.18. Length frequency distribution of eels in the River Nore (Brownsbarn) site, June 2010 (n = 51)**



**Fig. 4.19. Length frequency distribution of salmon in the River Nore (Brownsbarn) site, June 2010 (n = 44)**



**Fig. 4.20. Length frequency distribution of brown trout in the River Nore (Brownsbarn) site, June 2010 (n = 35)**

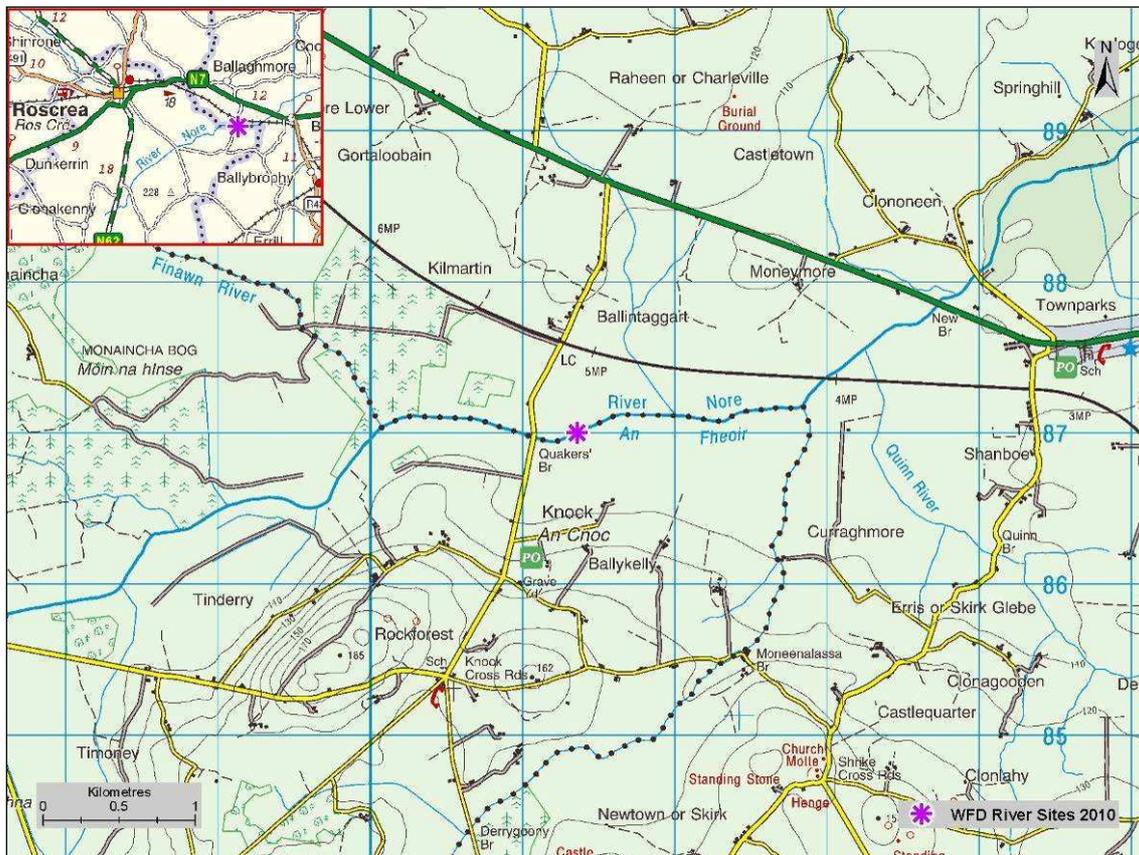
#### 4.2.5 The River Nore (Quakers' Bridge)



**Plate 4.7. The River Nore downstream of Quakers' Bridge, Co. Laois/Tipperary border**

A second site was surveyed on the River Nore approximately 8km south-east of Roscrea. The survey site was located just downstream of Quakers' Bridge, on the border between Counties Tipperary and Laois, approximately 8km south-east of Roscrea Town (Plate 4.7, Fig. 4.21). This site was previously surveyed by Inland Fisheries Ireland in August 2009 (Kelly *et al.*, 2010b).

Three electric-fishing passes were conducted using two boat-based electric-fishing units on the 12<sup>th</sup> of July 2010 along a 273m length of channel. The mean wetted width of the surveyed stretch was 8.0m and the mean depth was 110.0cm. A total wetted area of 2,184m<sup>2</sup> was surveyed. Glide was the dominant habitat type present, with a substrate of mainly sand, mud and silt.



**Fig. 4.21. Location of the River Nore (Quakers' Br.) surveillance monitoring site**

A total of seven fish species were recorded in the River Nore (Quakers' Br.) site. Brown trout was the most abundant species, followed by pike, minnow, eels, stone loach, three-spined stickleback and gudgeon (Table 4.7).

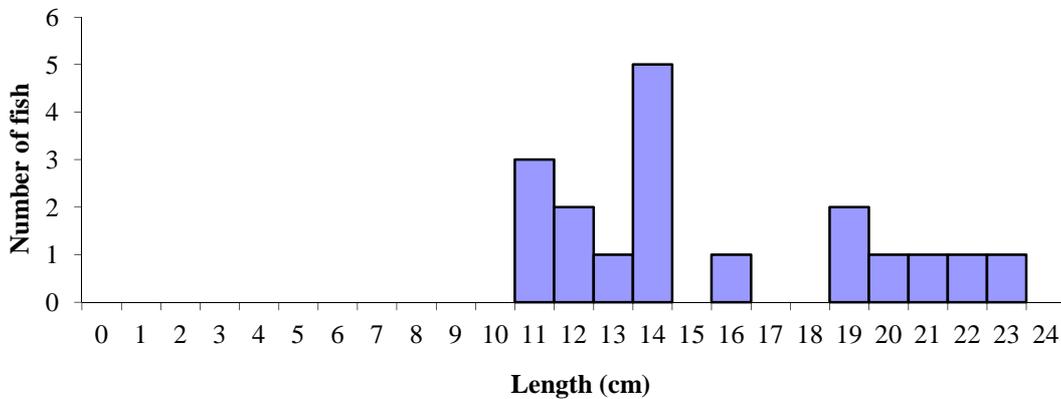
**Table 4.7. Minimum density of each fish species (no./m<sup>2</sup>) captured on the River Nore (Quakers' Br.) site, July 2010**

Scientific name	Common name	0+	1+ & older	Total minimum density
<i>Salmo trutta fario</i>	Brown trout	-	0.0073	0.0073
<i>Esox lucius</i>	Pike	-	0.0055	0.0055
<i>Phoxinus phoxinus</i>	Minnow	-	-	0.0028
<i>Anguilla anguilla</i>	Eel	-	-	0.0005
<i>Barbatula barbatula</i>	Stone loach	-	-	0.0005
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	-	-	0.0005
<i>Gobio gobio</i>	Gudgeon	-	-	0.0005
All Fish	All Fish	-	-	0.0169

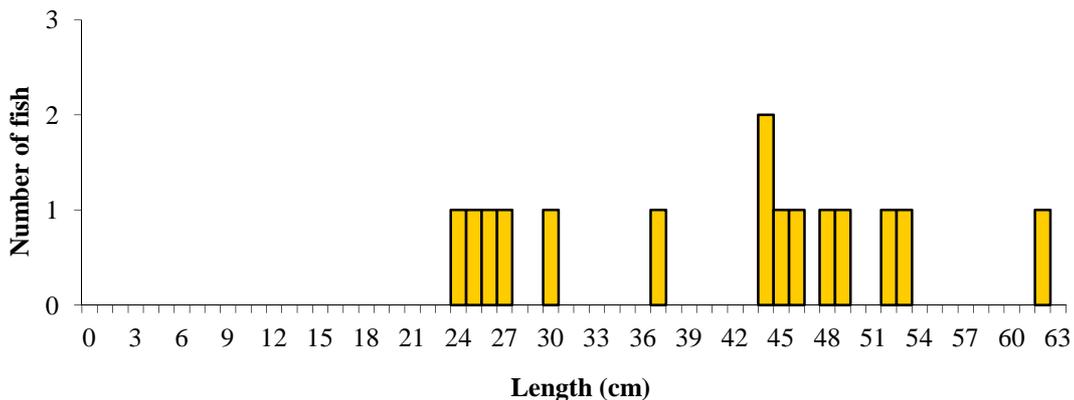
Brown trout ranged in length from 11.5cm to 23.3cm (Fig. 4.22). Four age classes (1+, 2+, 3+ and 4+) were present, accounting for approximately 67%, 28%, 6% and 6% of the total brown trout catch respectively. The mean brown trout L1, L2 and L3 were 8.0cm, 15.8cm and 21.1cm respectively (Appendix 1). This indicates that the rate of growth for brown trout in this river site is ‘slow’ according to the classification scheme of Kennedy and Fitzmaurice (1971).

Pike ranged in length from 24.1cm to 62.5cm (Fig. 4.23). Three age classes (1+, 2+ and 4+) were present, accounting for 33%, 60% and 7% of the total pike catch respectively.

Other species recorded included, minnow ranging in length from 3.0cm to 7.4cm, two eels measuring 18.5cm and 30.3cm, and single specimens of stone loach (9.5cm), gudgeon (10.3cm) and three-spined stickleback (3.8cm).



**Fig. 4.22. Length frequency distribution of brown trout in the River Nore (Quakers’) site, July 2010 (n = 18)**



**Fig. 4.23. Length frequency distribution of pike in the River Nore (Quakers’) site, July 2010 (n = 15)**

#### 4.2.6 The River Suir (Kilsheelan)

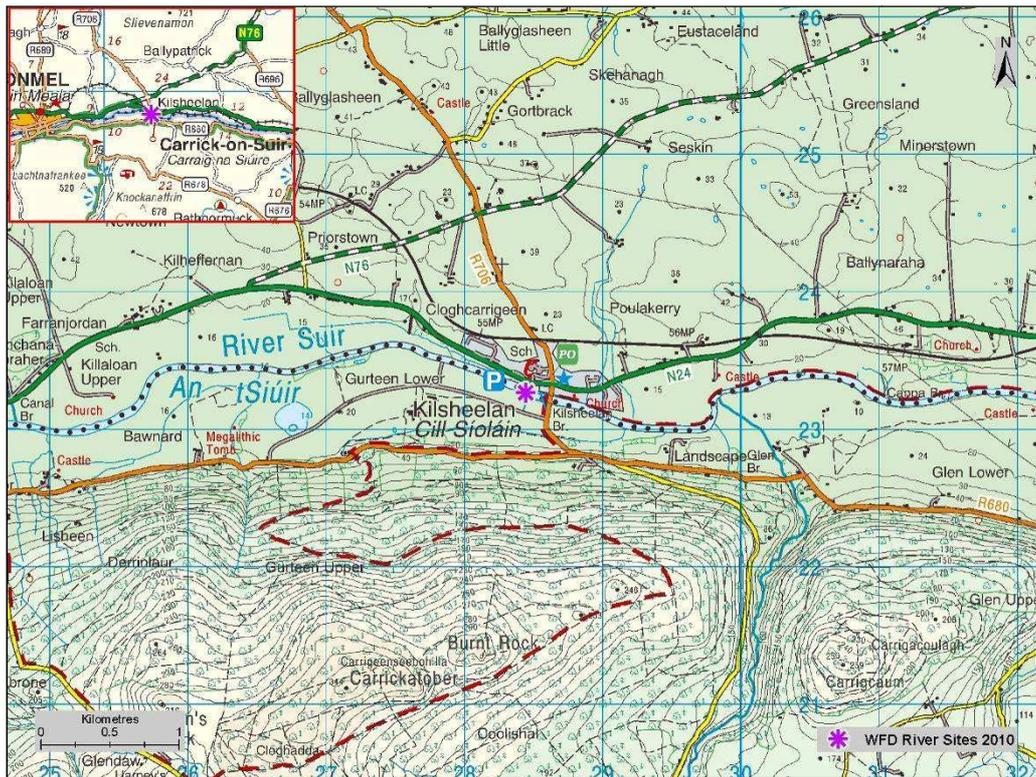


**Plate 4.8. The River Suir upstream of Kilsheelan Bridge, Co. Tipperary/Waterford border**

The River Suir rises in Devilsbit Mountain in Co. Tipperary and flows in a southerly direction through Templemore, Thurles, Cahir, Clonmel and Carrick-on-Suir before joining the River Barrow and the River Nore near Cheekpoint, Co. Waterford (Plate 4.8, Fig. 4.24). High recruitment from many tributaries and a near-perfect environment in the main channel make the River Suir ideal for trout production (O' Reilly, 2002).

This site is located within the Lower River Suir SAC (NPWS, 2006c), which contains important habitats, including alluvial wet woodland and yew wood, both of which are listed in Annex I of the Habitats Directive (NPWS, 2006c). A number of Annex II species listed in the Directive are also present, including otter, freshwater pearl mussels, crayfish, twaite shad, and salmon, as well as river, brook and sea lamprey (NPWS, 2006c).

The survey site was located upstream of Kilsheelan Bridge, approximately 4.5km east of Clonmel (Fig. 4.24). One electric-fishing pass was conducted using four boat-based electric-fishing units on the 2<sup>nd</sup> of June 2010 along a 588m length of channel. The mean wetted width of the surveyed stretch was 55.5m and the mean depth was 200.0cm. A total wetted area of 32,634m<sup>2</sup> was surveyed. Glide was the dominant habitat type present, with a substrate of mainly cobble and gravel.



**Fig. 4.24. Location of the River Suir (Kilsheelan Br.) surveillance monitoring site**

A total of nine fish species were recorded in the River Suir (Kilsheelan) site. Eel was the most abundant species, followed by salmon (Table 4.8).

**Table 4.8. Minimum density of each fish species (no./m<sup>2</sup>) captured on the River Suir (Kilsheelan) site, June 2010**

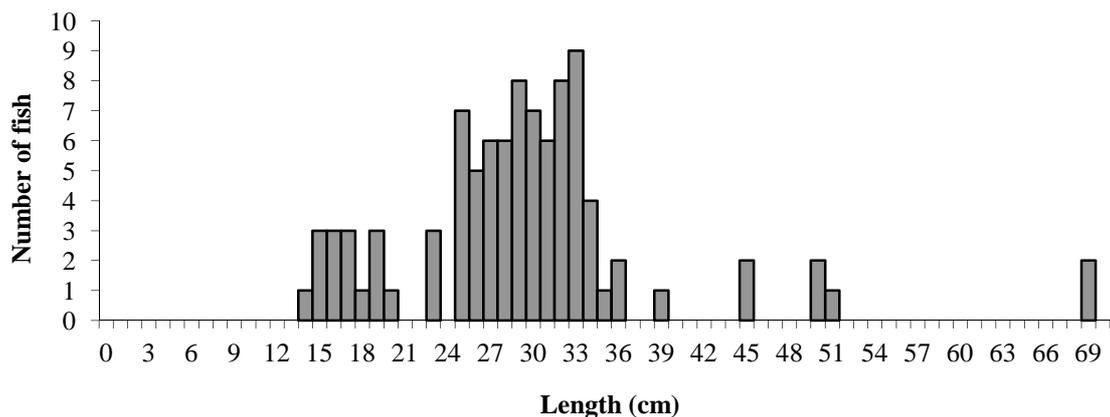
Scientific name	Common name	0+	1+ & older	Total minimum density
<i>Anguilla anguilla</i>	Eel	-	-	0.00291
<i>Salmo salar</i>	Salmon	-	0.00267	0.00267
<i>Barbatula barbatula</i>	Stone loach	-	-	0.00055
<i>Salmo trutta fario</i>	Brown trout	0.00003	0.00052	0.00055
<i>Platichthys flesus</i>	Flounder	-	-	0.00037
<i>Lampetra</i> sp.	Lamprey sp.	-	-	0.00012
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	-	-	0.00003
<i>Leuciscus leuciscus</i>	Dace	-	-	0.00003
<i>Phoxinus phoxinus</i>	Minnow	-	-	0.00003
All Fish	All Fish	-	-	0.00726

Eels ranged in length from 14.7cm to 69.9cm (Fig. 4.25).

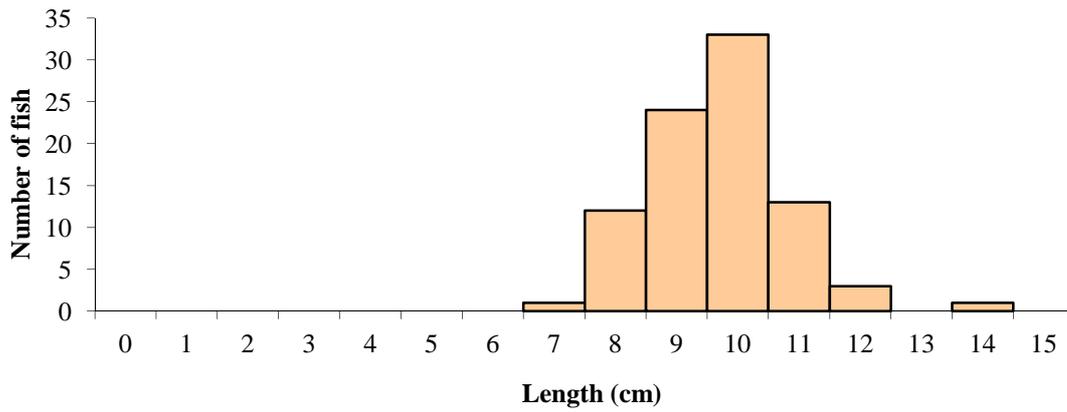
Salmon ranged in length from 7.0cm to 14.5cm (Fig. 4.26). Two age classes (1+ and 2+) were present, accounting for 99% and 1% of the total salmon catch respectively. The mean salmon L1 and L2 were 5.6cm and 9.8cm respectively (Appendix 2).

Brown trout ranged in length from 5.2cm to 33.6cm. Five age classes (0+, 1+, 2+, 3+ and 4+) were present, accounting for approximately 6%, 56%, 22%, 11% and 6% of the total brown trout catch respectively. The mean brown trout L1, L2 and L3 were 8.3cm, 14.9cm and 22.4cm respectively (Appendix 1). This indicates that the rate of growth for brown trout in this river site is ‘fast’ according to the classification scheme of Kennedy and Fitzmaurice (1971).

Other species recorded included, stone loach ranging in length from 5.1cm to 10.6cm, flounder from 8.6cm to 21.2cm, lamprey from 11.2cm to 13.0cm, and single specimens of three-spined stickleback (6.0cm), dace (22.4cm) and minnow (6.1cm).



**Fig. 4.25. Length frequency distribution of eels in the River Suir (Kilsheelan) site, June 2010 (n = 95)**



**Fig. 4.26. Length frequency distribution of salmon in the River Nore (Kilsheelan) site, June 2010 (n = 87)**

#### 4.2.7 The River Suir (Knocknageragh)



**Plate 4.9. The River Suir downstream of Knocknageragh Bridge, Co. Tipperary**

A second site was surveyed on the River Suir (see section 4.2.6 for description), near Templemore in Co. Tipperary.

The survey site was located approximately 14km from the source of the River Suir, downstream of Knocknageragh Bridge, just outside Templemore (Plate 4.9, Fig. 4.27). This site was previously surveyed by Inland Fisheries Ireland in August 2008 (Kelly *et al.*, 2010b).

Three electric-fishing passes were conducted using one boat-based electric fishing unit on the 12<sup>th</sup> of August 2010 along a 99m length of channel. The mean wetted width of the surveyed stretch was 6.3m and the mean depth was 33.0cm. A total area of 622m<sup>2</sup> was surveyed. Glide was the dominant habitat type present, with a substrate of mainly sand, mud and silt.



**Fig. 4.27. Location of the River Suir (Knocknageragh) surveillance monitoring site**

A total of seven fish species were recorded in the River Suir (Knocknageragh) site. Brown trout was the most abundant species, followed by stone loach, salmon, eels, pike, three-spined stickleback and lamprey (Table 4.9).

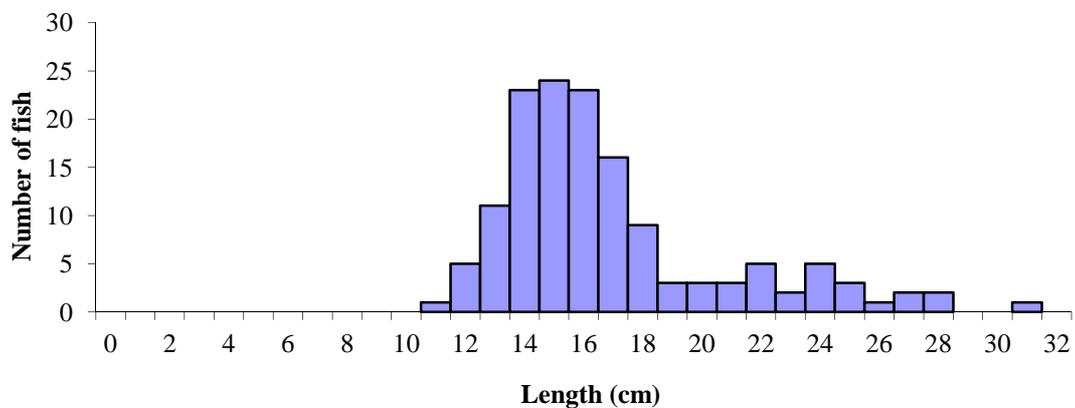
**Table 4.9. Minimum density of each fish species (no./m<sup>2</sup>) captured on the River Suir (Knocknageragh) site, August 2010**

Scientific name	Common name	0+	1+ & older	Total minimum density
<i>Salmo trutta fario</i>	Brown trout	-	0.127	0.127
<i>Barbatula barbatula</i>	Stone loach	-	-	0.005
<i>Salmo salar</i>	Salmon	-	0.003	0.003
<i>Anguilla anguilla</i>	Eel	-	-	0.002
<i>Esox lucius</i>	Pike	-	-	0.002
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	-	-	0.002
<i>Lampetra</i> sp.	Lamprey sp.	-	-	0.002
All Fish	All Fish	-	-	0.13664

Brown trout ranged in length from 11.9cm to 31.6cm. Four age classes (1+, 2+, 3+ and 4+) were present (Fig. 4.28), accounting for approximately 79%, 18%, 1% and 1% of the total brown trout catch respectively. The mean brown trout L1, L2, L3 and L4 were 8.0cm, 17.8cm, 22.3cm and 25.9cm respectively (Appendix 1). This indicates that the rate of growth for brown trout in this river site is ‘fast’ according to the classification scheme of Kennedy and Fitzmaurice (1971).

Five salmon ranging in length from 12.5cm to 13.4cm were captured. All of these fish were aged 1+, with a mean L1 of 6.8cm (Appendix 2).

Other species recorded included stone loach ranging in length from 5.6cm to 10.6cm and single specimens of eel (30.9cm), pike (23.2cm), three-spined stickleback (3.3cm) and lamprey (12.4cm).

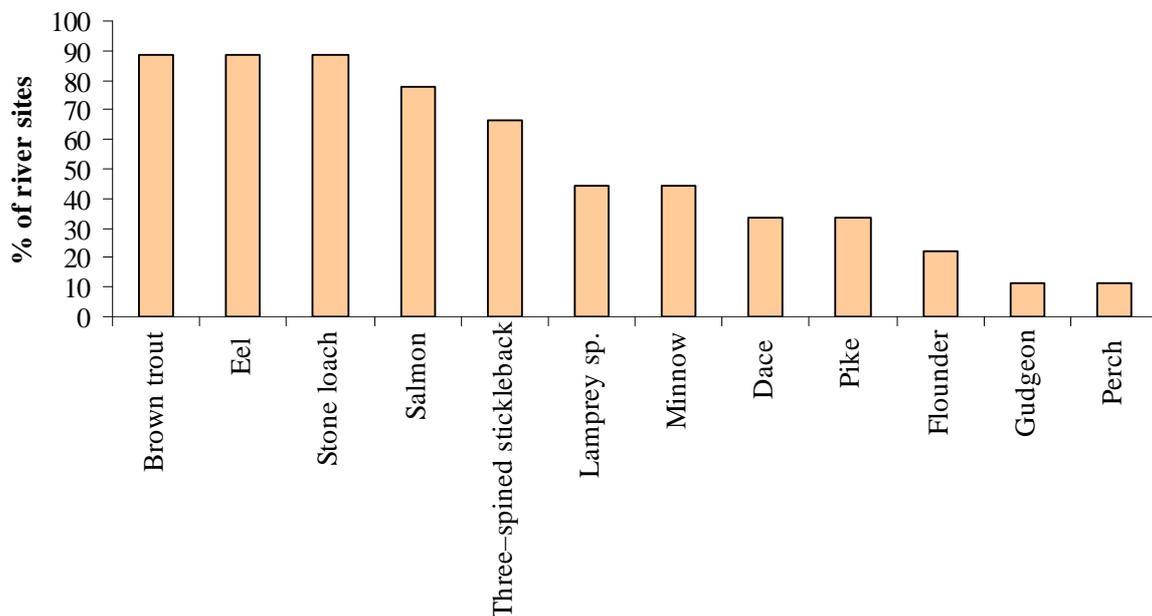


**Fig. 4.28. Length frequency distribution of brown trout in the River Suir (Knocknageragh) site, August 2010 (n = 142)**

#### 4.3 Community structure

##### 4.3.1 Species richness and composition

A total of 12 fish species were recorded within the nine SERBD sites surveyed. Brown trout, eels and stone loach were the most common fish species recorded, occurring in all but one of the sites surveyed (89%). This was followed by salmon (78%), three-spined stickleback (67%), lamprey (44%), minnow (44%), dace (33%), pike (33%) and flounder (22%). Gudgeon and perch were only recorded in one site each (Fig.4.29).



**Fig. 4.29. Percentage of sites where each fish species was recorded in the SERBD for WFD SM monitoring 2010**

Species richness ranged from five fish species at four sites (River Aherlow, River Ara, River Barrow and River Slaney) to a maximum of nine species recorded in the River Suir at Kilsheelan (Table 4.10). Kelly *et al.* (2008) classified fish species in Ireland into three groups. Group 1 – native species (e.g. salmonids, three-spined stickleback, lamprey and eel) were present at all sites surveyed. Group 2 – non-native species that influence ecology (e.g. pike, perch, roach, minnow, stone loach) were also recorded in all sites surveyed and Group 3 – non-native species that generally don't influence ecology (e.g. gudgeon) were recorded in only one site, the River Suir (Quakers' Br.).

**Table 4.10. Species richness at each river site surveyed in the SERBD, May to August 2010**

Site	Species richness	No. native species (Group 1)	No. non-native species (Group 2)	No. non-native species (Group 3)
<b>WADEABLE SITES</b>				
Gowran River	6	5	1	0
Slaney	5	4	1	0
<b>NON-WADEABLE SITES</b>				
Suir (Kilsheelan)	9	5	4	0
Nore (Brownsbarn)	7	4	3	0
Nore (Quakers')	7	3	3	1
Suir (Knocknageragh)	7	5	2	0
Aherlow	5	3	2	0
Ara	5	4	1	0
Barrow (Graiguenamanagh)	5	1	4	0

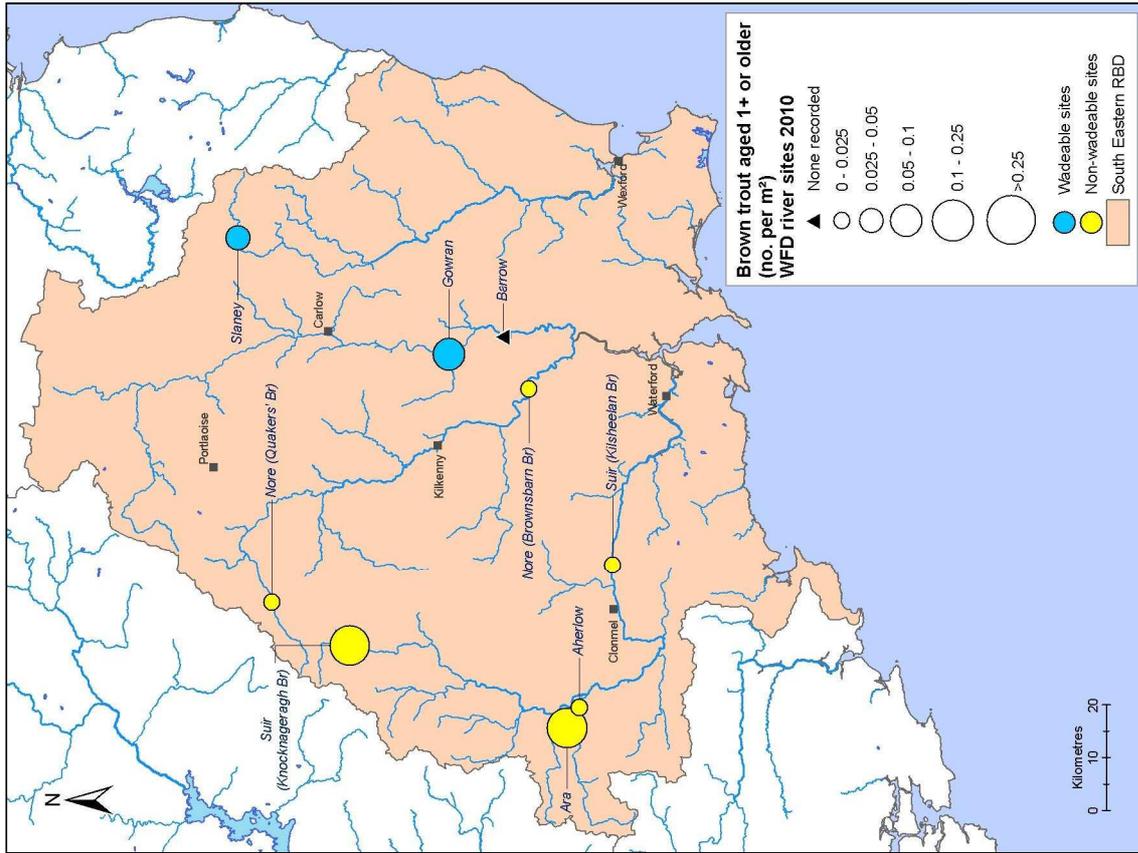
#### 4.3.2 Species abundance and distribution

Abundance (minimum population density) and distribution maps for the most common fish species recorded within the SERBD during 2010 are shown in Figures 4.30 to 4.43. Fish densities are generally higher in wadeable sites surveyed with bank-based electric-fishing gear than in non-wadeable sites surveyed with boat-based electric-fishing gear (Kelly *et al.*, 2009; Kelly *et al.* 2010c; Kelly *et al.* 2011). This is primarily due to the tendency for juvenile trout, salmon and other species to utilise shallow, riffle areas as nursery habitat, along with the difference in sampling efficiency of the two methods. As such, population densities recorded for each species using the two methods are displayed as separate colours on each map.

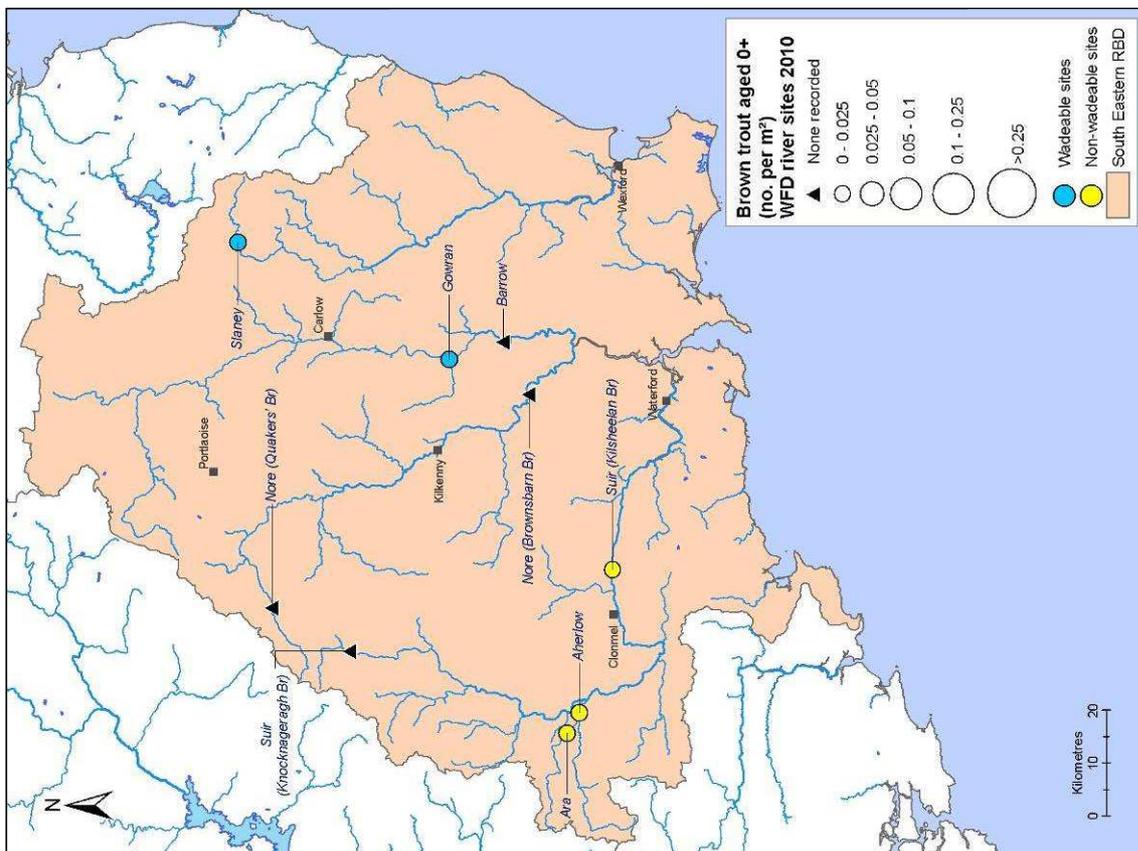
Brown trout were the most widely distributed species in the SERBD, occurring in eight of the nine sites. The greatest densities of brown trout fry (0+) in the non-wadeable and wadeable sites were 0.012 fish/m<sup>2</sup> (River Ara) and 0.023 fish/m<sup>2</sup> (Gowran River) respectively (Fig. 4.30). The highest densities of 1+ and older fish were recorded in the River Suir (Knocknageragh) and Gowran River (Fig. 4.31) with values of 0.127 fish/m<sup>2</sup> and 0.084 fish/m<sup>2</sup> respectively.

Salmon were recorded in seven of the sites surveyed. The greatest densities of fry (0+) in the non-wadeable and wadeable sites were 0.009 fish/m<sup>2</sup> (River Aherlow) and 0.211 fish/m<sup>2</sup> (River Slaney) respectively (Fig. 4.32). The highest densities of 1+ and older fish were recorded in the River Ara and River Slaney (Fig. 4.33) with values of 0.029 fish/m<sup>2</sup> and 0.161 fish/m<sup>2</sup> respectively.

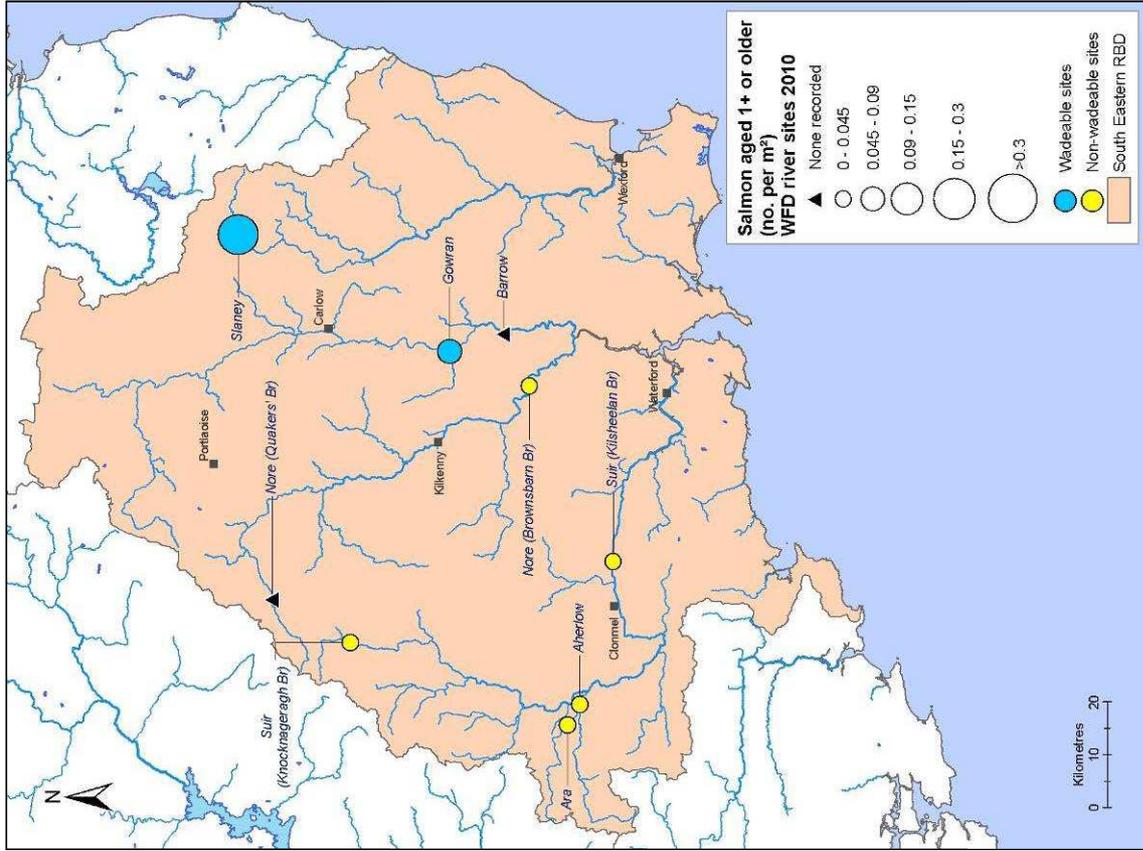
Eels (Fig. 4.34) and stone loach (Fig. 4.35) were also among the most frequently encountered species in this region, being recorded in eight of the nine sites. Of the remaining species, three-spined stickleback (Fig. 4.36) were recorded in six sites, lamprey (Fig. 4.37) and minnow (Fig. 4.38) in four sites, dace (Fig. 4.39) and pike (Fig. 4.40) in three sites, flounder (Fig. 4.41) in two sites and both gudgeon (Fig. 4.42) and perch (Fig. 4.43) in only one site.



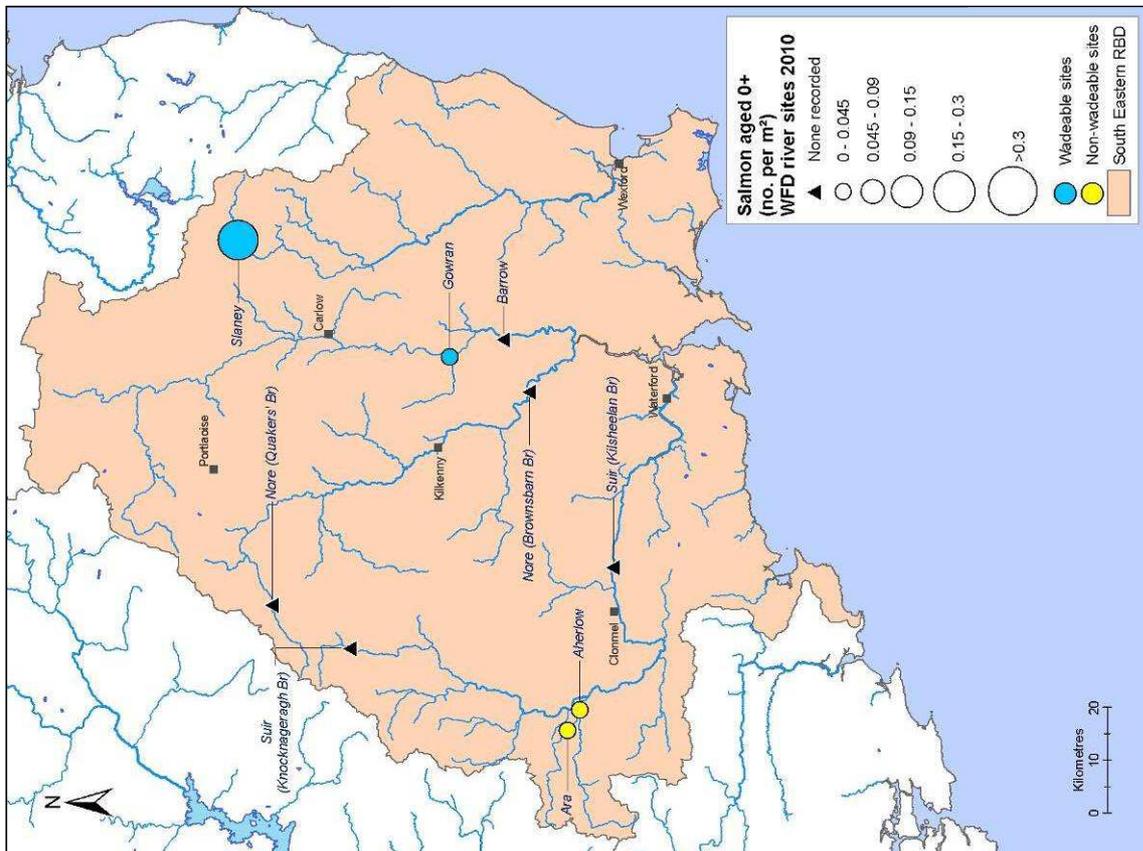
**Fig. 4.31. Distribution map of 1+ or older brown trout in the SERBD, WFD surveillance monitoring 2010**



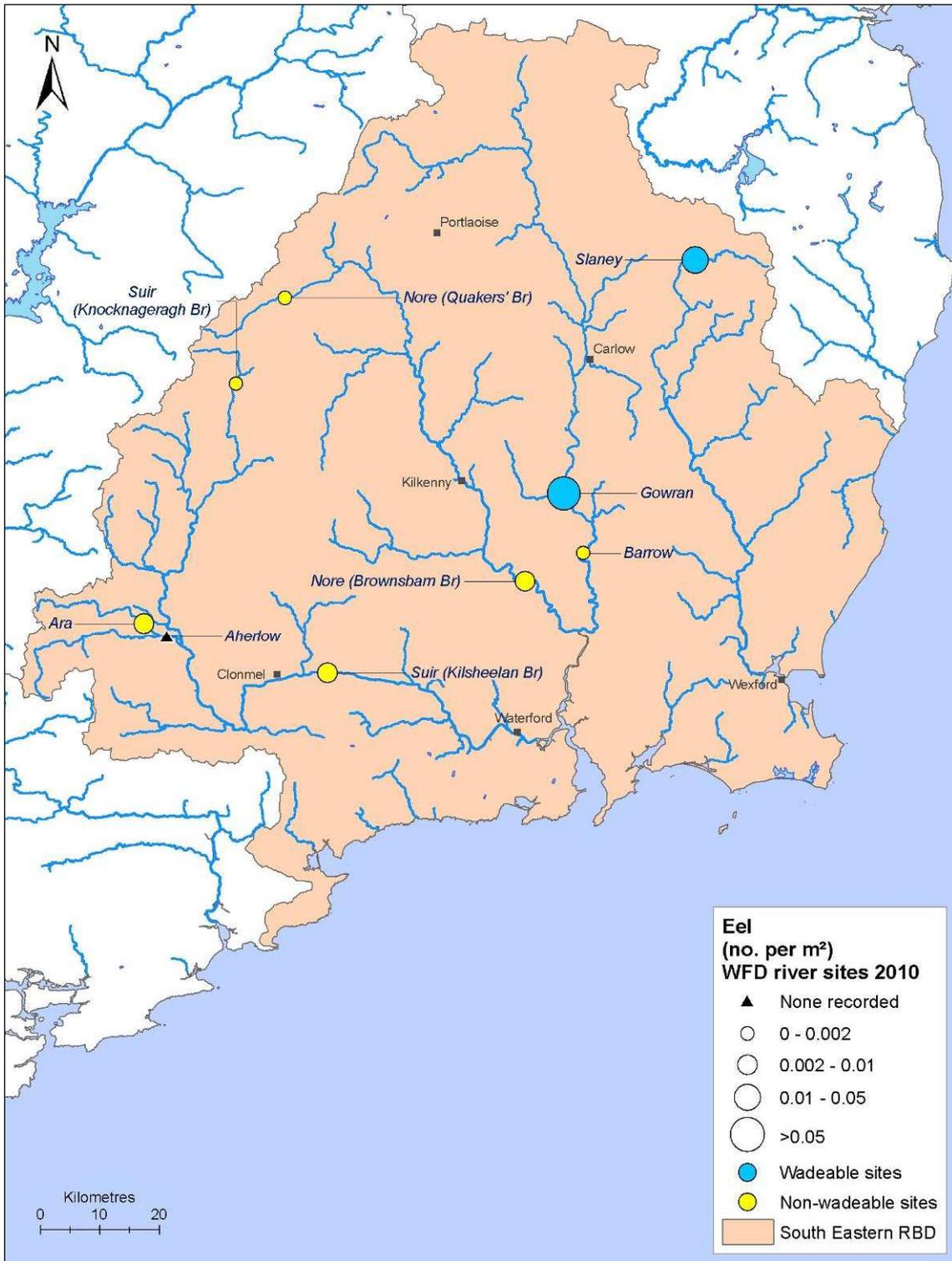
**Fig. 4.30. Distribution map of 0+ brown trout in the SERBD, WFD surveillance monitoring 2010**



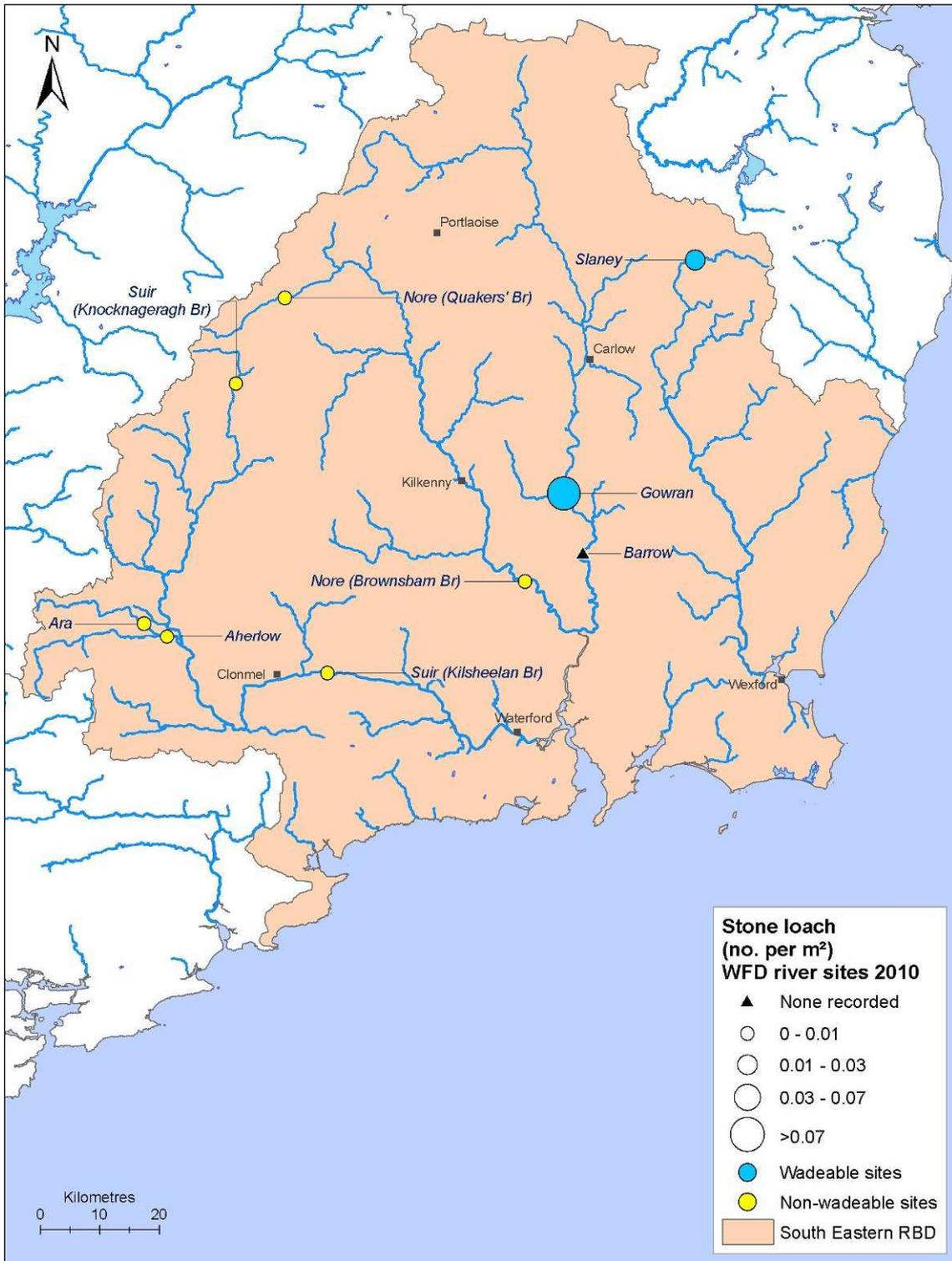
**Fig. 4.33. Distribution map of 1+ or older salmon in the SERBD, WFD surveillance monitoring 2010**



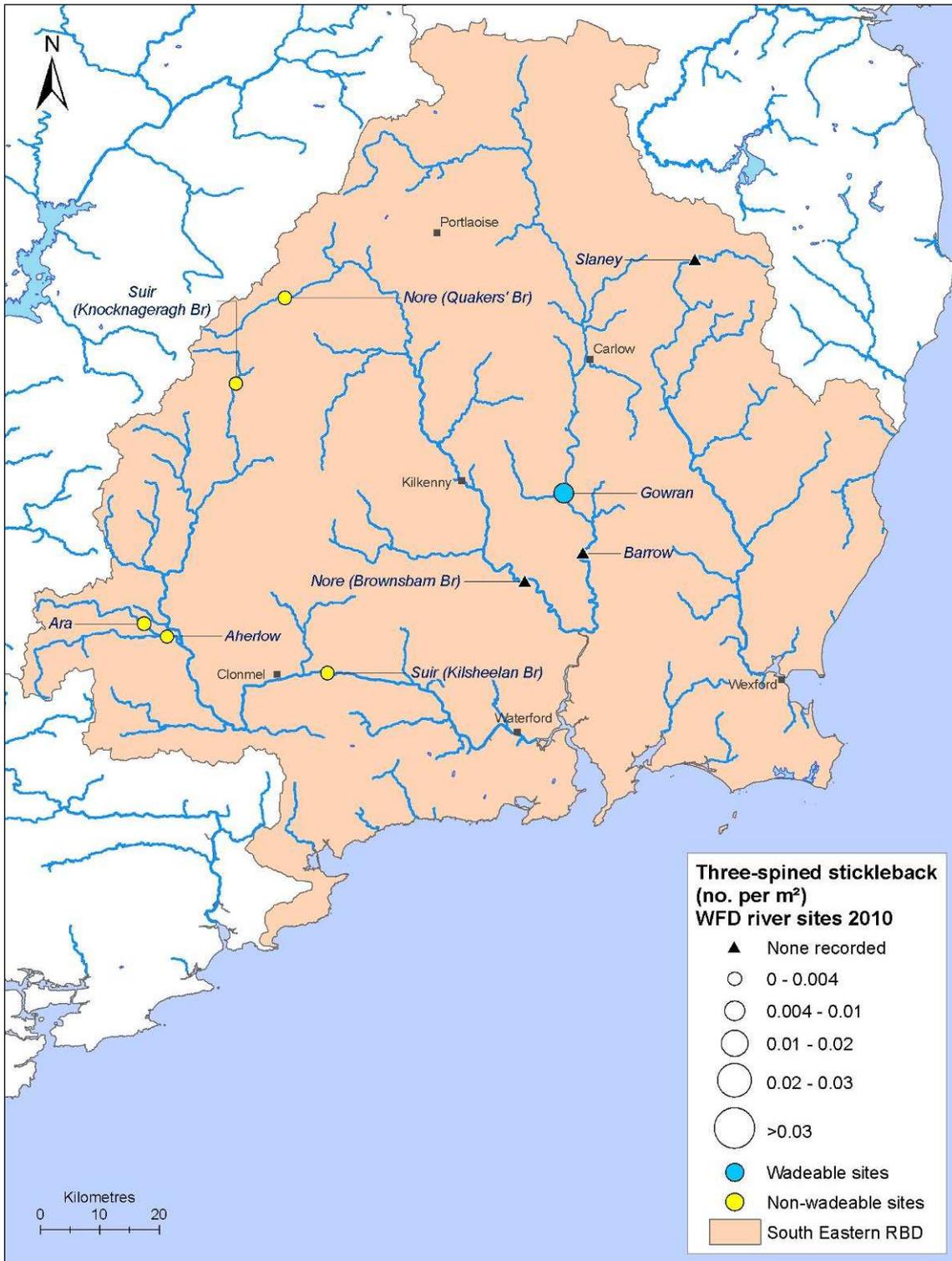
**Fig. 4.32. Distribution map of 0+ salmon in the SERBD, WFD surveillance monitoring 2010**



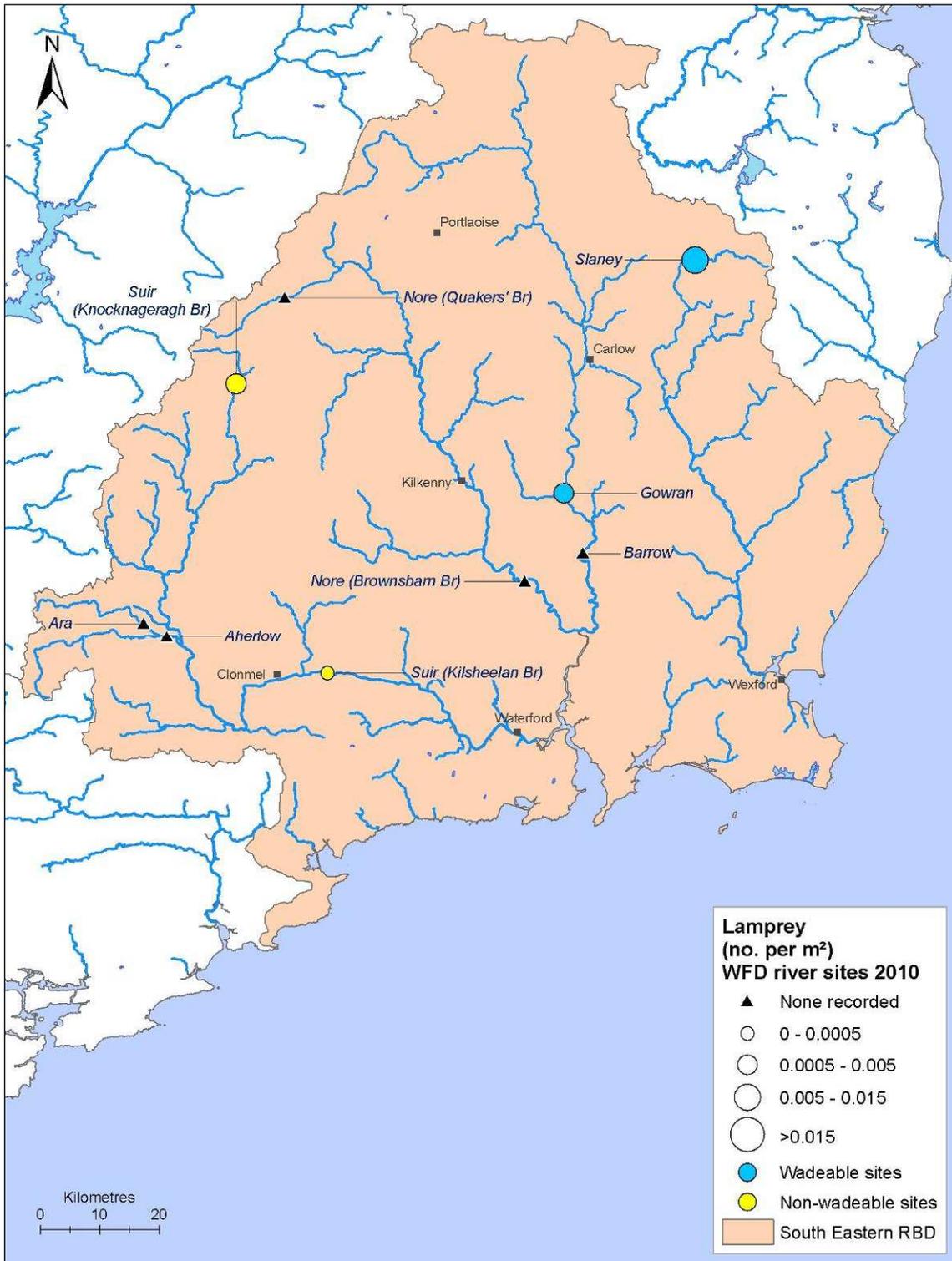
**Fig. 4.34. Distribution map of eels in the SERBD, WFD surveillance monitoring 2010**



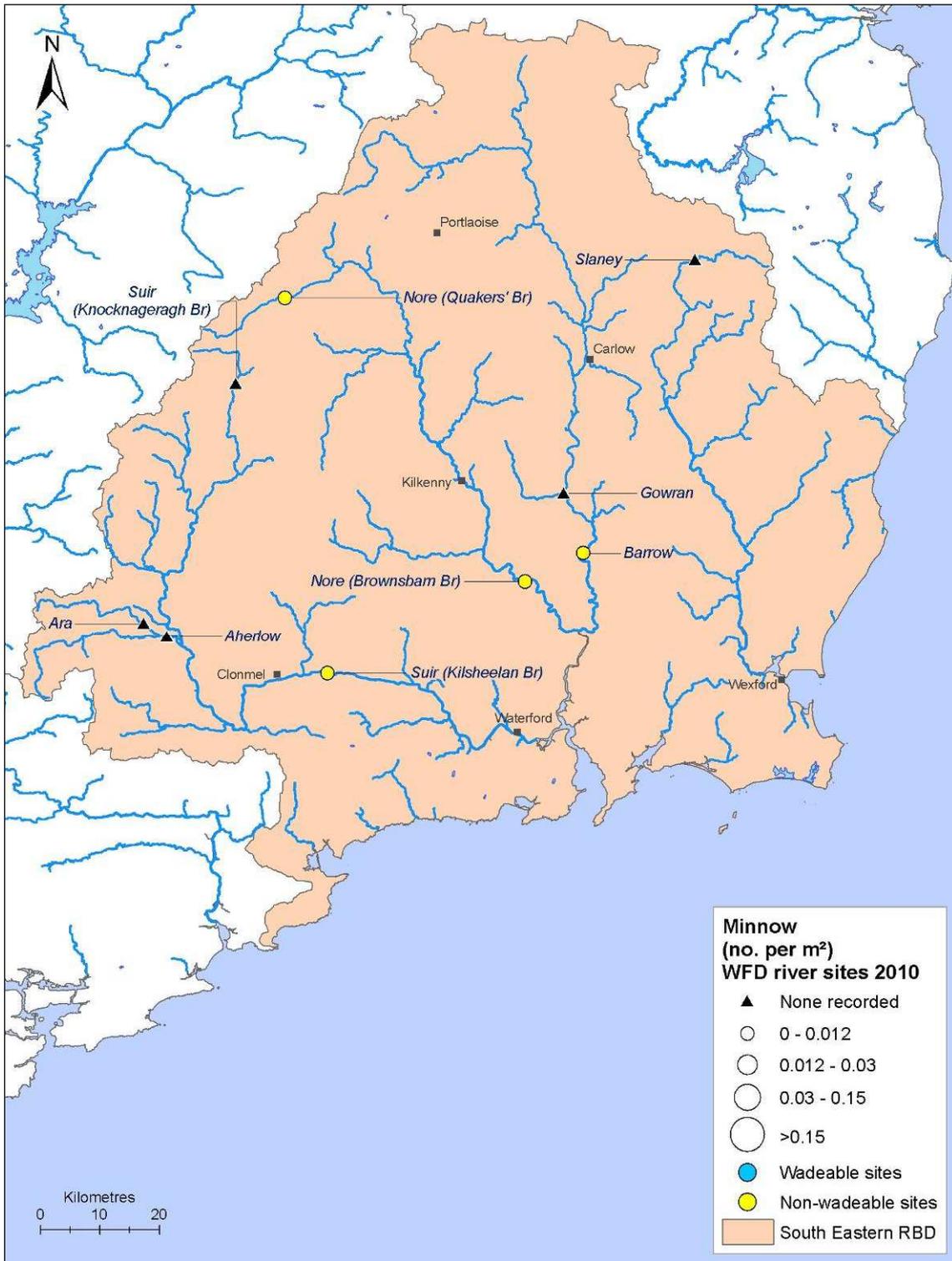
**Fig. 4.35. Distribution map of stone loach in the SERBD, WFD surveillance monitoring 2010**



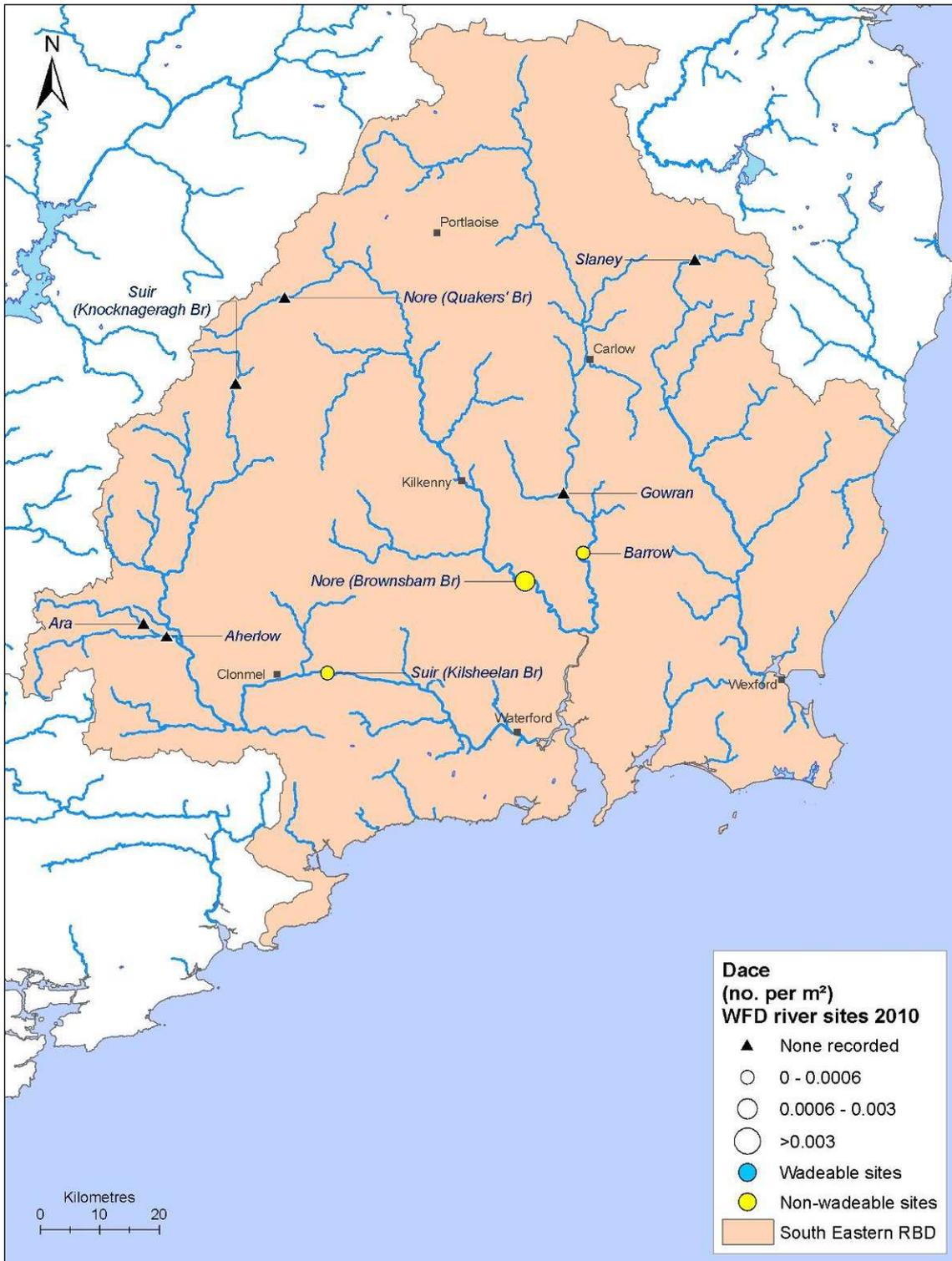
**Fig. 4.36. Distribution map of three-spined stickleback in the SERBD, WFD surveillance monitoring 2010**



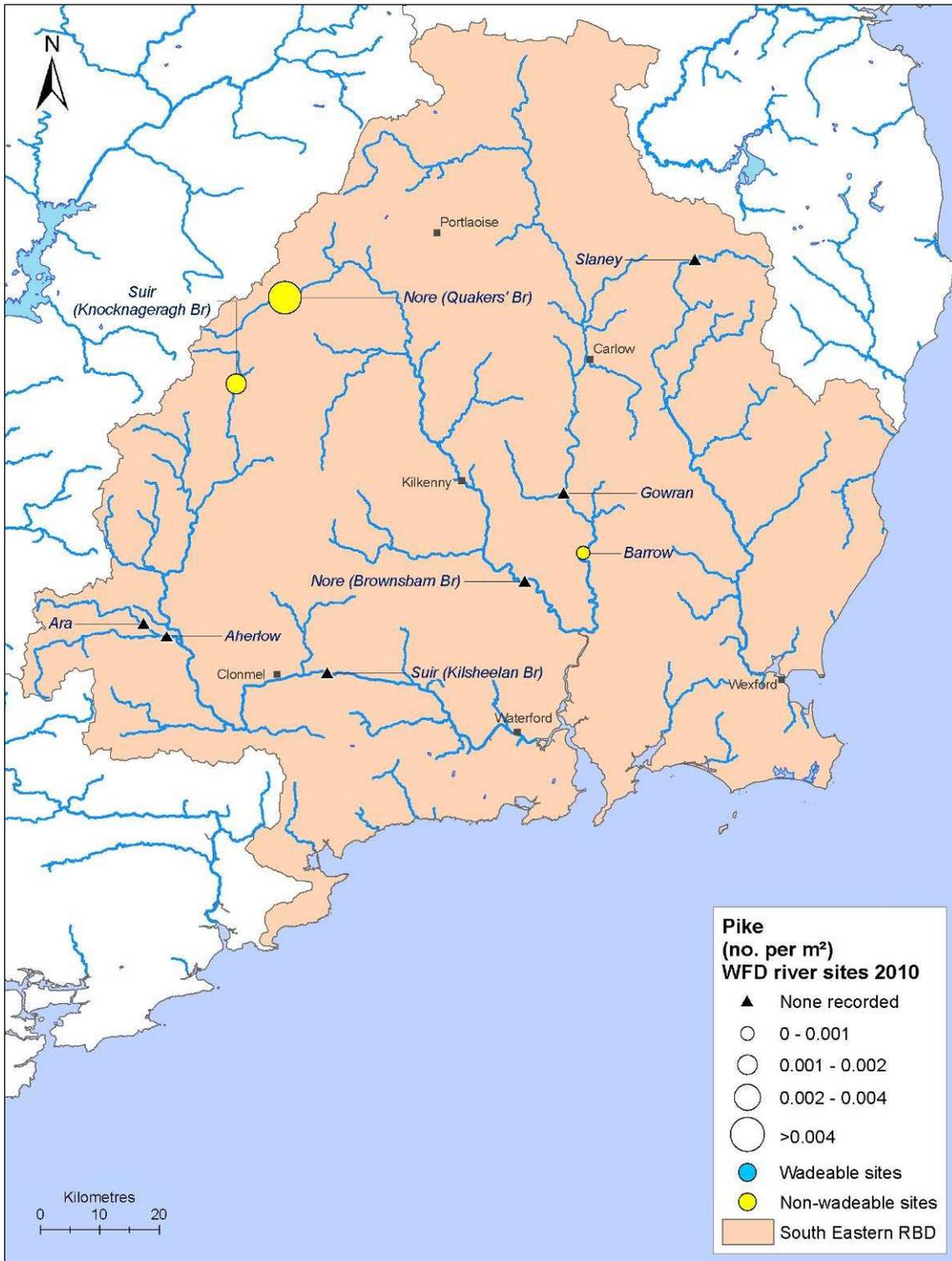
**Fig. 4.37. Distribution map of lamprey in the SERBD, WFD surveillance monitoring 2010**



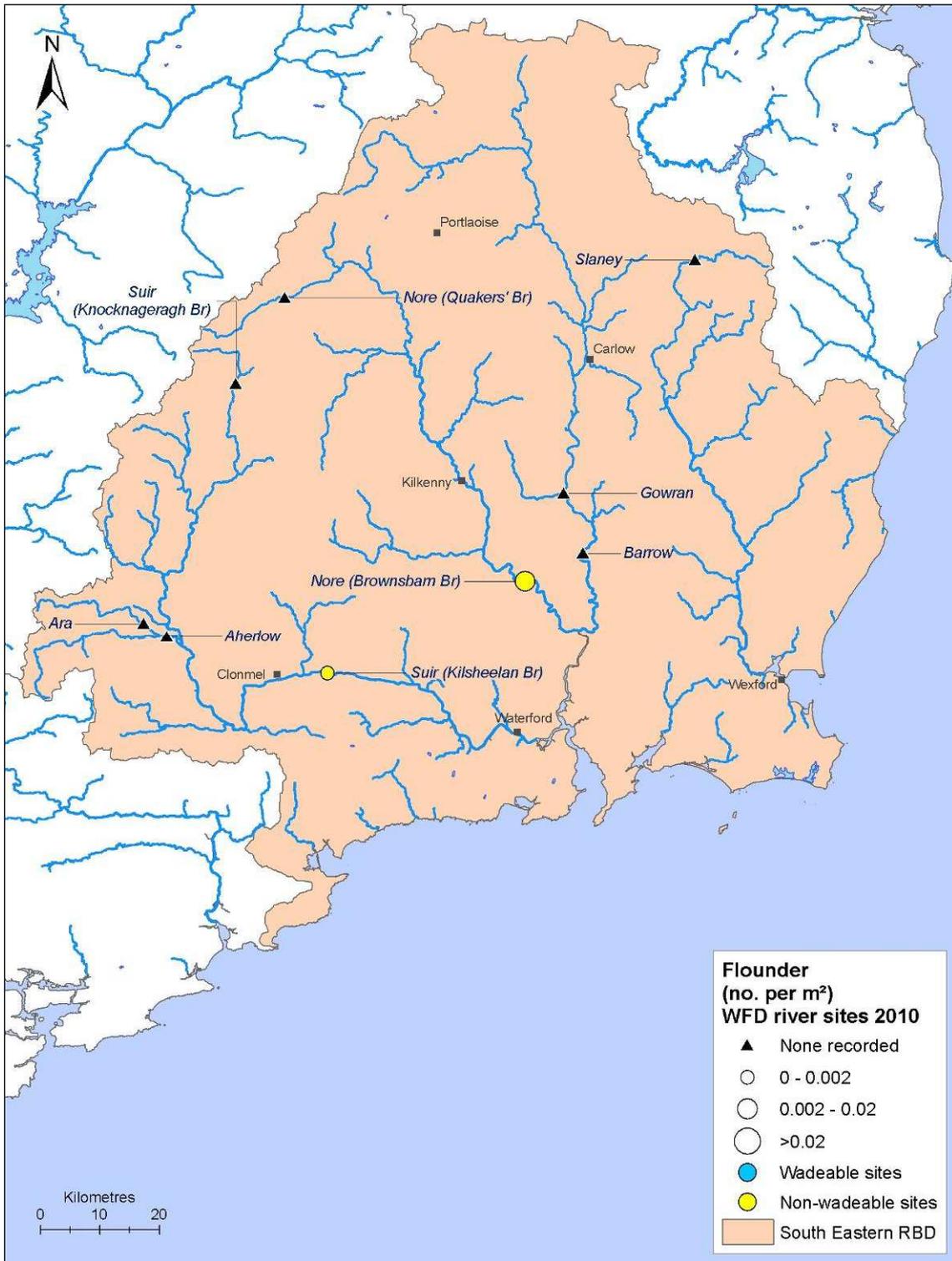
**Fig. 4.38. Distribution map of minnow in the SERBD, WFD surveillance monitoring 2010**



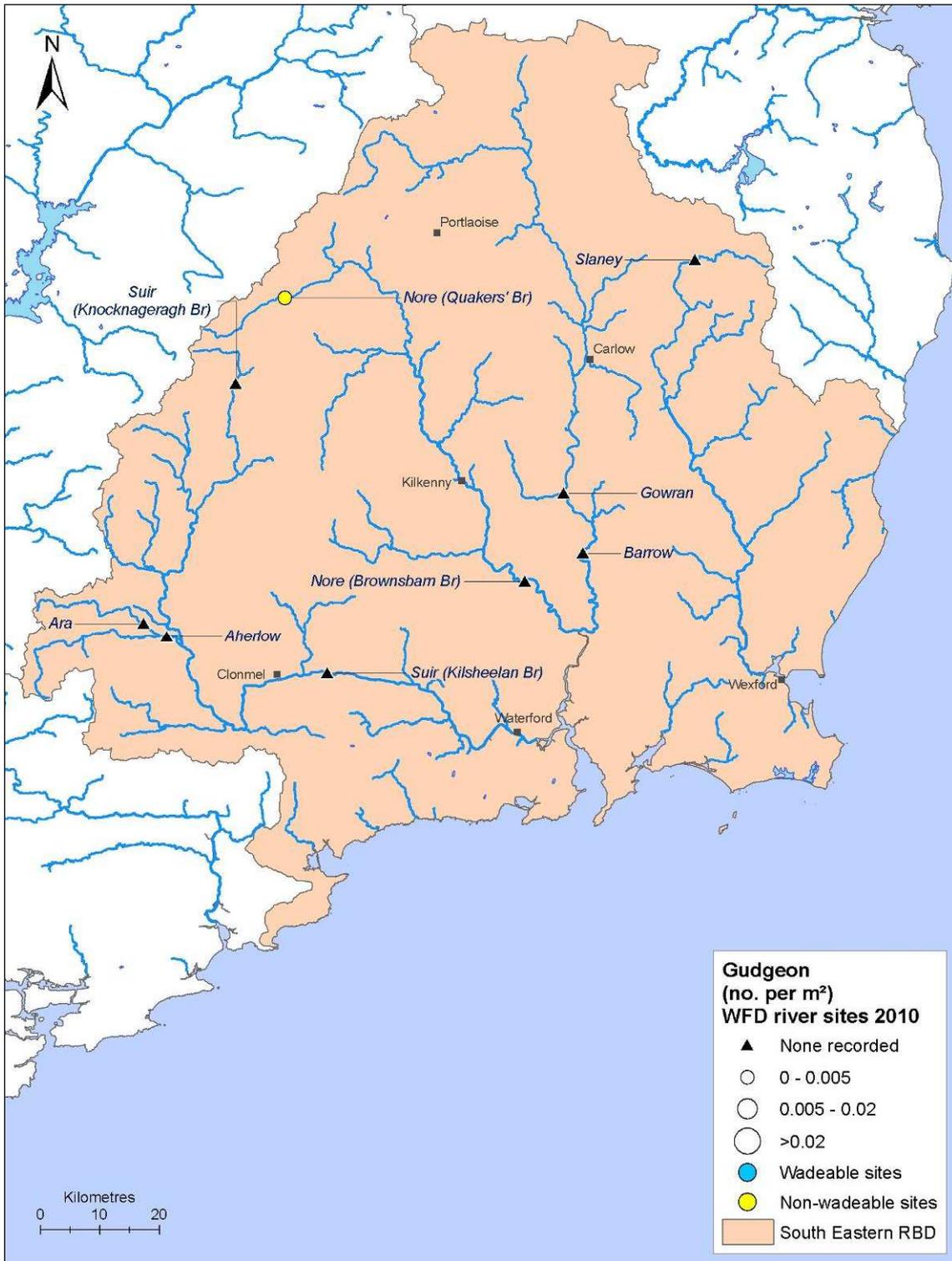
**Fig. 4.39. Distribution map of dace in the SERBD, WFD surveillance monitoring 2010**



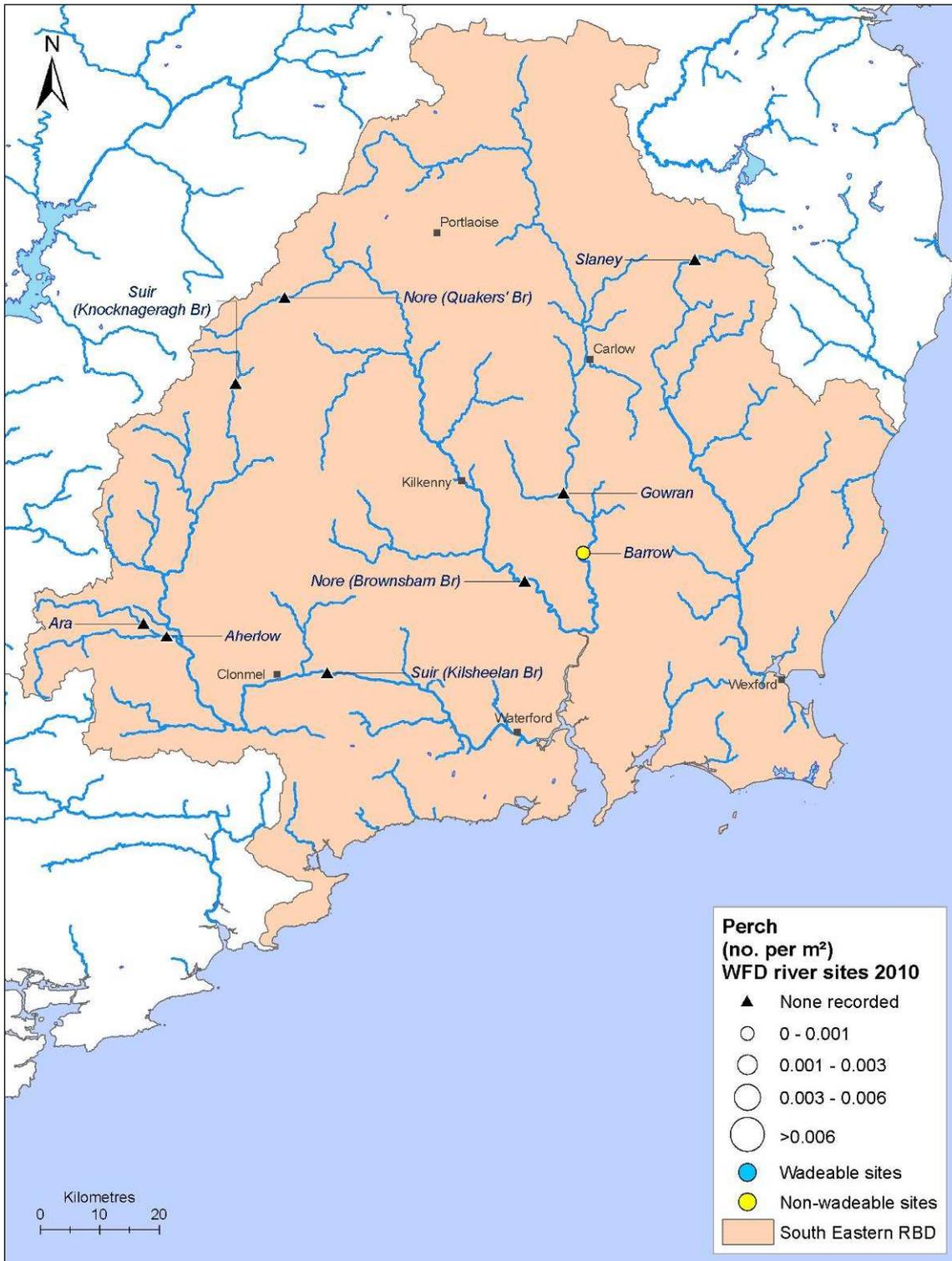
**Fig. 4.40. Distribution map of pike in the SERBD, WFD surveillance monitoring 2010**



**Fig. 4.41. Distribution map of flounder in the SERBD, WFD surveillance monitoring 2010**



**Fig. 4.42. Distribution map of gudgeon in the SERBD, WFD surveillance monitoring 2010**



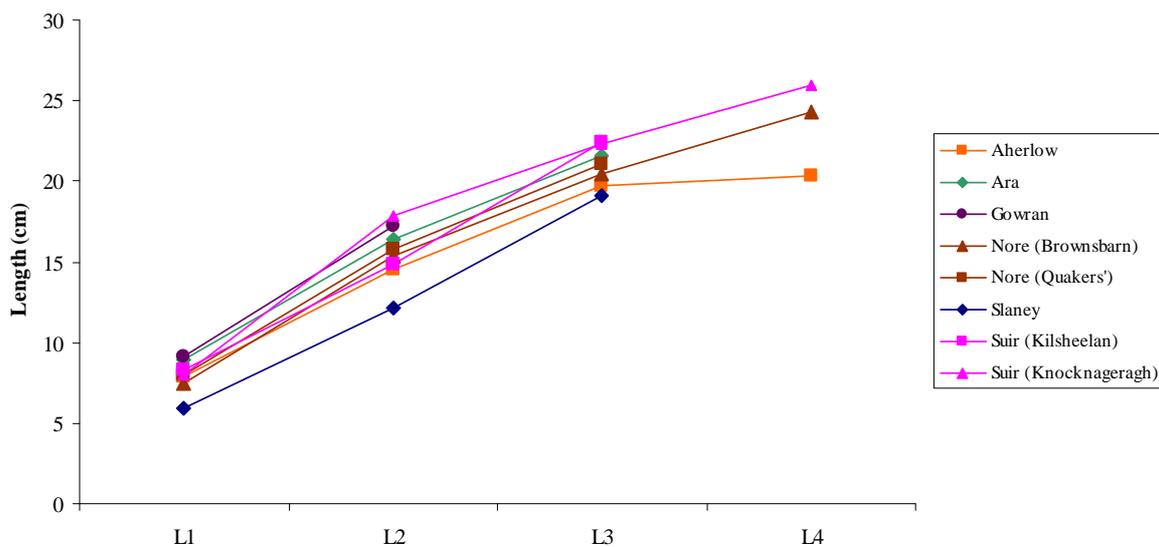
**Fig. 4.43. Distribution map of perch in the SERBD, WFD surveillance monitoring 2010**

### 4.3.3 Age and growth of brown trout and salmon

Growth rates based on back-calculated length-at-age data were analysed for brown trout and salmon in each river site surveyed in the SERBD during 2010.

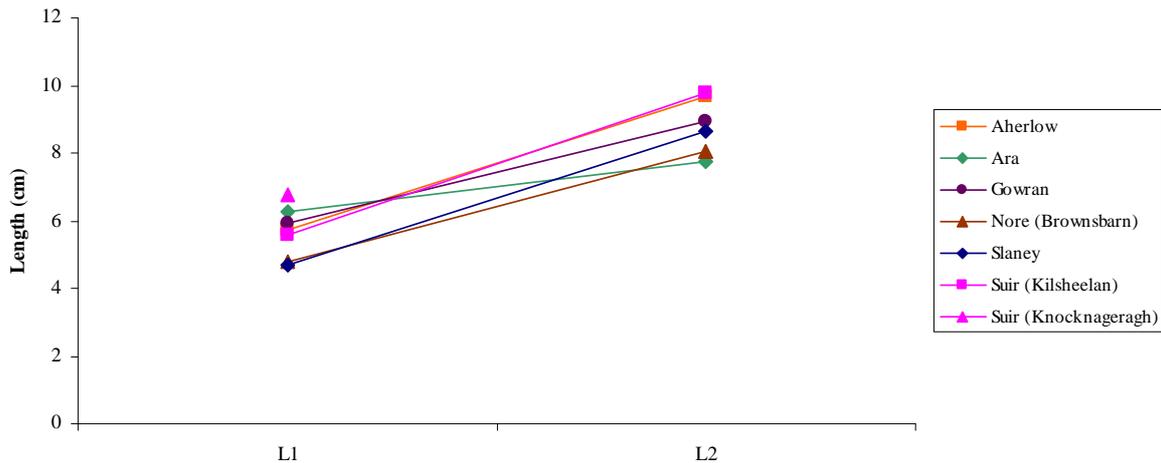
Brown trout were recorded in the Gowran, Slaney, Aherlow, Ara, Nore (Brownsbarn), Nore (Quakers'), Suir (Kilsheelan) and Suir (Knocknageragh) sites. Brown trout ranged in age from 0+ to 4+. The largest brown trout recorded in the SERBD in 2010 was captured in the River Aherlow, measuring 42.6cm in length and 856g in weight. The brown trout at each river site were assigned growth categories described by Kennedy and Fitzmaurice (1971), who examined the relationship between alkalinity and growth of brown trout in Irish streams and rivers. Brown trout growth was classified as 'slow' in the Aherlow, Ara, Nore (Brownsbarn), Nore (Quakers') and Slaney sites and as 'fast' in the Gowran, Suir (Kilsheelan) and Suir (Knocknageragh) sites (Appendix 1).

The back calculated length at age for brown trout at each site are shown in figure 4.44 below.



**Fig. 4.44. Back calculated length-at-age for brown trout in each river, WFD surveillance monitoring 2010**

Salmon were recorded in the Gowran, Slaney, Aherlow, Ara, Nore (Brownsbarn), Suir (Kilsheelan) and Suir (Knocknageragh) sites. Salmon ranged in age from 0+ to 2+. The largest juvenile salmon recorded in the SERBD during 2010 measured 16.9cm in length and was aged 1+. The back calculated length at age for salmon at each site are shown in figure 4.45 below.



**Fig. 4.45. Back calculated length-at-age for salmon in each river, WFD surveillance monitoring 2010**

#### 4.4 Ecological status

An essential step in the WFD process is the classification of the ecological status of lakes, rivers and transitional waters, which in turn will assist in identifying objectives that must be set in the individual River Basin Management Plans.

An ecological classification tool for fish in rivers has recently been developed for Ecoregion 17 (Republic of Ireland and Northern Ireland), along with a separate version for Scotland to comply with the requirements of the WFD. Agencies throughout each of the three regions have contributed data which was used in the model development. It was recommended during the earlier stages of this project that an approach similar to that developed by the Environment Agency in England and Wales (Fisheries Classification Scheme 2, or ‘FCS2’) be used. This approach has broadly been followed and improved to develop the new classification tool – ‘FCS2 Ireland’. The tool works by comparing various fish community metric values within a site (observed) to those predicted (expected) for that site under reference (un-impacted) conditions using a geo-statistical model based on Bayesian probabilities. The resultant output is an Ecological Quality Ratio (EQR) between 1 and 0, with five class boundaries defined along this range corresponding with the five ecological status classes of High, Good, Moderate, Poor and Bad. Confidence levels are assigned to each class and represented as probabilities.

Using FCS2 Ireland, along with expert opinion, each river site surveyed during 2010 has been assigned a draft fish ecological status class (Table 4.11). The River Suir (Knocknageragh Br.) and River Slaney (Waterloo Br.) have both shown a change in fish ecological status since the previous WFD surveys in 2008 and 2009 respectively. The River Suir (Knocknageragh Br.) changed from

“Moderate” to “Good”, while the River Slaney (Waterloo Br.) has improved from “Good” to “High” status (Table 4.11).

**Table 4.11. Fish ecological status of sites surveyed in the SERBD for surveillance monitoring 2010**

River	Site code	Site name	Fish ecological status 2010	Previous Fish ecological status (2008-2009)
<b>SERBD Wadeable sites</b>				
Gowran	14G030300F	Br N of Goresbridge (S Channel)	Moderate	NA
Slaney	12S020400F	Waterloo Br.	High	Good
<b>SERBD Non-wadeable sites</b>				
Aherlow	16A010900F	Killardy Br	Good	-
Ara	16A030600F	Ara Br	High	-
Barrow	14B013500F	Graiguenamanagh Br.	N/A*	-
Nore	15N012400F	Brownsbarn Br.	Good*	-
Nore	15N010300F	Quakers' Br.	Moderate	Moderate
Suir	16S022700F	Kilsheelan Br.	Good*	-
Suir	16S020200F	Knocknageragh Br.	Good	Moderate

*Note: \* denotes that site requires a resurvey to confirm status, additional sites within the waterbody will also be surveyed to support existing data*

## 5. DISCUSSION

A total of 12 fish species were recorded during the 2010 monitoring program within the SERBD. The highest species diversity recorded within any region throughout Ireland during 2010 was thirteen species. This was observed in both the Western and South Western River Basin Districts (WRBD and SWRBD), which contained a high number of non-native fish species. Information on fish species richness, composition, distribution and abundance throughout the whole country can be found in the WFD summary report for 2010 (Kelly *et al.*, 2011).

The River Suir at Kilsheelan Bridge was the most diverse site surveyed within the SERBD during 2010, with a total of nine species present. The lowest diversity recorded for any site in the SERBD was five species, recorded in four different sites, the Slaney, Barrow, Aherlow and Ara Rivers. The highest species diversity recorded in any site throughout the country was ten and this only occurred in one site within the SWRBD (River Blackwater at Lismore), where there was a high number of non-native fish present. Low species diversity is common in rivers throughout Ireland that contain only native fish species. Non-native species, however, are widespread throughout the SERBD (Kelly *et al.*, 2009, Kelly *et al.*, 2010c, Kelly *et al.*, 2011).

Brown trout, eels and stone loach were the most common species, recorded in eight of the nine sites surveyed, whilst salmon were also present in seven sites. The highest density of both brown trout and salmon were recorded in the River Aherlow.

Ireland's indigenous fauna has come under increasing threat from non-native introductions. Invasions by non-native species represent one of the greatest threats to natural biodiversity, second only to habitat destruction (Scalera and Zaghi, 2004). Non-native and invasive species can transform ecosystems, threatening both indigenous and high conservation status species (Stokes *et al.*, 2006), with impacts including displacement through competition for space and food. Direct impacts through predation are also evident (Barton and Heard, 2005). Eno *et al.* (1997) differentiate between non-native and alien species, with the former being those that have established themselves and the latter being those that have not established themselves and cannot do so without some sort of human intervention. Six non-native fish species were recorded in the SERBD during 2010, including the invasive species Dace which was present in the main channels of the Barrow, Nore and Suir Rivers.

Following the methods of Kennedy and Fitzmaurice (1971), the growth of brown trout was classified as 'slow' in the Aherlow, Ara, Nore (Brownsbarn), Nore (Quakers') and Slaney and as 'fast' in the Gowran, Suir (Kilsheelan) and Suir (Knocknageragh). Among all sites surveyed throughout the country for WFD surveillance monitoring during 2010 in which salmon were recorded, the five sites with the greatest mean L1 were all in the SERBD: the Suir (Knocknageragh), Ara, Gowran, Aherlow and Suir (Kilsheelan).

Using the recently completed ecological classification tool for fish in rivers (FCS2 Ireland), along with expert opinion, each river site surveyed during 2010 has been assigned a draft ecological status classification based on the fish populations present. All sites surveyed in the SERBD have been assigned a fish classification of at least Moderate status, with two sites (River Slaney and River Ara) achieving High status. The River Suir (Knocknageragh Br.) and River Slaney (Waterloo Br.) have both shown an improvement in 2010 from previous surveys, while the River Nore at Quaker's Br. has shown no change.

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## APPENDIX 1

Summary of the growth of brown trout in rivers (L1=back calculated length at the end of the first winter etc.)

River		L1	L2	L3	L4	Growth category
<b>Aherlow (Killardy)</b>	Mean	7.9	14.5	19.7	20.4	Slow
	S.D.	2.2	3.0	3.5	3.1	
	S.E.	0.3	0.4	0.6	1.6	
	n	70	57	30	4	
	Min	3.8	8.8	13.9	15.9	
	Max	12.7	20.7	26.2	23.0	
<b>Ara (Ara br.)</b>	Mean	8.9	16.4	21.6		Slow
	S.D.	1.8	3.6	1.7		
	S.E.	0.2	0.6	1.0		
	n	94	39	3		
	Min	4.1	10.1	19.7		
	Max	13.1	21.4	23.1		
<b>Gowran (Goresbridge)</b>	Mean	9.1	17.3			Fast
	S.D.	1.4	1.0			
	S.E.	0.3	0.6			
	n	18	3			
	Min	6.5	16.1			
	Max	11.5	18.0			
<b>Nore (Brownsbarn)</b>	Mean	7.4	15.3	20.5	24.3	Slow
	S.D.	1.5	2.6	4.0	n/a	
	S.E.	0.3	0.5	1.1	n/a	
	n	33	31	12	1	
	Min	3.6	8.8	13.1	24.3	
	Max	9.8	20.8	26.8	24.3	
<b>Nore (Quakers')</b>	Mean	8.0	15.8	21.1		Slow
	S.D.	1.4	1.3	n/a		
	S.E.	0.3	0.5	n/a		
	n	18	6	1		
	Min	5.7	14.4	21.1		
	Max	10.9	18.2	21.1		
<b>Slaney (Waterloo)</b>	Mean	6.0	12.2	19.1		Slow
	S.D.	1.3	1.2	n/a		
	S.E.	0.2	0.4	n/a		
	n	32	10	1		
	Min	3.6	10.8	19.1		
	Max	9.4	14.8	19.1		
<b>Suir (Kilsheelan)</b>	Mean	8.3	14.9	22.4		Fast
	S.D.	2.2	4.4	0.5		
	S.E.	0.6	1.8	0.4		
	n	14	6	2		
	Min	4.8	10.0	22.0		
	Max	10.9	22.0	22.8		

**APPENDIX 1 continued**

**Summary of the growth of brown trout in rivers (L1=back calculated length at the end of the first winter etc.)**

<b>River</b>		<b>L1</b>	<b>L2</b>	<b>L3</b>	<b>L4</b>	<b>Growth category</b>
<b>Suir (Knocknageragh)</b>	Mean	8.0	17.8	22.3	25.9	Fast
	S.D.	1.8	3.3	3.9	4.4	
	S.E.	0.2	0.6	2.0	3.1	
	n	62	27	4	2	
	Min	4.2	10.3	16.5	22.8	
	Max	12.5	23.0	25.1	29.0	

## APPENDIX 2

Summary of the growth of salmon in rivers (L1=back calculated length at the end of the first winter etc.)

River		L1	L2
<b>Aherlow (Killardy)</b>	Mean	5.8	9.7
	S.D.	1.2	n/a
	S.E.	0.2	n/a
	n	26	1
	Min	3.5	9.7
	Max	9.2	9.7
<b>Ara (Ara br.)</b>	Mean	6.3	7.7
	S.D.	1.2	n/a
	S.E.	0.2	n/a
	n	25	1
	Min	3.4	7.7
	Max	8.6	7.7
<b>Gowran (Goresbridge)</b>	Mean	5.9	8.9
	S.D.	1.4	n/a
	S.E.	0.3	n/a
	n	20	1
	Min	2.5	8.9
	Max	8.5	8.9
<b>Nore (Brownsbarn)</b>	Mean	4.8	8.1
	S.D.	1.1	n/a
	S.E.	0.2	n/a
	n	24	1
	Min	3.0	8.1
	Max	7.3	8.1
<b>Slaney (Waterloo)</b>	Mean	4.7	8.6
	S.D.	0.9	0.4
	S.E.	0.2	0.1
	n	33	8
	Min	3.5	8.0
	Max	7.2	9.2
<b>Suir (Kilsheelan)</b>	Mean	5.6	9.8
	S.D.	1.2	n/a
	S.E.	0.2	n/a
	n	27	1
	Min	3.3	9.8
	Max	7.6	9.8
<b>Suir (Knocknageragh)</b>	Mean	6.8	
	S.D.	0.5	
	S.E.	0.2	
	n	5	
	Min	6.3	
	Max	7.5	

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