

Sampling Fish for the Water Framework Directive

Rivers 2013

**South Eastern River
Basin District**



Iascach Intíre Éireann
Inland Fisheries Ireland



Water Framework Directive Fish Stock Survey of Rivers in the South Eastern River Basin District, 2013

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1. INTRODUCTION

Fish stock surveys were undertaken in 75 river sites throughout Ireland during the summer of 2013 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). Twelve river sites were surveyed in the South Eastern River Basin District (SERBD) in July 2013 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. As 2013 is the sixth year of the rivers sampling programme, many of the sites surveyed this year are repeat surveys of those carried out in previous years. As a result, surveys this year can be compared with those from before, to determine whether the status of our rivers is improving or deteriorating.

This report summarises the results of the 2013 fish stock survey carried out on each site in the SERBD, as part of the Water Framework Directive surveillance monitoring programme.

2. STUDY AREA

Twelve river sites were surveyed in five river catchments within the SERBD during 2013: the Barrow, Nore, Owenavorrigh, Slaney and Suir catchments (Table 2.1). The sites ranged in surface area from 143m² at the Douglas River to 662m² at the River Nier. Sites are divided into two categories for reporting purposes: wadeable sites, which are surveyed with bank-based electric fishing units, and non-wadeable sites, which are surveyed with boat-based electric fishing units. Only wadeable sites were surveyed in this RBD in 2013. 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, SERBD 2013

River	Site name	Catchment	Site Code	Waterbody code
SERBD Wadeable sites				
Ballyroan River	Ballydine Br._A	Nore	15B010150A	SE_15_1938
Ballyroan River	Gloreen Br._D	Nore	15B010200D	SE_15_1938
Banoge River	Owenavorrigh confl_A	Owenavorrigh	11B020300A	SE_11_257
Banoge River	N11_A	Owenavorrigh	11B020230A	SE_11_257
Clody, River	Ford near Bunclody_B	Slaney	12C030200B	SE_12_2098
Douglas River (Ballon)	Sragh Br._B	Slaney	12D030200B	SE_12_789
Glory, River	Raheen_A	Nore	15G010200A	SE_15_1870
Gowran River	Goresbridge_A	Barrow	14G030300A	SE_14_1879
Gowran River	Grange Lower_A	Barrow	14G030240A	SE_14_1879
Nier, River	Ballymacarbry_A	Suir	16N010100A	SE_16_1059
Nuenna River	Clomantagh_B	Nore	15N020100B	SE_15_1029
Slaney, River	Waterloo Br._A	Slaney	12S020400A	SE_12_1524

Table 2.1. Details of river sites surveyed for WFD surveillance monitoring, SERBD 2013

Site name	Upstream catchment (km ²)	Wetted width (m)	Surface area (m ²)	Mean depth (m)	Max depth (m)
SERBD Wadeable sites					
Ballyroan (Ballydine Br._A)	35.50	4.42	163	0.14	0.43
Ballyroan (Gloreen Br._D)	39.26	4.08	163	0.29	0.53
Banoge (Owenavorrhagh confl_A)	29.44	4.87	219	0.18	0.38
Banoge (N11_A)	22.65	5.57	223	0.27	0.43
Clody (Ford near Bunclody_B)	28.38	7.50	300	0.20	0.41
Douglas (Ballon)(Sragh Br._B)	15.22	3.33	143	0.13	0.26
Glory (Raheen_A)	62.07	7.12	320	0.26	0.53
Gowran (Goresbridge_A)	42.05	3.80	171	0.20	0.37
Gowran (Grange Lower_A)	39.61	5.13	205	0.43	0.61
Nier (Ballymacarbry_A)	69.00	16.55	662	0.28	0.77
Nuenna (Clomantagh_B)	22.81	4.70	207	0.17	0.35
Slaney (Waterloo Br._A)	77.66	10.60	477	0.24	0.60



Fig. 2.1. Location map of river sites surveyed throughout the SERBD for WFD fish surveillance monitoring 2013

3. METHODS

Electric-fishing is the method of choice for the surveillance monitoring of fish in rivers and to obtain a representative sample of the fish assemblage for each survey site. This technique complies with European Committee for Standardisation (CEN) guidelines for fish stock assessment in wadeable rivers (CEN, 2003). At each site, the sample stretch was isolated where possible using stop nets, with one to three fishings carried out using bank-based or boat-based electric fishing units. Each site ideally contained all habitat types, including riffle, glide and pool. A suite of physical and chemical parameters were also recorded.

Fish from each pass were sorted and processed separately. During processing, the species of each fish was identified, with its length and weight measured. Sub-samples were sometimes taken when large numbers of fish were present. For the purpose of species identification, 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 listed separately. For ageing analyses, scales were taken from fish greater than 8.0cm for salmonids and most non-native fish species. After processing, fish were held in large bins of oxygenated water until they were fully recovered, before returning them to the water.

For various reasons, including river width and flow rate, stop nets could not be deployed at every site, thus making three fishing passes impractical. Therefore, in order to draw comparisons between sites, fish densities were calculated using data from the first fishing pass only. The number captured in the first pass was divided by the total area surveyed to give a density for each species.

A subsample of the dominant fish species was aged (five fish from each 1cm size class). Fish scales were aged using a microfiche reader. 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 and L2 is the mean length at the end of the second winter, etc.).

4. RESULTS

4.1 River surveys

4.1.1 The Ballyroan River

Two sites were electric fished on the Ballyroan River (also known as the Gloreen River) as part of the WFD surveillance monitoring programme in rivers 2013; the Ballyroan River, Ballydine Br. and Ballyroan River, Gloreen Br.

The Gloreen Bridge survey site was located downstream of Gloreen Bridge approximately 1.3km downstream of the Ballydine Bridge site (Fig. 4.1; Plate 4.1). Three electric-fishing passes were conducted using one bank-based electric fishing unit on the 18th of July 2013, along a 40m length of channel. Riffle and glide dominated the habitat, while the substrate consisted largely of cobble. The vegetation at this site was diverse, consisting of a large number of emergent and riparian species.

The second survey site was located just downstream of Ballydine Bridge near an industrial estate in Abbeylax, Co. Laois (Fig. 4.1; Plate 4.2). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 18th of July 2013, along a 37m length of channel. Glide dominated the habitat, while the substrate consisted largely of gravel, mud and silt. The vegetation at this site consisted mainly of emergent bank-side and riparian species.

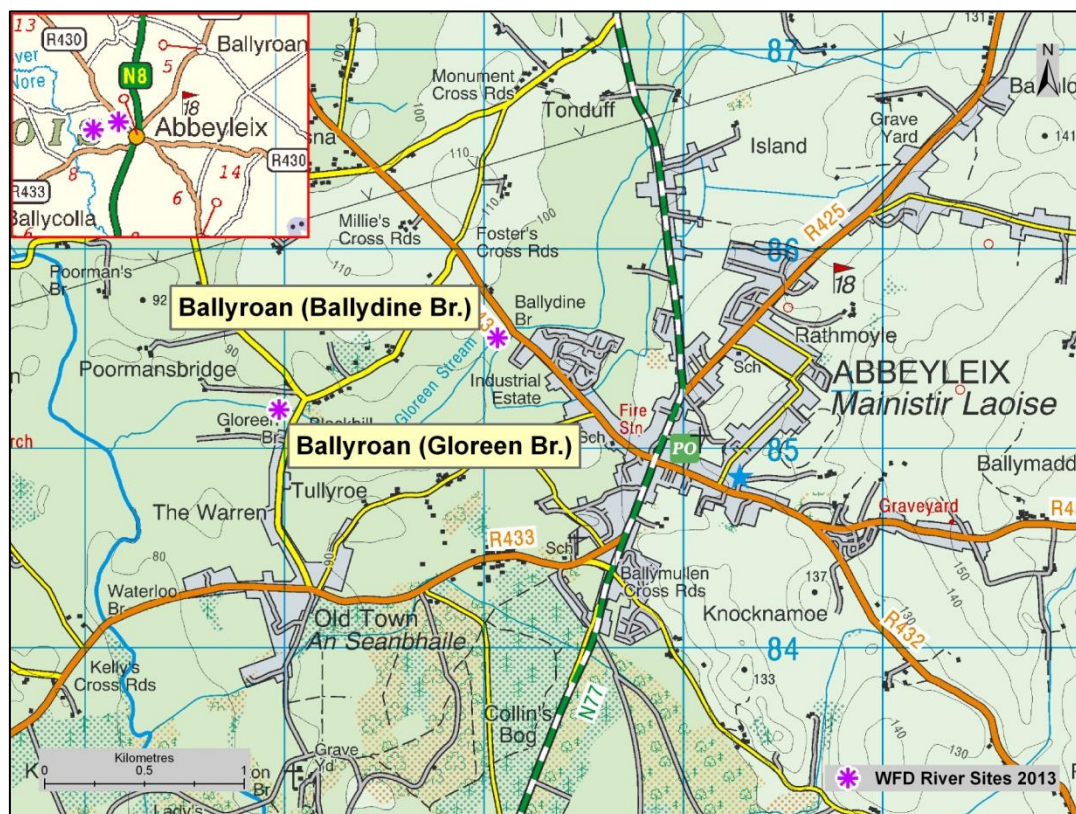


Fig. 4.1. Location of the Ballyroan River surveillance monitoring sites



Plate 4.1. The Ballyroan River at Glorean Br., Co. Laois



Plate 4.2. The Ballyroan River at Ballydine Br., Co. Laois

Ballyroan River (Gloreen Br.)

Five fish species were recorded in the Ballyroan River (Gloreen Br.) during the 2013 survey (Table 4.2). Three-spined stickleback was the most abundant species recorded, followed by brown trout, lamprey sp., stone loach and salmon.

Table 4.2. Density of fish (no./m²), Ballyroan River (Gloreen Br.) (fish density has been calculated as minimum estimates based on one fishing)

Species	Total minimum density 2013
Three-spined stickleback	0.361
Brown trout	0.257
0+ Brown trout	0.000
1++ Brown trout	0.257
Lamprey sp.	0.018
Stone loach	0.012
Salmon	0.006
0+ Salmon	0.000
1++ Salmon	0.006
All Fish	0.655

Brown trout captured during the 2013 survey ranged in length from 11.8cm to 28.1cm (mean = 16.7cm) (Fig. 4.4). Two age classes (1+ and 2+) were present, accounting for 85% and 15% of the total brown trout catch respectively.

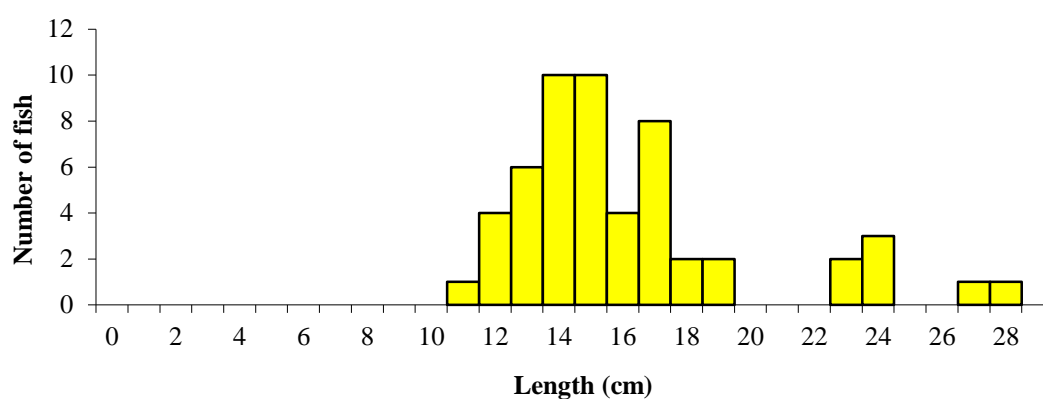


Fig. 4.4. Length frequency distribution of brown trout in the Ballyroan River (Gloreen Br.), July 2013 (n = 54)

Salmon captured during the 2013 survey ranged in length from 10.0cm to 12.5cm (mean = 11.5cm) (Fig. 4.5). Only one age class (1+) was present.

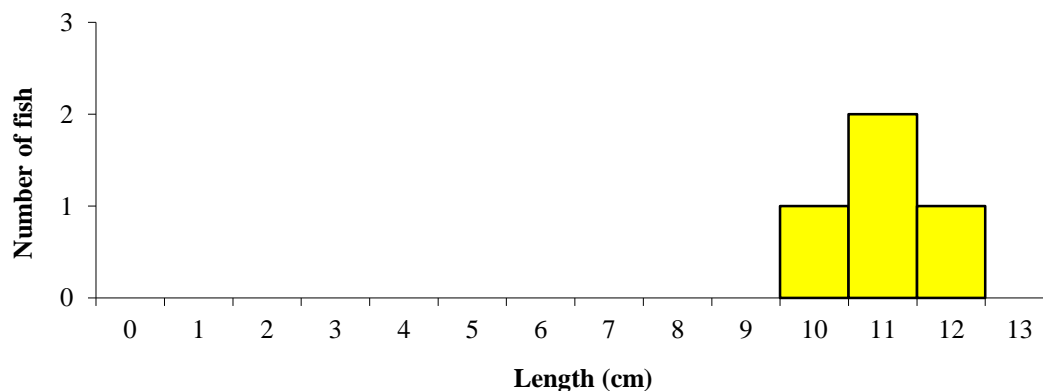


Fig. 4.5. Length frequency distribution of salmon in the Ballyroan River (Gloreen Br.), July 2013 (n = 4)

Ballyroan River (Ballydine)

Six fish species were recorded in the Ballyroan River (Ballydine) during the 2013 survey (Table 4.1). Brown trout was the most abundant species recorded, followed by three-spined stickleback, lamprey sp., European eel, salmon and stone loach.

Table 4.1. Density of fish (no./m²), Ballyroan River (Ballydine Br.) (fish density has been calculated as minimum estimates based on one fishing)

Species	Total minimum density
	2013
Brown trout	0.098
0+ Brown trout	0.031
1++ Brown trout	0.067
Three-spined stickleback	0.043
Lamprey sp.	0.018
European eel	0.006
Salmon	0.006
1++ Salmon	0.006
0+ Salmon	0.000
Stone loach	0.006
All Fish	0.177

Brown trout captured during the 2013 survey ranged in length from 5.8cm to 25.7cm (mean = 14.1cm) (Fig. 4.2). Four age classes (0+, 1+, 2+ and 3+) were present, accounting for 25%, 50%, 21% and 4% of the total brown trout catch respectively.

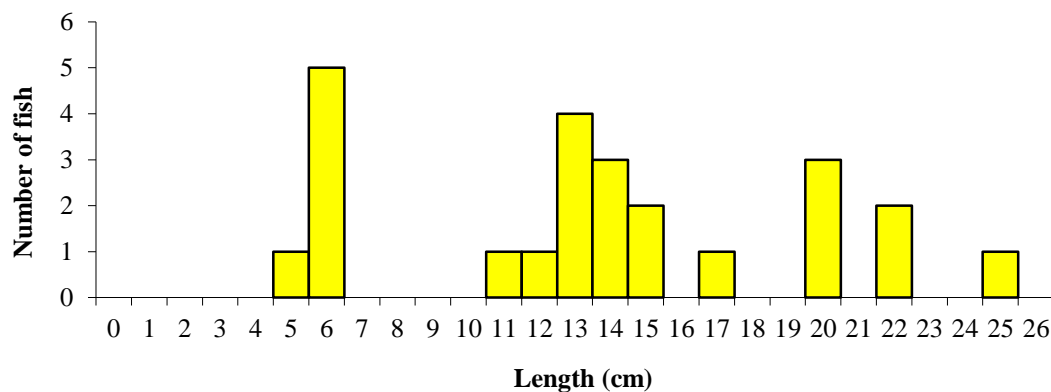


Fig. 4.2. Length frequency distribution of brown trout in the Ballyroan River (Ballydine Br.), July 2013 (n = 24)

Lamprey captured during the 2013 survey ranged in length from 6.8cm to 14.5cm (mean = 11.8cm) (Fig. 4.3).

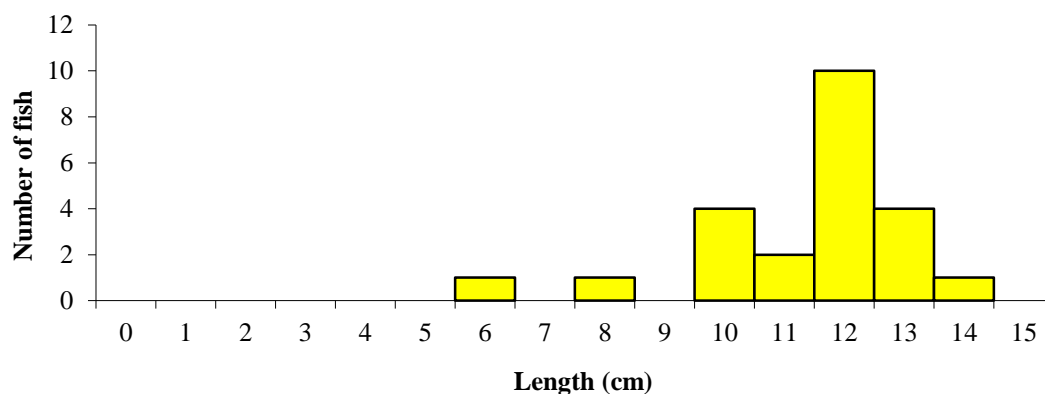


Fig. 4.3. Length frequency distribution of lamprey in the Ballyroan River (Ballydine Br.), July 2013 (n = 23)

4.1.2 The Banoge River

Two sites were electric fished on the Banoge River as part of the WFD surveillance monitoring programme in rivers 2013; the Banoge River, N11 Motorway Br. and the Banoge River, Owenavorrhagh Confluence.

The N11 Motorway Br. survey site was located downstream of the N11 Motorway bridge, approximately 1km south of Gorey, Co. Wexford (Fig. 4.6; Plate 4.4). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 16th of July 2013, along a 40m length of channel. Glide dominated the habitat, while the substrate consisted largely of cobble and gravel. Vegetation at this site was scarce, with green filamentous algae and *Ranunculus* sp. (aquatic buttercup) occupying large portions of the stretch. Himalayan Balsam was also abundant on the banks.

The Owenavorrhagh confluence survey site was located, approximately 1.5km further downstream of the site above on the upstream side of a bridge, just above the Owenavorrhagh River Confluence (Fig. 4.6; Plate 4.3). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 16th of July 2013, along a 45m length of channel. Glide was the dominant habitat, while the substrate was a good mix, with cobble the most abundant type. The vegetation at this site consisted of a number of bryophyte and emergent bank-side species.

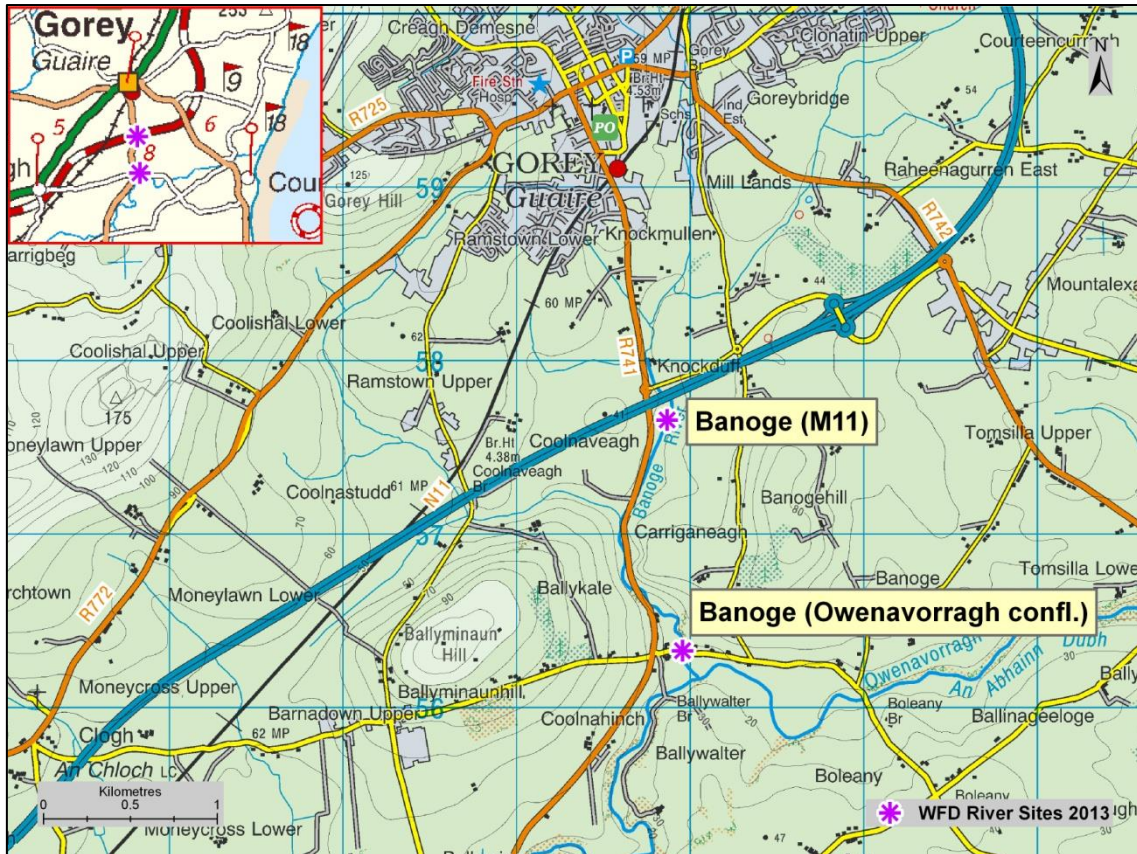


Fig. 4.6. Location of the Banoge River surveillance monitoring sites

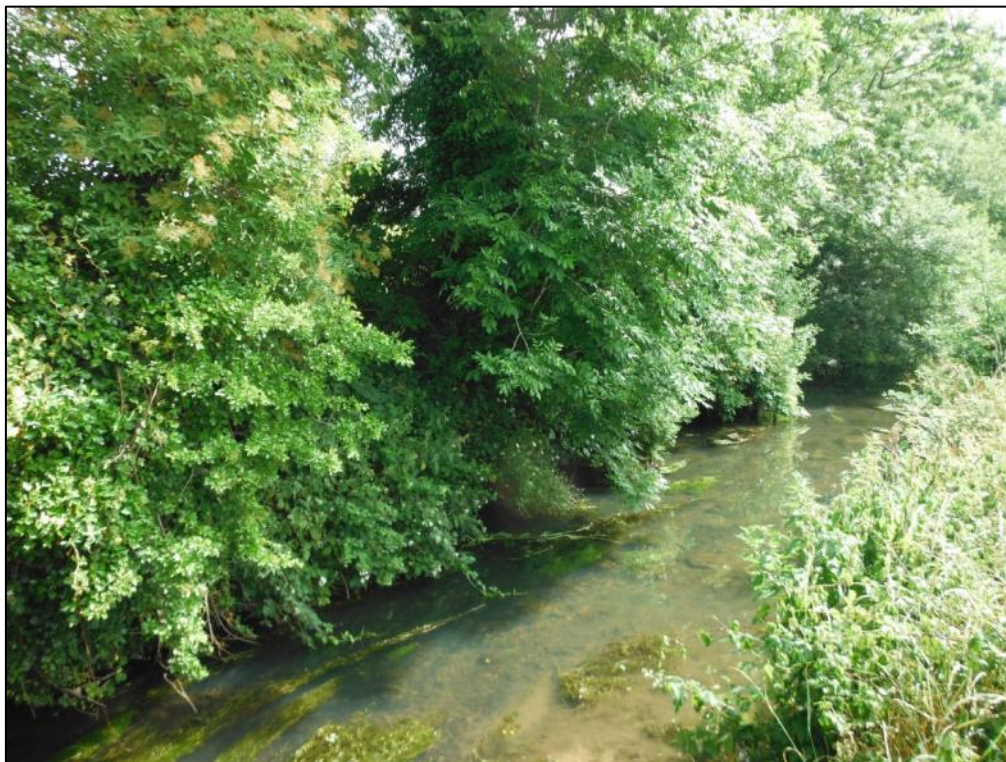


Plate 4.4. The Banoge River (M11), Co. Wexford



Plate 4.3. The Banoge River (Owenavorrhagh confl.), Co. Wexford

Banoge River (N11 Br.)

Four fish species were recorded in the Banoge River (M11 Br.) during the 2013 survey (Table 4.4). Three-spined stickleback was the most abundant species recorded, followed by European eel, Lamprey sp. and salmon.

Table 4.4. Density of fish (no./m²), Banoge River (M11) (fish density has been calculated as minimum estimates based on one fishing)

Species	Total minimum density
	2013
Three-spined stickleback	0.440
European eel	0.009
Lamprey sp.	0.009
Salmon	0.004
0+ Salmon	0.000
1++ Salmon	0.004
All Fish	0.463

Banoge River (Owenavorrhagh)

Five fish species were recorded in the Banoge River (Owenavorrhagh confl.) during the 2013 survey (Table 4.3). Brown trout was the most abundant species recorded, followed by salmon, European eel, stone loach and three-spined stickleback.

Table 4.3. Density of fish (no./m²), Banoge River (Owenavorrhagh confl.) (fish density has been calculated as minimum estimates based on one fishing)

Species	Total minimum density		
	2008	2011	2013
Brown trout	0.016	0.167	0.073
0+ Brown trout	0.003	0.136	0.005
1++ Brown trout	0.013	0.031	0.068
Salmon	0.042	0.050	0.027
0+ Salmon	0.003	0.050	0.005
1++ Salmon	0.039	0.006	0.023
European eel	0.084	0.056	0.027
Stone loach	0.042	0.360	0.009
Three-spined stickleback	-	-	0.005
Minnow	-	0.025	-
All Fish	0.185	0.657	0.142

Brown trout captured during the 2013 survey ranged in length from 7.2cm to 19.8cm (mean = 14.9cm) (Fig. 4.7). Two age classes (0+ and 1+) were present, accounting for 9% and 91% of the total salmon catch respectively. Brown trout captured during the 2011 survey ranged in length from 5.4cm to 15.0cm (mean = 7.9cm). Two age classes were present (0+, 1+), accounting for approximately 83% and 17% of the brown trout catch respectively. Brown trout captured during the 2008 survey ranged in length from 5.5cm to 16.1cm (mean = 12.0cm). Two age classes were present (0+ and 1+), accounting for approximately 30% and 70% of the brown trout catch respectively.

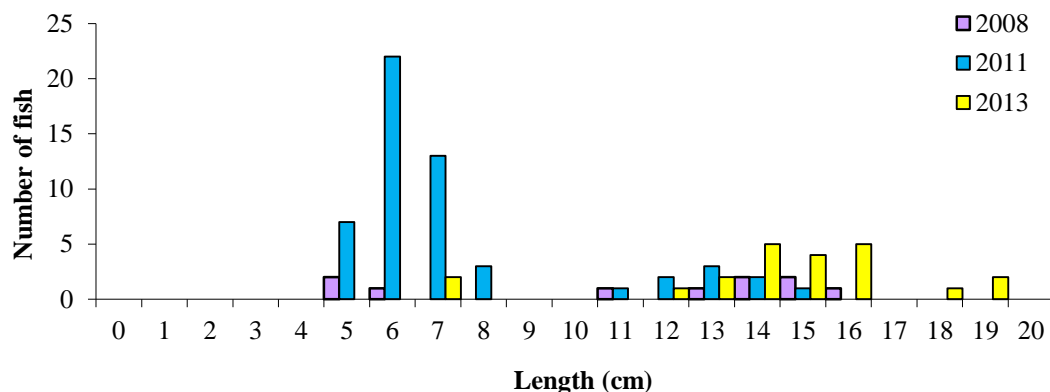


Fig. 4.7. Length frequency distribution of brown trout in the Banoge River (Owenavorrhagh confl.), June 2008 (n = 10), July 2011 (n = 54) and July 2013 (n = 22)

Eels captured during the 2013 survey ranged in length from 11.4cm to 33.1cm (mean = 18.7cm) (Fig. 4.8). Eels captured during the 2011 survey ranged in length from 9.1cm to 30.8cm (mean = 15.7cm). Eels captured during the 2008 survey ranged in length from 9.0cm to 36.0cm (mean = 20.7cm).

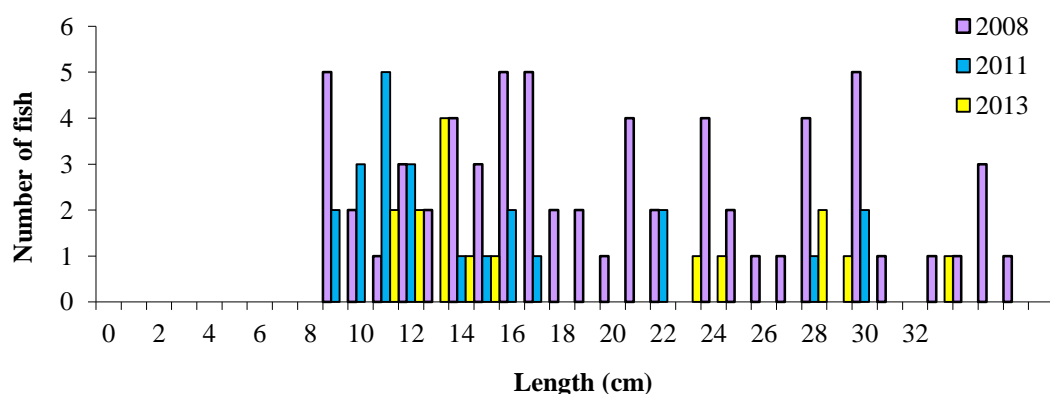


Fig. 4.8. Length frequency distribution of European eel in the Banoge River (Owenavorrhagh confl.), June 2008 (n = 65), July 2011 (n = 23) and July 2013 (n = 16)

Salmon captured during the 2013 survey ranged in length from 6.3cm to 13.1cm (mean = 11.7cm) (Fig. 4.9). Two age classes (0+ and 1+) were present, accounting for 11% and 89% of the total salmon catch respectively. Salmon captured during the 2011 survey ranged in length from 5.4cm to 11.2cm (mean = 6.6cm). Two age classes were present (0+ and 1+), accounting for approximately 97% and 3% of the salmon catch respectively. Salmon captured during the 2008 survey ranged in length from 4.8cm to 14.9cm (mean = 11.5cm). Two age classes were present (0+ and 1+), accounting for approximately 14% and 86% of the salmon catch respectively.

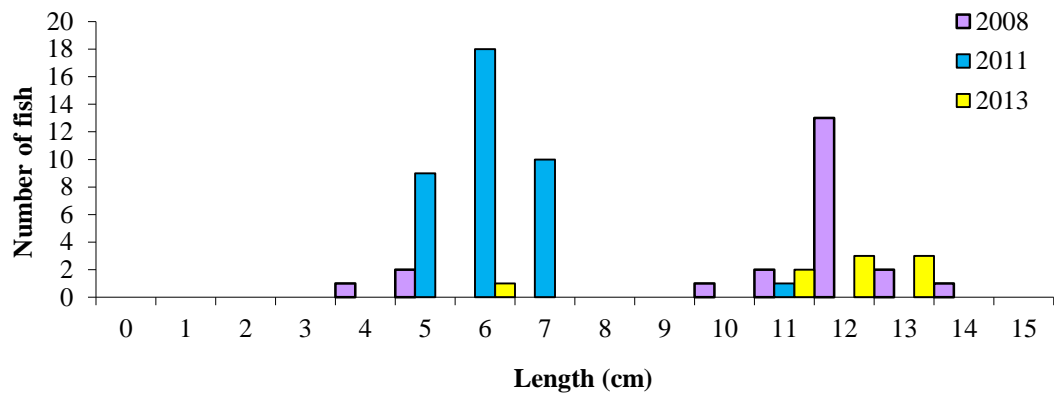


Fig. 4.9. Length frequency distribution of salmon in the Banoge River (Owenavorrhagh confl.), June 2008 (n = 22), July 2011 (n = 38) and July 2013 (n = 9)



Plate 4.5. The Clody River, (Ford near Bunclody), Co. Wexford

Four fish species were recorded in the Clody River (Ford near Bunclody) during the 2013 survey (Table 4.5). Salmon was the most abundant species recorded, followed by brown trout, Lamprey sp. and European eel.

Table 4.5. Density of fish (no./m²), Clody River (Ford near Bunclody) site (fish density has been calculated as minimum estimates based on one fishing)

Species	Total minimum density	
	2008	2013
Salmon	0.054	0.457
0+ Salmon	0.020	0.310
1++ Salmon	0.034	0.147
Brown trout	0.106	0.187
0+ Brown trout	0.091	0.097
1++ Brown trout	0.014	0.090
Lamprey sp.	-	0.007
European eel	-	0.003
All Fish	0.160	0.653

Brown trout captured during the 2013 survey ranged in length from 4.4cm to 22.4cm (mean = 8.6cm) (Fig. 4.11). Five age classes (0+, 1+, 2+, 3+ and 4+) were present, accounting for 59%, 28%, 8%, 4% and 1% of the total brown trout catch respectively. Brown trout captured during the 2008 survey ranged in length from 2.8cm to 18.6cm (mean = 6.1cm). Three age classes were present (0+, 1+ and 2+), accounting for approximately 87%, 8% and 4% of the brown trout catch respectively.

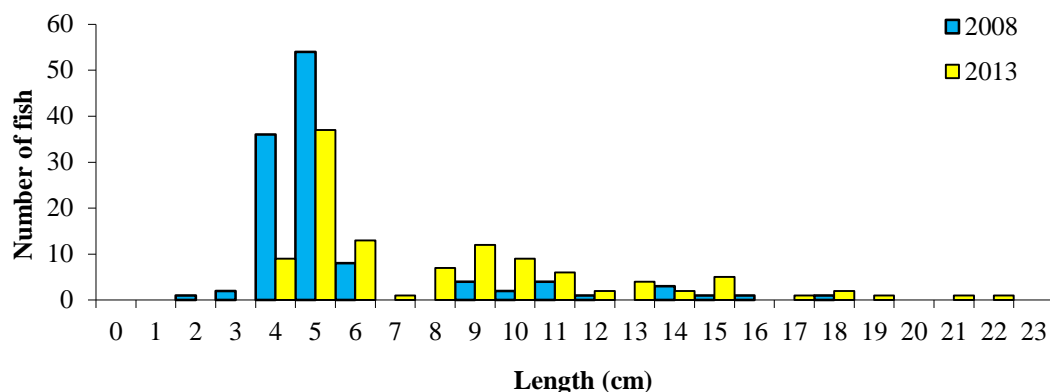


Fig. 4.11. Length frequency distribution of brown trout in the Clody River (For near Bunclody) site, July 2008 (n = 118) and July 2013 (n = 113)

Salmon captured during the 2013 survey ranged in length from 3.5cm to 12.6cm (mean = 6.1cm) (Fig. 4.12). Two age classes (0+ and 1+) were present, accounting for 78% and 22% of the total salmon catch respectively. Salmon captured during the 2008 survey ranged in length from 3.6cm to 13.0cm (mean = 7.4cm). Two age classes were present (0+ and 1+), accounting for approximately 49% and 51% of the salmon catch respectively.

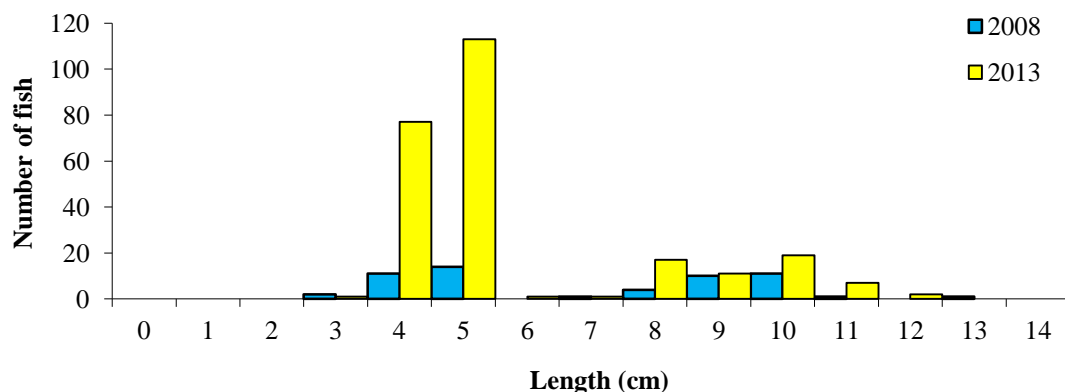


Fig. 4.12. Length frequency distribution of salmon in the Clody River (Ford near Bunclody) site, July 2008 (n = 55) and July 2013 (n = 249)

4.1.4 The Douglas River

One site was electric fished on the Douglas River as part of the WFD surveillance monitoring programme in rivers 2013. The survey site was located upstream of Sragh Bridge approximately 3km south of Ballon, Co. Carlow (Fig. 4.13; Plate 4.6). Three electric-fishing passes were conducted using one bank-based electric fishing unit on the 19th of July 2013, along a 43m length of channel. Glide dominated the habitat, while the substrate was a mix of gravel, sand, mud and silt. The vegetation at this site was dominated by submerged, emergent and floating species.

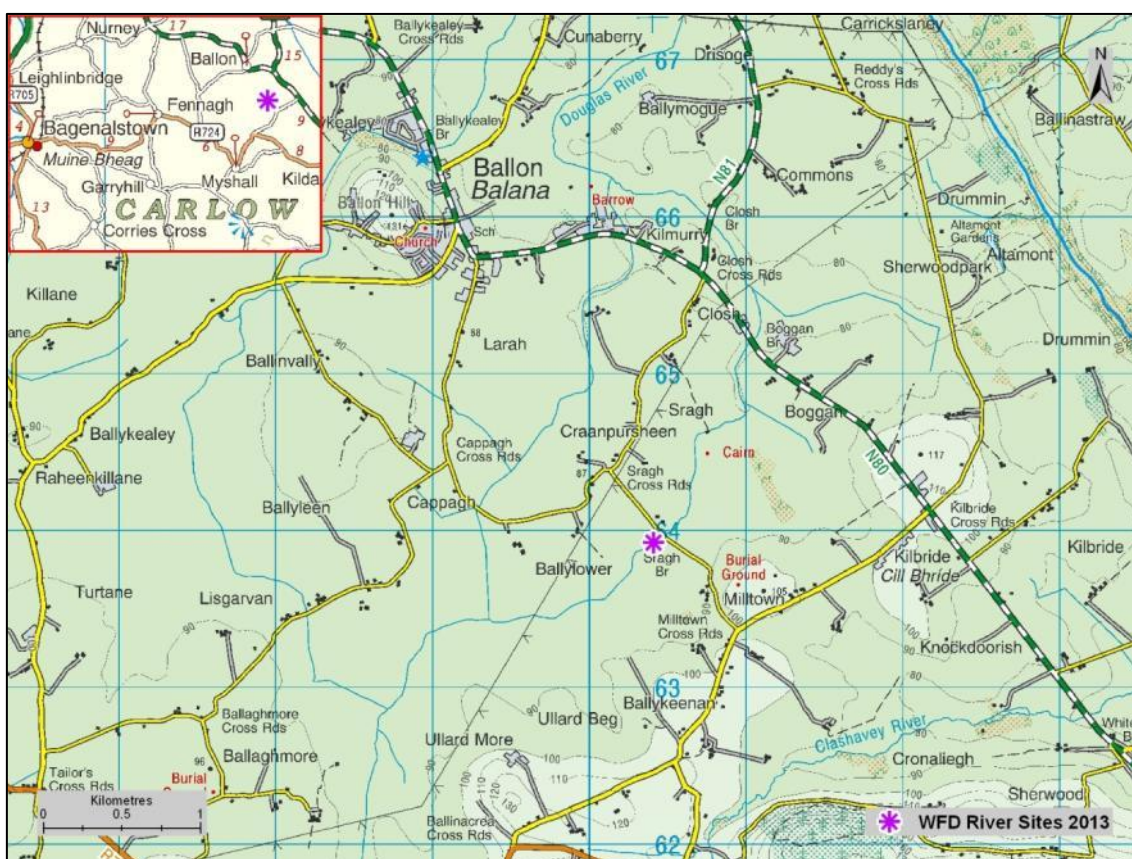


Fig. 4.13. Location of the Douglas River (Sragh Br.) surveillance monitoring site



Plate 4.6. The Douglas River at Sragh Br., Co. Carlow

Five fish species were recorded in the Douglas River during the 2013 survey (Table 4.6). Three-spined stickleback was the most abundant species recorded, followed by brown trout, lamprey sp., stone loach and minnow.

Table 4.6. Density of fish (no./m²), Douglas River (Sragh Br.) site (fish density has been calculated as minimum estimates based on one fishing)

Species	Total minimum density		
	2008	2011	2013
Three-spined stickleback	0.025	0.028	0.460
Brown trout	0.035	0.124	0.035
0+ Brown trout	0.015	0.034	0.021
1++ Brown trout	0.020	0.090	0.014
Lamprey sp.	0.015	0.062	0.035
Stone loach	0.035	0.023	0.007
Minnow	0.126	-	0.007
European eel	0.005	0.006	-
All Fish	0.242	0.243	0.544

Brown trout captured during the 2013 survey ranged in length from 5.9cm to 15.7cm (mean = 10.0cm) (Fig. 4.14). Two age classes (0+ and 1+) were present, accounting for 57% and 43% of the total brown trout catch respectively. Brown trout captured during the 2011 survey ranged in length from 6.4cm to 21.1cm (mean = 13.3cm). Three age classes were present (0+, 1+ and 2+), accounting for approximately 30%, 55% and 15% of the brown trout catch respectively. Brown trout captured during the 2008 survey ranged in length from 6.0cm to 20.5cm (mean = 10.2cm). Three age classes were present (0+, 1+ and 2+), accounting for approximately 69%, 8% and 23% of the brown trout catch respectively.

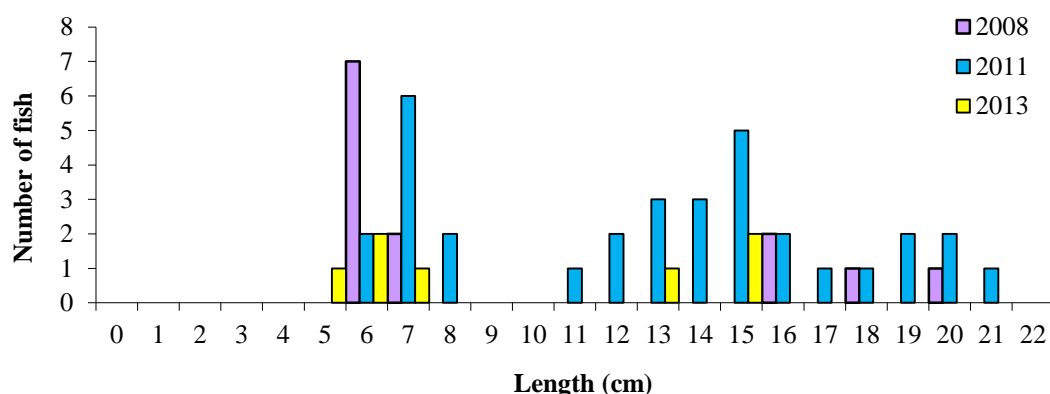


Fig. 4.14. Length frequency distribution of brown trout in the Douglas River (Sragh Br.) site, July 2008 (n = 13), July 2011 (n = 33) and July 2013 (n = 7)

Lamprey captured during the 2013 survey ranged in length from 3.8cm to 14.4cm (mean = 9.9cm) (Fig. 4.15). Lamprey captured during the 2011 survey ranged in length from 4.4cm to 15.1cm (mean = 9.7cm). Lamprey captured during the 2008 survey ranged in length from 8.2cm to 15.7cm (mean = 11.4cm).

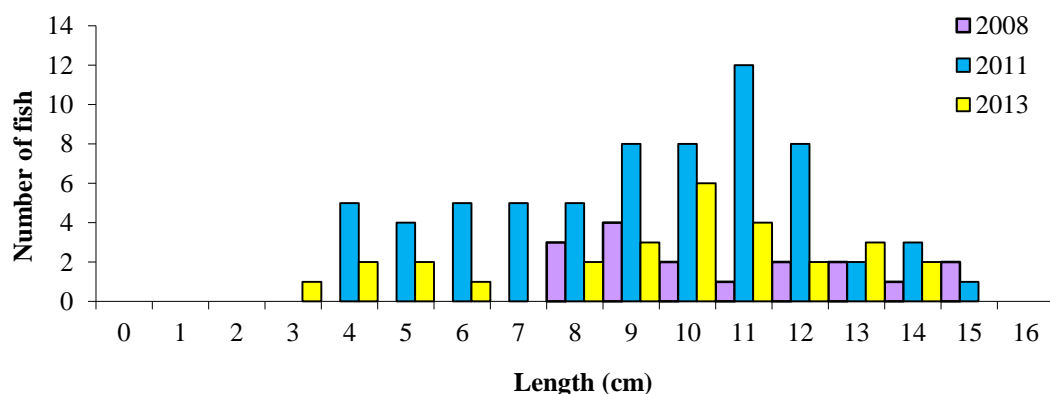


Fig. 4.15. Length frequency distribution of lamprey in the Douglas River (Sragh Br.) site, July 2008 (n = 17), July 2011 (n = 66) and July 2013 (n = 28)

4.1.5 The River Glory

One site was electric fished on the River Glory as part of the WFD surveillance monitoring programme in rivers 2013. The survey site was located just downstream of Chapelizod Bridge, approximately 10km southeast of Callan, Co. Kilkenny (Fig. 4.16; Plate 4.7). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 23th of July 2013, along a 45m length of channel. Glide dominated the habitat, while the substrate consisted mostly of gravel. The vegetation at this site was dominated by emergent bank-side species as well as a small number of bryophytes.

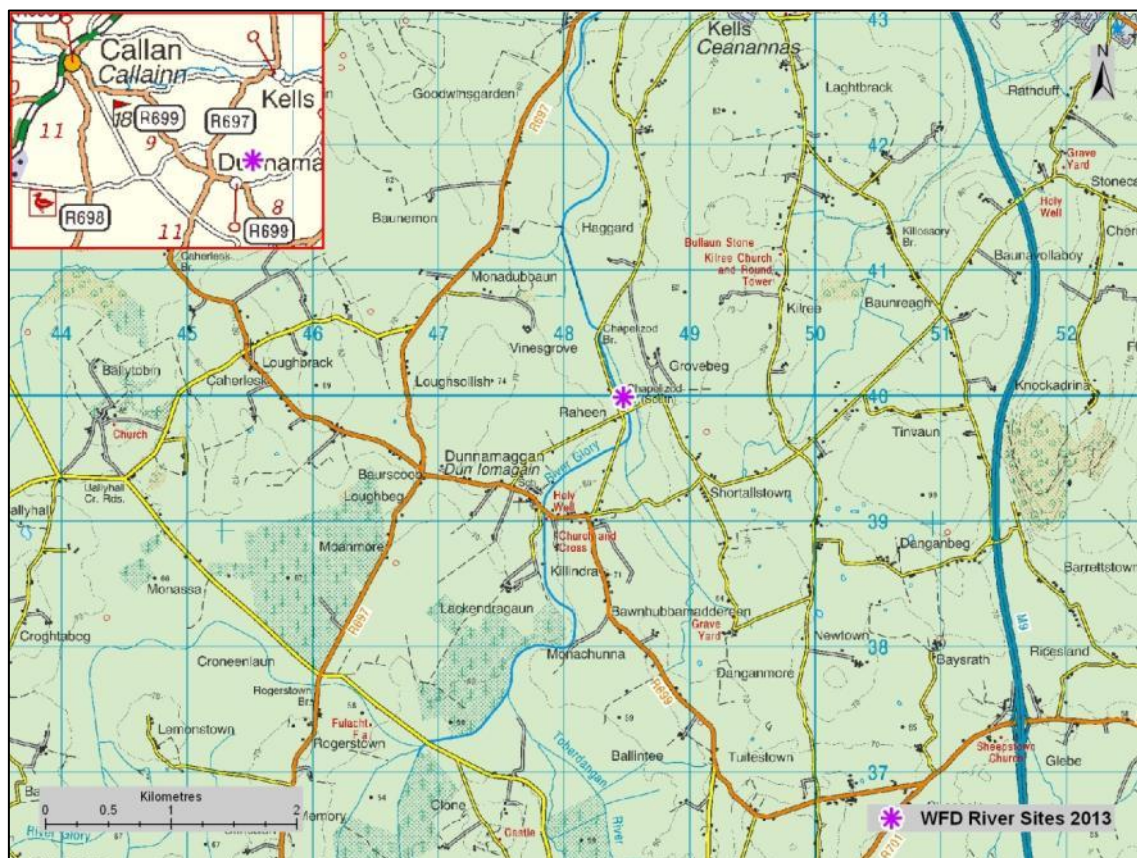


Fig. 4.16. Location of the Glory River (Chapelizod Br.) surveillance monitoring site



Plate 4.7. The Glory River at Chapelizod Br., Co. Kilkenny

Six fish species were recorded in the Glory River during the 2013 survey (Table 4.7). Brown trout was the most abundant species recorded, followed by three-spined stickleback, lamprey sp., stone loach, European eel and salmon.

Table 4.7. Density of fish (no./m²), Glory River (Chapelizod Br.) (fish density has been calculated as minimum estimates based on one fishing)

Species	Total minimum density	
	2008	2013
Brown trout	0.174	0.159
0+ Brown trout	0.013	0.003
1++ Brown trout	0.161	0.156
Three-spined stickleback	0.016	0.047
Lamprey sp.	0.003	0.025
Stone loach	0.010	0.006
European eel	0.003	0.006
Salmon	0.039	0.003
0+ Salmon	0.006	0.003
1++ Salmon	0.032	0.000
All Fish	0.245	0.247

Brown trout captured during the 2013 survey ranged in length from 6.7cm to 28.8cm (mean = 15.5cm) (Fig. 4.17). Three age classes (0+, 1+ and 2+) were present, accounting for 13%, 44% and 44% of the total brown trout catch respectively. Brown trout captured during the 2008 survey ranged in length from 5.1cm to 25.6cm (mean = 14.1cm). Four age classes were present (0+, 1+, 2+ and 3+), accounting for approximately 11%, 66%, 19% and 5% of the brown trout catch respectively.

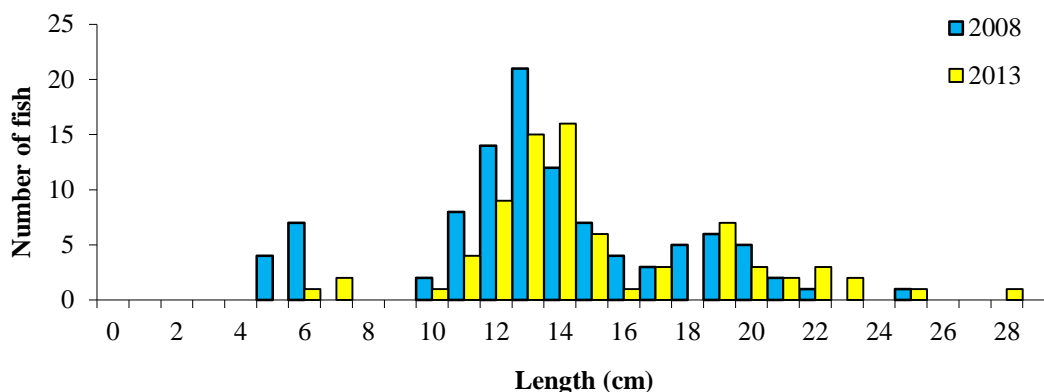


Fig. 4.17. Length frequency distribution of brown trout in the Glory River (Chapelizod Br.) site, July 2008 (n = 102) and July 2013 (n = 77)

Lamprey captured during the 2013 survey ranged in length from 8.5cm to 16.0cm (mean = 12.7cm) (Fig. 4.18). Lamprey captured during the 2008 survey ranged in length from 7.8cm to 16.5cm (mean = 12.8cm).

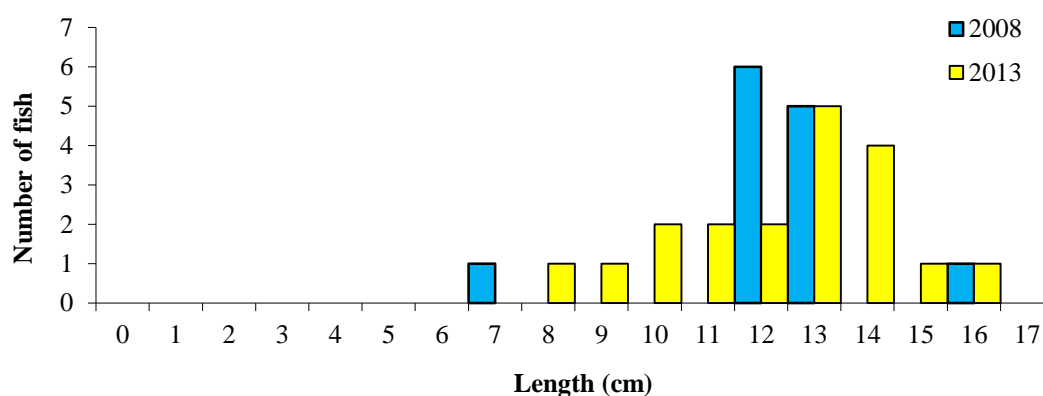


Fig. 4.18. Length frequency distribution of lamprey in the Glory River (Chapelizod Br.) site, July 2008 (n = 13) and July 2013 (n = 19)

Only one salmon was recorded during the 2013 survey, measuring 5.7cm in length and aged 0+. Salmon captured during the 2008 survey ranged in length from 4.5cm to 12.5cm (mean = 8.8cm) (Fig. 4.19). Two age classes (0+ and 1+) were present, accounting for 43% and 57% of the total salmon catch respectively.

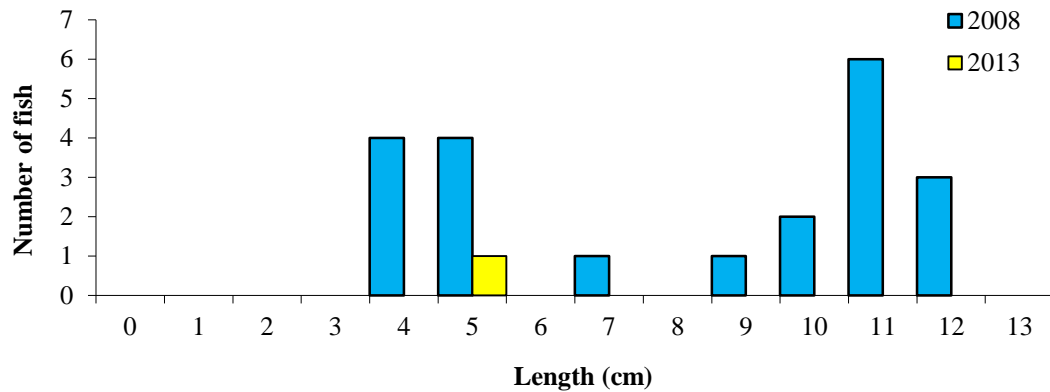


Fig. 4.19. Length frequency distribution of salmon in the Glory River (Chapelizod Br.) site, July 2008 (n = 12) and July 2013 (n = 1)

4.1.6 The Gowran River

Two sites were electric fished on the Gowran River as part of the WFD surveillance monitoring programme in rivers 2013; the Gowran River, Goresbridge and the Gowran River, Grange Lower.

The Goresbridge survey site was located just upstream of a small bridge in Goresbridge, Co. Kilkenny, only 200m upstream of the River Barrow confluence (Fig. 4.20; Plate 4.8). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 26th of September 2013, along a 45m length of channel. Glide was the most abundant habitat type, while the substrate consisted largely of cobble. The vegetation at this site was diverse, consisting of algae, bryophytes, submergent, floating and emergent species.

The Grange Lower survey site was located a further 2km upstream of the first site, approximately 2km west of Goresbridge (Fig. 4.20; Plate 4.9). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 22nd of July 2013, along a 40m length of channel. Glide dominated the habitat, while the substrate was mostly mud, silt and gravel. Vegetation at this site consisted of a number of submerged, floating and emergent species.



Fig. 4.20. Location of the Gowran River surveillance monitoring sites



Plate 4.8. The Gowran River at Goresbridge, Co. Kilkenny



Plate 4.9. The Gowran River at Grange Lower, Co. Kilkenny

Gowran River (Goresbridge)

Seven fish species were recorded in the Gowran River (Goresbridge) during the 2013 survey (Table 4.8). Three-spined stickleback was the most abundant species recorded, followed by brown trout, salmon, stone loach, European eel, minnow and lamprey sp.

Table 4.8. Density of fish (no./m²), Gowran River (Goresbridge) (fish density has been calculated as minimum estimates based on one fishing)

Species	Total minimum density	
	2010	2013
Three-spined stickleback	0.005	0.140
Brown trout	0.107	0.088
0+ Brown trout	0.023	0.018
1++ Brown trout	0.084	0.070
Salmon	0.093	0.023
0+ Salmon	0.019	0.000
1++ Salmon	0.075	0.023
Stone loach	0.131	0.023
European eel	0.051	0.012
Minnow	-	0.012
Lamprey sp.	0.005	0.006
All Fish	0.392	0.304

Brown trout captured during the 2013 survey ranged in length from 7.5cm to 17.1cm (mean = 12.6cm) (Fig. 4.21). Two age classes (0+ and 1+) were present, accounting for 36% and 64% of the total brown trout catch respectively. Brown trout captured during the 2010 survey ranged in length from 5.9cm to 20.8cm (mean = 13.0cm). Three age classes were present (0+, 1+ and 2+), accounting for approximately 26%, 63% and 11% of the brown trout catch respectively.

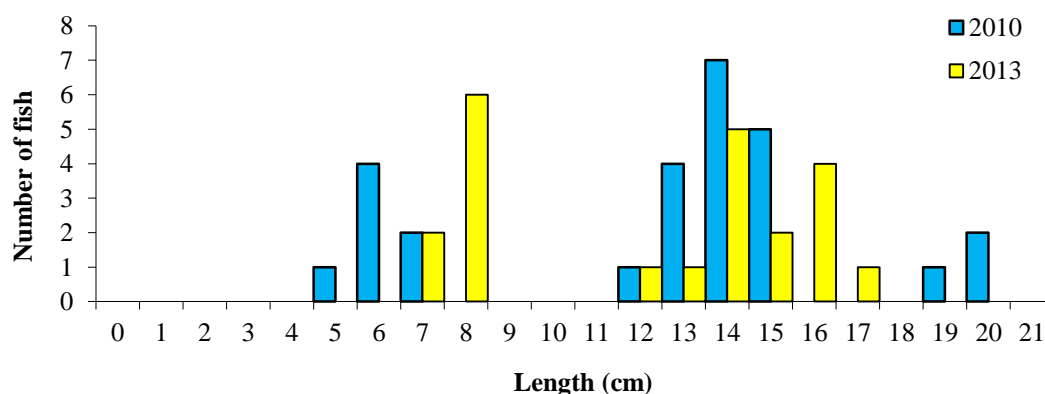


Fig. 4.21. Length frequency distribution of brown trout in the Gowran River (Goresbridge) site, July 2010 (n = 27) and July 2013 (n = 22)

Salmon captured during the 2013 survey ranged in length from 10.6cm to 12.0cm (mean = 11.4cm) (Fig. 4.22). Only four individuals were caught and all were aged 1+. Salmon captured during the 2010 survey ranged in length from 5.2cm to 14.0cm (mean = 10.7cm). Three age classes were present (0+, 1+ and 2+), accounting for approximately 22%, 75% and 3% of the salmon catch respectively.

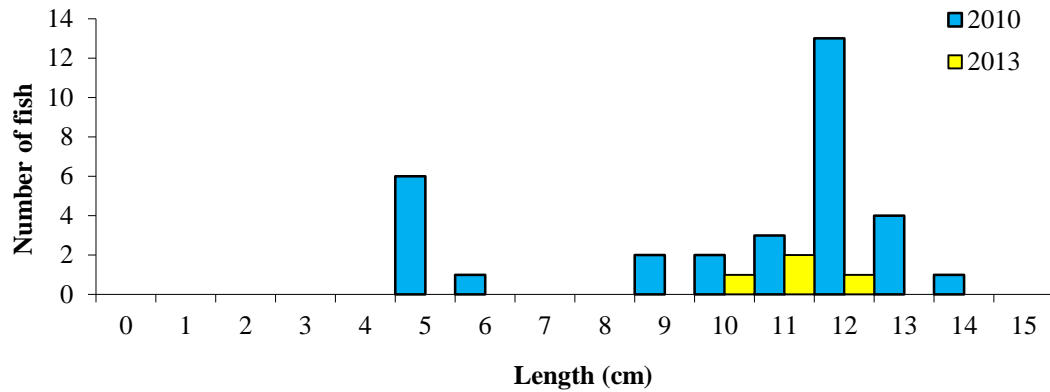


Fig. 4.22. Length frequency distribution of salmon in the Gowran River (Goresbridge) site, July 2010 (n = 32) and July 2013 (n = 4)

Gowran River (Grange Lower)

Two fish species were recorded in the Gowran River (Grange Lower) during the 2013 survey (Table 4.9). Brown trout was the most abundant species recorded, followed by three-spined stickleback.

Table 4.9. Density of fish (no./m²), Gowran River (Grange Lower) (fish density has been calculated as minimum estimates based on one fishing)

Species	Total minimum density
	2013
Brown trout	0.268
0+ Brown trout	0.024
1++ Brown trout	0.244
Three-spined stickleback	0.005
All Fish	0.273

Brown trout captured during the 2013 survey ranged in length from 4.4cm to 32.2cm (mean = 15.2cm) (Fig. 4.23). Five age classes (0+, 1+, 2+, 3+ and 4+) were present, accounting for 7%, 59%, 32%, 1% and 1% of the total brown trout catch respectively.

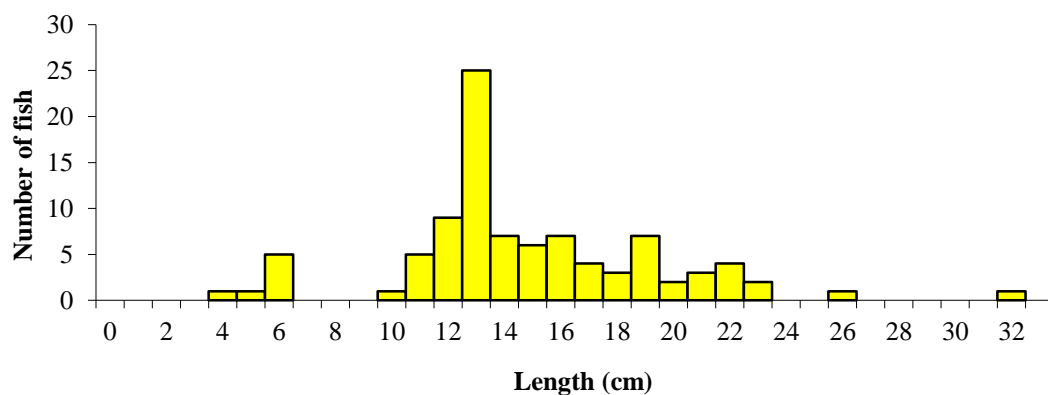


Fig. 4.23. Length frequency distribution of brown trout in the Gowran River (Grange Lower) site, July 2013 (n = 94)

4.1.7 The River Nier

One site was electric fished on the River Nier as part of the WFD surveillance monitoring programme in rivers 2013. The survey site was located just upstream of Ballymacarbry Br., just downstream of Ballymacarbry, Co. Waterford (Fig. 4.24; Plate 4.10). Three electric-fishing passes were conducted using four bank-based electric fishing units on the 24th of July 2013, along a 40m length of channel. Riffle and glide dominated the habitat, while the substrate was a mix of cobble and boulder. The vegetation at this site consisted of a large number of bryophytes, as well as algae and emergent bank-side species. Japanese knotweed was also present along the banks.

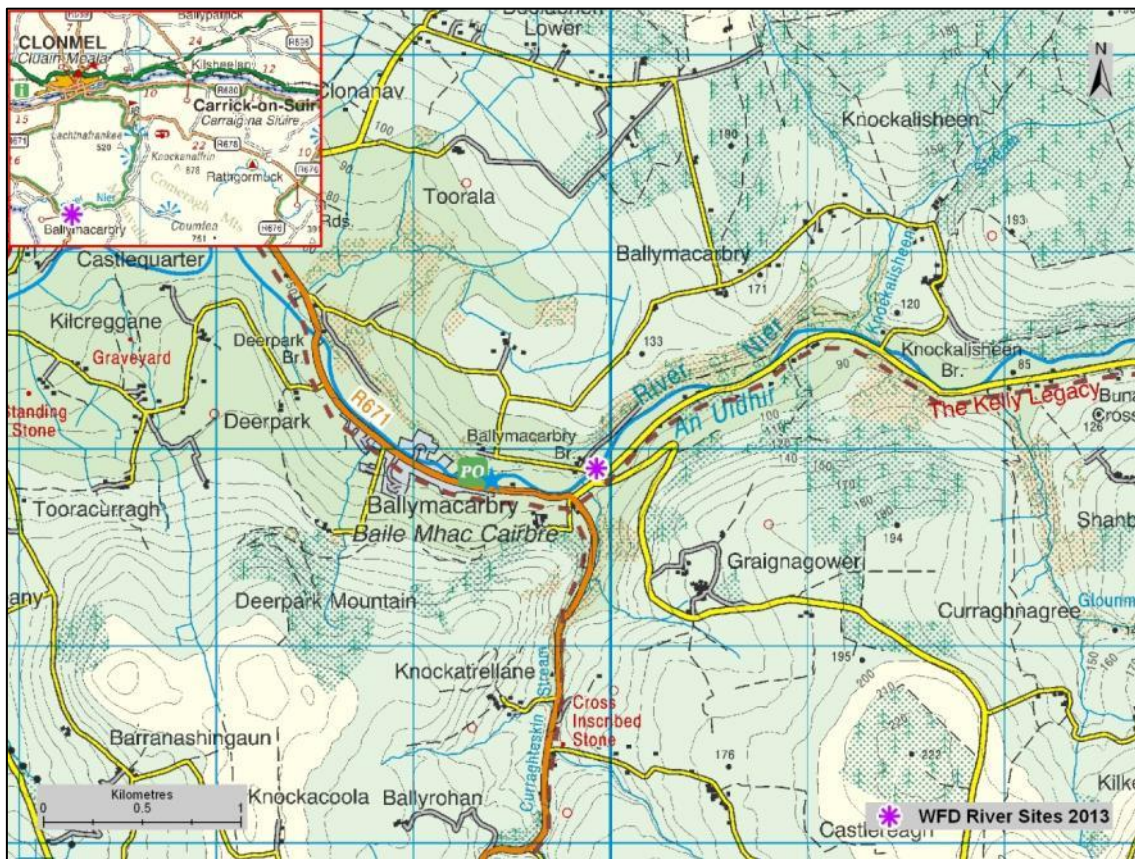


Fig. 4.24. Location of the River Nier (Ballymacarbry) surveillance monitoring site



Plate 4.10. The River Nier at Ballymacarbry, Co. Cork

Three fish species were recorded in the River Nier during the 2013 survey (Table 4.10). Salmon was the most abundant species recorded, followed by brown trout and European eel.

Table 4.10. Density of fish (no./m²), River Nier (Ballymacarbry) (fish density has been calculated as minimum estimates based on one fishing)

Species	Total minimum density	
	2008	2013
Salmon	0.379	0.225
0+ Salmon	0.189	0.014
1++ Salmon	0.189	0.211
Brown trout	0.038	0.029
0+ Brown trout	0.013	0.005
1++ Brown trout	0.026	0.024
European eel	0.014	0.009
All Fish	0.432	0.263

Brown trout captured during the 2013 survey ranged in length from 5.7cm to 29.4cm (mean = 12.1cm) (Fig. 4.25). Five age classes (0+, 1+, 2+, 3+ and 4+) were present, accounting for 18%, 59%, 18%, 2% and 2% of the total brown trout catch respectively. Brown trout captured during the 2008 survey ranged in length from 6.6cm to 24.3cm (mean = 12.2cm). Four age classes were present (0+, 1+, 2+ and 3+), accounting for approximately 34%, 50%, 13% and 3% of the brown trout catch respectively.

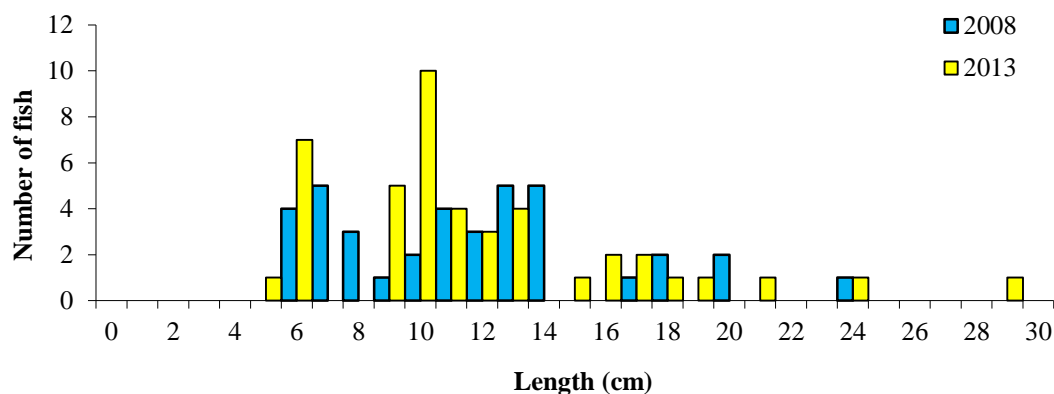


Fig. 4.25. Length frequency distribution of brown trout in the Nier (Ballymacarbry) River site, 2008 (n = 38) and 2013 (n = 44)

Eels captured during the 2013 survey ranged in length from 16.8cm to 34.3cm (mean = 24.8cm) (Fig. 4.26). Eels captured during the 2008 survey ranged in length from 12.5cm to 43.5cm (mean = 23.2cm).

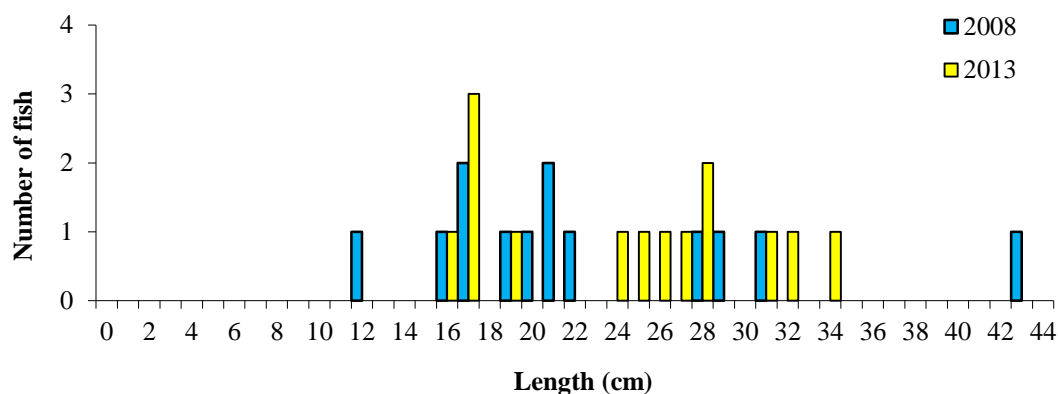


Fig. 4.26. Length frequency distribution of eels in the Nier (Ballymacarbry) River site, 2008 (n = 13) and 2013 (n = 14)

Salmon captured during the 2013 survey ranged in length from 4.8cm to 13.7cm (mean = 9.5cm) (Fig. 4.27). Three age classes (0+, 1+ and 2+) were present, accounting for approximately 10%, 77% and 14% of the total salmon catch respectively. Salmon captured during the 2008 survey ranged in length from 3.2cm to 12.9cm (mean = 7.7cm). Three age classes were present (0+, 1+ and 2+), accounting for approximately 51%, 48% and 1% of the salmon catch respectively.

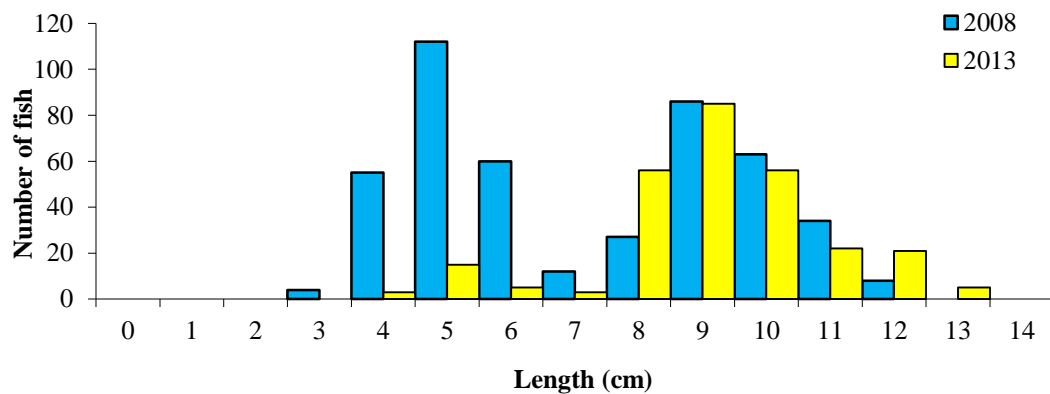


Fig. 4.27. Length frequency distribution of salmon in the Nier (Ballymacarbry) River site, 2008 (n = 461) and 2013 (n = 271)

4.1.8 The Nuenna River

One site was electric fished on the Nuenna River as part of the WFD surveillance monitoring programme in rivers 2013. The survey site was located downstream of a bridge at Clomantagh, approximately 5km west of Freshford, Co. Kilkenny (Fig. 4.28; Plate 4.11). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 22nd of July 2013, along a 44m length of channel. Glide dominated the habitat, while the substrate was mainly a mix of cobble and gravel. The vegetation at this site was diverse, with most major groups present, including bryophytes, submergent, floating and emergent species present.



Fig. 4.28. Location of the Nuenna River (Clomantagh) surveillance monitoring site



Plate 4.11. The Nuenna River at Clonmantagh, Co. Kilkenny

Only one fish species (brown trout) was recorded in the Nuenna River during the 2013 survey (Table 4.11).

Table 4.11. Density of fish (no./m²), Nuenna River (Clonmantagh) (fish density has been calculated as minimum estimates based on one fishing)

Species	Total minimum density		
	2008	2011	2013
Brown trout	0.073	0.241	0.121
0+ Brown trout	0.024	0.155	0.024
1++ Brown trout	0.049	0.086	0.097
Three-spined stickleback	0.005	0.039	-
Lamprey sp.	-	0.004	-
All Fish	0.078	0.284	0.121

Brown trout captured during the 2013 survey ranged in length from 5.3cm to 20.6cm (mean = 13.1cm) (Fig. 4.29). Four age classes (0+, 1+, 2+ and 3+) were present, accounting for 18%, 53%, 24% and 5% of the total brown trout catch respectively. Brown trout captured during the 2011 survey ranged in length from 3.5cm to 19.2cm (mean = 7.9cm). Three age classes were present (0+, 1+ and 2+), accounting for approximately 68%, 25% and 8% of the brown trout catch respectively. Brown trout captured during the 2008 survey ranged in length from 5.1cm to 25.2cm (mean =

13.4cm). Four age classes were present (0+, 1+, 2+ and 3+), accounting for approximately 25%, 29%, 39% and 7% of the brown trout catch respectively.

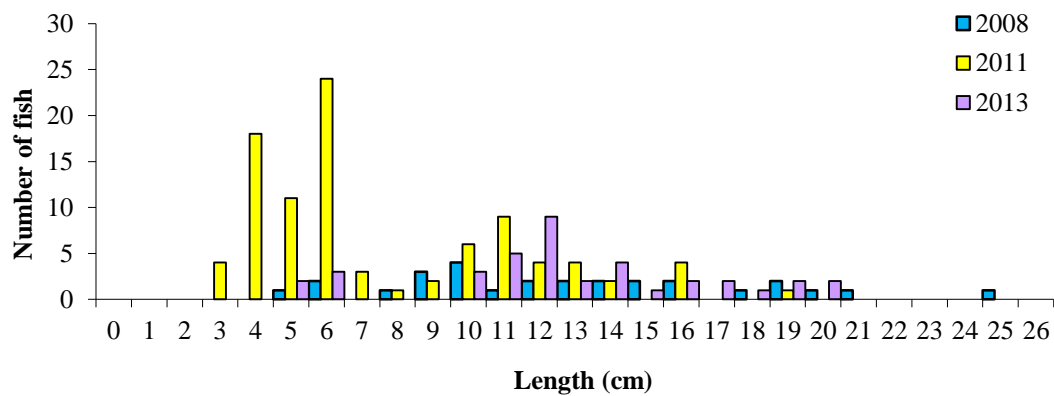


Fig. 4.29. Length frequency distribution of brown trout in the Nuenna River (Clomantagh) site, July 2008 (n = 28), July 2011 (n = 93) and July 2013 (n = 38)

4.1.9 The River Slaney

One site was electric fished on the River Slaney as part of the WFD surveillance monitoring programme in rivers 2013. The survey site was located just upstream of Waterloo Br. approximately 7km north of Baltinglass, Co. Wicklow (Fig. 4.30; Plate 4.12). Three electric-fishing passes were conducted using three bank-based electric fishing units on the 15th of July 2013, along a 45m length of channel. Glide was the dominant substrate type, while the substrate was diverse, consisting mainly of cobble. The vegetation at this site was diverse, with a large number of mosses and liverwort present.

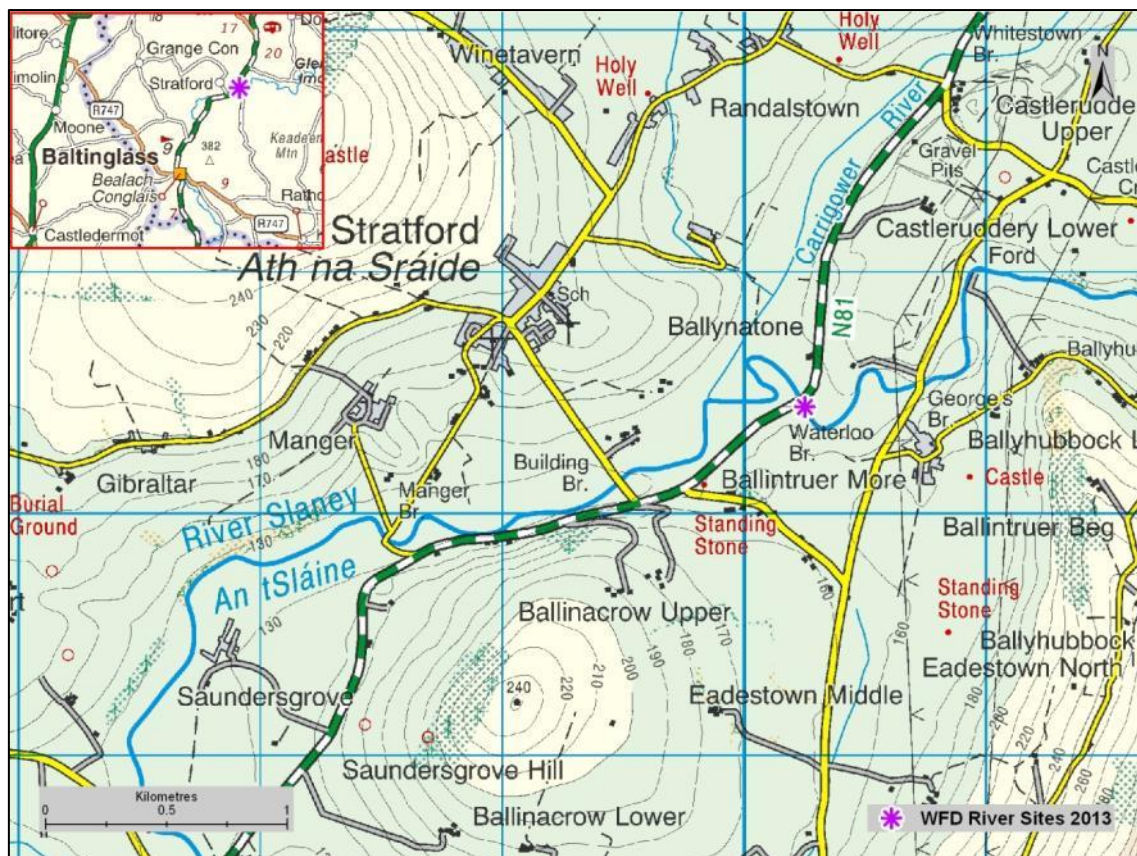


Fig. 4.30. Location of the River Slaney (Waterloo Br.) surveillance monitoring sites



Plate 4.12. The River Slaney at Waterloo Br., Co. Wicklow

Five fish species were recorded in the River Slaney during the 2013 survey (Table 4.12). Salmon was the most abundant species recorded, followed by brown trout, lamprey sp., European eel and stone loach.

Table 4.12. Density of fish (no./m²), River Slaney (Waterloo Br.) site (fish density has been calculated as minimum estimates based on one fishing)

Species	Total minimum density		
	2009	2010	2013
Salmon	0.044	0.372	0.312
0+ Salmon	0.007	0.211	0.216
1++ Salmon	0.037	0.161	0.096
Brown trout	0.018	0.042	0.046
0+ Brown trout	0.002	0.004	0.010
1++ Brown trout	0.018	0.038	0.036
Lamprey sp.	-	0.010	0.008
European eel	0.004	0.013	0.004
Stone loach	0.002	0.013	0.002
All Fish	0.067	0.451	0.373

Brown trout captured during the 2013 survey ranged in length from 5.5cm to 22.1cm (mean = 13.2cm) (Fig. 4.31). Three age classes (0+, 1+ and 2+) were present, accounting for 15%, 44% and 41% of the total brown trout catch respectively. Brown trout captured during the 2010 survey ranged in length from 6.0cm to 25.1cm (mean = 13.8cm). Four age classes were present (0+, 1+, 2+ and 3+), accounting for approximately 12%, 59%, 27% and 2% of the brown trout catch respectively.

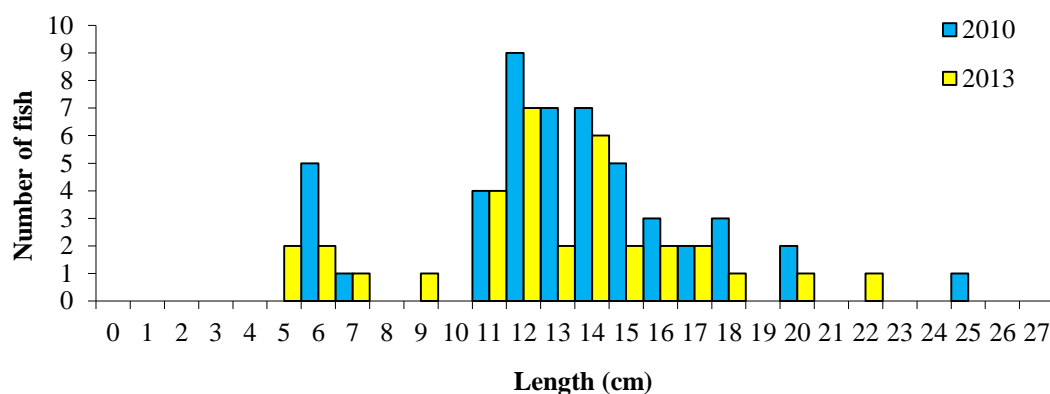


Fig. 4.31. Length frequency distribution of brown trout in the Slaney River (Waterloo Br.) site, August 2009 (n = 48), July 2010 (n = 49) and July 2013 (n = 34)

Salmon captured during the 2013 survey ranged in length from 4.1cm to 12.8cm (mean = 6.9cm) (Fig. 4.32). Three age classes (0+, 1+ and 2+) were present, accounting for 72%, 27% and 1% of the total salmon catch respectively. Salmon captured during the 2010 survey ranged in length from 4.2cm to 14.8cm (mean = 7.9cm). Three age classes were present (0+, 1+ and 2+), accounting for approximately 60%, 37% and 3% of the salmon catch respectively.

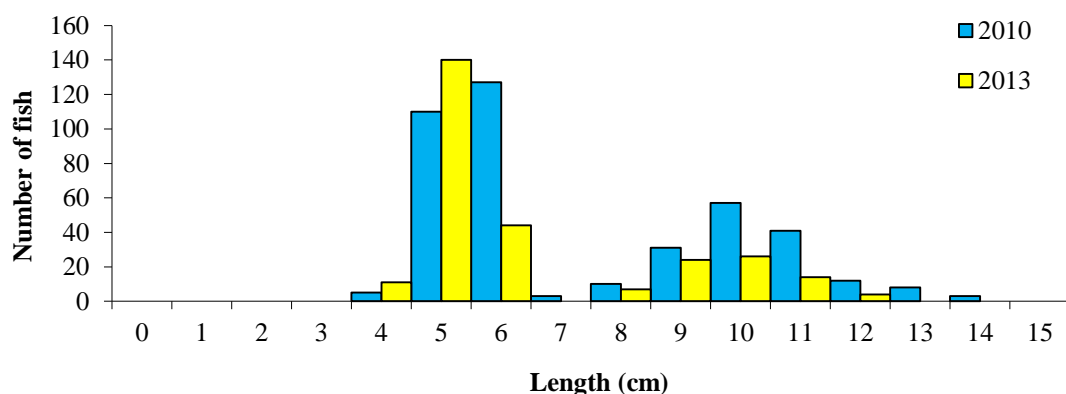


Fig. 4.32. Length frequency distribution of salmon in the Slaney River (Waterloo Br.) site, August 2009 (n = 69), July 2010 (n = 407) and July 2013 (n = 270)

4.2 Community Structure

A total of seven fish species were recorded within the twelve SERBD sites surveyed during 2013 (Fig. 4.33). Brown trout was the most common fish species recorded, occurring in eleven of the twelve sites, followed by salmon, European eel, three-spined stickleback, lamprey and stone loach. Minnow were recorded in only one site.

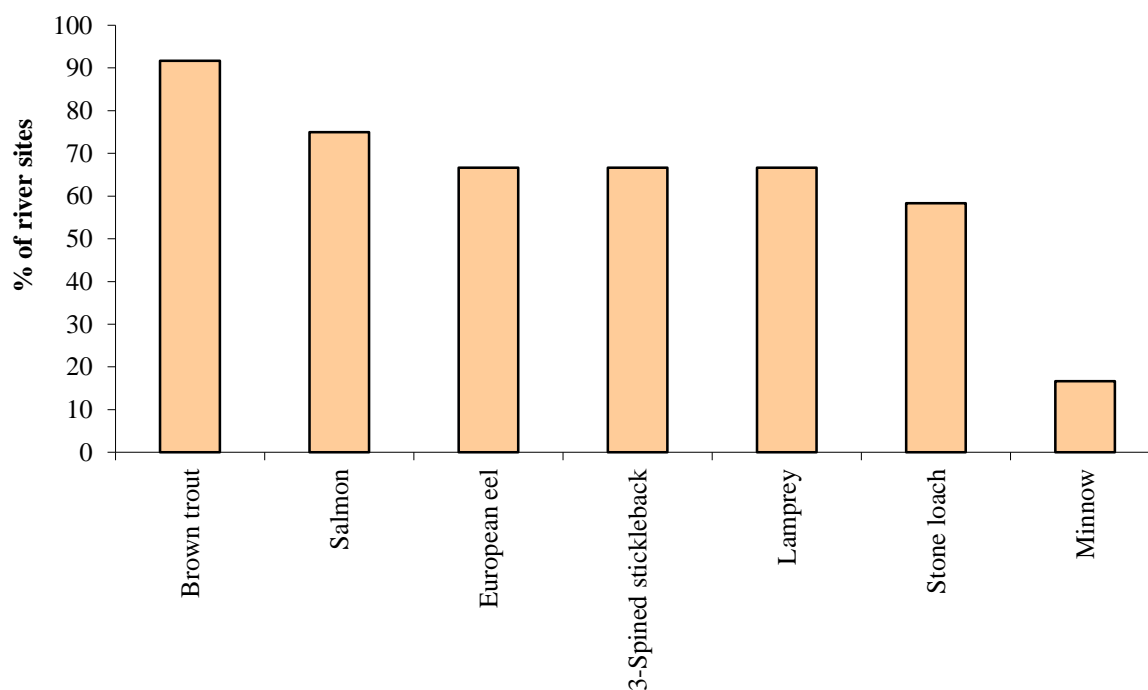


Fig. 4.33. Percentage of sites where each fish species was recorded in the ERBD for WFD SM monitoring 2013

4.3 Age and growth

Growth rates based on back-calculated length-at-age data were analysed for selected species in each river sites surveyed in the SERBD during 2013.

The mean back-calculated length-at-age data for brown trout in the SERBD are shown in Figure 4.34 and Appendix 1. Brown trout were recorded at eleven of the twelve sites, with all of these containing brown trout aged 1+ or older. Ages ranged from 0+ to 4+, with fish aged 0+ and 1+ comprising the most abundant age classes within the region. The largest brown trout recorded in the SERBD in 2013 was caught in the Gowran River (Grange Lower), which measured 32.2cm in length and weighed 343.5g. 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. Using this method, the growth rate can only be reliably estimated from fish at sites where individual fish are 2+ or older, and where sufficient numbers are caught. Growth was considered very slow at the Clody River and River Slaney, slow in the Ballyroan (Ballydine Br.), Glory, Gowran (Grange Lower), Nier and Nuenna Rivers and fast in the Ballyroan River at Gloreen Br. (Appendix 1).

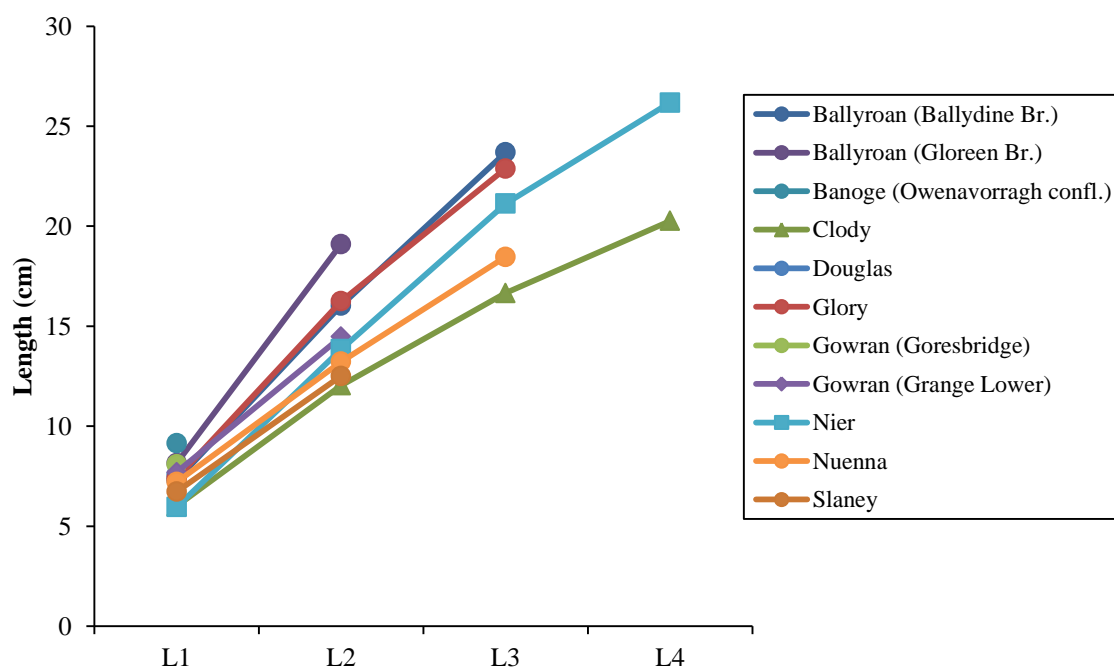


Fig. 4.34. Back calculated lengths for brown trout in each river site, WFD surveillance monitoring 2013

The mean back-calculated length-at-age data for salmon in the SERBD are shown in Figure 4.35 and Appendix 2. Salmon were recorded in eight river sites and ranged in age from 0+ to 2+. The most abundant age class was 0+, with those aged 1+ also highly represented. The largest juvenile salmon recorded in the SERBD during 2013 was caught in the Banoge River at the M11 site, measured 16.6cm, weighed 56g and was aged 1+.

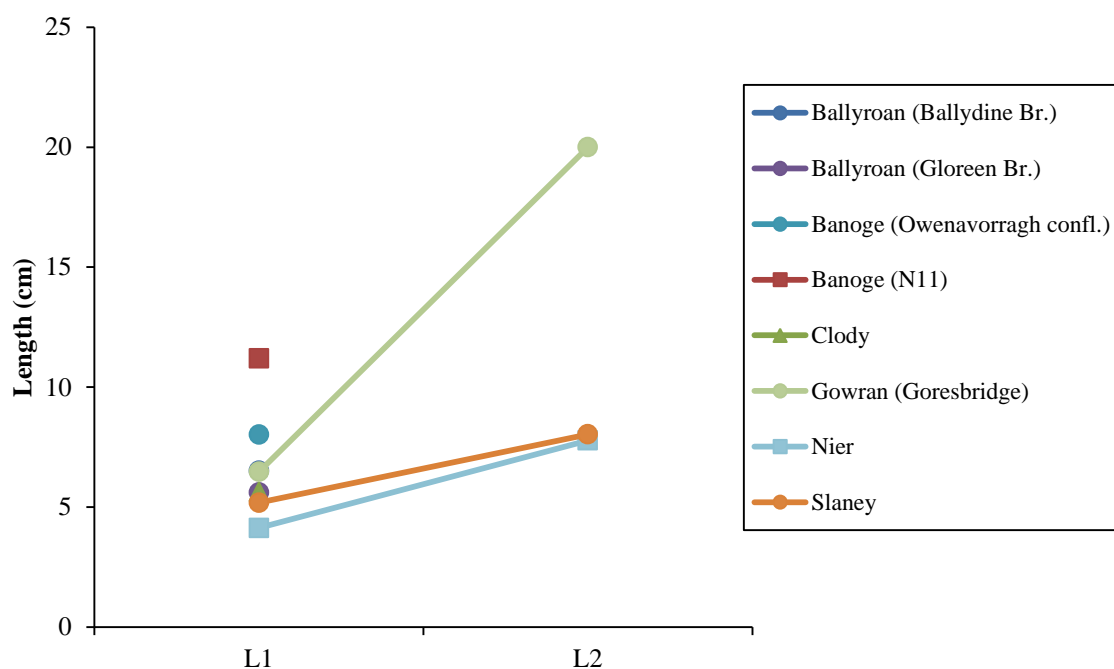


Fig. 4.35. Back calculated lengths for salmon in each river, WFD surveillance monitoring 2013

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 District Management Plans. Following an approach similar to that developed by the Environment Agency in England and Wales, the Fisheries Classification Scheme 2 (FCS2) has been developed for the 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 contributed data to be used in the model, which was developed under the management of the Scotland & Northern Ireland Forum for Environmental Research (SNIFFER). This method is a geostatistical model based on Bayesian probabilities, that makes probabilistic comparisons of observed fish counts with expected (predicted) fish counts under reference (un-impacted conditions). This classification system (SNIFFER, 2011) generates Ecological Quality Ratings (EQRs) between 1 and 0 for each site, corresponding to the five different ecological status classes of High, Good, Moderate, Poor and Bad. Confidence levels are then assigned to each class and represented as probabilities. The confidence level for a site is expressed as the probability of that site being assigned to each different status class, with the highest class probability being the overall classification.

Using this tool and expert opinion, each site surveyed in 2013 was assigned a draft fish classification status (Table 4.13). One site was classed as High, three as Good and eight as Moderate. When comparing the status this year with that from previous years, there was an improvement Clody and Glory Rivers and a deterioration in the River Nier. All other sites remained unchanged.

Table 4.13. Ecological status of sites surveyed in the SERBD for surveillance monitoring 2013 (figures in brackets indicate confidence of site status being correct)

River	Site name	Site Code	Previous ecological status	Ecological status 2013
SERBD Wadeable sites				
Ballyroan	Ballydine Br._A	15B010150A		Moderate (94%)
Ballyroan	Gloreen Br._D	15B010200D		Moderate (81%)
Banoge	(M11)_A	11B020230A		Moderate
Banoge	Owenavorrhagh confl_A	11B020300A	Moderate (97%)(2008), Moderate (2011)	Moderate (91%)
Clody	Ford near Bunclody_B	12C030200B	Good (75%)(2008)	High (100%)
Douglas (Ballon)	Sragh Br._B	12D030200B	Moderate (97%)(2008), Moderate (2011)	Moderate (91%)
Glory	Raheen_A	15G010200A	Moderate (2008)	Good (58%)
Gowran	Goresbridge_A	14G030300A	Moderate (2010)	Moderate
Gowran	Grange Lower_A	14G030240A		Moderate (97%)
Nier	Ballymacarby_A	16N010100A	High (81%)(2008)	Good (99%)
Nuenna	Clomantagh_B	15N020100B	Moderate (74%)(2008), Good (67%)(2011)	Moderate (77%)
Slaney	Waterloo Br._A	12S020400A	Good (2009), High (100%)(2010)	Good (63%)

5. DISCUSSION

A total of seven fish species were recorded during the 2013 WFD surveillance monitoring programme for fish in rivers within the SERBD. Brown trout was the most commonly encountered species in the SERBD, recorded at all but one site. The Gowran River (Goresbridge) was the most diverse site surveyed within the SERBD in 2013 with a total of seven species recorded. The site that recorded the lowest diversity in this region was the Nuenna River site, with only one species (brown trout) present. The greatest abundances of brown trout and salmon were recorded in Gowran River (Grange Lower) and Clody Rivers respectively.

Following the methods of Kennedy and Fitzmaurice (1971), growth was considered very slow at the Clody River and River Slaney, slow in the Ballyroan (Ballydine), Glory, Gowran (Grange Lower), Nier and Nuenna Rivers and fast in the Ballyroan River at Gloreen Br. (Appendix 1).

The Fish Classification Scheme 2 (FCS2) tool for assessing the ecological status of rivers has been recently developed for the Republic of Ireland which is compliant with the requirements of the WFD. Using this tool and expert opinion, each site surveyed in 2013 was assigned a draft fish classification status. One site was classed as High, three as Good and eight as Moderate.

6. REFERENCES

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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
Ballyroan (Ballydine Br.)	Mean	7.30	16.03	23.69		Slow
	S.D.	1.33	2.75	n/a		
	S.E.	0.31	1.12	n/a		
	n	18	6	1		
	Min	4.89	12.02	23.69		
	Max	9.50	19.68	23.69		
Ballyroan (Gloreen Br.)	Mean	8.15	19.11			Fast
	S.D.	1.66	4.50			
	S.E.	0.27	1.70			
	n	38	7			
	Min	5.33	12.17			
	Max	12.81	24.64			
Banoge (Owenavorrhagh confl.)	Mean	9.15				n/a
	S.D.	1.96				
	S.E.	0.44				
	n	20				
	Min	5.08				
	Max	12.60				
Clody (Ford near Bunclody)	Mean	6.00	12.04	16.66	20.27	Very slow
	S.D.	1.03	1.25	1.41	n/a	
	S.E.	0.18	0.36	0.71	n/a	
	n	32	12	4	1	
	Min	4.33	10.10	14.73	20.27	
	Max	8.91	14.75	18.13	20.27	
Douglas (Sragh Br.)	Mean	7.57				n/a
	S.D.	0.97				
	S.E.	0.56				
	n	3				
	Min	6.45				
	Max	8.19				
Glory (Raheen)	Mean	7.39	16.25	22.88		Slow
	S.D.	1.19	1.89	n/a		
	S.E.	0.18	0.46	n/a		
	n	44	17	1		
	Min	5.21	13.30	22.88		
	Max	9.98	19.69	22.88		

APPENDIX 1 continued

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
Gowran (Goresbridge)	Mean	8.09				n/a
	S.D.	0.86				
	S.E.	0.23				
	n	14				
	Min	6.68				
	Max	9.26				
Gowran (Grange Lower)	Mean	7.70	14.47			Slow
	S.D.	1.60	1.33			
	S.E.	0.24	0.33			
	n	44	16			
	Min	4.56	12.46			
	Max	12.71	17.27			
Nier (Ballymacarbry)	Mean	5.96	13.85	21.13	26.18	Slow
	S.D.	1.25	1.01	n/a	n/a	
	S.E.	0.22	0.36	n/a	n/a	
	n	31	8	1	1	
	Min	3.60	12.43	21.13	26.18	
	Max	8.56	15.25	21.13	26.18	
Nuenna (Clomantagh)	Mean	7.21	13.23	18.47		Slow
	S.D.	1.52	1.48	n/a		
	S.E.	0.31	0.49	n/a		
	n	24	9	1		
	Min	5.40	11.06	18.47		
	Max	10.66	15.61	18.47		
Slaney (Waterloo Br.)	Mean	6.72	12.52			Very Slow
	S.D.	1.36	2.59			
	S.E.	0.25	0.69			
	n	29	14			
	Min	3.24	7.81			
	Max	9.98	18.33			

APPENDIX 2

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

River		L1	L2
Ballyroan (Ballydine Br.)	Mean	6.52	
	S.D.	n/a	
	S.E.	n/a	
	n	1	
	Min	6.52	
	Max	6.52	
Ballyroan (Gloreen Br.)	Mean	5.61	
	S.D.	0.81	
	S.E.	0.40	
	n	4	
	Min	4.57	
	Max	6.25	
Banoge (Owenavorrhagh confl.)	Mean	8.03	
	S.D.	1.23	
	S.E.	0.44	
	n	8.00	
	Min	6.10	
	Max	9.56	
Banoge (M11)	Mean	11.20	
	S.D.	n/a	
	S.E.	n/a	
	n	1	
	Min	11.20	
	Max	11.20	
Clody (Ford near Bunclody)	Mean	5.63	
	S.D.	1.07	
	S.E.	0.23	
	n	22	
	Min	4.11	
	Max	7.62	
Gowran (Goresbridge)	Mean	6.47	
	S.D.	2.10	
	S.E.	1.05	
	n	4	
	Min	3.36	
	Max	7.95	

APPENDIX 2 continued

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

River		L1	L2
Nier	Mean	4.13	7.78
	S.D.	0.90	0.67
	S.E.	0.15	0.19
	n	34	12
	Min	3.19	6.38
	Max	7.82	8.54
Slaney	Mean	5.19	8.03
	S.D.	1.01	0.01
	S.E.	0.21	0.01
	n	24	3
	Min	3.68	8.02
	Max	7.63	8.05

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