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# Sampling Fish for the Water Framework Directive

## *Rivers 2011*

## South Eastern River Basin District

Iascach Intíre Éireann
Inland Fisheries Ireland

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Inland Fisheries Ireland

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

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## 1. INTRODUCTION

Fish stock surveys were undertaken in 65 river sites throughout Ireland during the summer of 2011 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). Seven of these surveys were carried out at river sites in the South Eastern River Basin District (SERBD) in July 2011 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 2011 is the fourth year of the rivers sampling programme, many of the sites surveyed this year are repeat surveys of those carried out in 2008. As a result, surveys this year can be compared with surveys from before to determine whether the status of our rivers is improving or deteriorating.

This report summarises the results of the 2011 fish stock survey carried out on each site, as part of the Water Framework Directive surveillance monitoring programme.

## 2. STUDY AREA

Seven river sites were surveyed in five river catchments within the SERBD during 2011: the Duncormick, Nore, Owenavorragh, Slaney and Suir catchments. The sites ranged in surface area from 180m$^2$ for the Duncormick River to 1,679m$^2$ for the Owenavorragh River. The 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, 2011**

| River | Site name | Catchment | Site Code | Waterbody code |
|---|---|---|---|---|
| **SERBD Wadeable sites** | | | | |
| Ballyroan | Gloreen Br. | Nore | 15B010200 | SE_15_1938 |
| Banoge | Br u/s Owenavorragh confl | Owenavorragh | 11B020300 | SE_11_257 |
| Douglas (Ballon) | Sragh Br. | Slaney | 12D030200 | SE_12_789 |
| Duag | Br. u/s Ballyporeen | Suir | 16D030100 | SE_16_639 |
| Duncormick | Br. nr Duncormick Rly St. | Duncormick | 13D010350 | SE_13_745 |
| Nuenna | Br. d/s Clomantagh | Nore | 15N020100 | SE_15_1029 |
| **SERBD Non-Wadeable sites** | | | | |
| Owenavorragh | Br. N of Ballinamona | Owenavorragh | 11O010500 | SE_11_251 |

**Table 2.2. Details of river sites surveyed for WFD surveillance monitoring, 2011**

| River | Upstream catchment (km$^2$) | Wetted width (m) | Surface area (m$^2$) | Mean depth (m) | Max depth (m) |
|---|---|---|---|---|---|
| **SERBD Wadeable sites** | | | | | |
| Ballyroan (Gloreen Br.) | 39.26 | 4.97 | 189 | 0.15 | 0.31 |
| Banoge (Br u/s Owenavorragh confl) | 29.44 | 4.45 | 334 | 0.18 | 0.44 |
| Douglas (Ballon) (Sragh Br.) | 15.22 | 4.05 | 365 | 0.13 | 0.25 |
| Duag (Br. u/s Ballyporeen) | 16.44 | 4.20 | 210 | 0.14 | 0.28 |
| Duncormick (Br. nr Duncormick Rly St.) | 36.40 | 4.00 | 180 | 0.19 | 0.46 |
| Nuenna (Br. d/s Clomantagh) | 22.81 | 5.28 | 232 | 0.25 | 0.50 |
| **SERBD Non-Wadeable sites** | | | | | |
| Owenavorragh (Br. N of Ballinamona) | 82.85 | 7.30 | 1679 | 0.41 | 0.83 |

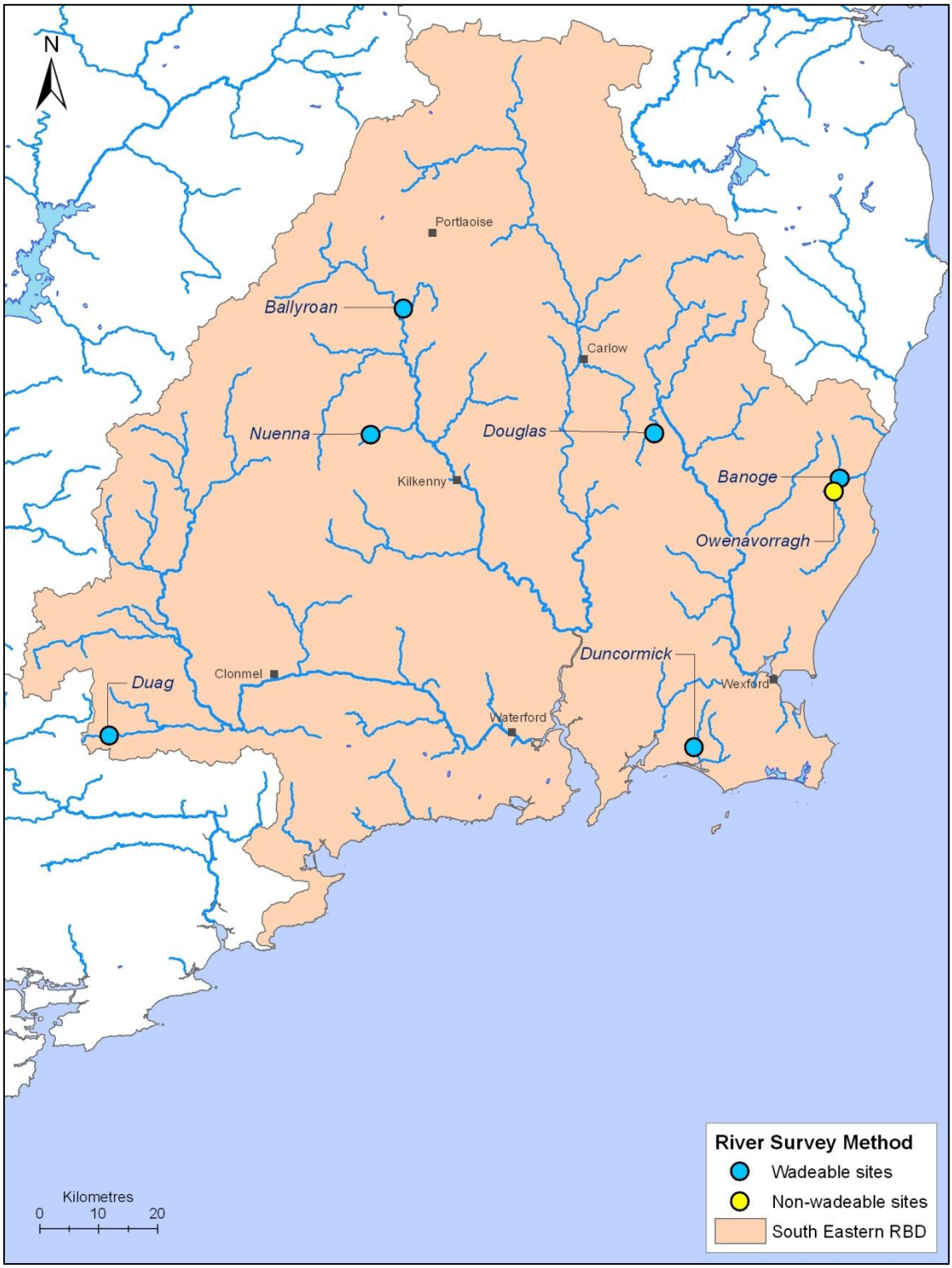


**Fig. 2.1. Location map of river sites surveyed throughout the SERBD for WFD fish surveillance monitoring 2011**

## 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. This technique complies with European Committee for Standardisation (CEN) guidelines for fish stock assessment in wadeable rivers (CEN, 2003). At each site, the stretch sampled was isolated, where possible, using stop nets, and one to three fishings were carried out using bank-based electric fishing units (hand-sets) or boat-based electric fishing units carried in flat-bottomed boats. Each site ideally contained all habitat types, including riffle, glide and pool. A suite of physical and chemical parameters were also recorded at each site, and in some cases also, a macrophyte survey and two-minute multi-habitat kick sample of benthic macroinvertebrates.

Fish from each pass were sorted and processed separately (Plate 3.2). During processing, the species of each fish was identified and its length and weight were measured; sub-samples were measured when large numbers of fish were present. For the purpose of species identification, river lamprey (*Lampetra fluviatilis*) and brook lamprey (*Lampetra planeri*) were treated as one. 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. These fish were held in a large bin of oxygenated water after processing until they were fully recovered and were then returned to the water. Opercular bones were taken from perch for ageing. Samples of European eels were retained for further analysis.

For various reasons, including river width and the practicalities of using stop-nets, three fishing passes were not possible or practical at all sites. 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 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 rates were 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.).

# 4. RESULTS

## 4.1 River surveys

### *4.1.1 The Ballyroan River*

One site was electric fished on the Ballyroan River as part of the WFD surveillance monitoring programme in rivers 2011. The survey site was located upstream of Gloreen Bridge, approximately 1km west of its confluence with the River Nore (Fig. 4.1; Plate 4.1). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 21st of July 2011, along a 38m length of channel. The mean wetted width of the channel was 4.97m and the mean depth was 15.0cm. A total wetted area of 189m$^2$ was surveyed. Glide was the most abundant habitat present along this stretch, while the substrate was a good mix of cobble, gravel and sand. The vegetation at this site was dominated by a variety of emergent bankside species, with a wide variety of riparian species also present along the banks.

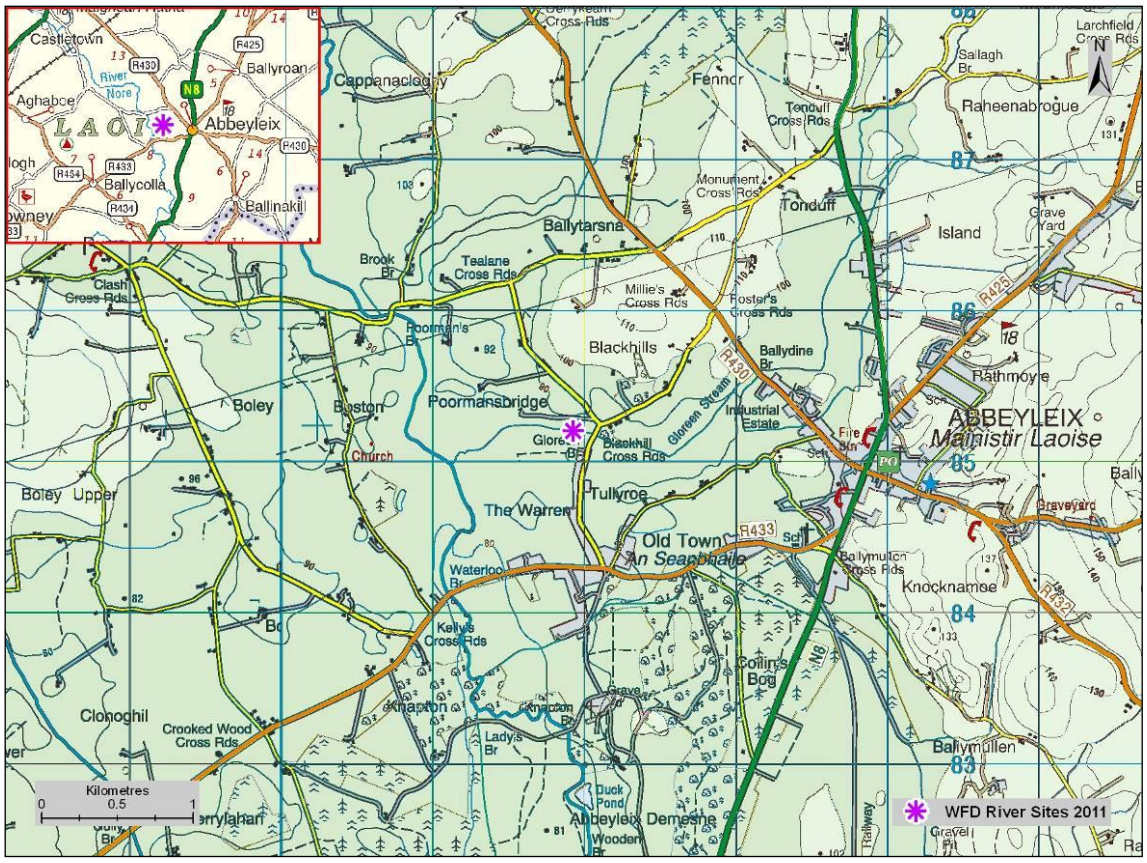


**Fig. 4.1. Location of the Ballyroan River surveillance monitoring site**

**Plate 4.1. The Ballyroan River at Gloreen Bridge, Co. Laois**

A total of six fish species were recorded in the Ballyroan River site. Salmon was the most abundant species, followed by three-spined stickleback, stone loach, eels, lamprey and brown trout (Table 4.1). During the previous survey in 2008, the same species composition was present, with the exception of stone loach, which was only recorded in the 2011 survey.

**Table 4.1. Density of fish (no./m$^2$), Ballyroan River site (fish density has been calculated as minimum estimates based on one fishing)**

| | 2008 | | | 2011 | | |
|---|---|---|---|---|---|---|
| **Common name** | **0+** | **1+ & older** | **Total minimum density** | **0+** | **1+ & older** | **Total minimum density** |
| Salmon | 0.009 | 0.030 | 0.039 | 0.117 | 0.032 | 0.148 |
| Three-spined stickleback | - | - | 0.011 | - | - | 0.079 |
| Stone loach | - | - | - | - | - | 0.032 |
| Eel | - | - | 0.002 | - | - | 0.011 |
| Lamprey sp. | - | - | 0.009 | - | - | 0.005 |
| Brown trout | 0.002 | 0.209 | 0.212 | 0.005 | 0.000 | 0.005 |
| All Fish | - | - | 0.273 | - | - | 0.281 |

Salmon captured during the 2011 survey ranged in length from 4.8cm to 13.7cm (mean = 7.1cm) (Fig. 4.2). Two age classes (0+ and 1+) were present, accounting for approximately 82% and 18% of the total salmon catch respectively. Salmon captured during the 2008 survey had similar lengths ranging from 5.2cm to 14.5cm (mean = 10.4cm) (Fig. 4.2). Two age classes (0+ and 1+) were present, with a mean L1 of 5.3cm, accounting for 27% and 73% of the salmon catch respectively.

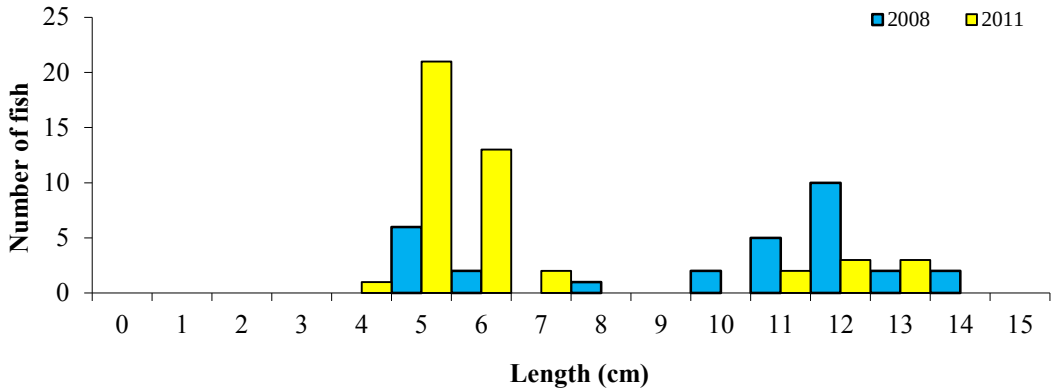


**Fig. 4.2. Length frequency distribution of salmon in the Ballyroan River site, July 2008 (n = 45) and July 2011 (n = 45)**

### *4.1.2 The Banoge River*

One site was electric fished on the Banoge River as part of the WFD surveillance monitoring programme in rivers 2011. The survey site was located, upstream of a bridge, a few hundred metres before the confluence with the Owenavorragh River (Fig 4.3; Plate 4.2). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 21st of July 2011, along a 75m length of channel. The mean wetted width of the channel was 4.45m and the mean depth was 18.0cm. A total wetted area of 334m$^2$ was surveyed. Glide dominated a good mix of habitat along this stretch, while the substrate consisted of mainly cobble. Despite the heavy shading at this site, aquatic vegetation was abundant; filamentous green algae, submerged, floating and emergent species were all prevalent throughout the stretch.

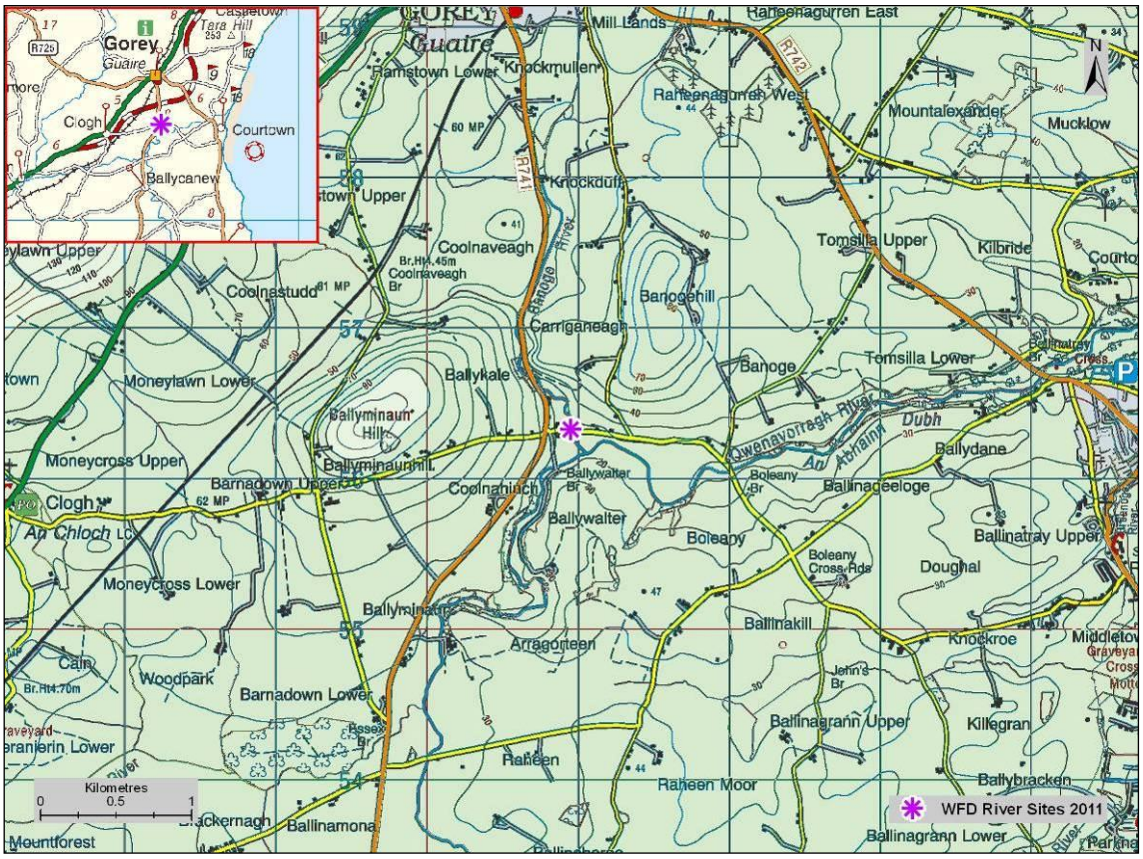


**Fig. 4.3. Location of the Banoge River surveillance monitoring site**

**Plate 4.2. The Banoge River upstream of the Owenavorragh River confluence, Co. Wexford**

A total of six fish species were recorded in the Banoge River site. Stone loach was the most abundant species, followed by brown trout, eels, salmon, minnow and three-spined stickleback (Table 4.2). During the previous survey in 2008, the same species composition was present, with the exception of minnow, which were only recorded in the 2011 survey.

**Table 4.2. Density of fish (no./m$^2$), Banoge River site (fish density has been calculated as minimum estimates based on one fishing)**

| Common name | 2008 | | | 2011 | | |
|---|---|---|---|---|---|---|
| | 0+ | 1+ & older | Total minimum density | 0+ | 1+ & older | Total minimum density |
| Stone loach | - | - | 0.036 | - | - | 0.174 |
| Brown trout | 0.005 | 0.017 | 0.022 | 0.096 | 0.039 | 0.135 |
| Eel | - | - | 0.088 | - | - | 0.057 |
| Salmon | 0.003 | 0.025 | 0.028 | 0.036 | 0.003 | 0.036 |
| Minnow | - | - | - | - | - | 0.012 |
| Three-spined stickleback | - | - | 0.002 | - | - | 0.003 |
| All Fish | - | - | 0.175 | - | - | 0.416 |

Brown trout captured during 2011 ranged in length from 5.3cm to 20.9cm (mean = 8.5cm) (Fig. 4.4). Three age classes (0+, 1+ and 2+) were present, accounting for approximately 75%, 24% and 1% of the total brown trout catch respectively. Brown trout captured during the 2008 survey ranged in length from 5.5cm to 19.8cm (mean = 13.9) (Fig. 4.4). Two age classes (0+ and 1+), accounting for 19% and 81% respectively.

Salmon captured during the 2011 survey ranged in length from 5.4cm to 11.2cm (mean = 6.7cm) (Fig. 4.5). Two age classes (0+ and 1+) were present, accounting for approximately 98% and 2% of the total salmon catch respectively. Salmon captured during the 2008 survey ranged in length from 4.8cm to 14.9cm (mean = 11.3cm) (Fig. 4.5). Two age classes were present (0+ and 1+), accounting for 18% and 82% of the salmon catch respectively.

Stone loach captured during the 2011 survey ranged in length from 4.8cm to 8.3cm (mean = 7.0cm) (Fig. 4.6). In 2008 they ranged in length from 5.2cm to 8.6cm (mean = 7.0cm). Eels captured during the 2011 survey ranged in length from 9.1cm to 41.5cm (mean = 20.4cm) (Fig. 4.7). In 2008 they ranged in length from 9.0cm to 39.5cm (mean = 22.1cm).

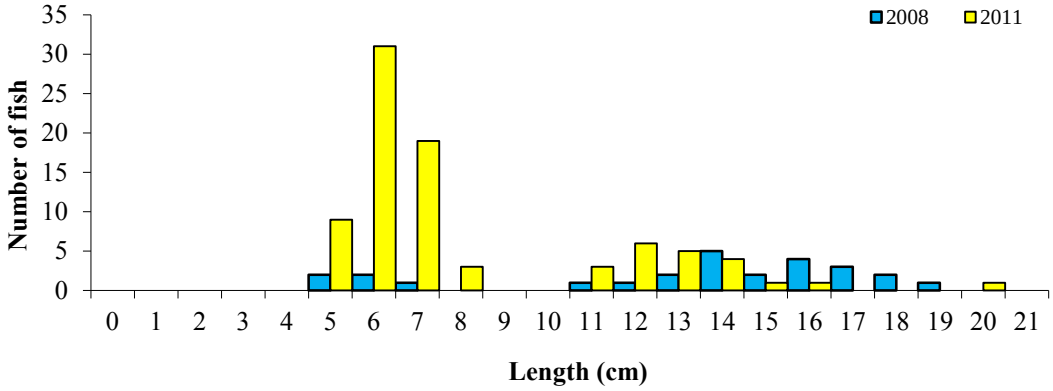


**Fig. 4.4. Length frequency distribution of brown trout in the Banoge River site, June 2008 (n = 26) and July 2011 (n = 83)**

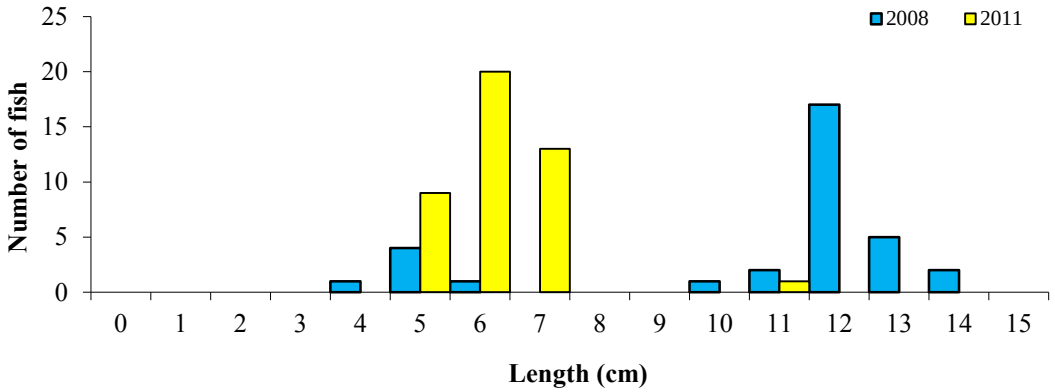


**Fig. 4.5. Length frequency distribution of salmon in the Banoge River site, June 2008 (n = 33) and July 2011 (n = 43)**

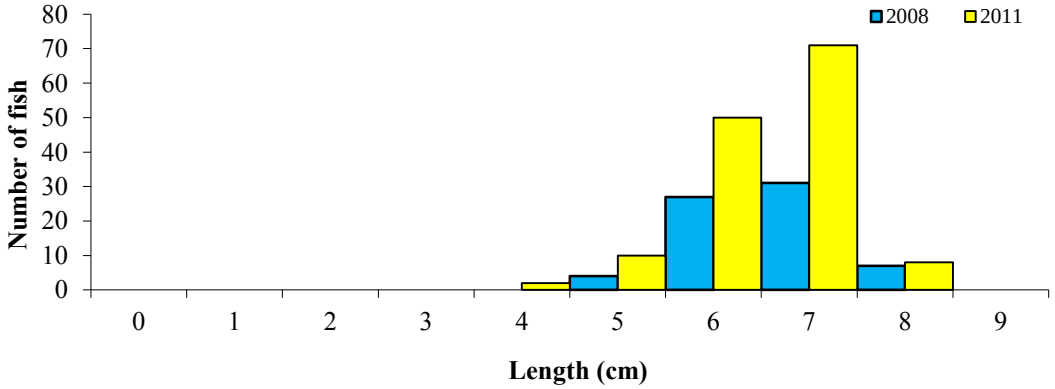


**Fig. 4.6. Length frequency distribution of stone loach in the Banoge River site, June 2008 (n = 69) and July 2011 (n = 141)**

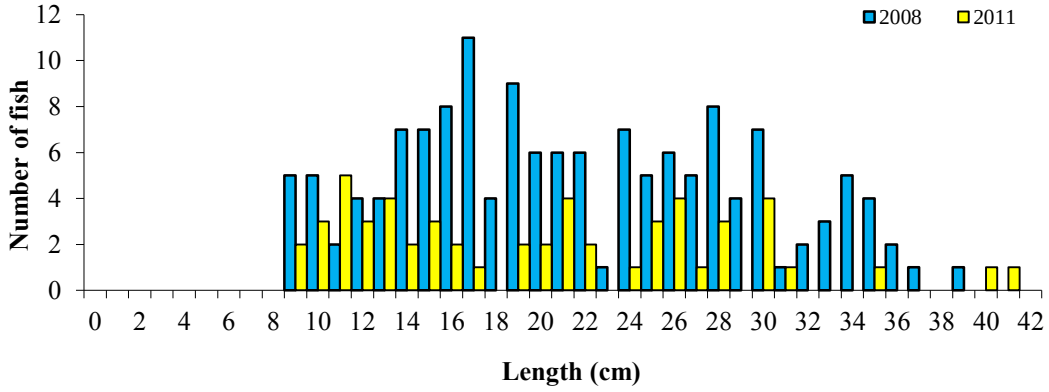


**Fig. 4.7. Length frequency distribution of eels in the Banoge River site, June 2008 (n = 146) and July 2011 (n = 55)**

### *4.1.3 The Douglas (Ballon) River*

One site was electric fished on the Douglas River as part of the WFD surveillance monitoring programme in rivers 2011. The survey site was located just upstream of Sragh Bridge, approximately two kilometres south east of Ballon (Fig 4.8; Plate 4.3). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 18th of July 2011, along a 90m length of channel. The mean wetted width of the channel was 4.05m and the mean depth was 13.0cm. A total wetted area of 365m$^2$ was surveyed. Pool was the most dominant habitat type along this stretch, while the substrate was an even mix of gravel, sand and mud/silt. Vegetation at this site was dominated by floating and submerged species. The invasive plant, Himalayan balsam, was also present along the banks.

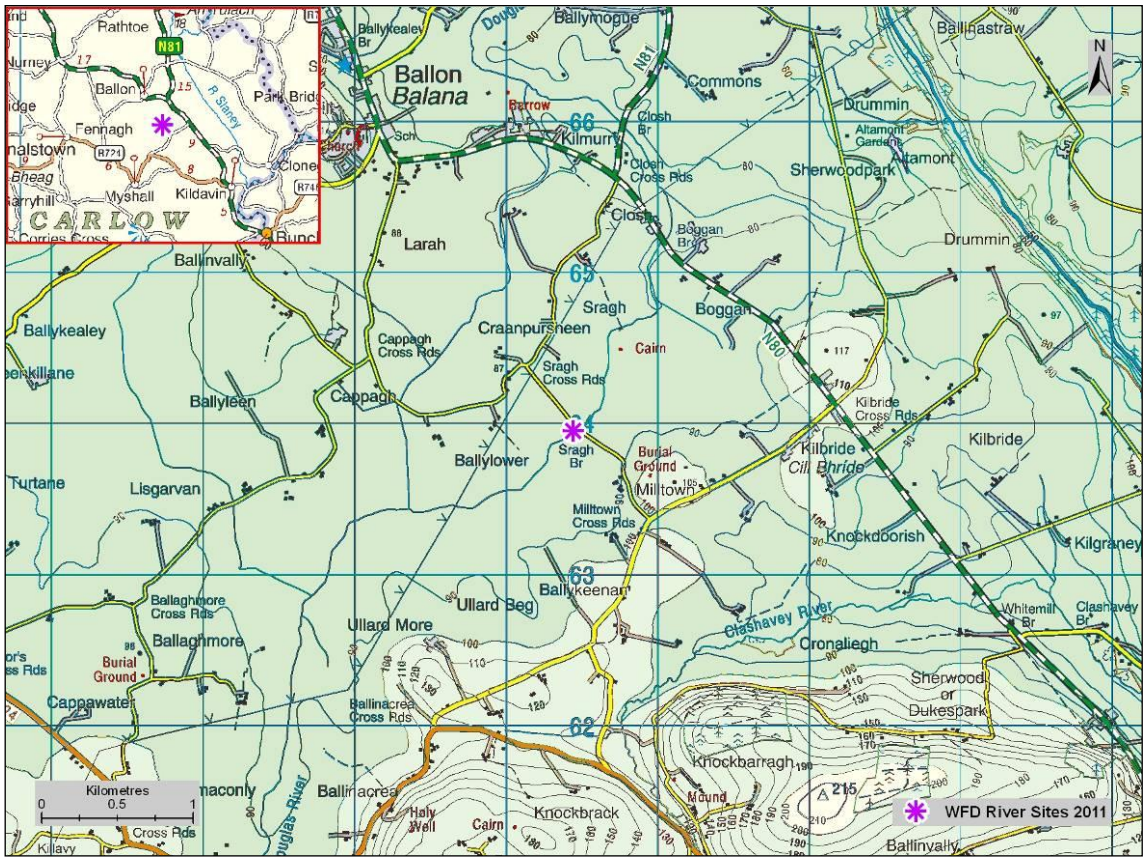


**Fig. 4.8. Location of the Douglas River surveillance monitoring site**

**Plate 4.3. The Douglas River at Sragh Bridge, Co. Carlow**

A total of five fish species were recorded in the Douglas River site. Brown trout was the most abundant species, followed by lamprey, three-spined stickleback, stone loach and eels (Table 4.3). During the previous survey in 2008, the same species composition was present, with the exception of minnow, which were only recorded in the 2008 survey.

**Table 4.3. Density of fish (no./m$^2$), Douglas River site (fish density has been calculated as minimum estimates based on one fishing)**

| Common name | 2008 | | | 2011 | | |
|---|---|---|---|---|---|---|
| | 0+ | 1+ & older | Total minimum density | 0+ | 1+ & older | Total minimum density |
| Brown trout | 0.026 | 0.023 | 0.049 | 0.063 | 0.049 | 0.112 |
| Lamprey sp. | - | - | 0.021 | - | - | 0.066 |
| Three-spined stickleback | - | - | 0.041 | - | - | 0.036 |
| Stone loach | - | - | 0.028 | - | - | 0.022 |
| Eel | - | - | 0.010 | - | - | 0.003 |
| Minnow | - | - | 0.227 | - | - | - |
| All Fish | - | - | 0.376 | - | - | 0.239 |

Lamprey captured during 2011 ranged in length from 4.0cm to 15.1cm (mean = 9.7cm). In 2008 they had similar lengths ranging from 4.0cm to 15.7cm (mean = 9.9cm).

Brown trout captured during the 2011 survey ranged in length from 6.0cm to 21.1cm (mean = 10.8cm) (Fig. 4.10). Three age classes (0+, 1+ and 2+) were present, accounting for approximately 59%, 33% and 8% of the total brown trout catch respectively. Brown trout captured during the 2008 survey ranged in length from 5.9cm to 22.4cm (mean = 10.7cm) (Fig. 4.10). Four age groups (0+ to 3+) were present, accounting for approximately 64%, 11%, 21% and 4% of the brown trout catch respectively.

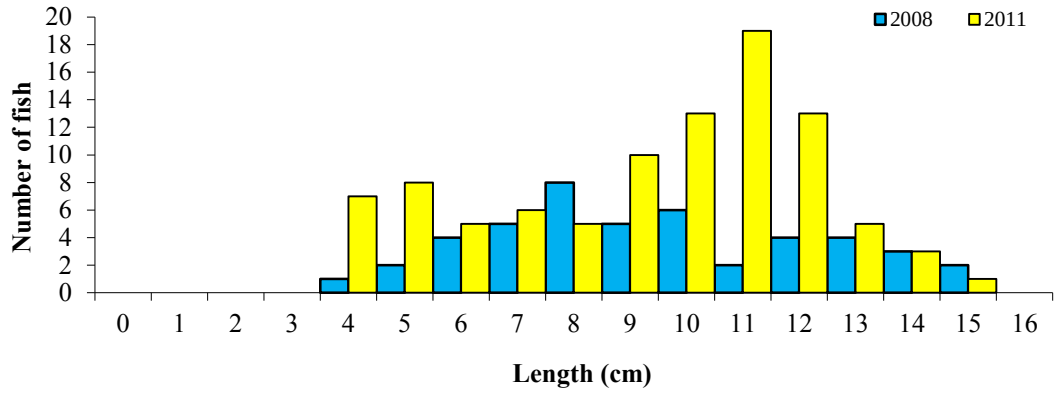


**Fig. 4.9. Length frequency distribution of lamprey in the Douglas River site, July 2008 (n = 46) and July 2011 (n = 95)**

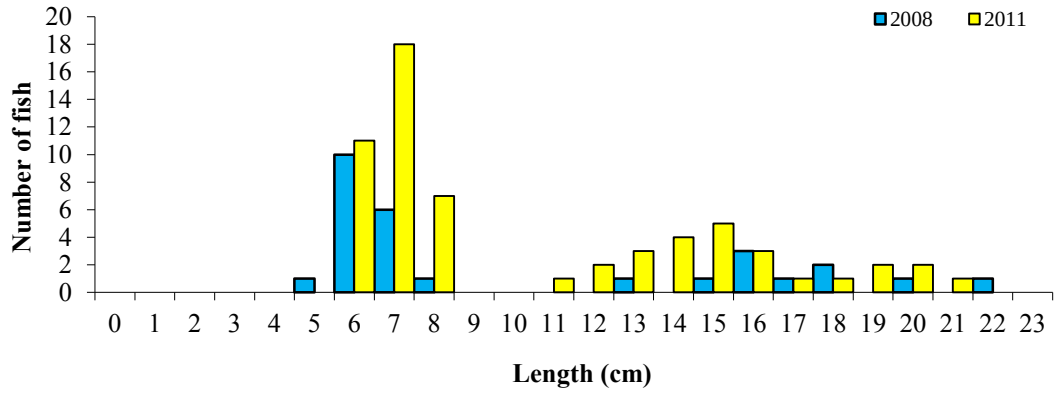


**Fig. 4.10. Length frequency distribution of brown trout in the Douglas River site, July 2008 (n = 28) and July 2011 (n = 61)**

### *4.1.4 The Duag River*

One site was electric fished on the Duag River as part of the WFD surveillance monitoring programme in rivers 2011. The survey site was located downstream of an unnamed bridge located approximately 1.5 kilometres west of Ballyporeen in Co. Tipperary (Fig. 4.11; Plate 4.4). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 20th of July 2011, along a 45m length of channel. The mean wetted width of the channel was 4.20m and the mean depth was 14.0cm. A total wetted area of 189m$^2$ was surveyed. Riffle and glide dominated the habitat along this stretch, while the substrate was a good mix of cobble, gravel and sand. A wide variety of vegetation was recorded at this site, with filamentous green algae, bryophytes and emergent bankside species all abundant throughout.

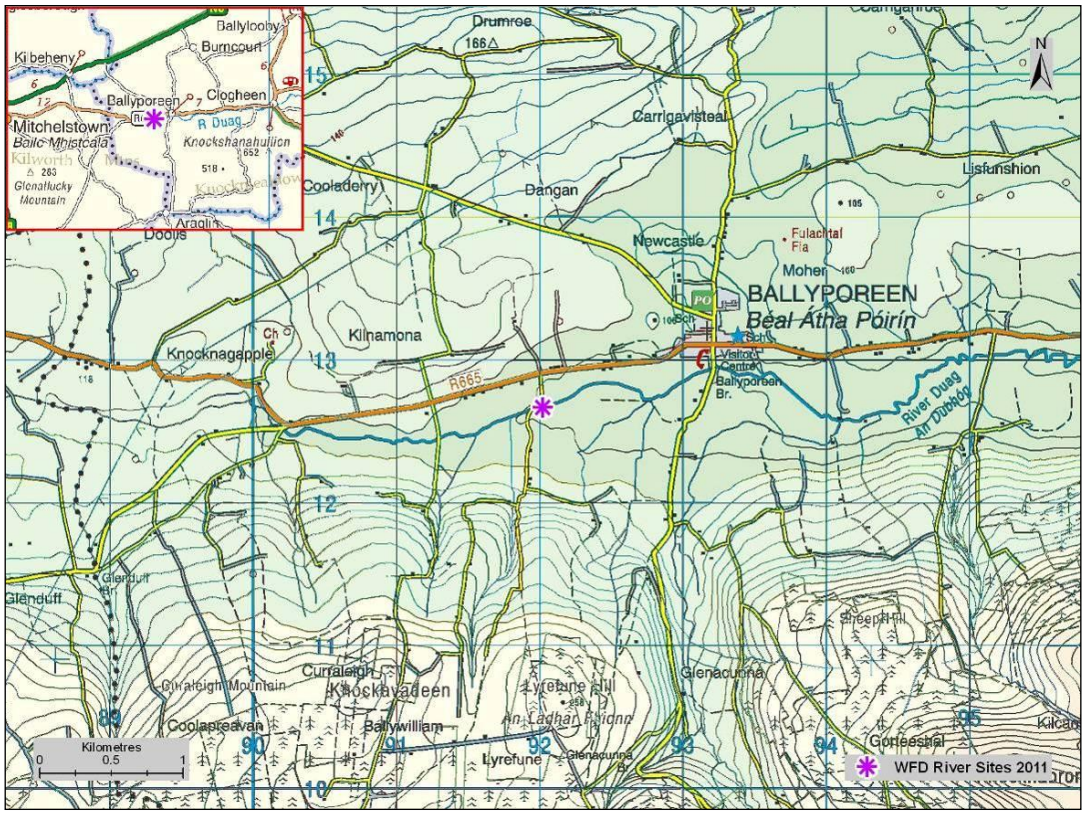


**Fig. 4.11. Location of the Duag River surveillance monitoring site**

**Plate 4.4. The Duag River near Ballyporeen, Co. Tipperary**

A total of five fish species were recorded in the Duag River site. Brown trout was the most abundant species, followed by salmon, lamprey, stone loach and three-spined stickleback (Table 4.4). This river was also surveyed in 2008, with results from that survey also shown, for comparative purposes. In comparison to the previous survey in 2008, most of the same species were present, with the exception of stone loach, which were only recorded in 2011, and eels, which were only recorded in 2008.

**Table 4.4. Density of fish (no./m$^2$), Duag River site (fish density has been calculated as minimum estimates based on one fishing)**

| Common name | 2008 | | | 2011 | | |
|---|---|---|---|---|---|---|
| | 0+ | 1+ & older | Total minimum density | 0+ | 1+ & older | Total minimum density |
| Brown trout | 0.070 | 0.027 | 0.097 | 0.487 | 0.037 | 0.524 |
| Salmon | 0.005 | 0.035 | 0.040 | 0.042 | 0.000 | 0.042 |
| Lamprey sp. | - | - | 0.027 | - | - | 0.037 |
| Stone loach | - | - | - | - | - | 0.011 |
| Three-spined stickleback | - | - | 0.003 | - | - | 0.005 |
| Eel | - | - | 0.013 | - | - | - |
| All Fish | - | - | 0.180 | - | - | 0.619 |

Brown trout captured during 2011 ranged in length from 4.1cm to 14.0cm (mean = 6.8cm) (Fig. 4.12). Two age classes (0+ and 1+) were present, accounting for approximately 95% and 5% of the total brown trout catch respectively. Brown trout captured during the 2008 survey were larger, ranging in length from 4.9cm to 23.7cm (mean = 8.2cm) (Fig. 4.12). Three age classes (0+, 1+ and 2+) were present, accounting for approximately 77%, 17% and 6% of the brown trout population respectively.

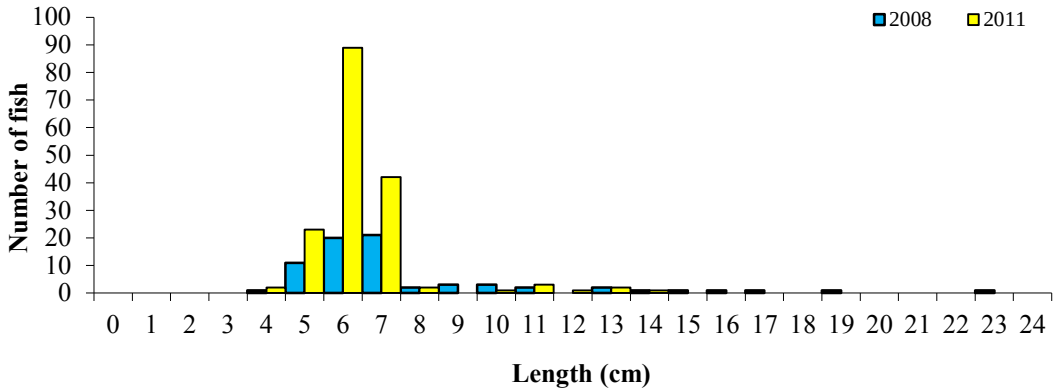


**Fig. 4.12. Length frequency distribution of brown trout in the Duag River site, July 2008 (n = 71) and July 2011 (n = 166)**

### *4.1.5 The Duncormick River*

One site was electric fished on the Duncormick River as part of the WFD surveillance monitoring programme in rivers 2011. The survey site was located just downstream of a railway bridge near Duncormick village (Fig 4.13; Plate 4.5). Two electric-fishing passes were conducted using two bank-based electric fishing units on the 6th of July 2011, along a 45m length of channel. The mean wetted width of the channel was 4.00m and the mean depth was 19.0cm. A total wetted area of 180m$^2$ was surveyed. Pool and glide dominated the habitat along this stretch, while the substrate was a good mix of sand, gravel and cobble. The instream vegetation at this site consisted mainly of bryophytes and emergent bankside species.

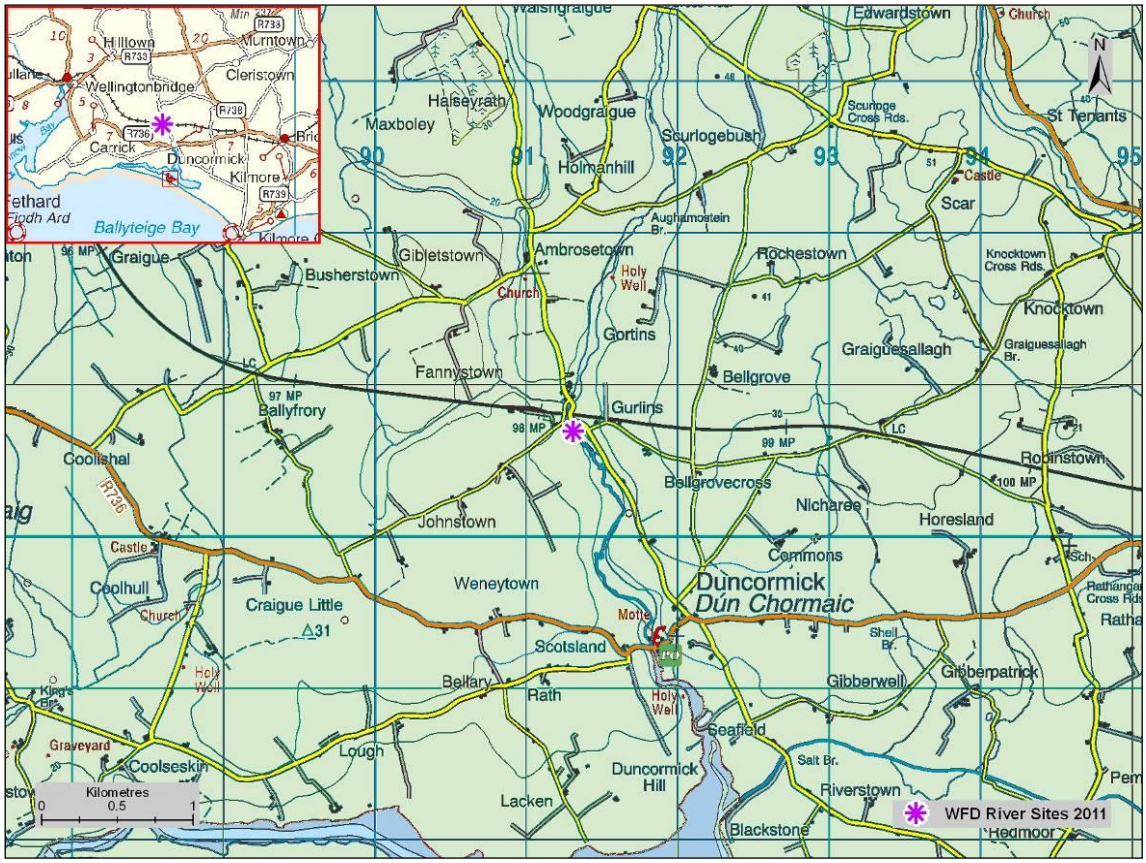


**Fig. 4.13. Location of the Duncormick River surveillance monitoring site**

**Plate 4.5. The Duncormick River upstream of Duncormick Village, Co. Wexford**

A total of four fish species were recorded in the Duncormick River site. Brown trout was the most abundant species, followed by eels, stone loach and three-spined stickleback (Table 4.5). In contrast to the previous survey in 2008, the same species were recorded with the exception of flounder and salmon, which were not recorded in 2011.

**Table 4.5. Density of fish (no./m$^2$), Duncormick River site (fish density has been calculated as minimum estimates based on one fishing)**

| Common name | 2008 | | | 2011 | | |
|---|---|---|---|---|---|---|
| | 0+ | 1+ & older | Total minimum density | 0+ | 1+ & older | Total minimum density |
| Brown trout | 0.061 | 0.053 | 0.114 | 0.022 | 0.222 | 0.244 |
| Eel | - | - | 0.025 | - | - | 0.033 |
| Stone loach | - | - | 0.004 | - | - | 0.011 |
| Three-spined stickleback | - | - | 0.019 | - | - | 0.006 |
| Flounder | - | - | 0.002 | - | - | - |
| Salmon | 0.013 | 0.006 | 0.019 | - | - | - |
| All Fish | - | - | 0.184 | - | - | 0.294 |

Brown trout captured during the 2011 survey ranged in length from 5.9cm to 27.2cm (mean = 15.8cm) (Fig. 4.14). Four age classes (0+, 1+, 2+ and 3+) were present, accounting for approximately 14%, 64%, 17%, and 5% of the total brown trout catch respectively. Brown trout captured during 2008 ranged in length from 5.0cm to 26.2cm (mean = 9.9cm) (Fig. 4.14). Three age classes (0+, 1+ and 2+) were present, accounting for approximately 63%, 28% and 9% of the brown trout catch respectively.

Eels captured during the 2011 survey ranged in length from 7.7cm to 28.1cm (mean = 17.4cm) (Fig. 4.15). In 2008 they had similar lengths, ranging from 8.1cm to 28.5cm (mean = 14.3cm).

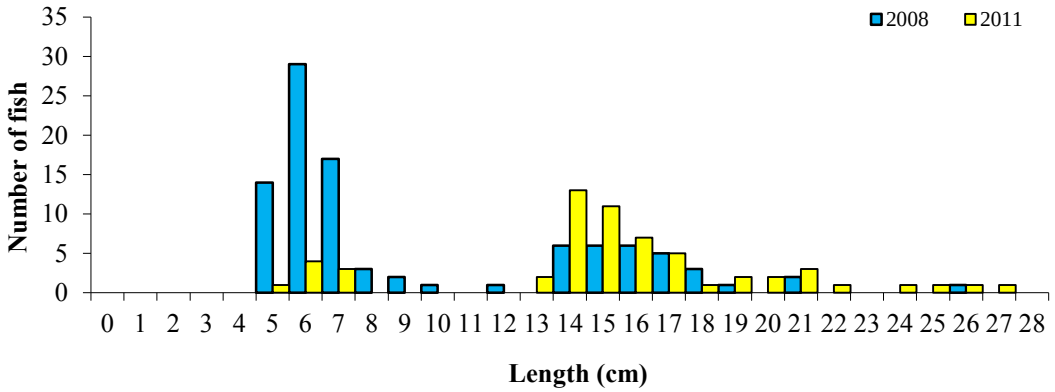


**Fig. 4.14. Length frequency distribution of brown trout in the Duncormick River site, July 2008 (n = 97) and July 2011 (n = 59)**

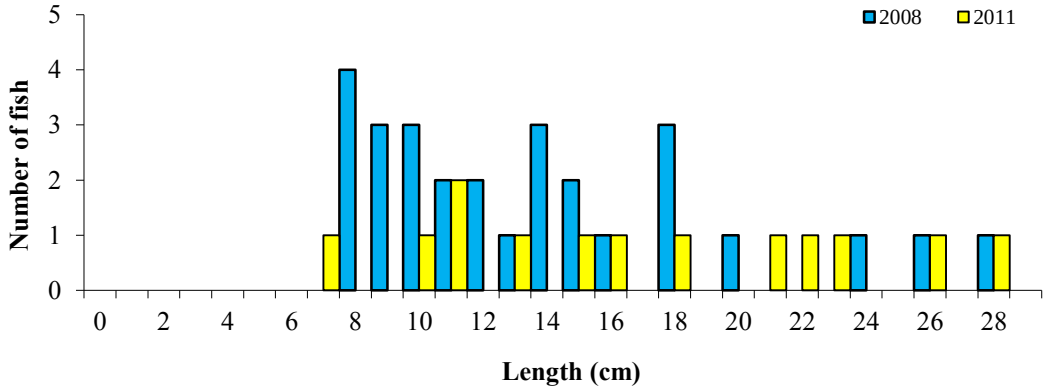


**Fig. 4.15. Length frequency distribution of eels in the Duncormick River site, July 2008 (n = 28) and July 2011 (n = 13)**

### *4.1.6 The Nuenna River*

One site was electric fished on the Nuenna River as part of the WFD surveillance monitoring programme in rivers 2011. The survey site was located relatively high up on the system, on the downstream side of the bridge just outside Clomantagh village and approximately five kilometres south-west of Freshford (Fig. 4.16; Plate 4.6). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 19th of July 2011, along a 44m length of channel. The mean wetted width of the channel was 5.28m and the mean depth was 25.0cm. A total wetted area of 232m$^2$ was surveyed. The habitat along this stretch was well mixed, with glide dominant, while the substrate was comprised of mainly gravel and cobble and sand. A wide variety of vegetation was recorded throughout this site, with filamentous green algae, bryophytes and emergent bankside species all abundant.

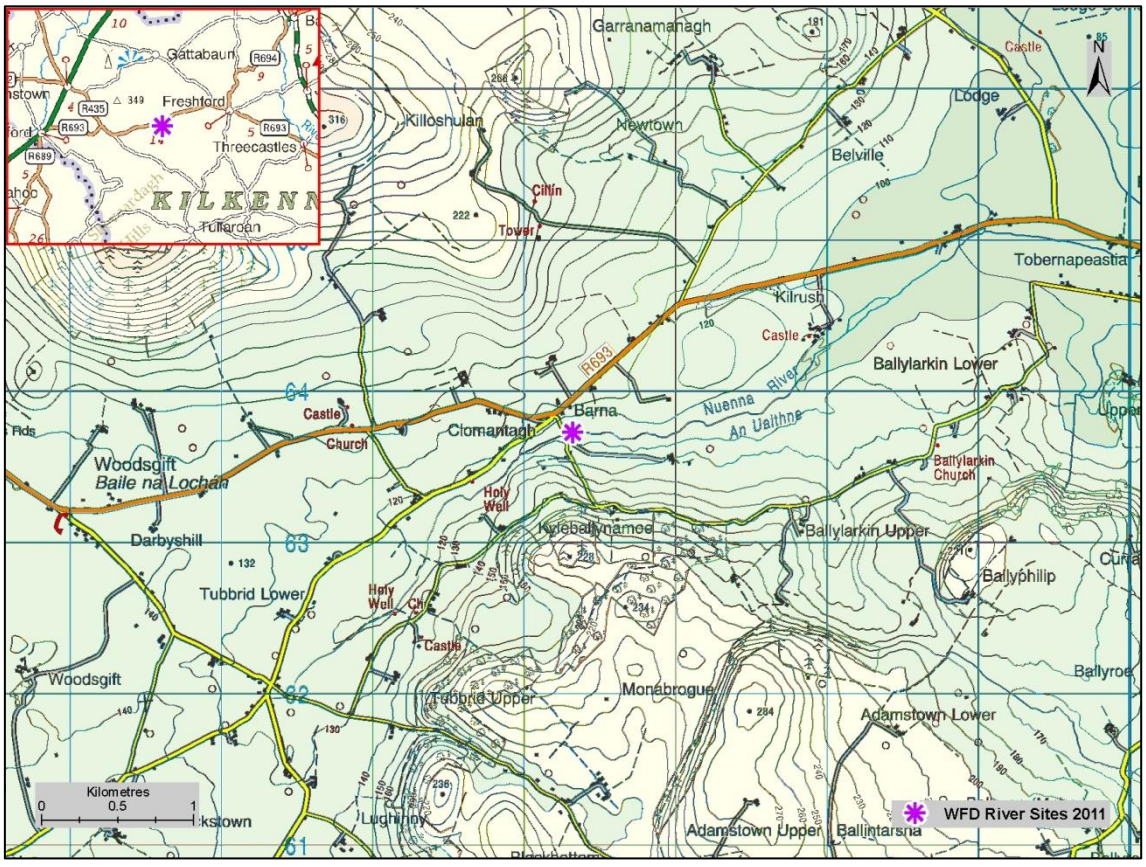


**Fig. 4.16. Location of the Nuenna River surveillance monitoring site**

**Plate 4.6. The Nuenna River (bridge d/s Clomantagh) near Freshford, Co. Kilkenny**

A total of three fish species were recorded in the Nuenna River site. Brown trout was the most abundant species, followed by three-spined stickleback and lamprey (Table 4.6). The same species composition was recorded in 2008 with the exception of lamprey, which were only recorded in 2011.

**Table 4.6. Density of fish (no./m$^2$), Nuenna River site (fish density has been calculated as minimum estimates based on one fishing)**

| Common name | 2008 | | | 2011 | | |
|---|---|---|---|---|---|---|
| | 0+ | 1+ & older | Total minimum density | 0+ | 1+ & older | Total minimum density |
| Brown trout | 0.028 | 0.058 | 0.086 | 0.155 | 0.086 | 0.241 |
| Three-spined stickleback | - | - | 0.003 | - | - | 0.039 |
| Lamprey sp. | - | - | - | - | - | 0.004 |
| All Fish | - | - | 0.088 | - | - | 0.284 |

Brown trout captured during the 2011 survey ranged in length from 3.5cm to 19.2cm (mean = 7.9cm) (Fig. 4.17). Three age classes (0+, 1+ and 2+) were present, accounting for approximately 68%, 25% and 8% of the total brown trout catch respectively. Brown trout captured during 2008 ranged in length from 4.5cm to 25.2cm (mean = 13.5cm) (Fig. 4.17). Four age classes (0+, 1+, 2+ and 3+) were present, respectively, accounting for approximately 24%, 26%, 43% and 7% of the brown trout population respectively.

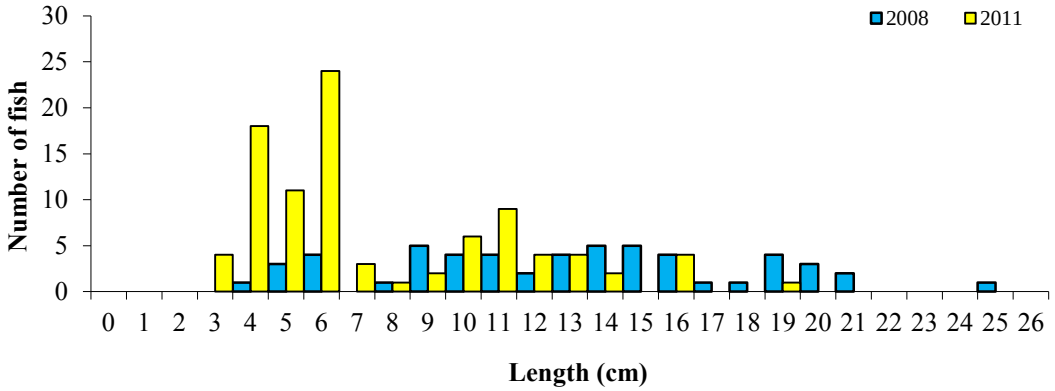


**Fig. 4.17. Length frequency distribution of brown trout in the Nuenna River site, July 2008 (n = 54) and July 2011 (n = 93)**

### *4.1.7 The Owenavorragh River*

One site was electric fished on the Owenavorragh River as part of the WFD surveillance monitoring programme in rivers 2011. The survey site was located downstream of a bridge located north of Ballinamona, just before its confluence with the Brackan River (Fig. 4.18; Plate 4.7). Two electric-fishing passes were conducted using two boat-based electric fishing units on the 8th of July 2011, along a 230m length of channel.

Mean wetted width of the channel was 7.30m and the mean depth was 41.0cm. A total wetted area of 1679m$^2$ was surveyed. Glide dominated the habitat along this stretch, while the substrate was almost entirely composed of gravel. The vegetation at this site was dominated by bankside emergent species.

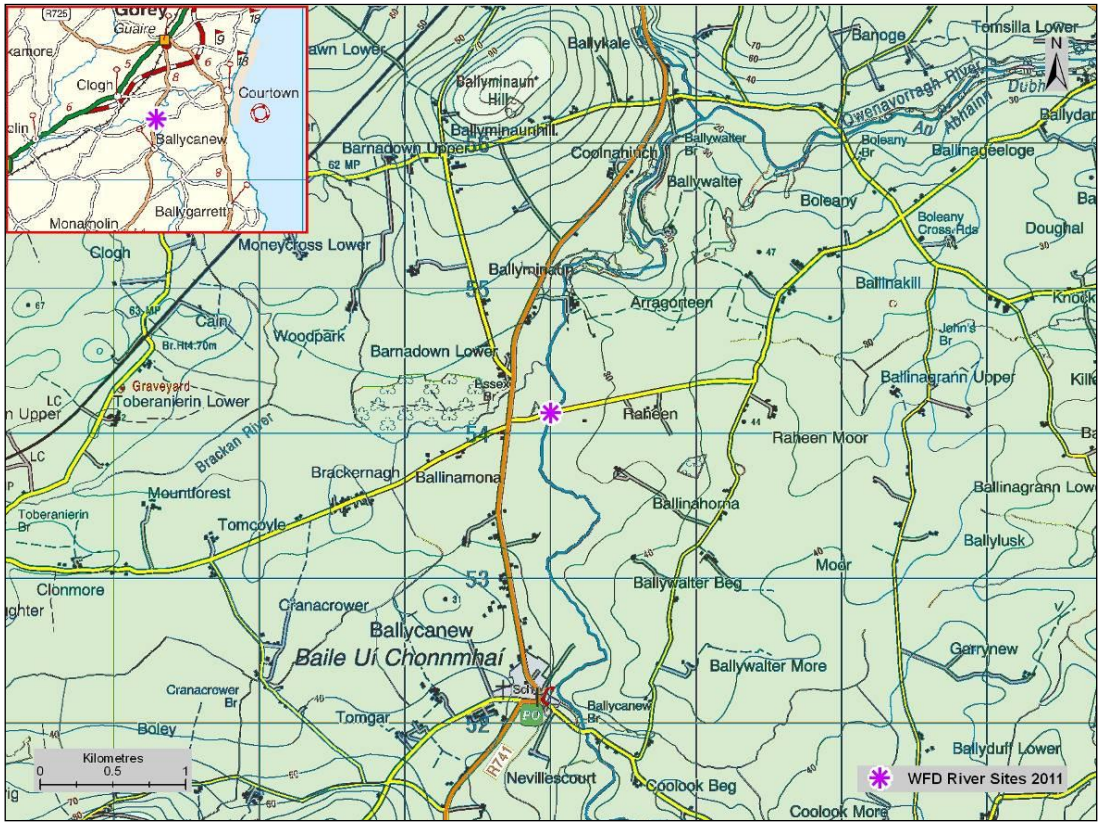


**Fig. 4.18. Location of the Owenavorragh River surveillance monitoring site**

**Plate 4.7. The Owenavorragh River (bridge north of Ballinamona), Ballycanew, Co. Wexford**

A total of six fish species were recorded in Owenavorragh River site (sea trout are included as a separate variety of trout). Minnow was the most abundant species, followed by brown trout, salmon, stone loach, three-spined stickleback, sea trout, and lamprey (Table 4.7). During the previous survey in 2008, the same species composition was present, with the exception of eels, which were only recorded in the 2008 survey.

**Table 4.7. Density of fish (no./m$^2$), Owenavorragh River site (fish density has been calculated as minimum estimates based on one fishing)**

| Common name | 2008 | | | 2011 | | |
|---|---|---|---|---|---|---|
| | 0+ | 1+ & older | Total minimum density | 0+ | 1+ & older | Total minimum density |
| Minnow | - | - | 0.082 | - | - | 0.129 |
| Brown trout | 0.027 | 0.023 | 0.051 | 0.001 | 0.017 | 0.018 |
| Salmon | 0.041 | 0.010 | 0.051 | 0.002 | 0.004 | 0.006 |
| Stone loach | - | - | 0.031 | - | - | 0.003 |
| Three-spined stickleback | - | - | 0.008 | - | - | 0.002 |
| Sea trout | - | - | 0.002 | - | - | 0.002 |
| Lamprey sp. | - | - | 0.032 | - | - | 0.001 |
| Eel | - | - | 0.010 | - | - | - |
| All Fish | - | - | 0.267 | - | - | 0.161 |

Minnow captured during the 2011 survey ranged in length from 1.7cm to 7.3cm (mean = 4.9cm) (Fig. 4.19). In 2008 they ranged in length from 1.5cm to 9.0cm (mean = 5.2cm).

Brown trout captured during the 2011 survey ranged in length from 6.8cm to 33.9cm (mean = 19.9cm) (Fig. 4.20). Four age classes (0+, 1+, 2+ and 3+) were present, accounting for approximately 4%, 70%, 25% and 2% of the total brown trout catch respectively. Brown trout captured during the 2008 survey had similar lengths, ranging from 6.5cm to 33.5cm (mean 16.4cm) (Fig. 4.20). Three age classes (0+, 1+ and 2+) were present, accounting for 50%, 43% and 7% of the brown trout catch respectively.

Salmon captured during the 2011 survey ranged in length from 5.2cm to 15.9cm (mean = 10.1cm) (Fig. 4.21). Two age classes (0+ and 1+) were present, accounting for approximately 44% and 56% of the total salmon catch respectively. Salmon during the 2008 survey ranged in length from 5.5cm to 16.6cm (mean = 10.1cm) (Fig. 4.21). Two age classes (0+ and 1+) were present, accounting for approximately 80% and 20% of the population respectively.

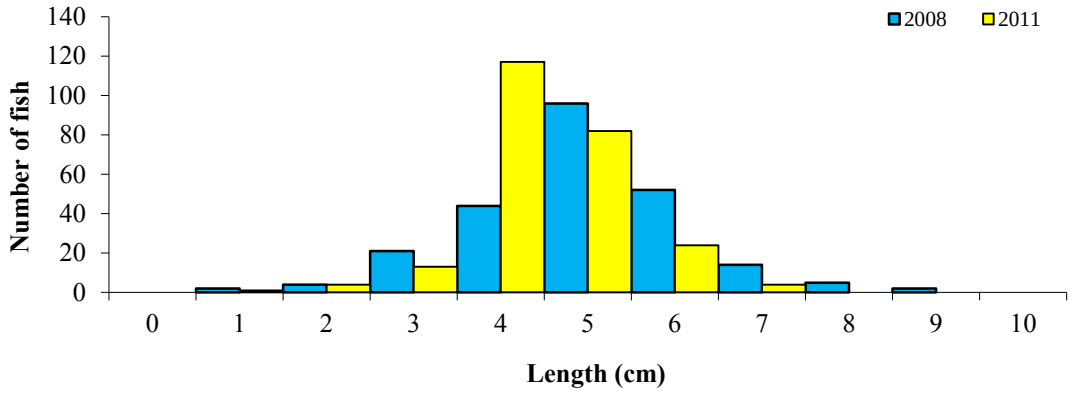


**Fig. 4.19. Length frequency distribution of minnow in the Owenavorragh River site, September 2008 (n = 240) and July 2011 (n = 245)**

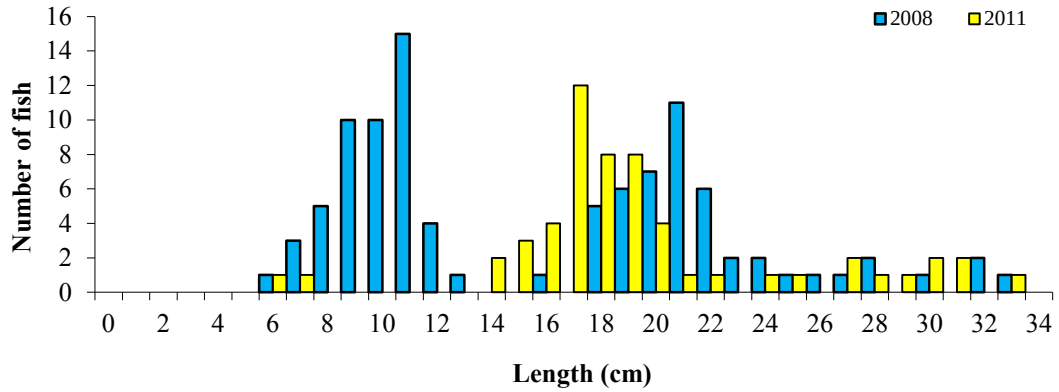


**Fig. 4.20. Length frequency distribution of brown trout in the Owenavorragh River site, September 2008 (n = 98) and July 2011 (n = 56)**

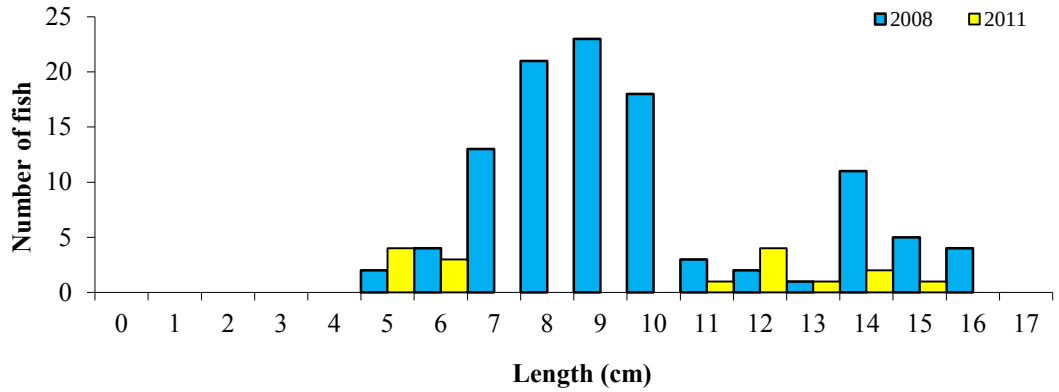


**Fig. 4.21. Length frequency distribution of salmon in the Owenavorragh River site, September 2008 (n =107 (sub-sample)) and July 2011 (n = 16)**

## 4.2 Community structure

### *4.2 Species distribution*

A total of eight fish species (sea trout are included as a separate 'variety' of trout) were recorded within the seven SERBD sites surveyed during 2011(Fig.4.21). Brown trout and three-spined stickleback were the most common fish species recorded, occurring in all of the sites surveyed, followed by stone loach (86%), lamprey (71%), eels and salmon (57%) and minnow (29%). Sea trout were only recorded at one site.

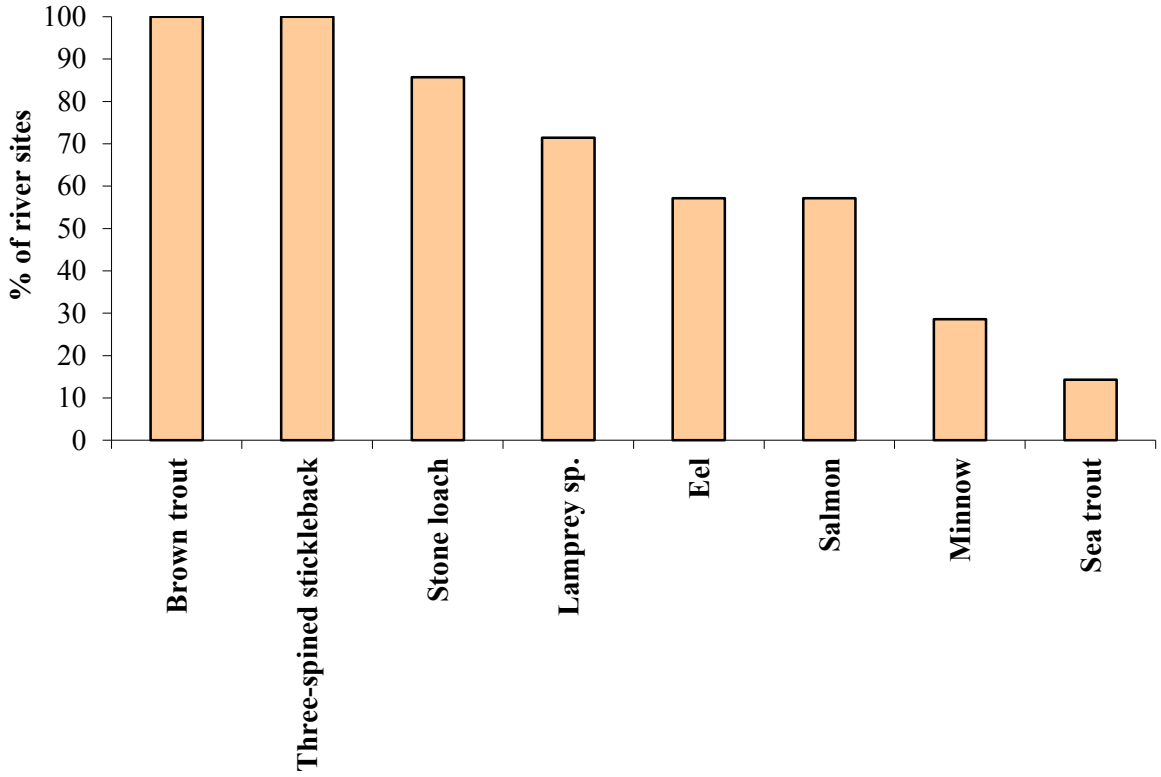


**Fig. 4.22. Percentage of sites where each fish species was recorded in the SERBD for WFD SM monitoring 2011**

### 4.3 Age and growth

Growth rates based on back-calculated length-at-age data were analysed for brown trout, salmon and sea trout in each river site surveyed in the SERBD during 2011.

The mean back-calculated length-at-age data for brown trout in the SERBD are shown in Figure 4.23 and Appendix 1. Brown trout were recorded in all seven sites, with six sites containing brown trout aged 1+ or older. Ages ranged from 0+ to 3+, and fish aged 0+ comprised the most abundant age class within the region. The largest brown trout recorded in the SERBD in 2011 was caught in the Owenavorragh River, which measured 33.9cm in length, weighed 526g and was aged 2+. 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 could only be reliably estimated from fish at sites where individual fish were 2+ or older, and where sufficient numbers were caught. Growth was considered "very fast" at the Owenavorragh site (Appendix 1).

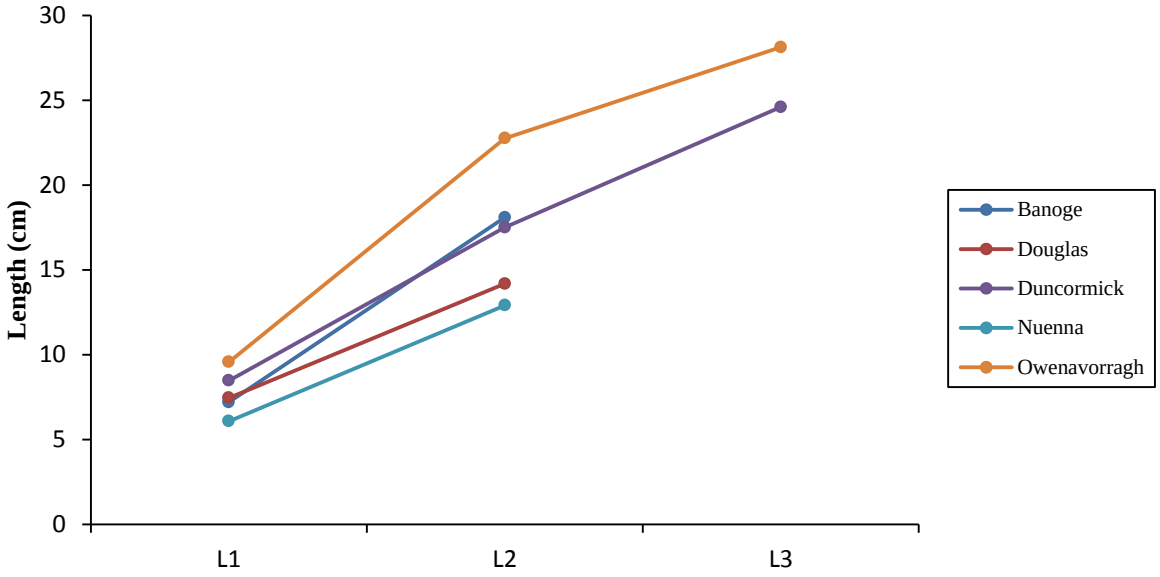


**Fig. 4.23. Back calculated lengths for brown trout in each river, WFD surveillance monitoring 2011**

The mean back-calculated length-at-age data for salmon in the SERBD are shown in Appendix 2. Salmon were recorded in four sites, with three of these sites containing salmon aged 1+ or older. Ages ranged from 0+ to 1+, and fish aged 0+ comprised the most abundant age class within the region. Although low numbers were caught, the largest salmon recorded in the SERBD in 2011 was caught in the Owenavorragh River, which measured 15.9cm in length, weighed 58.5g and was aged 1+.

### 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 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 2011 has been assigned a draft fish classification status (Table 4.11). All but one sites was classed as "Moderate", while the Nuenna was classified as "Good". Only the Nuenna showed an improvement when compared to the 2008 status classification, while another site, the Duag had deteriorated (Table 4.11).

**Table 4.11. Ecological status of sites surveyed in the SERBD for surveillance monitoring 2011 (figures in brackets indicate confidence in class)**

| River | Site Code | Site name | Previous ecological status | Ecological status 2011 |
|---|---|---|---|---|
| Ballyroan | 15B010200 | Gloreen Br. | Moderate (2008) | Moderate |
| Banoge | 11B020300 | Br u/s Owenavorragh confl | Moderate (2008) | Moderate |
| Douglas (Ballon) | 12D030200 | Sragh Br. | Moderate (2008) | Moderate (52%) |
| Duag | 16D030100 | Br. u/s Ballyporeen | Good (2008) | Moderate (100%) |
| Duncormick | 13D010350 | Br. nr Duncormick Rly St. | Moderate (2008) | Moderate (79%) |
| Nuenna | 15N020100 | Br. d/s Clomantagh | Moderate (2008) | Good (68%) |
| Owenavorragh | 11O010500 | Br. N of Ballinamona | Moderate (2008) | Moderate (78%) |

## 5. DISCUSSION

A total of eight fish species (sea trout are included as a separate variety of trout) were recorded during the 2011 WFD rivers surveillance monitoring programme for fish in rivers within the SERBD. Brown trout and three-spined stickleback were the two most commonly encountered species in the SERBD, recorded in all seven sites, followed by stone loach and lamprey. The Owenavorragh River was the most diverse site surveyed within the SERBD for the Water Framework Directive in 2011 with a total of seven species present. The site that recorded the lowest diversity in this region was the Nuenna River (nore catchment), with three species present, brown trout, lamprey and three-spined stickleback. The greatest abundances of brown trout and salmon were recorded in the Duag River (Suir catchment) and Ballyroan River (Nore catchment) respectively. The Owenavorragh River was the only river surveyed in 2011 where sea trout were recorded.

Following the methods of Kennedy and Fitzmaurice (1971), growth could only be estimated at one site, on the Owenavorragh River, where the growth was considered "very fast".

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 2011 has been assigned a draft fish classification status. All sites were classified as "Moderate" except for the Nuenna, which was classified as "Good". All of these sites were surveyed in both 2008 and 2011 and when comparing the status for both years, one site had improved, while another had deteriorated.

## 6. REFERENCES

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Council of the European Communities (2000) Establishing a framework for Community action in the field of water policy. Directive of the European Parliament and of the Council establishing a framework for community action in the field of water policy (2000/60/EC). *Official Journal of the European Communities*, **43**, 1-73.

Kennedy, M. and Fitzmaurice, P. (1971) Growth and food of Brown Trout *Salmo Trutta* (L.) in Irish Waters. *Proceedings of the Royal Irish Academy*, **71 (B) (18),** 269-352.

## 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 | Growth Category |
|---|---|---|---|---|---|
| **Banoge** | Mean | 7.20 | n/a | | n/a |
| | S.D. | 1.36 | n/a | | |
| | S.E. | 0.30 | n/a | | |
| | n | 20 | 1 | | |
| | Min | 5.21 | 18.09 | | |
| | Max | 10.05 | 18.09 | | |
| **Douglas** | Mean | 7.46 | 14.18 | | n/a |
| | S.D. | 1.67 | 2.36 | | |
| | S.E. | 0.42 | 1.67 | | |
| | n | 16 | 2 | | |
| | Min | 5.56 | 12.50 | | |
| | Max | 11.73 | 15.85 | | |
| **Duag** | Mean | 5.58 | | | n/a |
| | S.D. | 0.81 | | | |
| | S.E. | 0.30 | | | |
| | n | 7 | | | |
| | Min | 4.37 | | | |
| | Max | 6.42 | | | |
| **Duncormick** | Mean | 8.47 | 17.50 | 24.59 | n/a |
| | S.D. | 1.47 | 2.62 | 1.03 | |
| | S.E. | 0.27 | 0.93 | 0.73 | |
| | n | 29 | 8 | 2 | |
| | Min | 5.59 | 14.43 | 23.87 | |
| | Max | 11.08 | 21.63 | 25.32 | |
| **Nuenna** | Mean | 6.08 | 12.90 | | n/a |
| | S.D. | 1.31 | 2.49 | | |
| | S.E. | 0.28 | 1.11 | | |
| | n | 22 | 5 | | |
| | Min | 3.97 | 8.60 | | |
| | Max | 8.40 | 14.61 | | |
| **Owenavorragh** | Mean | 9.57 | 22.76 | n/a | Very fast |
| | S.D. | 1.83 | 3.66 | n/a | |
| | S.E. | 0.31 | 1.10 | n/a | |
| | n | 36 | 11 | 1 | |
| | Min | 6.53 | 14.30 | 28.12 | |
| | Max | 13.66 | 29.06 | 28.12 | |

## APPENDIX 2

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

| River | | L1 |
|---|---|---|
| **Ballyroan** | Mean | 5.47 |
| | S.D. | 0.69 |
| | S.E. | 0.26 |
| | n | 7 |
| | Min | 4.40 |
| | Max | 6.51 |
| **Banoge** | Mean | n/a |
| | S.D. | n/a |
| | S.E. | n/a |
| | n | 1 |
| | Min | 5.43 |
| | Max | 5.43 |
| **Owenavorragh** | Mean | 5.99 |
| | S.D. | 0.88 |
| | S.E. | 0.29 |
| | n | 9 |
| | Min | 4.73 |
| | Max | 7.66 |

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