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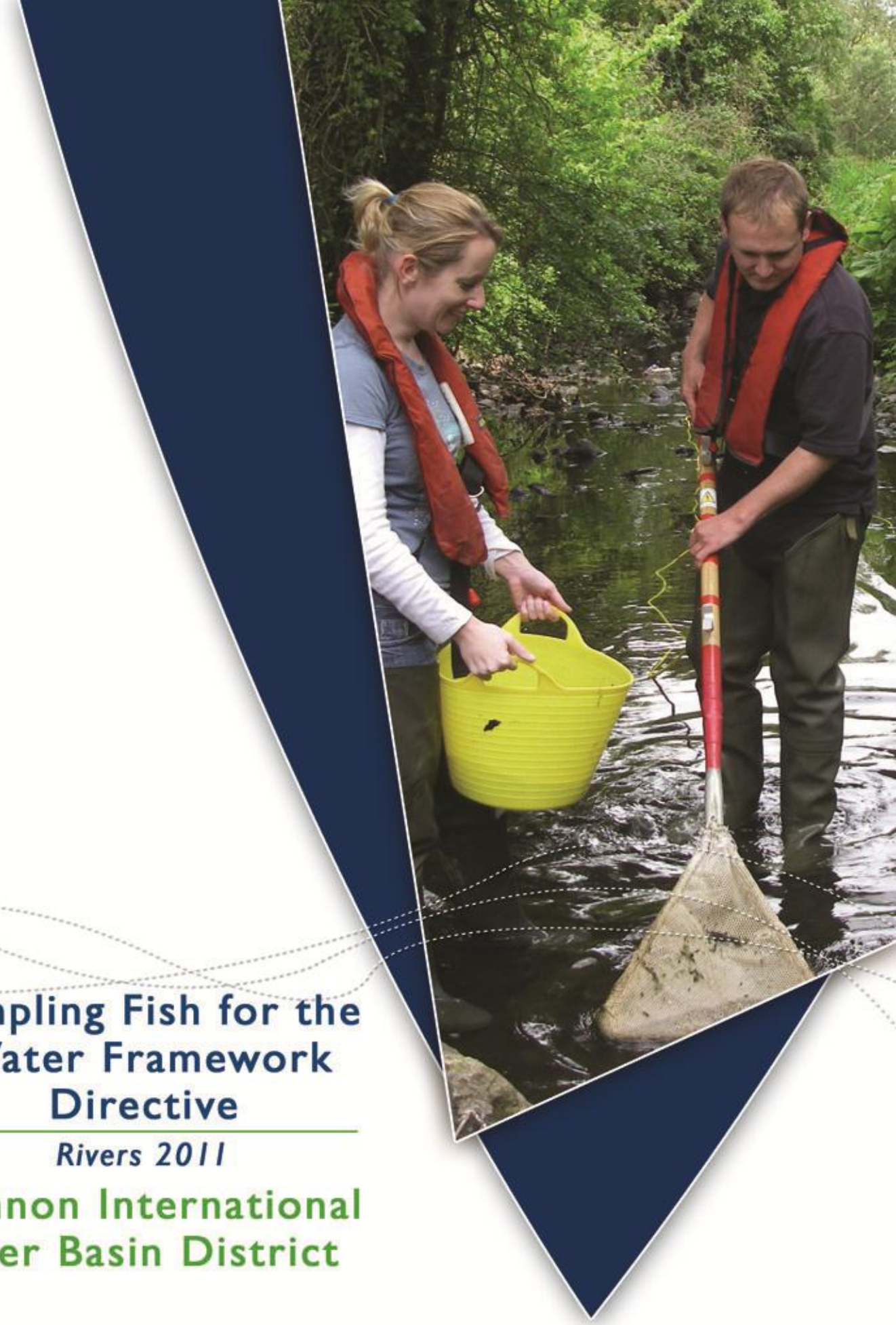

Sampling Fish for the Water Framework Directive

Rivers 2011

Shannon International 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 Shannon International River Basin District

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TABLE OF CONTENTS

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). Seventeen of these surveys were carried out at river sites in the Shannon International River Basin District (ShIRBD) between August and September 2011 by staff from Inland Fisheries Ireland (IFI) (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

Seventeen river sites were surveyed in four river catchments within the ShIRBD during 2011: the Bunratty, Inny, Shannon Estuary South and Shannon. The sites ranged in surface area from 130m^2 for the River Inny (Oldcastle) to 1,652m^2 for the Scramoge River (Riverdale). 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 ShIRBD 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
ShIRBD Wadeable sites				
Boor	Br. NW of Kilbillaghan	Shannon Upr	26B071100	SH_26_3921
Bow	Bow River Br.	Shannon Lwr	25B100100	SH_25_2145
Camlin	Br. just S of Killoe	Shannon Upr	26C010500	SH_26_3927_2
Deel (Newcastlewest)	Br. near Balliniska	Shannon Est Sth	24D020400	SH_24_863
Gourna	Beside railway br.	Bunratty	27G020600	SH_27_885
Gourna	Br. u/s Owenogarney confl	Bunratty	27G020550	SH_27_885
Graney	Caher Br.	Shannon Lwr	25G040025	SH_25_2081
Inny	Br. 1 km S of Oldcastle	Inny	26I010100	SH_26_2060
Inny	Tully	Inny	26I010220	SH_26_2664
Little (Cloghan)	Br. SW of Cloghan	Shannon Lwr	25L010200	SH_25_3014
Mountnugent	Mountnugent Br.	Inny	26M020500	SH_26_2742
Mountnugent	Racraveen	Inny	26M010450	SH_26_2742
ShIRBD Non-wadeable sites				
Camlin	Br. W. of Lisnabo	Shannon Upr	26C011000	SH_26_3927_2
Clodiagh (Tullamore)	Br. at Rahan	Shannon Lwr	25C060500	SH_25_2952
Scramoge	Br. N.E. of Riverdale	Shannon Upr	26S010320	SH_26_3801
Scramoge	Carrowclogher	Shannon Upr	26S010330	SH_26_3801
Silver (Kilcormac)	Lumcloon Br.	Shannon Lwr	25S020700	SH_25_3701

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)
ShIRBD Wadeable sites					
Boor (Br. NW of Kilbillaghan)	53.65	4.73	237	0.31	0.89
Bow (Bow River Br.)	10.75	5.33	240	0.14	0.62
Camlin (Br. just S of Killoe)	114.68	6.57	236	0.41	0.61
Deel (Newcastlewest) Br. near Balliniska	152.66	8.52	426	0.28	0.59
Gourna (Beside railway br.)	15.25	4.98	219	0.22	0.42
Gourna (Br. u/s Owenogarney confl)	15.01	4.18	188	0.17	0.41
Graney (Caher Br.)	13.73	5.62	213	0.12	0.39
Inny (Br. 1 km S of Oldcastle)	13.18	3.25	130	0.23	0.51
Inny (Tully)	52.62	5.12	220	0.23	0.54
Little (Br. SW of Cloghan)	29.90	3.62	264	0.17	0.47
Mountnugent (Mountnugent Br.)	91.11	7.03	309	0.31	0.57
Mountnugent (Racraveen)	87.92	6.32	208	0.19	0.42
ShIRBD Non-Wadeable sites					
Camlin (Br. W. of Lisnabo)	260.43	11.00	1133	0.55	0.74
Clodiagh(Tullamore) (Br. at Rahan)	253.35	7.83	1253	0.56	1.00
Scramoge (Br. N.E. of Riverdale)	137.07	7.00	1652	0.66	1.20
Scramoge (Carrowclogher)	137.17	6.00	648	0.62	0.85
Silver (Kilcormac) Lumcloon Br.	156.41	7.00	938	0.47	1.16

Fig. 2.1. Location map of river sites surveyed throughout the ShIRBD 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. 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 Boor River

One site was electric fished on the Boor River as part of the WFD surveillance monitoring programme in rivers 2011. The survey site was located close to the bridge at Kilbillaghan (Fig. 4.1; Plate 4.1). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 26th of August 2011, along a 45m length of channel. The mean wetted width of the channel was 4.73m and the mean depth was 31.0cm. A total wetted area of 213m^2 was surveyed. Riffle, glide and pool were evenly mixed throughout this site, while the substrate ranged from cobble to gravel to mud/silt. The vegetation at this site consisted of filamentous green algae, bryophytes and emergent bankside species.

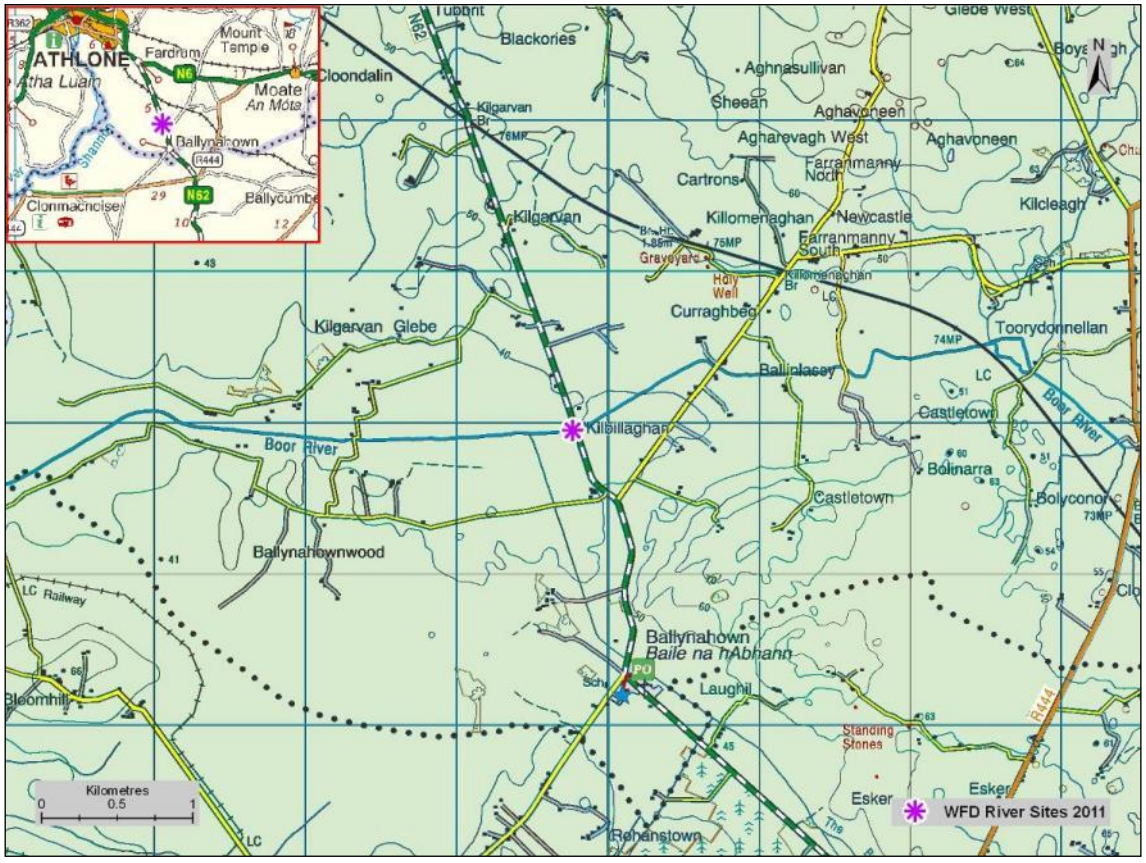

Fig. 4.1. Location of the Boor River surveillance monitoring site

Plate 4.1. The Boor River at Kilbillaghan, Co. Westmeath

A total of four fish species were recorded in the Boor River site. Brown trout was the most abundant species, followed by stone loach, three-spined stickleback and eels (Table 4.1). During the previous survey in 2008, five additional species were recorded (Table 4.1).

Table 4.1. Density of fish (no./m^2), Boor 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	0.022	0.072	0.093	0.122	0.033	0.155
Stone loach	-	-	0.007	-	-	0.028
Three-spined stickleback	-	-	0.002	-	-	0.023
Eel	-	-	0.002	-	-	0.005
Salmon	-	0.005	0.005	-	0.005	0.005
Gudgeon	-	-	0.033	-	-	-
Minnow	-	-	0.011	-	-	-
Roach	-	-	0.002	-	-	-
Lamprey sp.	-	-	0.002	-	-	-
All Fish	-	-	0.157	-	-	0.211

Brown trout captured during the 2011 survey ranged in length from 6.2cm to 25.4cm (mean = 10.2cm) (Fig. 4.2). Three age classes (0+, 1+ and 2+) were present, accounting for approximately 75%, 21% and 4% of the total brown trout catch respectively. Brown trout captured during the 2008 survey ranged in length from 6.0cm to 23.4cm (mean = 15.0cm) (Fig. 4.2). Four age classes (0+, 1+, 2+ and 3+) were present, accounting for approximately 25%, 32%, 41% and 1% of the brown trout catch respectively at the site.

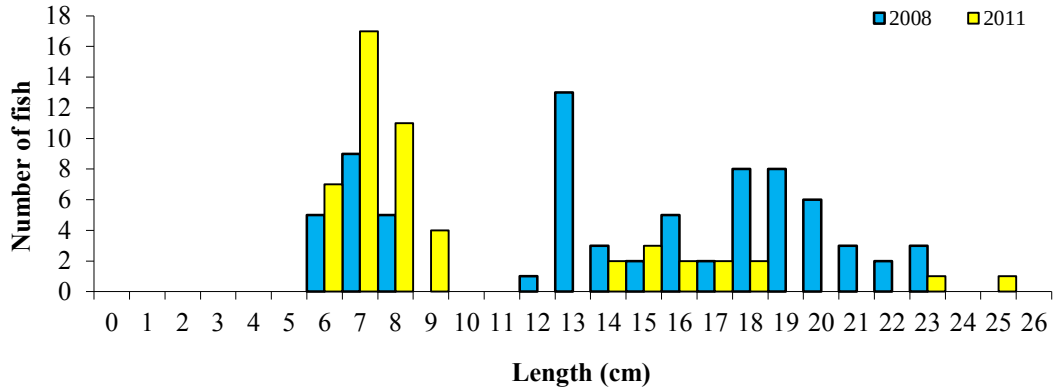

Fig. 4.2. Length frequency distribution of brown trout in the Boor River site, August 2008 (n = 75) and August 2011 (n = 52)

4.1.2 The Bow River

One site was electric fished on the Bow River as part of the WFD surveillance monitoring programme in rivers 2011. The survey site was located along a side road, northeast of Scariff, Co. Clare, downstream of the Bow River Bridge (Fig. 4.3; Plate 4.2). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 31st of August 2011, along a 45m length of channel. The mean wetted width of the channel was 5.33m and the mean depth was 14.0cm. A total wetted area of 240m^2 was surveyed. Riffle and glide dominated the habitat along this site, while the substrate was a good mix of cobble, gravel and boulder. The instream vegetation at this site consisted mainly of filamentous green algae and bryophytes.

Fig. 4.3. Location of the Bow River surveillance monitoring site

Plate 4.2. The Bow River (Bow River Br.) near Scarriff, Co. Clare

A total of three fish species were recorded in the Bow river site. Brown trout was the most abundant species, followed by stone loach and eels (Table 4.2). Two additional fish species were recorded at the same site during the previous survey in 2008 (Table 4.2).

Table 4.2. Density of fish (no./m^2), Bow 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	0.098	0.244	0.341	0.175	0.150	0.325
Stone loach	-	-	0.026	-	-	0.038
Eel	-	-	0.014	-	-	0.013
Salmon	0.004	0.049	0.053	-	-	-
Minnow	-	-	0.002	-	-	-
All Fish	-	-	0.437	-	-	0.375

Brown trout captured during the 2011 survey ranged in length from 5.3cm to 21.9cm (mean = 9.2cm) (Fig. 4.4). Four age classes (0+, 1+, 2+ and 4+) were present, accounting for approximately 55%, 38%, 6% and 1% of the total brown trout catch respectively. Brown trout captured during the 2008 survey ranged from 5.0cm to 25.0cm in length (mean = 10.5cm) (Fig. 4.4). Five age classes (0+, 1+, 2+, 3+ and 4+) were present, accounting for approximately 34%, 43%, 19%, 3% and 1% of the brown trout catch respectively.

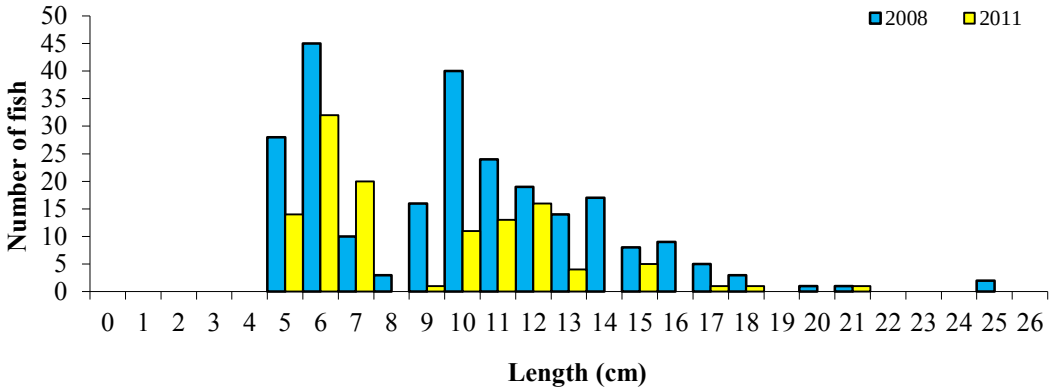

Fig. 4.4. Length frequency distribution of brown trout in the Bow River site, August 2008 (n = 245) and August 2011 (n = 119)

4.1.3. The Camlin River (Killoe and Lisnabo)

Two sites were electric fished on the Camlin River as part of the WFD surveillance monitoring programme in rivers 2011.

The Camlin River (Killoe) survey site was located downstream of a bridge just south of Killoe, northeast of Longford (Fig. 4.5; Plate 4.3). Three electric-fishing passes were conducted using three bank-based electric fishing units on the 24th of August 2011, along a 36m length of channel. The mean wetted width of the channel was 6.57m and the mean depth was 41.0cm. A total wetted area of 236m^2 was surveyed. Glide was the most dominant habitat along this stretch, while the substrate was a good mix of cobble, gravel, mud/silt and sand. The vegetation at this site consisted mainly of emergent bankside species.

The Camlin River (Lisnabo) survey site was located upstream of Ballykenny Bridge, approximately 2.5 km from where it enters the River Shannon (Fig. 4.5; Plate 4.4). Three electric-fishing passes were conducted using two boat-based electric fishing units on the 24th of August 2011, along a 103m length of channel. The mean wetted width of the channel was 11.00m and the mean depth was 55.0cm. A total wetted area of 1133m^2 was surveyed. The habitat along this stretch consisted entirely of glide, while cobble was the most abundant substrate type present. The vegetation at this site was dominated by emergent bankside species.

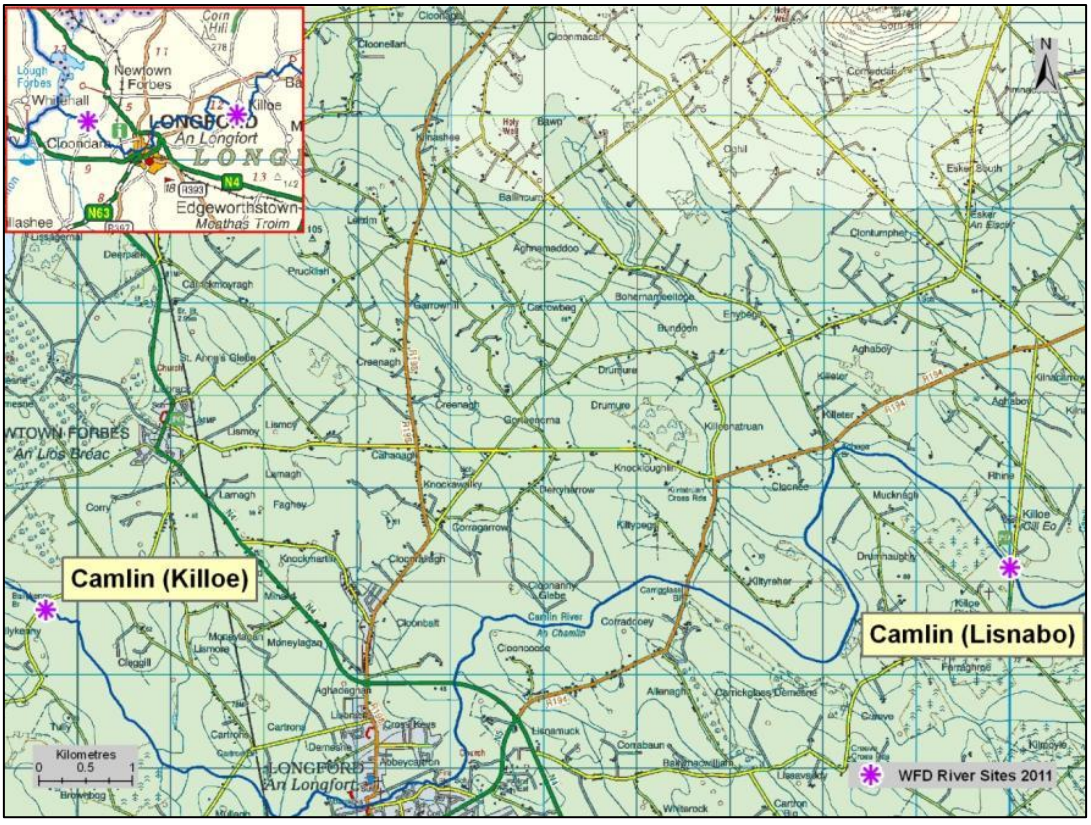

Fig. 4.5. Location of the Camlin River (Killoe and Lisnabo) surveillance monitoring sites

Plate 4.3. The Camlin River at Killoe, Co. Longford

Plate 4.4. The Camlin River (Lisnabo), Co. Longford

The Camlin River (Killoe)

A total of five fish species were recorded in the Camlin River (Killoe) site. Gudgeon was the most abundant species, followed by stone loach, brown trout, roach and lamprey (Table 4.3). Large numbers of cyprinid fry were also present.

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

	2011		
Common name	**0+**	**1+ & older**	**Total minimum density**
Gudgeon	-	-	0.186
Cyprinid fry	-	-	0.047
Stone loach	-	-	0.034
Brown trout	0.021	0.004	0.025
Roach	-	-	0.017
Lamprey sp.	-	-	0.013
All Fish	-	-	0.321

Gudgeon captured during the 2011 survey ranged in length from 4.0cm to 11.7cm (mean = 6.9cm) (Fig. 4.6). Brown trout ranged in length from 7.4cm to 19.8cm (mean = 10.1cm), two age classes (0+ and 1+) were present, accounting for 0+ (86%) and 1+ (14%).

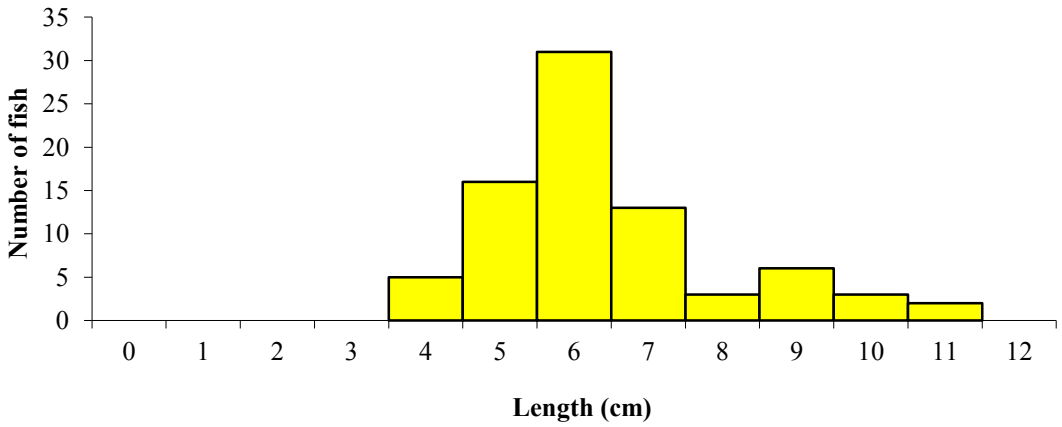

Fig. 4.6. Length frequency distribution of gudgeon in the Camlin (Killoe) River site, August 2011 (n = 79)

The Camlin River (Lisnabo)

A total of eight fish species were recorded in the Camlin River (Lisnabo) site. Roach was the most abundant species, followed gudgeon, perch, stone loach, pike, brown trout, lamprey and nine-spined stickleback (Table 4.4). This site was also surveyed in 2008, with results from that survey also shown for comparative purposes. The same species composition was recorded during the 2008 survey with the exception of stone loach, lamprey and nine-spined stickleback, which were only present in the 2011 survey.

Table 4.4. Density of fish (no./m^2), Camlin River (Lisnabo) 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
Roach	-	-	0.006	-	-	0.232
Gudgeon	-	-	0.002	-	-	0.011
Perch	-	-	0.006	-	-	0.010
Stone loach	-	-	-	-	-	0.004
Pike	-	-	0.002	-	-	0.003
Brown trout	0.001	-	0.001	0.002	-	0.002
Lamprey sp.	-	-	-	-	-	0.001
Nine-spined stickleback	-	-	-	-	-	0.001
All Fish	-	-	0.017	-	-	0.262

Roach captured during the 2011 survey ranged in length from 1.0cm to 26.5cm (mean = 6.9cm) (Fig. 4.7). Roach are broken into each age class with the approximate percentage of the total catch shown in parentheses (0+ (48%), 1+ (31%), 2+ (6%), 3+ (2%), 4+ (4%), 5+ (4%), 6+ (3%), 7+ (<1%) and 8+ (<1%)). Roach captured during the 2008 survey ranged in length from 7.2cm to 20.1cm (mean = 12.7cm) (Fig 4.7). Five age classes (1+, 2+, 3+, 4+ and 5+) were present, accounting for approximately 14%, 46%, 19%, 16% and 5% of the total roach catch respectively.

Perch captured in 2011 ranged in length from 8.6cm to 28.7cm (mean = 15.3cm) (Fig. 4.8). In 2008 they ranged in length from 13.1cm to 23.0cm (mean = 16.7cm) (Fig. 4.32).

Pike captured during the 2011 survey ranged in size from 14cm to 51.3cm (mean = 26.3cm). Three age classes, 0+, 1+ and 2+ were present, accounting for approximately 64%, 18% and 18% of the total catch respectively. Pike captured during the 2008 survey ranged in length from 16.1cm to 61.7cm (mean = 28.0cm). Four age classes (0+, 1+, 2+ and 3+) were present, accounting for 67%, 11%, 11% and 11% of the total pike catch respectively.

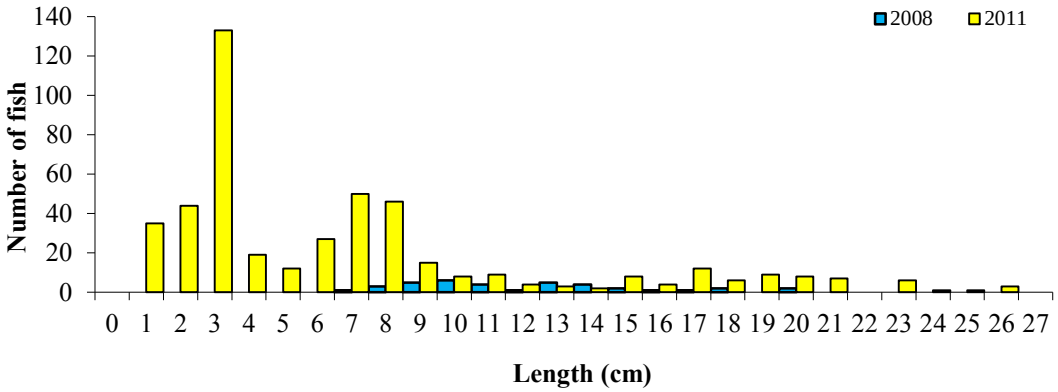

Fig. 4.7. Length frequency distribution of roach in the Camlin River (Lisnabo) site, Spetember 2008 (n = 37) and August 2011 (n = 472)

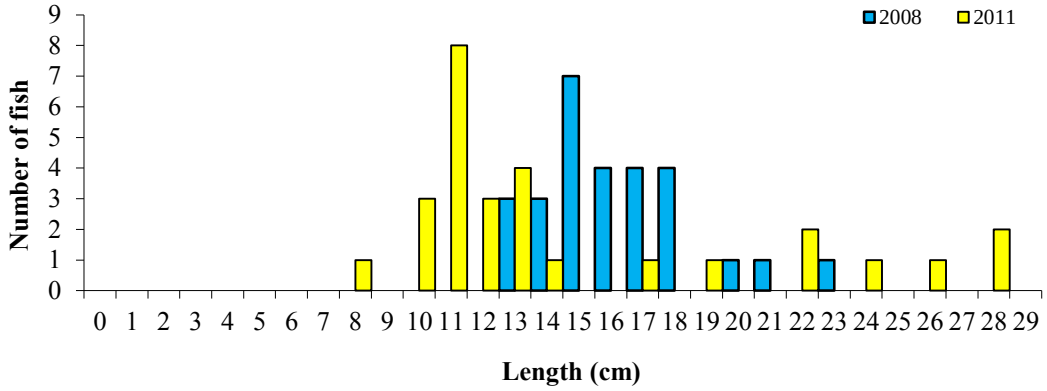

Fig. 4.8. Length frequency distribution of perch in the Camlin River (Lisnabo) site, September 2008 (n = 28) and August 2011 (n = 28)

4.1.4 The River Deel (Newcastlewest)

One site was electric fished on the River Deel as part of the WFD surveillance monitoring programme in rivers 2011. The survey site was located downstream of Bunoke Bridge near the townland of Ballinska, approximately 6.5km southeast of Newcastle West, Co. Limerick (Fig. 4.9; Plate 4.5). Three electric-fishing passes were conducted using three bank-based electric fishing units on the 29th of August 2011, along a 45m length of channel. The mean wetted width of the channel was 8.52m and the mean depth was 28.0cm. A total wetted area of 383m^2 was surveyed. Glide was the dominant habitat along this stretch, while the substrate was mixed between gravel, sand and cobble. The vegetation at this site consisted mainly of emergent bankside species.

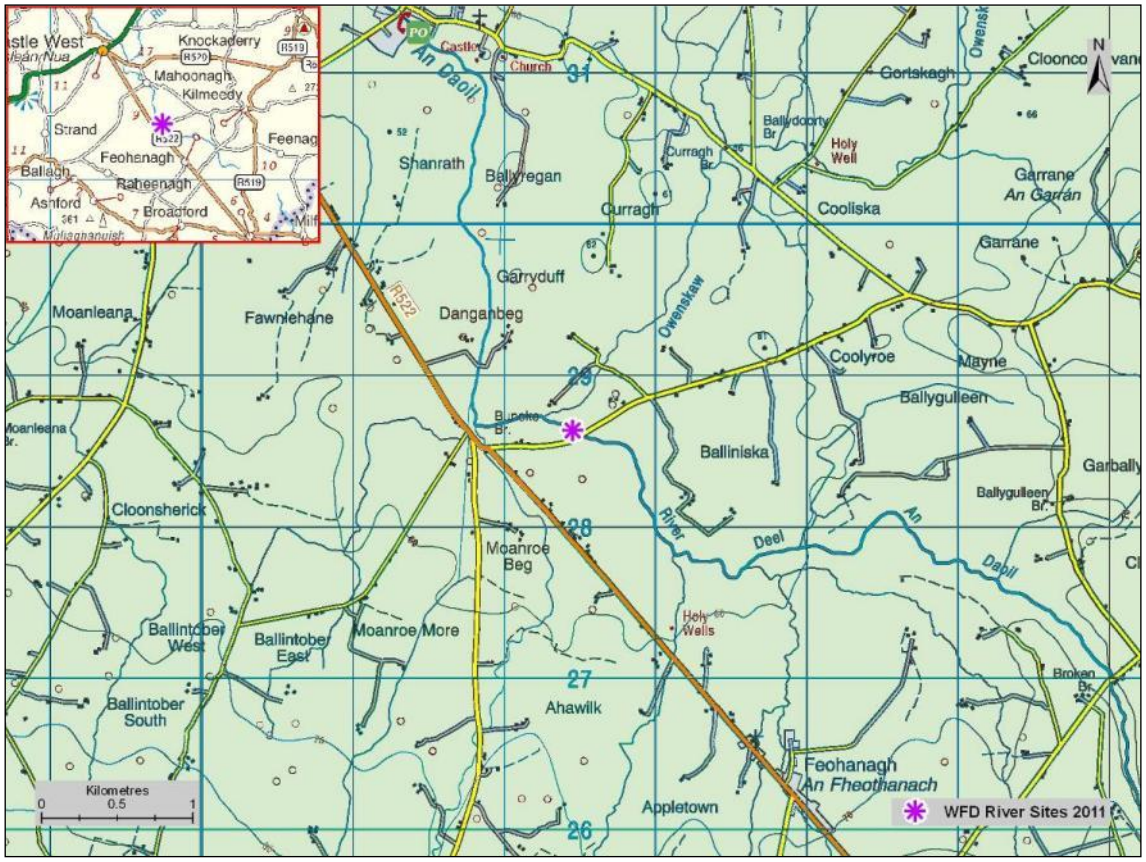

Fig. 4.9. Location of the River Deel (Newcastlewest) surveillance monitoring site

Plate 4.5. The River Deel (bridge near Balliniska) site, Co. Limerick

A total of five fish species were recorded in the River Deel (Newcastlewest) site. Minnow was the most abundant species, followed by stone loach, brown trout, three-spined stickleback and salmon (Table 4.5). The same site was surveyed using boats in 2008 and in contrast to that previous survey, no eels or gudgeon were recorded in 2011. Salmon were unique, however, in 2011.

Table 4.5. Density of fish (no./m^2), River Deel (Newcastlewest) 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	-	-	0.026	-	-	1.722
Stone loach	-	-	0.004	-	-	0.060
Brown trout		0.080	0.080		0.026	0.026
Three-spined stickleback	-	-	0.001	-	-	0.021
Salmon	-	-	-	0.005		0.005
Eel	-	-	0.001	-	-	-
Gudgeon	-	-	0.001	-	-	-
All Fish	-	-	0.113	-	-	1.834

Minnow captured in 2011 ranged in length from 3.2cm to 7.7cm (mean = 5.2cm) (Fig. 4.10). In 2008 they ranged in length from 3.6cm to 7.3cm (mean = 5.6cm).

Brown trout captured in 2011 ranged in length from 15.3cm to 30.8cm (mean = 18.9cm) (Fig. 4.11). Three age classes were present (1+, 2+ and 3+), accounting for approximately 83%, 8% and 8% of the brown trout catch respectively. Brown trout captured in 2008 ranged in length from 13.5cm to 36.5cm (mean = 20.6) (Fig. 4.11). Four age classes were present (1+, 2+, 3+ and 4+), accounting for approximately 71%, 21%, 7% and <1% of the total brown trout catch respectively.

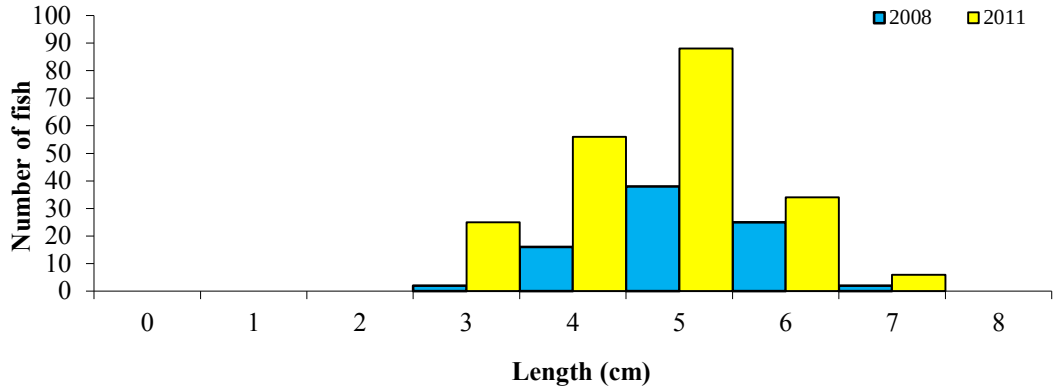

Fig. 4.10. Length frequency distribution of minnow in the River Deel (Newcastlewest) site, July 2008 (n = 83) and August 2011 (n = 209 (sub-sample))

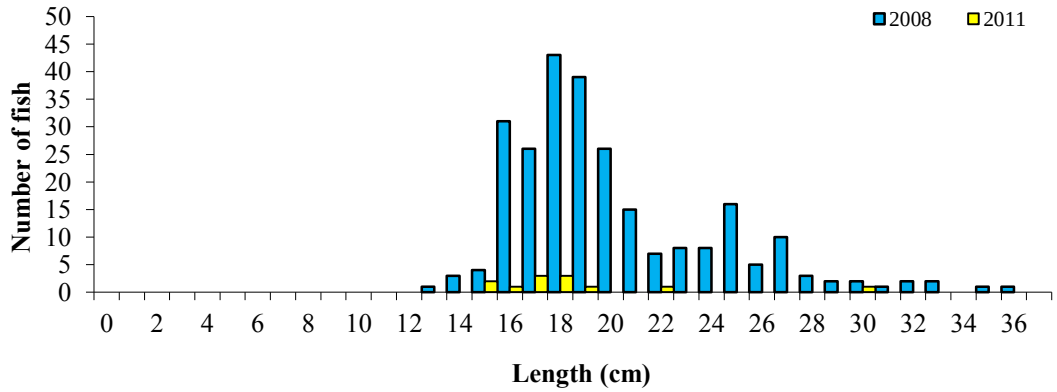

Fig. 4.11. Length frequency distribution of brown trout in the River Deel (Newcastlewest) site, July 2008 (n = 256) and August 2011 (n = 12)

4.1.5. The Gourna River (Railway and Owenogarney)

Two sites were electric fished on the Gourna River as part of the WFD surveillance monitoring programme in rivers 2011. The Gourna River (Railway) survey site was located just upstream of a railway bridge at Carrownerribul just outside of Sixmilebridge (Fig. 4.12; Plate 4.6). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 30th of August 2011, along a 44m length of channel. The mean wetted width of the channel was 4.98m and the mean depth was 22.0cm. A total wetted area of 219m^2 was surveyed. Glide was the dominant habitat type along this stretch, while the substrate was evenly mixed between boulder, cobble, gravel, sand and mud/silt. The vegetation at this site was comprised mainly of bryophyte species.

The second survey stretch (Gourna River - Owenogarney) was located a few hundred metres upstream of the railway bridge at Carrownerribul just outside of Sixmilebridge (Fig. 4.12; Plate 4.7). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 30th of August 2011, along a 45m length of channel. The mean wetted width of the channel was 4.18m and the mean depth was 17.0cm. A total wetted area of 188m^2 was surveyed. Glide was the dominant substrate type present along this stretch, while the substrate was mixed between gravel, cobble, sand, mud/silt and boulder. A wide variety of vegetation was present at this site, including green filamentous green algae, bryophytes and emergent bankside species.

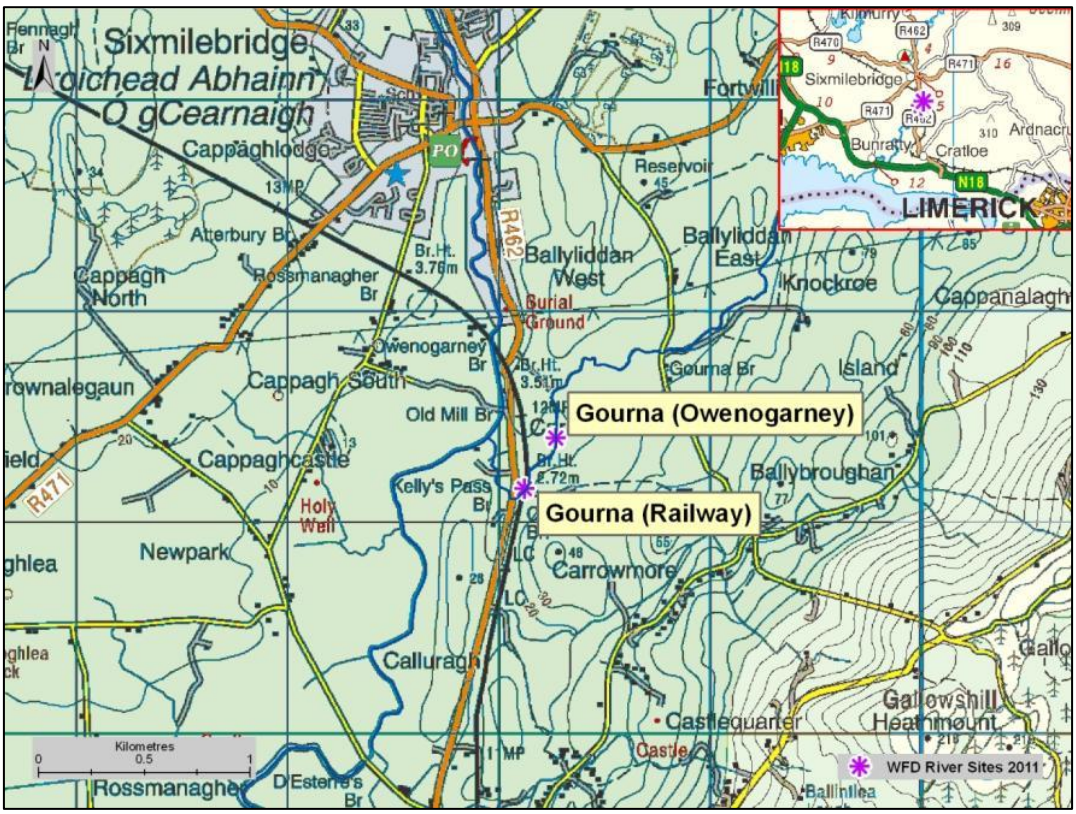

Fig. 4.12. Location of the Gourna River (Railway and Owenogarney) surveillance monitoring sites

Plate 4.6. The Gourna River (Railway) site, Co. Clare

Plate 4.7. The Gourna River (Owenogarney), Co. Clare

The Gourna River (Railway)

A total of six fish species were recorded in the Gourna River (Railway) site. Salmon was the most abundant species, followed by lamprey, brown trout, eels, stone loach and three-spined stickleback (Table 4.6).

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

Common name	2011		
	0+	1+ & older	Total minimum density
Salmon	0.123	0.073	0.196
Lamprey sp.	-	-	0.187
Brown trout	0.055	0.082	0.137
Eel	-	-	0.082
Stone loach	-	-	0.023
Three-spined stickleback	-	-	0.009
All Fish	-	-	0.634

Salmon ranged in length from 4.6cm to 13.0cm (mean = 7.5cm) (Fig. 4.13). Three age classes (0+, 1+ and 2+) were present, accounting for approximately 73%, 14% and 1% of the total salmon catch respectively.

Lamprey ranged in length from 3.7cm to 11.9cm (mean = 7.1cm) (Fig. 4.14). Eels ranged in length from 8.9cm to 34.5cm (mean = 21.6cm) (Fig. 4.15).

Brown trout ranged in length from 5.9cm to 20cm (mean = 11.9cm) (Fig. 4.16). Three age classes (0+, 1+ and 2+) were present, accounting for approximately 39%, 56% and 6% of the total catch respectively.

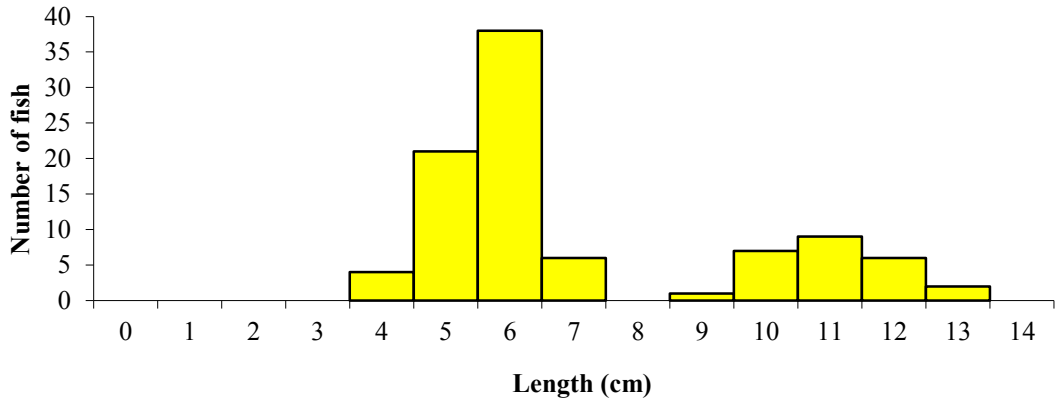

Fig. 4.13. Length frequency distribution of salmon in the Gourna (Railway) River site, August 2011 (n = 94)

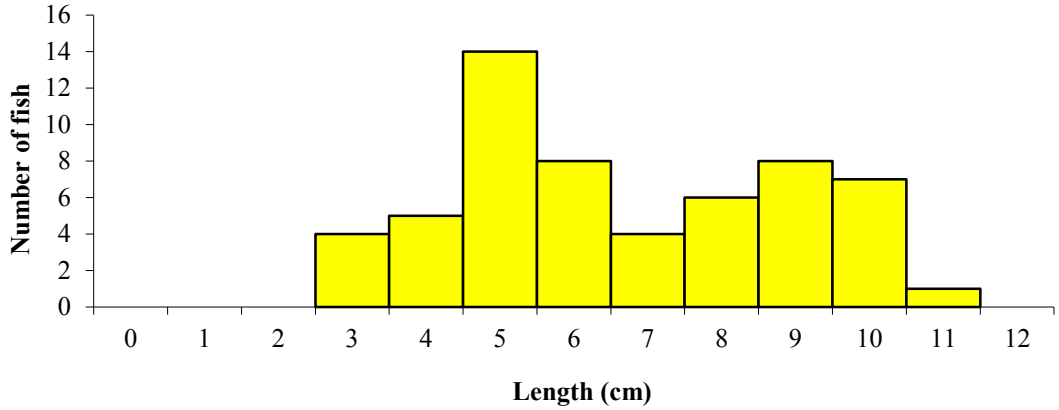

Fig. 4.14. Length frequency distribution of lamprey in the Gourna (Railway) River site, August 2011 (n = 57)

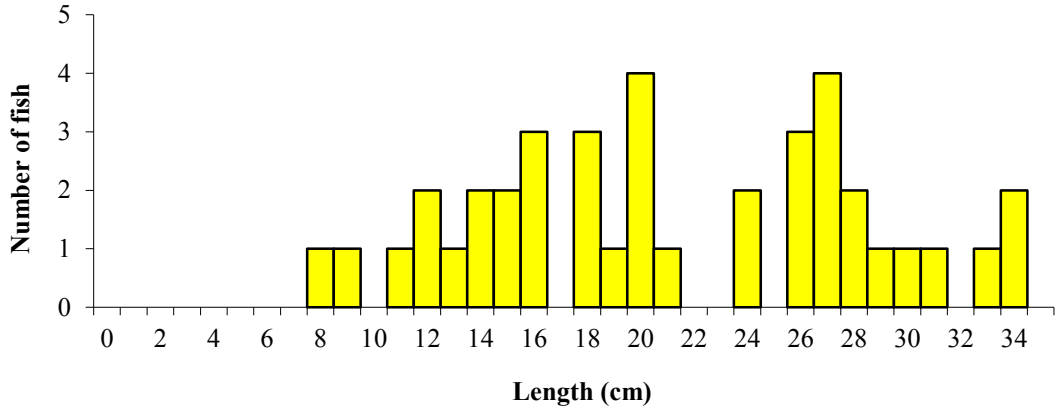

Fig. 4.15. Length frequency distribution of a sub-sample of eels in the Gourna (Railway) River site, August 2011 (n = 39)

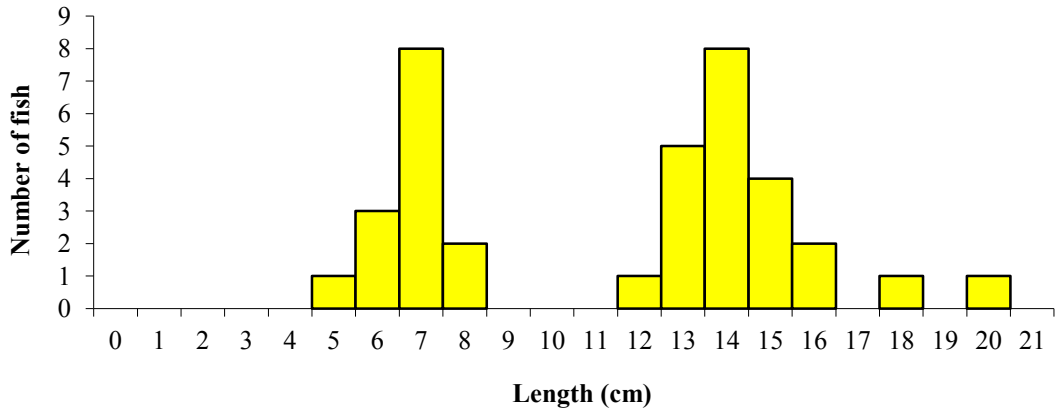

Fig. 4.16. Length frequency distribution of brown trout in the Gourna (Railway) River site, August 2011 (n = 36)

The Gourna River (Owenogarney)

A total of six fish species were recorded in the Gourna River (Owenogarney) site. Salmon was the most abundant species, followed by brown trout, eels, lamprey, three-spined stickleback and stone loach (Table 4.7). During the previous survey in 2008, the same species composition was recorded at this site.

Table 4.7. Density of fish (no./m^2), Gourna River (Owenogarney) 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
Salmon	0.100	0.012	0.112	0.271	0.048	0.319
Brown trout	0.038	0.088	0.126	0.112	0.064	0.175
Eel	-	-	0.000	-	-	0.085
Lamprey sp.	-	-	0.044	-	-	0.085
Three-spined stickleback	-	-	0.200	-	-	0.064
Stone loach	-	-	0.003	-	-	0.032
All Fish	-	-	0.485	-	-	0.760

Salmon captured during the 2011 survey ranged in length from 4.8cm to 16.6cm (mean = 7.4cm) (Fig. 4.17). Two age classes (0+ and 1+) were present, accounting for approximately 86% and 14% of the total salmon catch respectively. Salmon captured in 2008 ranged in length from 4.8cm to 14.2cm (mean = 8.1cm) (Fig. 4.17). Three age classes (0+, 1+ and 2+) were present, accounting for approximately 88%, 11% and 2% of the total salmon catch respectively.

Lamprey captured during the 2011 survey ranged in length from 1.8cm to 13.5cm (mean = 7.4cm) (Fig 4.18). In 2008 they ranged in length from 4.0cm to 13.2cm (mean = 9.0cm) (Fig. 4.18).

Brown trout captured during the 2011 survey ranged in length from 6.5cm to 20.4cm (mean = 11.0cm) (Fig. 4.19). Three age classes (0+, 1+ and 2+) were present, accounting for approximately 65%, 33% and 2% of the total brown trout catch respectively. Brown trout captured during 2008 ranged in length from 5.2cm to 22.8cm (mean = 13.8cm) (Fig. 4.19). Four age classes (0+, 1+, 2+ and 3+) were present, accounting for approximately 29%, 44%, 25% and 2% of the total brown trout catch respectively.

Eels captured during the 2011 survey ranged in length from 7.5cm to 31.4cm (mean = 19.8cm) (Fig. 4.20). In 2008 they ranged in length from 7.1m to 24.4cm (mean = 13.1cm) (Fig. 4.20).

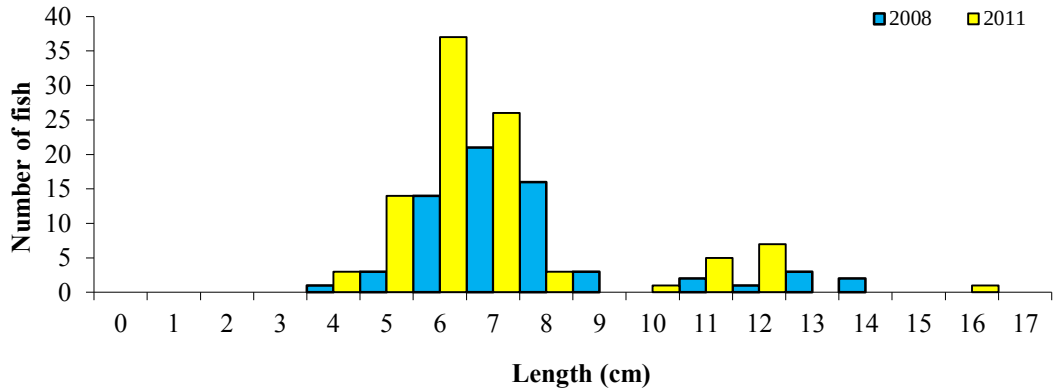

Fig. 4.17. Length frequency distribution of salmon in the Gourna (Owenogarney) River site, August 2008 (n = 66) and August 2011 (n = 97)

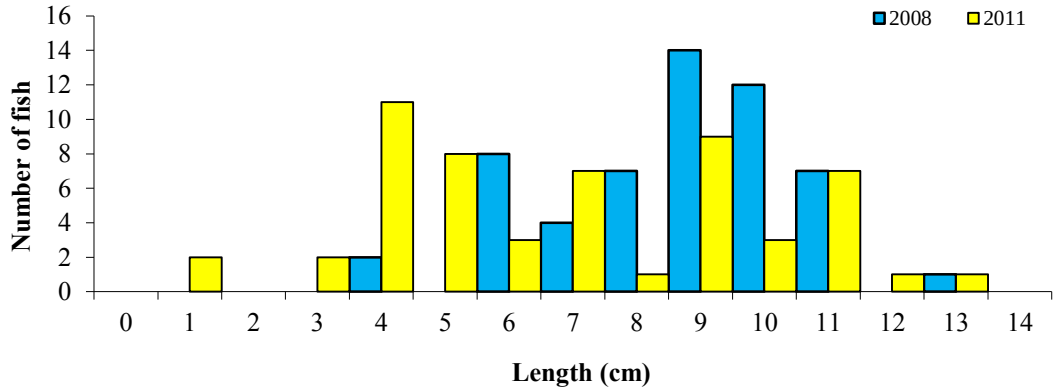

Fig. 4.18. Length frequency distribution of lamprey in the Gourna (Owenogarney) River site, August 2008 (n= 55) and August 2011 (n = 55)

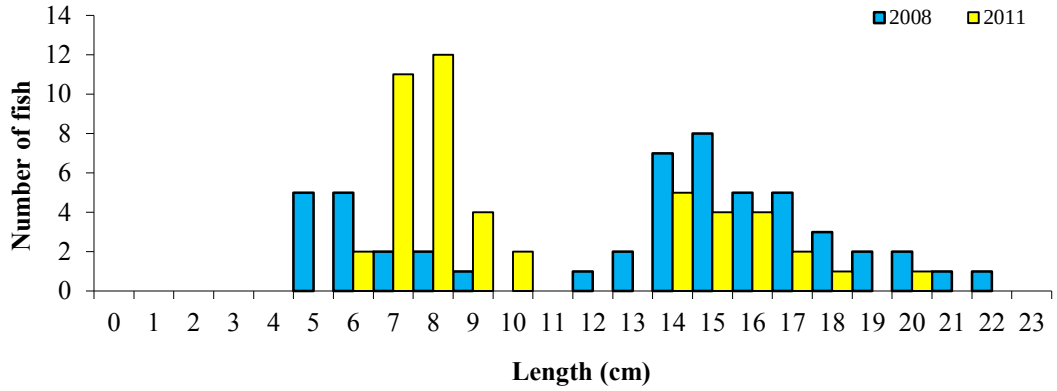

Fig. 4.19. Length frequency distribution of brown trout in the Gourna (Owenogarney) River site, August 2008 (n = 52) and August 2011 (n = 48)

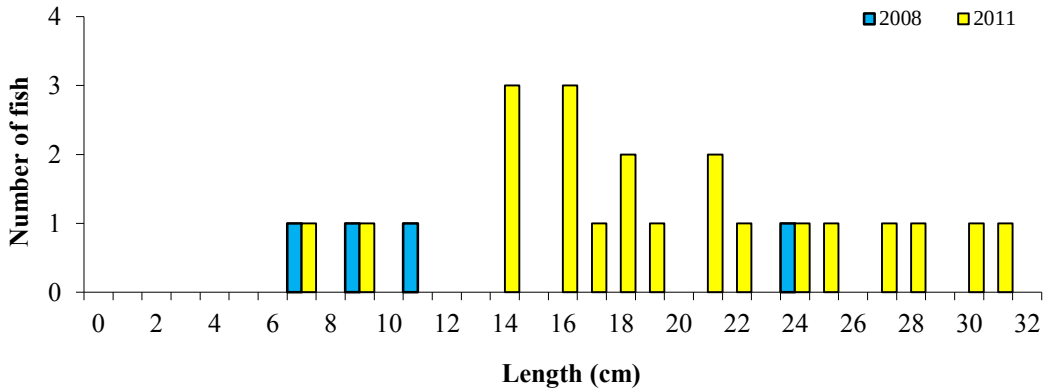

Fig. 4.20. Length frequency distribution of eels in the Gourna (Owenogarney) River site, August 2008 (n = 4) and August 2011 (n = 21)

4.1.6 The Graney River (Caher Br.)

One site was electric fished on the Graney River as part of the WFD surveillance monitoring programme in rivers 2011. The survey site was located downstream of Caher Bridge, approximately 1.5km southwest of Lough Graney (Fig. 4.21; Plate 4.8). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 31st of August 2011, along a 38m length of channel. The mean wetted width of the channel was 5.62m and the mean depth was 12.0cm. A total wetted area of 213m^2 was surveyed. Riffle and glide were the most abundant habitats present along this stretch, while the substrate was comprised mainly of cobble. The vegetation at this heavily shaded site was dominated by bryophytes.

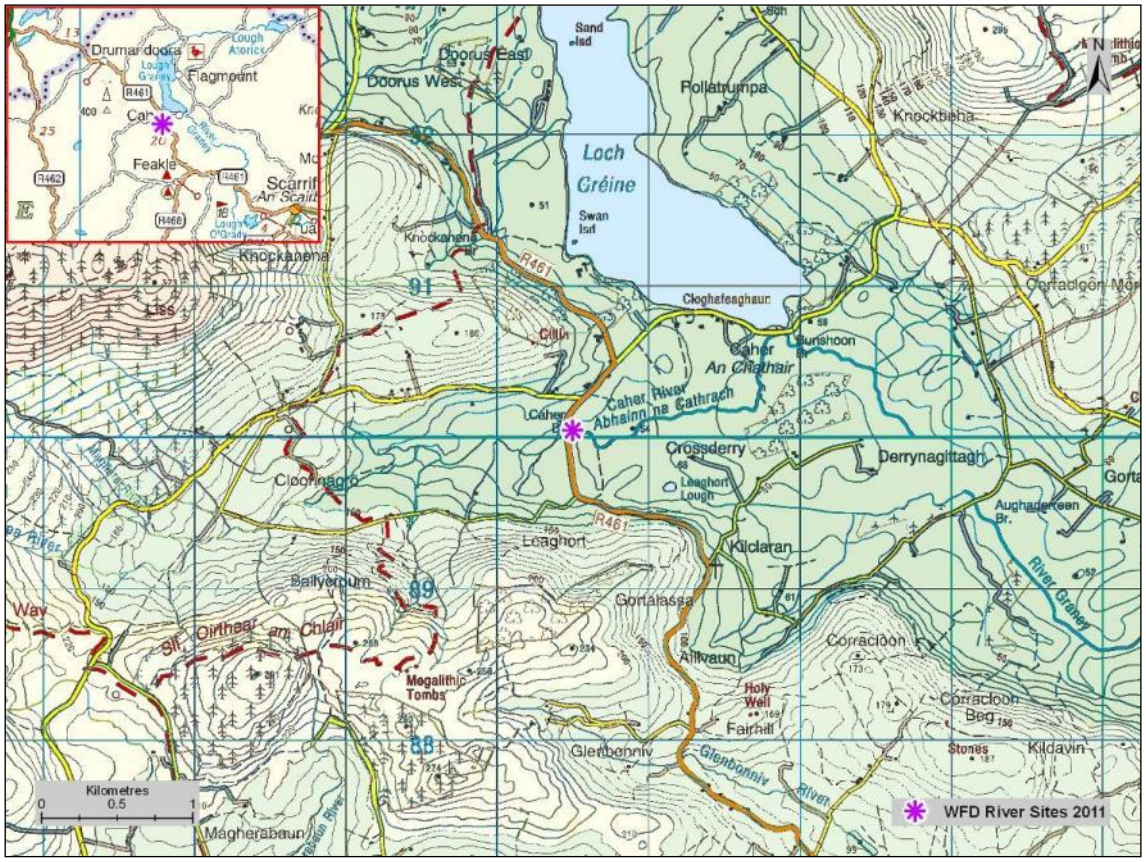

Fig. 4.21. Location of the Graney River surveillance monitoring site

Plate 4.8. The Graney River at Caher Bridge, Co. Clare

A total of three fish species were recorded in the Graney River site. Brown trout was the most abundant species, followed by stone loach and lamprey (Table 4.8). More species were recorded during the survey in 2008, i.e. salmon, eels and roach, whereas stone loach were only recorded in the 2011 survey.

Table 4.8. Density of fish (no./m^2), Graney 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	0.092	0.101	0.193	0.300	0.089	0.389
Stone loach	-	-	-	-	-	0.009
Lamprey sp.	-	-	0.002	-	-	0.005
Salmon	0.000	0.005	0.005	-	-	-
Eel	-	-	0.002	-	-	-
Roach	-	-	0.002	-	-	-
All Fish	-	-	0.205	-	-	0.403

Brown trout captured during the 2011 survey ranged in length from 4.6cm to 15.9cm (mean = 6.6cm) (Fig. 4.22). Two age classes (0+ and 1+) were present, accounting for approximately 85% and 15% of the total brown trout catch respectively. Brown trout captured during 2008 survey ranged in length from 4.6cm to 20.5cm (mean = 9.5cm) (Fig. 4.22). Four age classes (0+, 1+, 2+ and 3+) were present, accounting for 53%, 40%, 6% and 1% of the total brown trout catch respectively.

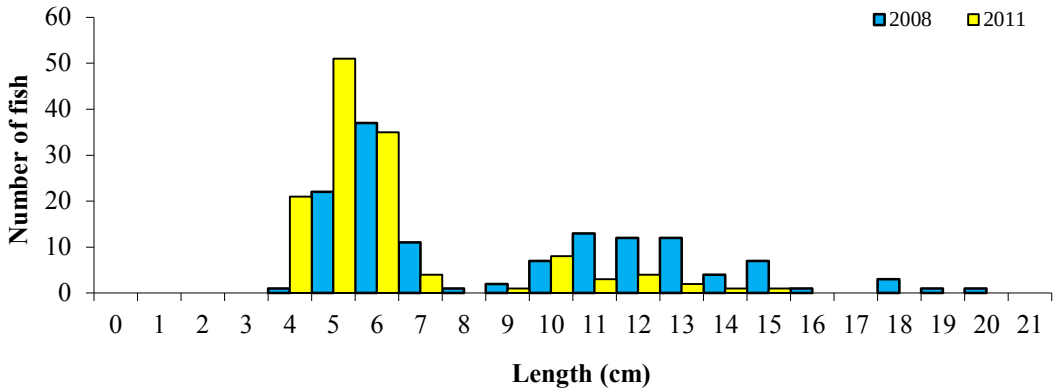

Fig. 4.22. Length frequency distribution of brown trout in the Graney River site, August 2008 (n = 135 (sub-sample)) and August 2011 (n = 131)

4.1.7. The River Inny (Oldcastle and Tully)

Two sites were electric fished on the River Inny as part of the WFD surveillance monitoring programme in rivers 2011. The River Inny (Oldcastle) survey site was located quite close to its source, on the downstream side of Tubride Bridge, just south of the village of Oldcastle, Co. Meath (Fig. 4.23; Plate 4.9). Three electric-fishing passes were conducted using one bank-based electric fishing unit on the 23rd of August 2011, along a 40m length of channel. The mean wetted width of the channel was 3.25m and the mean depth was 23.0cm. A total wetted area of 130m^2 was surveyed. Glide was the most abundant habitat present along this stretch, while the substrate was a good mix of boulder, gravel, cobble and sand. The vegetation at this site was composed of mainly bryophytes and a small number of emergent bankside species.

The second survey stretch (River Inny - Tully) was located upstream of a bridge within a large dairy farm, approximately 3km northwest of Oldcastle (Fig. 4.23; Plate 4.10). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 23rd of August 2011, along a 43m length of channel. The mean wetted width of the channel was 5.12m and the mean depth was 23.0cm. A total wetted area of 220m^2 was surveyed. Glide was the dominant habitat along this stretch, while the substrate consisted of mainly cobble and boulder. A wide variety of vegetation was present at this site, with filamentous green algae, bryophytes and floating as well as emergent species all abundant throughout.

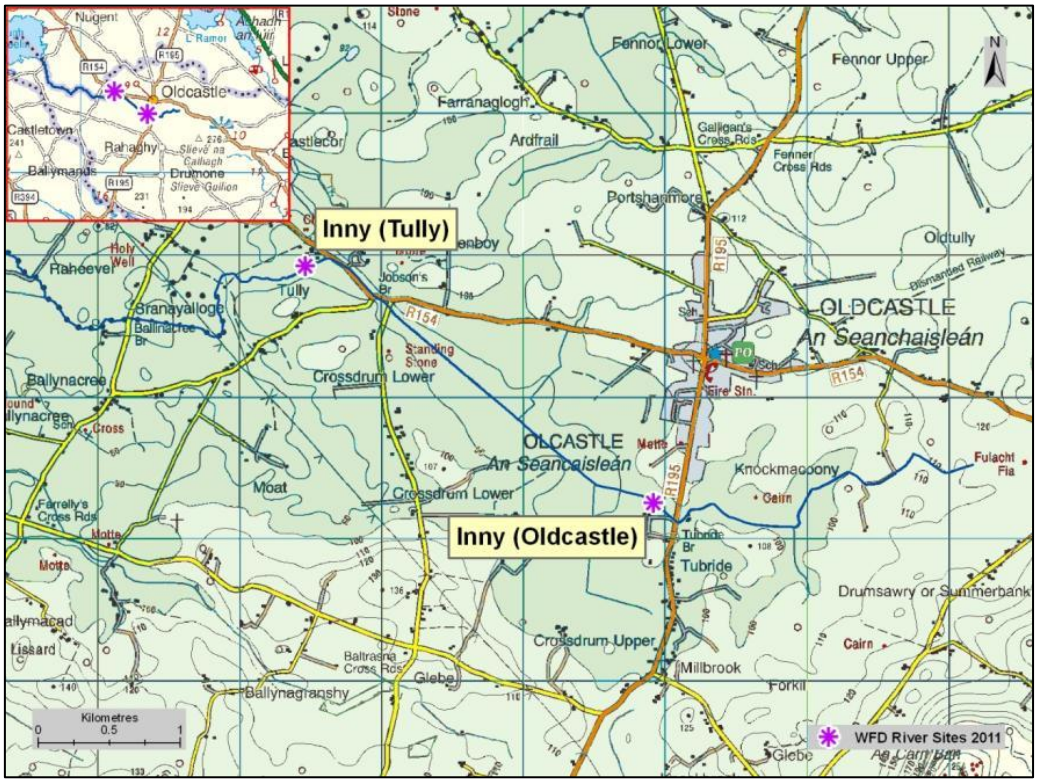

Fig. 4.23. Location of the River Inny (Oldcastle and Tully) surveillance monitoring sites

Plate 4.9. The River Inny (Oldcastle) site, Co. Meath

Plate 4.10. The River Inny (Tully) site, Co. Meath

River Inny (Oldcastle)

A total of three fish species were recorded in the River Inny (Oldcastle) site. Brown trout was the most abundant species, followed by three-spined stickleback and lamprey (Table 4.9). The same species composition was recorded in 2008 with the exception of lamprey, which were only recorded in the 2011 survey.

Table 4.9. Density of fish (no./m^2), River Inny (Oldcastle) 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	0.314	0.112	0.426	0.208	0.138	0.346
Three-spined stickleback	-	-	0.008	-	-	0.154
Lamprey sp.	-	-	-	-	-	0.023
All Fish	-	-	0.434	-	-	0.523

Brown trout captured during the 2011 survey ranged in length from 5.0cm to 16.6cm (mean = 9.2cm) (Fig. 4.24). Three age classes (0+, 1+ and 2+) were present, accounting for approximately 53%, 44% and 3% of the total brown trout catch respectively. Brown trout captured in 2008 ranged in length from 5.5cm to 18.3cm (mean = 9.1cm) (Fig. 4.24). Three age classes (0+, 1+ and 2+) were present, accounting for approximately 77%, 18% and 5% of the total brown trout catch respectively.

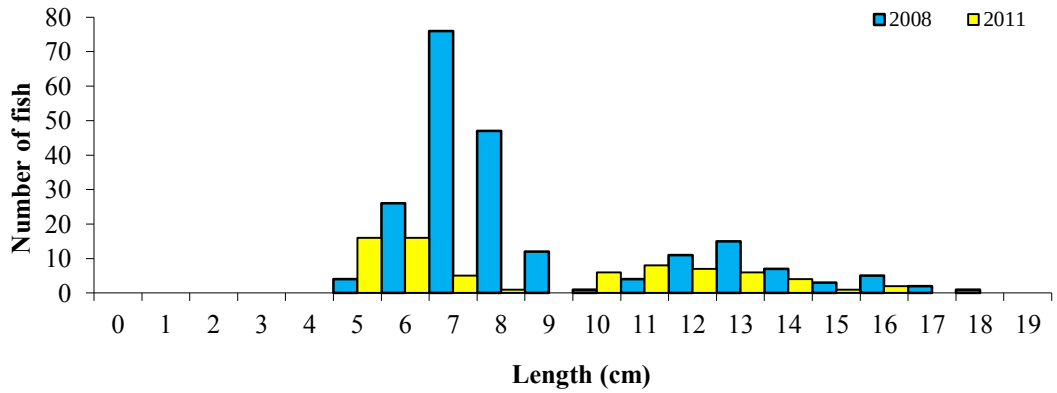

Fig. 4.24. Length frequency distribution of brown trout in the River Inny (Oldcastle) site, September 2008 (n = 214) and August 2011 (n = 72)

The River Inny (Tully)

A total of three fish species were recorded in the River Inny (Tully) site. Brown trout was the most abundant species, followed by three-spined stickleback and lamprey (Table 4.10).

Table 4.10. Density of fish (no./m^2), River Inny (Tully) site (fish density has been calculated as minimum estimates based on one fishing)

	2011		
Common name	**0+**	**1+ & older**	**Total minimum density**
Brown trout	0.555	0.209	0.764
Three-spined stickleback	-	-	0.009
Lamprey sp.	-	-	0.009
All Fish	-	-	0.782

Brown trout captured during the 2011 survey ranged in length from 4.8cm to 22.1cm (mean = 8.5cm) (Fig. 4.25). Three age classes (0+, 1+ and 2+) were present, accounting for approximately 79%, 20% and 1% of the total brown trout catch respectively.

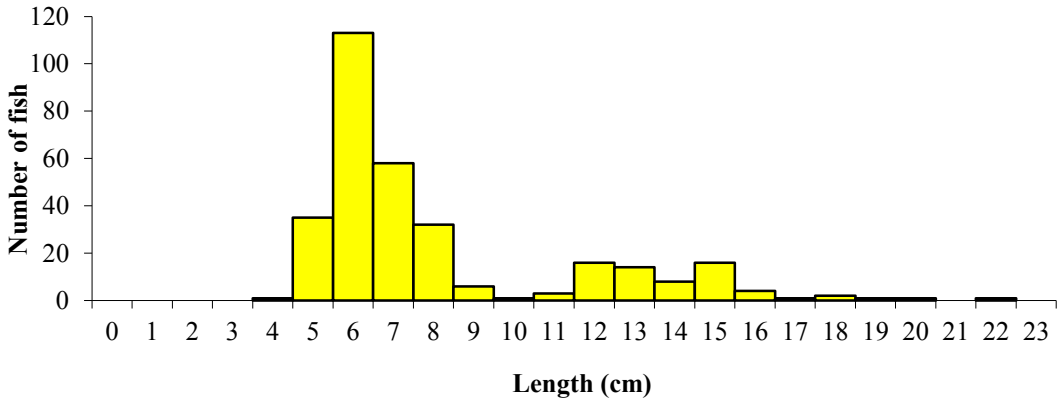

Fig. 4.25. Length frequency distribution of brown trout in the River Inny (Tully) site, August 2011 (n = 313)

4.1.8 The Little (Cloghan) River

One site was electric fished on the Little (Cloghan) River as part of the WFD surveillance monitoring programme in rivers 2011. The survey site was located upstream of the bridge, on the main road between Cloghan and Banagher (Fig. 4.26; Plate 4.11). Three electric-fishing passes were conducted using one bank-based electric fishing unit on the 12th of August 2011, along a 73m length of channel. The mean wetted width of the channel was 3.62m and the mean depth was 17.0cm. A total wetted area of 264m^2 was surveyed. Glide was the most dominant habitat along this stretch, while gravel and cobble were the most abundant substrate types present. The vegetation at this site was varied, with filamentous green algae, bryophytes and emergent bankside species all prevalent throughout.

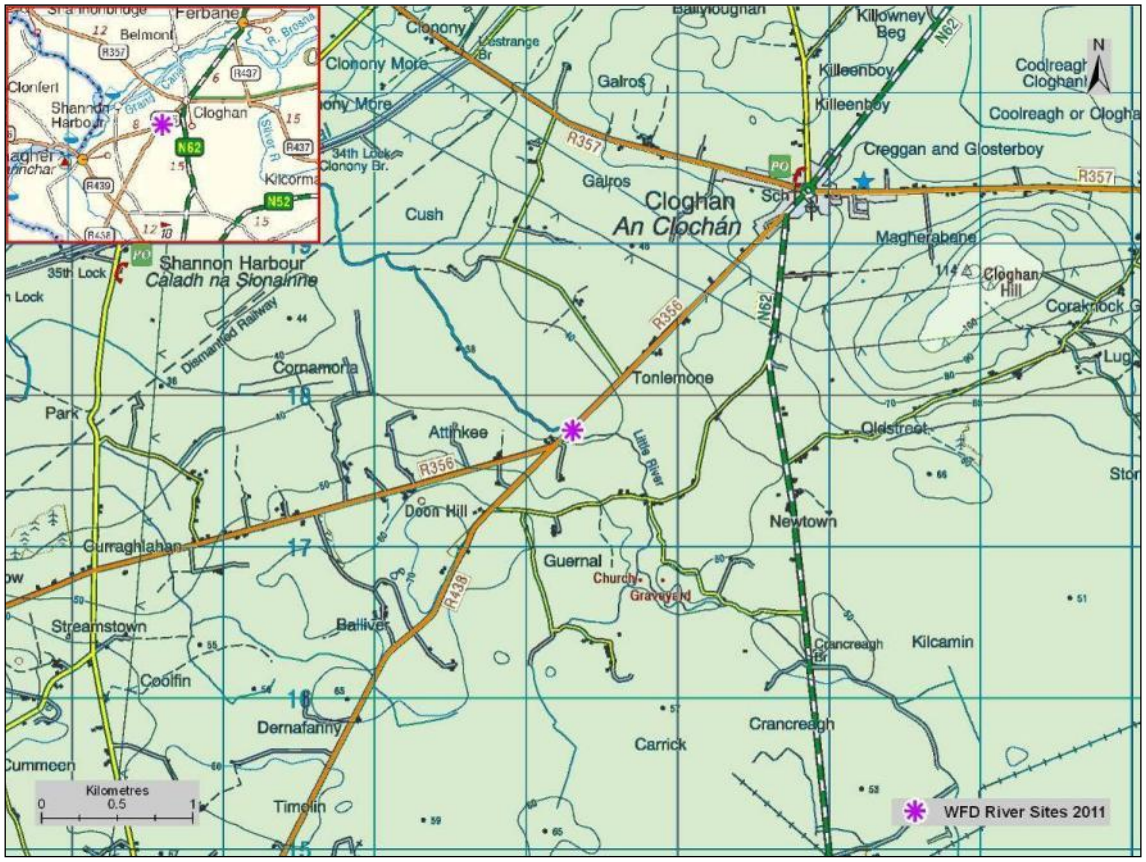

Fig. 4.26. Location of the Little River surveillance monitoring site

Plate 4.11. The Little River near Cloghan, Co. Offaly

A total of six fish species were recorded in the Little River site. Brown trout was the most abundant species, followed by lamprey, minnow, eels, stone loach and three-spined stickleback (Table 4.11). During the previous survey in 2008 the same species composition was recorded with the exception of eels and stone loach, which were not recorded in 2008, and gudgeon and roach, which were not recorded in the 2011 survey.

Table 4.11. Density of fish (no./m^2), Little 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	0.064	0.047	0.111	0.061	0.042	0.102
Lamprey sp.	-	-	0.012	-	-	0.027
Minnow	-	-	0.199	-	-	0.027
Three-spined stickleback	-	-	0.012	-	-	0.004
Eel	-	-	-	-	-	0.004
Stone loach	-	-	-	-	-	0.004
Gudgeon	-	-	0.006	-	-	-
Roach	-	-	0.006	-	-	-
All Fish	-	-	0.345	-	-	0.167

Brown trout captured during the 2011 survey ranged in length from 6.5cm to 25.5cm (mean = 13.0cm) (Fig. 4.27). Four age classes (0+, 1+, 2+ and 3+) were present, accounting for approximately 46%, 46%, 6% and 3% of the total brown trout catch respectively. Brown trout captured in 2008 ranged in length from 7.2cm to 24.2cm (mean = 13.9cm) (Fig 4.27). Three age classes (0+, 1+ and 2+) were present, accounting for approximately 53%, 20% and 27% of the total brown trout catch respectively.

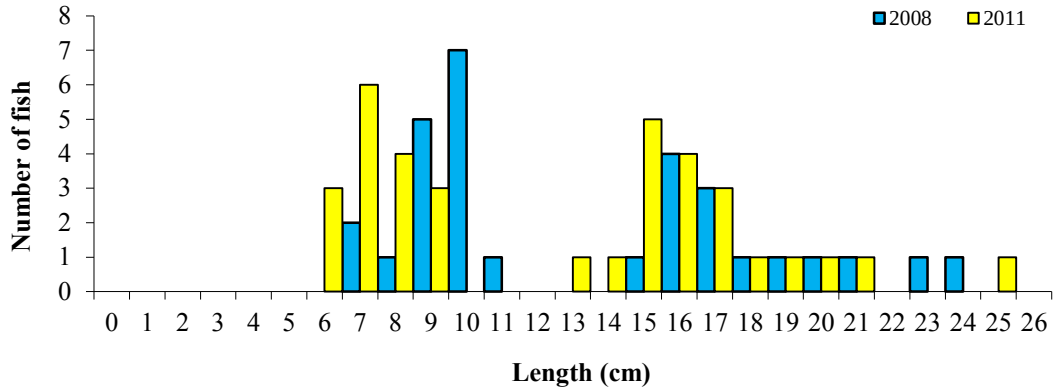

Fig. 4.27. Length frequency distribution of brown trout in the Little River site, September 2008 (n = 30) and September 2011 (n = 35)

4.1.9. The Mountnugent River (Mountnugent Br. and Racraveen)

Two sites were electric fished on the Mountnugent River as part of the WFD surveillance monitoring programme in rivers 2011.

The Mountnugent River (Mountnugent Br.) survey site was located upstream of Mountnugent Bridge in the village of Mountnugent, approximately two kilometres east of Lough Sheelin (Fig. 4.28; Plate 4.12). Three electric-fishing passes were conducted using three bank-based electric fishing units on the 22nd of August 2011, along a 44m length of channel. The mean wetted width of the channel was 7.03m and the mean depth was 31.0cm. A total wetted area of 309m^2 was surveyed. This stretch was almost entirely made up of glide, while gravel dominated the substrate. The vegetation at this site consisted of bryophytes and emergent bankside species.

The Mountnugent River (Racraveen) survey site was located further upstream of the previous site (Section 4.1.11) on the upstream side of a bridge between Racraveen and Gallonreagh (Fig. 4.28; Plate 4.13). Three electric-fishing passes were conducted using three bank-based electric fishing units on the 22nd of August 2011, along a 33m length of channel. The mean wetted width of the channel was 6.32m and the mean depth was 19.0cm. A total wetted area of 208m^2 was surveyed. Glide was the most abundant habitat type present along this stretch, while gravel and cobble dominated the substrate. A variety of vegetation was recorded at this site, with bryophytes, and emergent bankside species both abundant throughout.

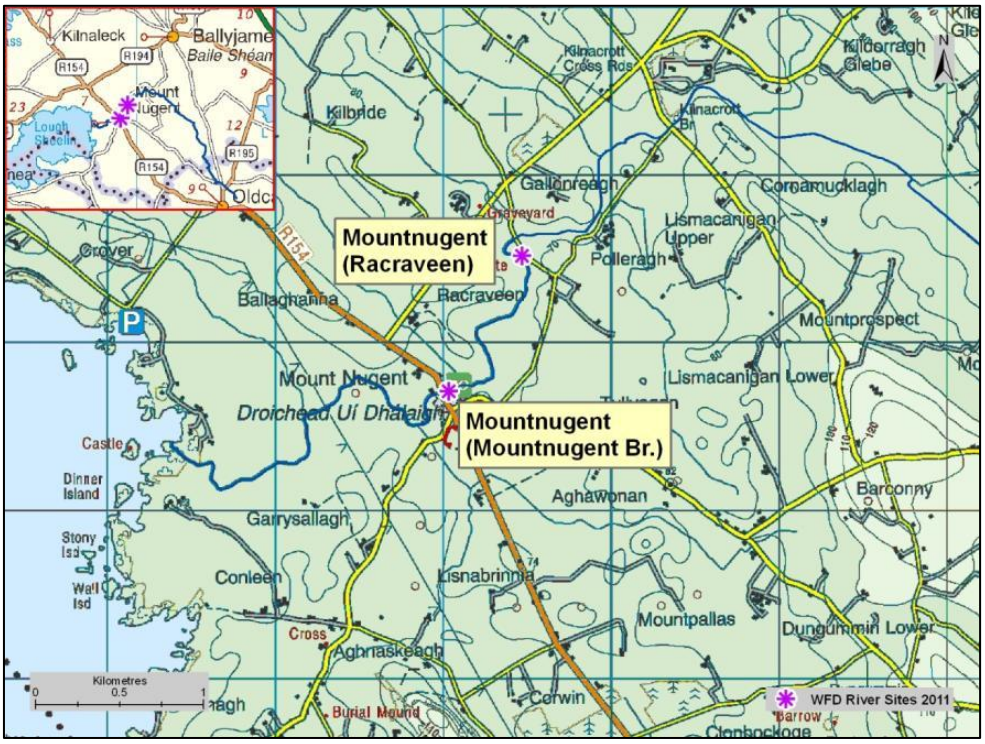

Fig. 4.28. Location of the Mountnugent River (Mountnugent and Racraveen) surveillance monitoring sites

Plate 4.12. The Mountnugent River at Mountnugent Bridge, Co. Cavan

Plate 4.13. The Mountnugent River at Racraveen, Co. Cavan

Mountnugent River (Mountnugent Br.)

A total of six fish species were recorded in the Mountnugent River (Mountnugent) site. Brown trout was the most abundant species, followed by stone loach, perch, three-spined stickleback, lamprey and minnow (Table 4.12). During the previous survey in 2008, gudgeon were recorded, whereas three-spined stickleback, lamprey and minnow were only recorded in the 2011 survey.

Table 4.12. Density of fish (no./m^2), Mountnugent River (Mountnugent) 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	0.001	0.042	0.042	0.013	0.110	0.123
Stone loach	-	-	0.001	-	-	0.032
Perch	-	-	0.004	-	-	0.019
Three-spined stickleback	-	-	-	-	-	0.010
Lamprey sp.	-	-	-	-	-	0.010
Minnow	-	-	-	-	-	0.003
Gudgeon	-	-	0.003	-	-	-
All Fish	-	-	0.050	-	-	0.197

Brown trout captured during the 2011 survey ranged in length from 7.3cm to 24.8cm (mean = 15.3cm) (Fig. 4.29). Three age classes (0+, 1+ and 2+) were present, accounting for approximately 16%, 80% and 4% of the total brown trout catch respectively. Brown trout captured in 2008 ranged in length from 8.2cm to 59.0cm (mean = 21.7cm) (Fig. 4.29). Five age classes (0+, 1+, 2+, 3+, 4+ and 6+) were present, accounting for approximately 1%, 61%, 20%, 15%, 1% and 1% of the total brown trout catch respectively.

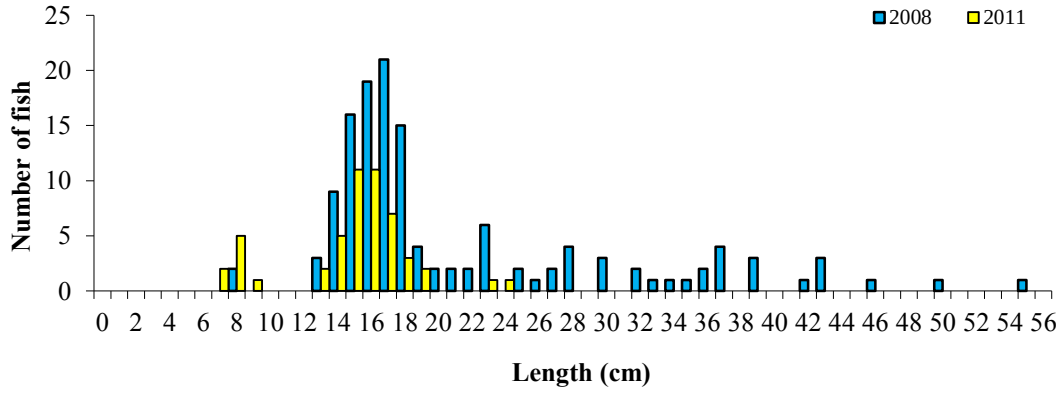

Fig. 4.29. Length frequency distribution of brown trout in the Mountnugent River (Mountnugent) site, September 2008 (n = 134) and August 2011 (n = 51)

The Mountnugent River (Racraveen)

A total of five fish species were recorded in the Mountnugent River (Racraveen) site. Minnow was the most abundant species, followed by three-spined stickleback, brown trout, stone loach and lamprey (Table 4.13).

Table 4.13. Density of fish (no./m^2), Mountnugent River (Racraveen) site (fish density has been calculated as minimum estimates based on one fishing)

Common name	2011		
	0+	1+ & older	Total minimum density
Minnow	-	-	0.389
Three-spined stickleback	-	-	0.211
Brown trout	0.029	0.101	0.130
Stone loach	-	-	0.115
Lamprey sp.	-	-	0.005
All Fish	-	-	0.849

Minnow ranged in length from 2.2cm to 6.9cm (mean = 5.5cm). Three-spined stickleback ranged in length from 2.0cm to 6.0cm (mean = 3.5cm).

Brown trout ranged in length from 7.9cm to 22.9cm (mean = 15.1cm) (Fig. 4.30). Three age classes (0+, 1+ and 2+) were present, accounting for approximately 21%, 76% and 3% of the total brown trout catch respectively.

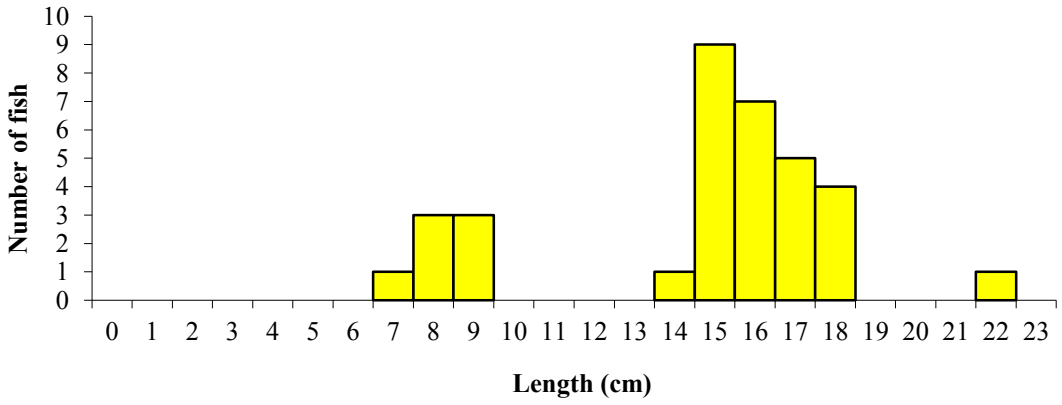

Fig. 4.30. Length frequency distribution of brown trout in the Mountnugent River (Racraveen) site, September 2011 (n = 34)

4.1.10. The Clodiagh (Tullamore) River

One site was electric fished on the Clodiagh River as part of the WFD surveillance monitoring programme in rivers 2011. The survey site was located upstream of Rahan Bridge in the village of Rahan, several kilometres west of Tullamore (Fig. 4.31; Plate 4.14). Three electric-fishing passes were conducted using one boat-based electric fishing unit on the 13th of September 2011, along a 160m length of channel. The mean wetted width of the channel was 7.83m and the mean depth was 56.0cm. A total wetted area of 1253m^2 was surveyed. The habitat along this stretch was composed entirely of glide, while the substrate was an even mix of cobble, gravel and sand.

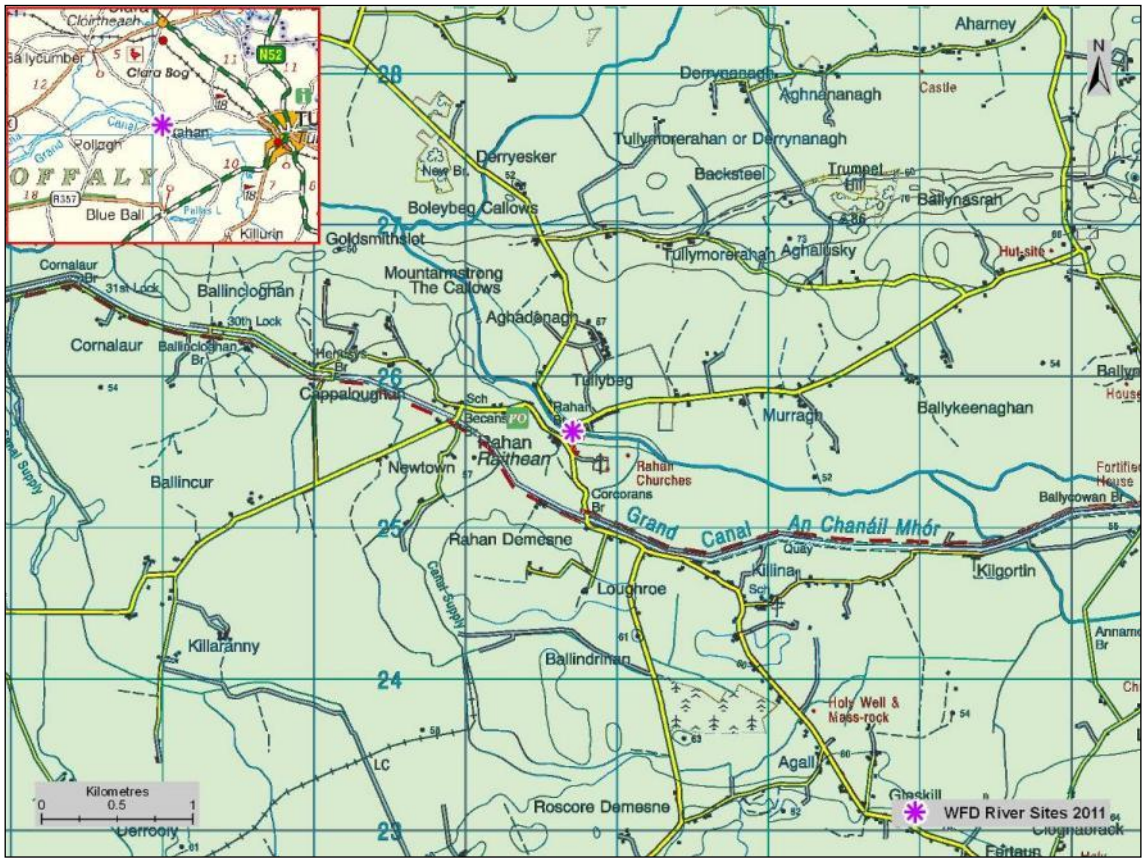

Fig. 4.31. Location of the Clodiagh River surveillance monitoring site

Plate 4.14. The Clodiagh River at Rahan Bridge, Co. Offaly

A total of five fish species were recorded in the Clodiagh River site. Brown trout was the most abundant species, followed by minnow, gudgeon, stone loach and three-spined stickleback (Table 4.14). During the previous survey in 2008 the same species composition was recorded with the exception of eels, lamprey and salmon, which were present in 2008 but not recorded in 2011, while gudgeon were only recorded in the 2011 survey.

Table 4.14. Density of fish (no./m^2), Clodiagh 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	0.001	0.044	0.044	-	0.041	0.041
Minnow	-	-	0.001	-	-	0.002
Gudgeon	-	-	-	-	-	0.002
Stone loach	-	-	0.002	-	-	0.001
Three-spined stickleback	-	-	0.002	-	-	0.001
Eel	-	-	0.001	-	-	-
Lamprey sp.	-	-	0.001	-	-	-
Salmon		0.001	0.001	-	-	-
All Fish	-	-	0.051	-	-	0.046

Brown trout captured during the 2011 survey ranged in length from 17.6cm to 41.9cm (mean = 25.3cm) (Fig. 4.32). Four age classes (1+, 2+, 3+ and 4+) were present, accounting for approximately 32%, 55%, 10% and 3% of the total brown trout catch respectively. Brown trout captured in 2008 ranged in length from 7.1cm to 32.5cm (mean = 21.4cm) (Fig. 4.32). Four age classes (0+, 1+, 2+ and 3+) were present, accounting for approximately 3%, 46%, 45% and 6% of the total brown trout catch respectively.

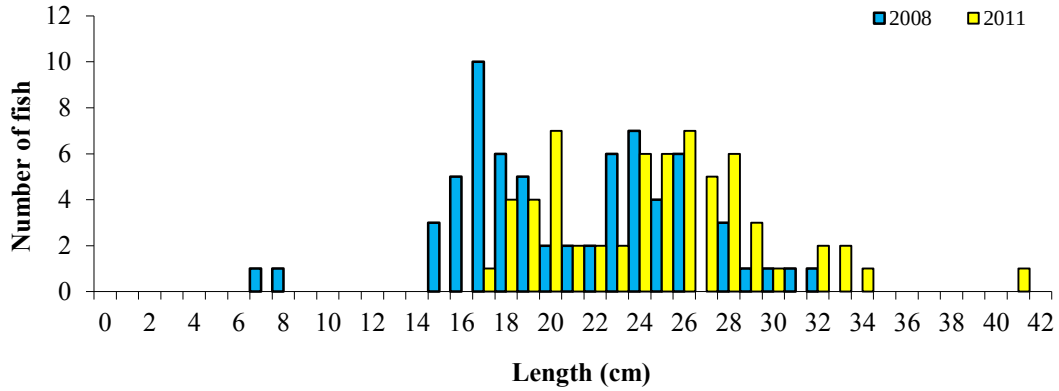

Fig. 4.32. Length frequency distribution of brown trout in the Clodiagh River site, July 2008 (n = 67) and August 2011 (n = 62)

4.1.11 The Scramoge River (Riverdale and Carrowclogher)

Two sites were electric fished on the Scramoge river as part of the WFD surveillance monitoring programme in rivers 2011.

The Scramoge River (Riverdale) survey site was located downstream of Cloonconny Bridge approximately 4km southwest of Strokestown (Fig. 4.33; Plate 4.15). Three electric-fishing passes were conducted using two boat-based electric fishing units on the 25th of August 2011, along a 236m length of channel. The mean wetted width of the channel was 7.00m and the mean depth was 66.0cm. A total wetted area of 1652m^2 was surveyed. Glide was the only habitat present along this stretch, with cobble and gravel dominating the substrate. This site was rich in aquatic vegetation, with a wide variety of emergent, submerged and floating species present.

The second survey stretch (Scramoge River - Carrowclogher) was located directly downstream of the previous site (Fig. 4.33; Plate 4.16). Two electric-fishing passes were conducted using one boat-based electric fishing unit on the 25th of August 2011, along a 108m length of channel. The mean wetted width of the channel was 6.00m and the mean depth was 62.0cm. A total wetted area of 648m^2 was surveyed. Glide was the only habitat present along this stretch, while the substrate was dominated by gravel. This site was slightly more shaded than the previous Scramoge River site, with less instream vegetation reflecting this difference.

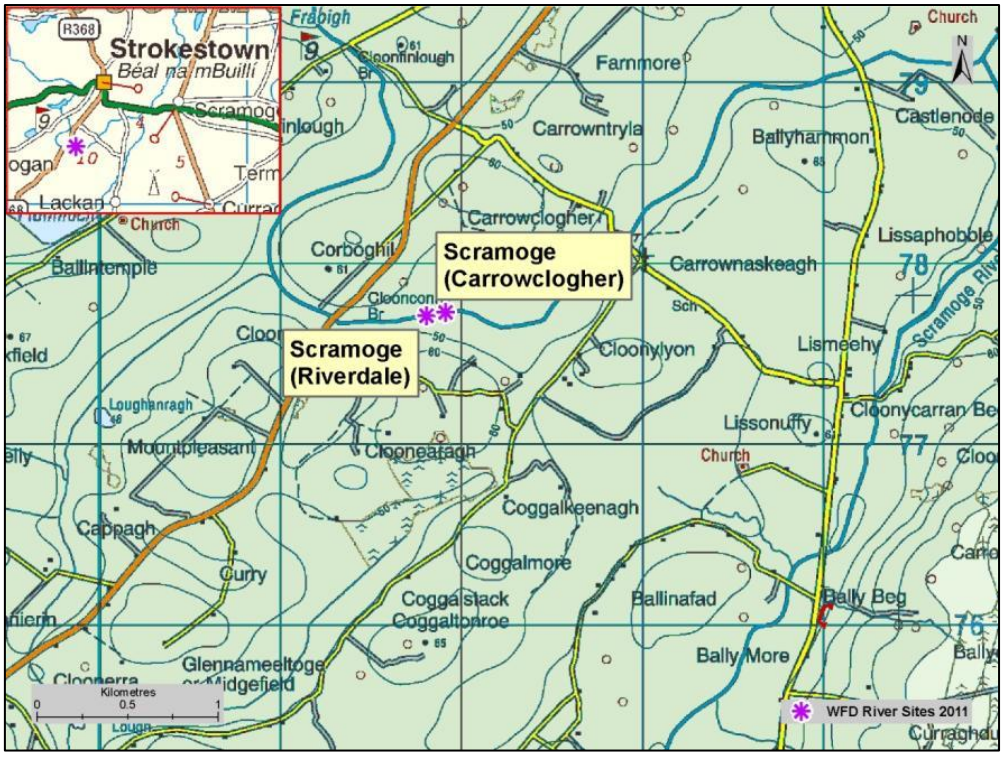

Fig. 4.33. Location of the Scramoge River (Riverdale and Carrowclogher) surveillance monitoring sites

Plate 4.15. The Scramoge River near Riverdale, Co. Roscommon

Plate 4.16. The Scramoge River at Carrowclogher, Co. Roscommon

Scramoge River (Riverdale)

A total of eight fish species were recorded in the Scramoge River (Riverdale) site. Perch was the most abundant species, followed by gudgeon, pike, lamprey, stone loach, roach, eels and brown trout (Table 4.15). A greater species composition was recorded in 2011, including species such as gudgeon, lamprey, stone loach and brown trout, which were not recorded in 2008.

Table 4.15. Density of fish (no./m^2), Scramoge River (Riverdale) 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
Perch	-	-	0.015	-	-	0.021
Gudgeon	-	-	-	-	-	0.009
Pike	-	-	0.003	-	-	0.004
Lamprey sp.	-	-	-	-	-	0.002
Roach	-	-	0.006	-	-	0.002
Stone loach	-	-	-	-	-	0.002
Eel	-	-	0.000	-	-	0.001
Brown trout	-	-	-	0.001	-	0.001
All Fish	-	-	0.026	-	-	0.041

Perch captured during the 2011 survey ranged in length from 4.8cm to 25.2cm (mean = 13.4cm) (Fig. 4.34). Perch captured during the 2008 survey ranged in length from 5.7cm to 26.0cm (mean = 13.4cm) (Fig. 4.34).

Pike ranged in size from 14.4cm to 39.8cm (mean = 24.3cm). Three age classes (0+, 1+ and 2+) were present, accounting for approximately 50%, 30% and 20% of the total pike catch respectively. Pike captured in 2008 ranged in length from 23.9cm to 50.7cm (mean = 37.9cm). Three age classes (1+, 2+ and 3+) were present, accounting for approximately 50%, 10% and 40% of the total pike catch respectively.

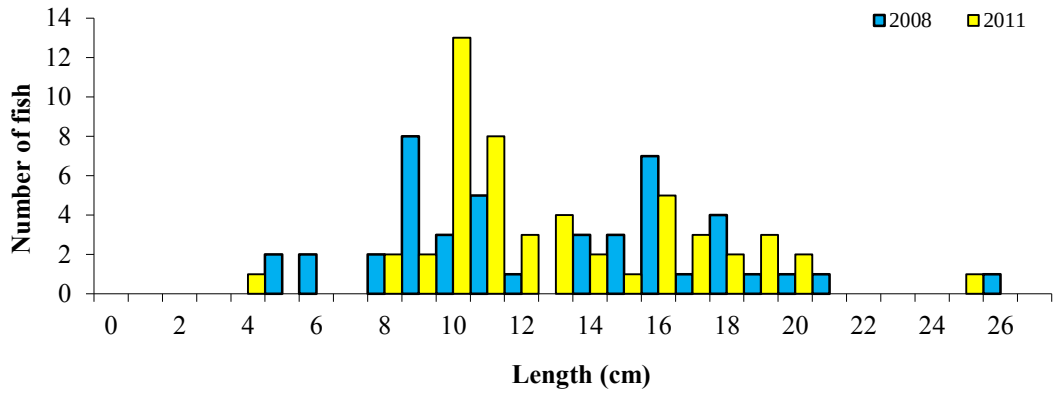

Fig. 4.34. Length frequency distribution of perch in the Scramoge River (Riverdale) site, September 2008 (n = 45) and August 2011 (n = 52)

The Scramoge River (Carrowclogher)

A total of six fish species were recorded in the Scramoge River (Carrowclogher) site. Perch was the most abundant species, followed by stone loach, pike, eels, gudgeon and brown trout (Table 4.16).

Table 4.16. Density of fish (no./m^2), Scramoge River (Carrowclogher) site (fish density has been calculated as minimum estimates based on one fishing)

	2011		
Common name	**0+**	**1+ & older**	**Total minimum density**
Perch	-	-	0.015
Stone loach	-	-	0.003
Pike	-	-	0.003
Eel	-	-	0.002
Gudgeon	-	-	0.002
Brown trout	0.002	-	0.002
All Fish	-	-	0.026

Two pike were recorded at this site, a 0+ individual measuring 18.5cm and a 2+ individual measuring 34.6cm. Perch ranged in length from 9.8cm to 22.3cm (mean = 16.3cm).

4.1.12 The Silver (Kilcormac) River

One site was electric fished on the Silver (Kilcormac) River as part of the WFD surveillance monitoring programme in rivers 2011.

The survey site was located just downstream of Lumcloon Bridge, approximately 3km upstream of the Silver River's confluence with the River Brosna (Fig. 4.36, Plate 4.17). Three electric-fishing passes were conducted using one boat-based electric fishing unit on the 13th of September 2011, along a 134m length of channel. The mean wetted width of the channel was 7.00m and the mean depth was 47.0cm. A total wetted area of 938m^2 was surveyed. Glide was the only habitat present along this stretch, while gravel dominated the substrate. The vegetation along this stretch consisted mainly of emergent species, with some submerged bryophytes.

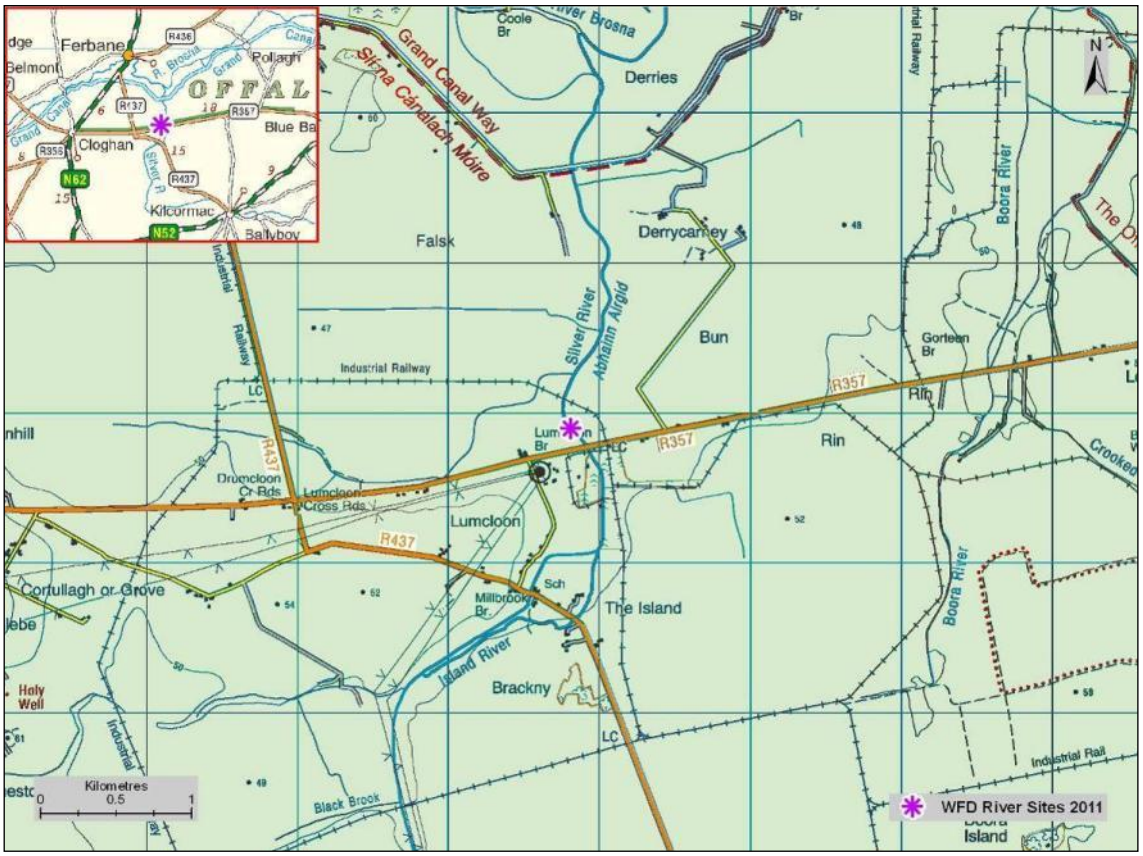

Fig. 4.36. Location of the Silver River surveillance monitoring site

Plate 4.17. The Silver River at Lumcloon Bridge, Co. Offaly

A total of six fish species were recorded in the Silver River site. Brown trout was the most abundant species, followed by minnow, gudgeon, stone loach, three-spined stickleback and salmon (Table 4.17). During the previous survey in 2008 the same species composition was recorded with the exception of minnow and three-spined stickleback, which were not recorded in 2008 but were present in 2011.

Table 4.17. Density of fish (no./m^2), Silver 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	0.042		0.042	0.044	0.042	0.085
Minnow	-	-	-	-	-	0.057
Gudgeon	-	-	0.002	-	-	0.005
Stone loach	-	-	0.002	-	-	0.001
Three-spined stickleback	-	-	-	-	-	0.001
Salmon		0.001	0.001		0.001	0.001
All Fish	-	-	0.047	-	-	0.150

Brown trout captured during the 2011 survey ranged in length from 8.5cm to 33.8cm (mean = 15.8cm) (Fig. 4.37). Five age classes (0+, 1+, 2+, 3+ and 4+) were present, accounting for approximately 49%, 39%, 6%, 4% and 2% of the total brown trout catch respectively. Brown trout captured during the 2008 survey ranged in length from 11.3cm to 32.0cm (mean = 19.2cm) (Fig. 4.37). Four age classes (1+, 2+, 3+ and 4+) were present, accounting for approximately 66%, 17%, 15% and 2% of the total brown trout catch respectively.

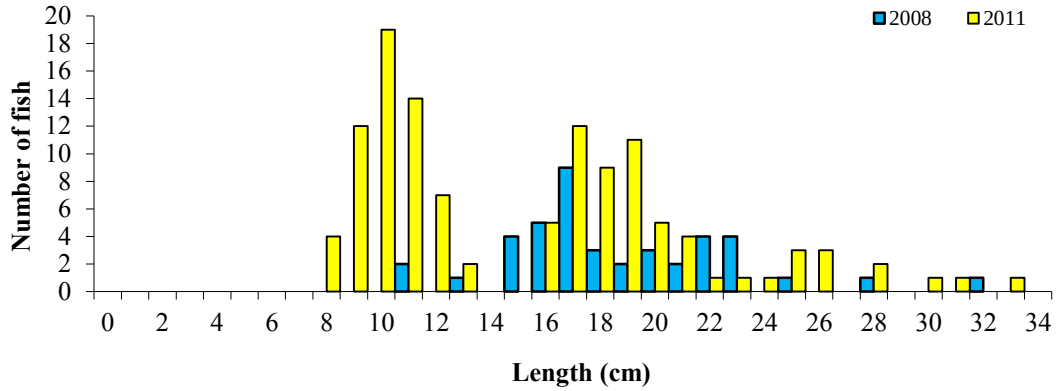

Fig. 4.37. Length frequency distribution of brown trout in the Silver River (Kilcormac) site, October 2008 (n = 42) and August 2011 (n = 118)

4.2 Community structure

4.2 Species distribution

A total of 12 fish species and were recorded within the 17 ShIRBD sites surveyed during 2011 (Fig. 4.38). Brown trout was the most common species, present at all sites surveyed, followed by stone loach, lamprey and three-spined stickleback, eels, gudgeon and minnow, salmon, perch, pike and roach. Nine-spined stickleback were only recorded at one site (Fig. 4.38).

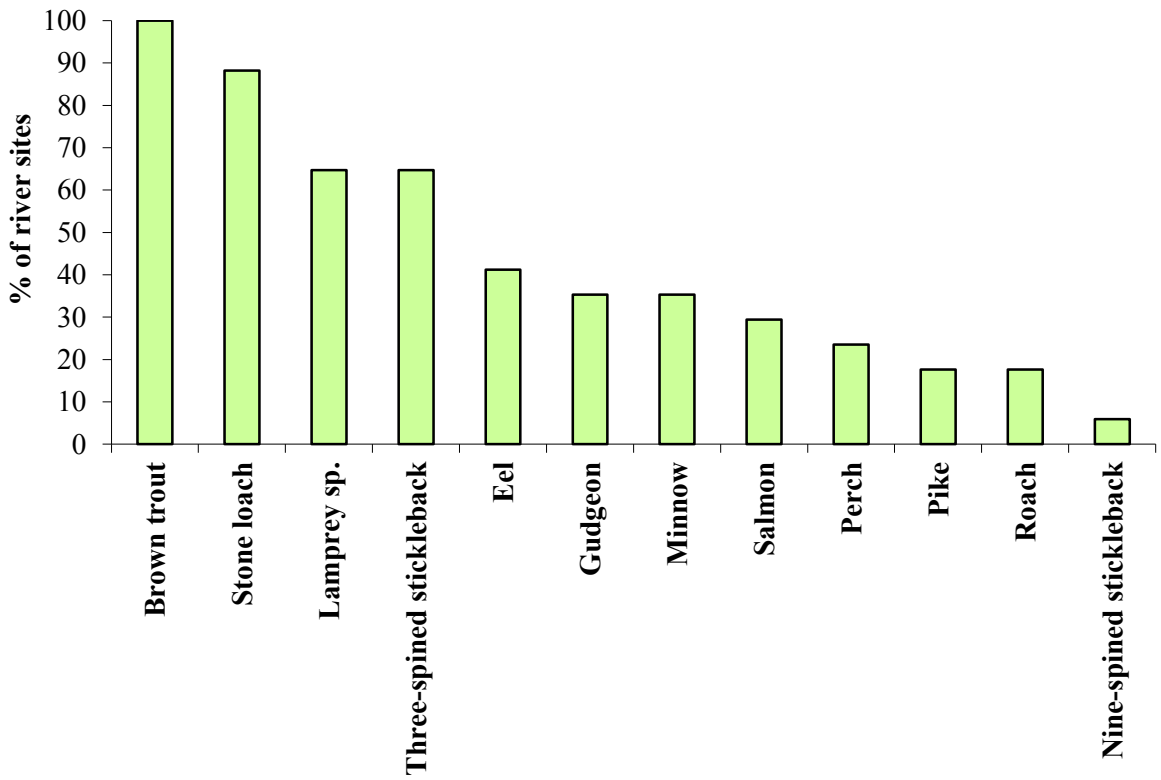

Fig. 4.38. Percentage of sites where each fish species was recorded in the ShIRBD for WFD SM monitoring 2011

4.3 Age and growth

Growth rates based on back-calculated length-at-age data were analysed for brown trout, salmon, roach and pike in the ShIRBD during 2011.

Brown trout were present in all of the ShIRBD sites surveyed, however some rivers only contained fry (0+ fish), making it unfeasible to determine growth rate. Brown trout up to age 4+ were recorded in three rivers, the Bow, Clodiagh and Silver, while age 3+ fish were caught in a total of five rivers, the Bow, Clodiagh, Deel, Little and Silver. Fish aged 0+ comprised the most abundant age class. The largest brown trout recorded in the ShIRBD in 2011 was captured in the Clodiagh River, which measured 41.9cm in length, weighed 936g and was aged 4+. 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 "fast" at the Clodiagh sites (Fig. 4.39 and Appendix 1).

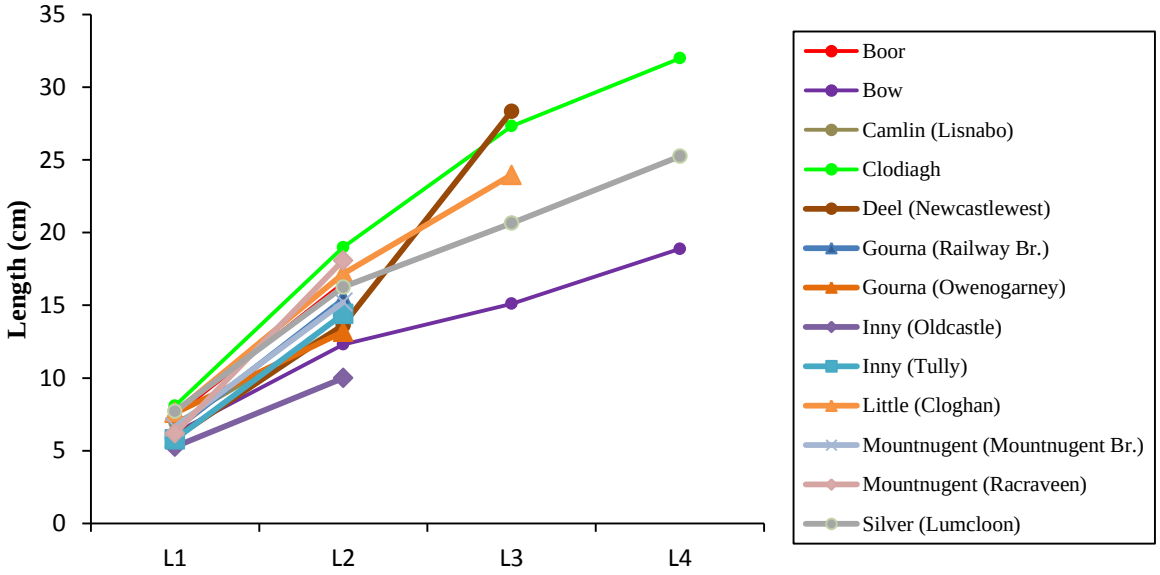

Fig. 4.39. Back-calculated lengths-at-age for brown trout in the ShIRBD, WFD surveillance monitoring 2011

Salmon were recorded in five sites within the ShIRBD in 2011. Ages ranged from 0+ to 2+, with those aged 0+, comprising the most abundant age class. The largest salmon recorded in the ShIRBD during 2011 was caught in the Gourna River (Owenogarney), measured 16.6cm in length, weighed 51g and was aged 1+.

The mean back-calculated length-at-age data for roach in the ShIRBD are shown in Figure 4.41 and Appendix 3. Roach were recorded at three sites surveyed in the ShIRBD in 2011. Roach ages ranged from 0+ to 8+. Fish aged 0+ were the most abundant age class. The largest roach recorded in the ShIRBD during 2010 was caught in the Camlin River at Lisnabo, measured 26.5cm in length, weighed 357g and was aged 8+.

The mean back-calculated length-at-age data for pike in the ShIRBD are shown in Figure 4.42 and Appendix 4. Pike were recorded at three sites surveyed in the ShIRBD in 2011, with ages ranging from 0+ to 2+. Fish aged 0+ were the most abundant age class. The largest pike recorded in the ShIRBD during 2011 was caught in the Camlin River (Lisnabo), which measured 51.3cm in length, weighed 1.07kg and was aged 2+.

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 have contributed data to be used in the model, which was developed under the management of the Scotland & Northern Ireland Forum for Environmental Research (SNIFFER). The process works by comparing various fish community metric values within a site (observed) with those predicted (expected) for that site under reference (un-impacted) conditions, using a geostatistical model based on Bayesian probabilities. This classification system generates Ecological Quality Ratings (EQRs) between 1 and 0 for each site, which correspond 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 4.18). Two sites were classified as “High”, six sites as “Good”, eight sites as “Moderate” and one site as “Poor”. Eleven of these sites were surveyed in both 2008 and 2011 and when comparing the status for both years, two sites showed an improvement, six sites had no change and three sites deteriorated.

Table 4.18. Ecological status of sites surveyed in the ShIRBD for surveillance monitoring 2011 (figures in brackets indicate confidence in class)

River	Site Code	Site name	Previous ecological status	Ecological status 2011
Boor	26B071100	Br. NW of Kilbillaghan	Moderate (2008)	Good (85%)
Bow	25B100100	Bow River Br.	Good (2008)	Moderate (72%)
Camlin	26C011000	Br. W. of Lisnabo	Moderate (2008)	Moderate (98%)
Camlin	26C010500	Br. just S of Killoe	-	Moderate (62%)
Clodiagh (Tullamore)	25C060500	Br. at Rahan	Good (2008)	Moderate (72%)
Deel (Newcastlewest)	24D020400	Br. near Balliniska	Moderate (2008)	Moderate (87%)
Gourna	27G020600	Beside railway Br.	-	High (100%)
Gourna	27G020550	Br. u/s Owenogarney confl	Good (2008)	High (100%)
Graney	25G040025	Caher Br.	Good (2008)	Good
Inny	26I010100	Br. 1 km S of Oldcastle	-	Good
Inny	26I010220	Br. d/s of Dairy farm (Tully)	-	Good
Little (Cloghan)	25L010200	Br. SW of Cloghan	Moderate (2008)	Moderate (78%)
Mountnugent	26M020500	Mountnugent Br.	Good (2008)	Good (87%)
Mountnugent	26M010450	Racraveen	-	Good (79%)
Scramoge	26S010320	Br. N.E. of Riverdale	Moderate (2008)	Moderate (93%)
Scramoge	26S010330	Carrowclogher	-	Poor (99%)
Silver (Kilcormac)	25S020700	Lumcloon Br.	Good (2008)	Moderate (87%)

5. DISCUSSION

A total of 12 fish species were recorded during the 2011 WFD surveillance monitoring programme for fish in rivers within the ShIRBD. Brown trout was the most commonly encountered species in the ShIRBD, recorded in all 17 sites, followed by stone loach and both lamprey and three-spined stickleback. The Camlin River (Lisnabo) and Scramoge River (Riverdale) sites were the most diverse sites surveyed within the ShIRBD for the Water Framework Directive in 2011 with a total of eight species present in both. The lowest species diversity recorded at any site was three species, in the Bow, Graney, and both River Inny sites. The highest abundances of brown trout and salmon were recorded in the River Inny (Tully) and Gourna River (Owenogarney) sites respectively.

Following the methods of Kennedy and Fitzmaurice (1971), growth could only be estimated at one site, on the Clodiagh River, where it was considered to be "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. Two sites were classified as "High", seven sites as "Good", seven sites as "Moderate" and one site as "Poor". Eleven of these sites were surveyed in both 2008 and 2011 and when comparing the status for both years, two sites showed an improvement, six sites had no change and three sites 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	L4	Growth Category
Boor	Mean	7.4	n/a			n/a
	S.D.	1.4	n/a			
	S.E.	0.5	n/a			
	n	10	1			
	Min	5.8	16.5			
	Max	9.8	16.5			
Bow	Mean	6.2	12.3	n/a	n/a	n/a
	S.D.	1.4	1.7	n/a	n/a	
	S.E.	0.3	0.6	n/a	n/a	
	n	25	7	1	1	
	Min	4.8	9.4	15.1	18.9	
	Max	9.6	14.6	15.1	18.9	
Camlin (Killoe)	Mean	n/a				n/a
	S.D.	n/a				
	S.E.	n/a				
	n	1				
	Min	8.4				
	Max	8.4				
Camlin (Lisnabo)	Mean	6.9	n/a			n/a
	S.D.	0.1	n/a			
	S.E.	0.1	n/a			
	n	2	1			
	Min	6.8	13.7			
	Max	7.0	13.7			
Clodiagh	Mean	8.1	19.0	27.3	n/a	Fast
	S.D.	1.7	3.2	3.0	n/a	
	S.E.	0.2	0.5	1.2	n/a	
	n	55	35	6	1	
	Min	4.1	11.1	22.0	32.0	
	Max	12.8	24.1	30.3	32.0	
Deel (Newcastlewest)	Mean	5.9	13.6	n/a		n/a
	S.D.	1.8	1.6	n/a		
	S.E.	0.5	1.2	n/a		
	n	12	2	1		
	Min	3.2	12.5	28.3		
	Max	9.3	14.8	28.3		

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
Gourna (Railway Br.)	Mean	6.5	15.4			n/a
	S.D.	1.1	0.0			
	S.E.	0.3	0.0			
	n	18	2			
	Min	4.5	15.4			
	Max	9.1	15.4			
Gourna (Owenogarney)	Mean	7.6	n/a			n/a
	S.D.	0.9	n/a			
	S.E.	0.2	n/a			
	n	16	1			
	Min	6.6	13.2			
	Max	10.0	13.2			
Graney	Mean	5.3				n/a
	S.D.	1.3				
	S.E.	0.3				
	n	16				
	Min	3.5				
	Max	7.6				
Inny (Oldcastle)	Mean	5.3	10.0			n/a
	S.D.	1.2	1.1			
	S.E.	0.3	0.8			
	n	23	2			
	Min	3.5	9.2			
	Max	7.8	10.8			
Inny (Tully)	Mean	5.8	14.4			n/a
	S.D.	1.4	2.7			
	S.E.	0.3	1.6			
	n	31	3			
	Min	3.3	11.4			
	Max	9.3	16.7			
Little (Cloghan)	Mean	7.6	17.2	n/a		n/a
	S.D.	1.3	2.1	n/a		
	S.E.	0.3	1.2	n/a		
	n	18	3	1		
	Min	5.3	14.9	24.0		
	Max	10.3	18.9	24.0		

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
Mountnugent (Mountnugent Br.)	Mean	6.6	15.2			n/a
	S.D.	1.4	0.0			
	S.E.	0.3	0.0			
	n	29	2			
	Min	4.5	15.2			
	Max	10.4	15.2			
Mountnugent (Racraveen)	Mean	6.2	n/a			n/a
	S.D.	1.3	n/a			
	S.E.	0.3	n/a			
	n	21	1			
	Min	4.2	18.1			
	Max	8.4	18.1			
Silver (Lumcloon)	Mean	7.7	16.3	20.6	n/a	n/a
	S.D.	1.8	3.7	1.9	n/a	
	S.E.	0.3	1.2	1.0	n/a	
	n	37	10	4	1	
	Min	4.3	10.4	19.2	25.3	
	Max	11.5	20.8	23.4	25.3	

APPENDIX 2

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

River		L1	L2
Boor	Mean	n/a	
	S.D.	n/a	
	S.E.	n/a	
	n	1	
	Min	5.5	
	Max	5.5	
Deel (Newcastlewest)	Mean		
	S.D.		
	S.E.		
	n		
	Min		
	Max		
Gourna (Railway Br.)	Mean	5.0	n/a
	S.D.	0.8	n/a
	S.E.	0.2	n/a
	n	15	1
	Min	4	10
	Max	6.6	10
Gourna (Owenogarney)	Mean	5.9	
	S.D.	1.2	
	S.E.	0.4	
	n	11	
	Min	4	
	Max	8.3	
Silver (Kilcormac)	Mean	n/a	
	S.D.	n/a	
	S.E.	n/a	
	n	1	
	Min	5	
	Max	5	

APPENDIX 3

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

River		L1	L2	L3	L4	L5	L6	L7	L8
Camlin (Lisnabo)	Mean	2.4	5.6	9.7	14.1	17.3	20.4	23.1	24.8
	S.D.	0.7	1.1	1.5	1.5	1.5	1.4	0.9	1.1
	S.E.	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.6
	n	74	60	44	38	27	16	6	4
	Min	1.3	3.4	6.7	10.5	14.3	17.5	22.4	23.3
	Max	4.4	8.3	12.6	17.6	20.1	22.6	24.7	26.0
Scramoge (Riverdale)	Mean	2.9	n/a						
	S.D.	0.0	n/a						
	S.E.	0.0	n/a						
	n	3	1						
	Min	2.9	4.8						
	Max	3.0	4.8						

APPENDIX 4

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

River		L1	L2
Camlin (Lisnabo)	Mean	23.7	39.8
	S.D.	2.8	3.2
	S.E.	1.6	2.3
	n	3	2
	Min	21.4	37.5
	Max	26.8	42.0
Scramoge (Riverdale)	Mean	17.1	27.2
	S.D.	1.3	3.8
	S.E.	0.6	2.7
	n	5	2
	Min	15.3	24.5
	Max	18.8	29.9
Scramoge(Carrowclogher)	Mean	14.3	n/a
	S.D.	n/a	n/a
	S.E.	n/a	n/a
	n	1	1
	Min	14.3	23.3
	Max	14.3	23.3

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