



**Sampling Fish for the  
Water Framework  
Directive**

*Rivers 2012*

**Shannon  
International River  
Basin District**



Iascach Intíre Éireann  
Inland Fisheries Ireland

## Water Framework Directive Fish Stock Survey of Rivers in the Shannon International River Basin District 2012

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## **1. INTRODUCTION**

Fish stock surveys were undertaken in 58 river sites throughout Ireland during the summer of 2012 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). Fifteen of these surveys were carried out at river sites in the Shannon International River Basin District (ShIRBD) from May to September 2012 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 2012 is the fifth year of the rivers sampling programme, many of the sites surveyed this year are repeat surveys of those carried out in 2009. 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 2012 fish stock surveys carried out on each site in the ShIRBD, as part of the Water Framework Directive surveillance monitoring programme.

## **2. STUDY AREA**

Fifteen river sites were surveyed in six river catchments within the ShIRBD during 2012: the Caher, Creegh, Feale, Shannon Lower, Shannon Estuary South and Tyshe catchments. The sites ranged in surface area from 92m<sup>2</sup> for the Tyshe River (Site A) to 13,149m<sup>2</sup> for the River Maigue (Castleroberts Br.). 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 for 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, ShIRBD 2012**

River	Site name	Catchment	Site Code	Waterbody code
<b>ShIRBD Wadeable sites</b>				
Ballyfinboy	Ballinderry Br._A	Shannon Lwr	25B020750A	SH_25_1853
Bilboa	Br u/s Blackboy Br - Bilboa Br._A	Shannon Lwr	25B030080A	SH_25_486
Caher	Br. 2 km d/s Formoyle_A	Caher	28C010200A	SH_28_106
Dead	Pope's Bridge_A	Shannon Lwr	25D010100A	SH_25_1893
Dead	Pope's Bridge_B	Shannon Lwr	25D010100B	SH_25_1893
Owvane (Limerick)	Br. u/s (SE of) Loghill_A	Shannon Est sth	24O020200A	SH_24_878
Owveg (Kerry)	Owveg Br._B	Feale	23O050200B	SH_23_1743
Tyshe	West br. Ardfert at Friary_A	Tyshe	23T020400A	SH_23_427
Tyshe	West br. Ardfert at Friary_B	Tyshe	23T020400B	SH_23_427
<b>ShIRBD Non-Wadeable sites</b>				
Creagh	Drumellihy Br._A	Creagh	28C021500A	SH_28_709
Kilcrow	Ballyshrul Br._A	Shannon Lwr	25K010700A	SH_25_334
Little Brosna	Riverstown Br._A	Shannon Lwr	25L020700A	SH_25_633
Maugue	Castleroberts Br._A	Shannon Est Sth	24M010900A	SH_24_1675
Nenagh	Ballysoilshaun Br._A	Shannon Lwr	25N010300A	SH_25_335
Tullamore	Br. SW of Ballycowen Br._A	Shannon Lwr	25T030400A	SH_25_3798

**Table 2.2. Details of river sites surveyed for WFD surveillance monitoring, ShIRBD 2012**

River	Upstream catchment (km <sup>2</sup> )	Wetted width (m)	Surface area (m <sup>2</sup> )	Mean depth (m)	Max depth (m)
<b>ShIRBD Wadeable sites</b>					
Ballyfinboy (Ballinderry Br._A)	184.86	7.25	254	0.43	0.78
Bilboa (Br u/s Blackboy Br - Bilboa Br._A)	85.13	13.83	553	0.22	0.40
Caher (Br. 2 km d/s Formoyle_A)	14.91	4.95	223	0.20	0.43
Dead (Pope's Bridge_A)	61.94	6.43	161	0.27	0.40
Dead (Pope's Bridge_B)	61.94	6.25	250	0.34	0.63
Owvane (Limerick) (Br. u/s (SE of) Loghill_A)	74.99	15.22	609	0.23	0.51
Owveg (Kerry) (Owveg Br._B)	18.53	7.63	344	0.18	0.42
Tyshe (West br. Ardfert at Friary_A)	8.52	2.97	92	0.23	0.54
Tyshe (West br. Ardfert at Friary_B)	8.52	4.25	170	0.13	0.21
<b>ShIRBD Non-Wadeable sites</b>					
Creagh (Drumellihy Br._A)	76.00	7.65	1071	0.43	0.90
Kilcrow (Ballyshrul Br._A)	216.10	11.17	1720	0.51	1.29
Little Brosna (Riverstown Br._A)	317.55	11.43	1646	0.54	0.87
Maugue (Castleroberts Br._A)	805.99	33.80	13149	0.87	1.79
Nenagh (Ballysoilshaun Br._A)	82.44	8.45	980	0.51	0.92
Tullamore (Br. SW of Ballycowen Br._A)	124.50	7.42	786	0.59	0.97



**Fig. 2.1. Location map of river sites surveyed throughout the ShIRBD for WFD fish surveillance monitoring 2012**

### 3. METHODS

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

Fish from each pass were sorted and processed separately. During processing, the species of each fish was identified, with its length and weight measured. Sub-samples were sometimes taken when large numbers of fish were present. For the purpose of species identification, juvenile river lamprey (*Lampetra fluviatilis*), brook lamprey (*Lampetra planeri*) and sea lamprey (*Petromyzon marinus*) were recorded as 'Lamprey sp.'. Sea trout and brown trout were listed separately. For ageing analyses, scales were taken from fish greater than 8.0cm for salmonids and most non-native fish species. After processing, fish were held in large bins of oxygenated water until they were fully recovered, before returning them to the water.

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

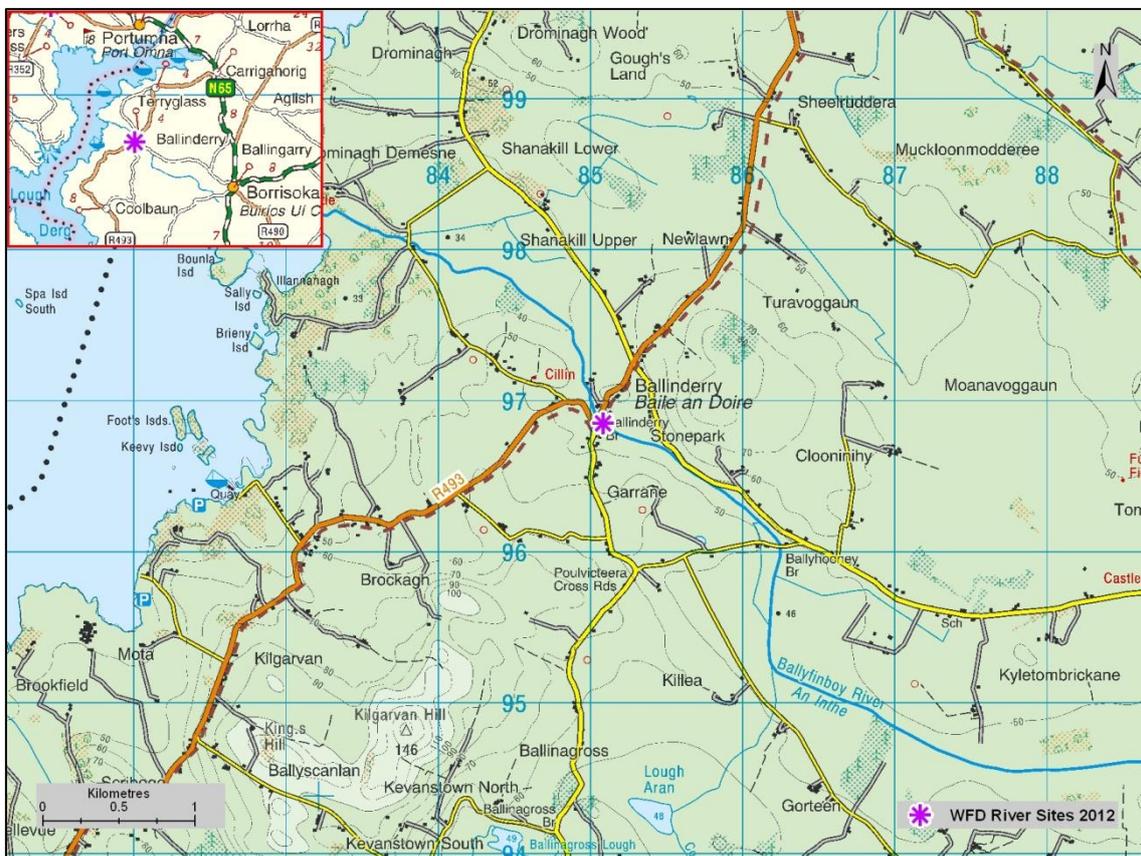
A subsample of the dominant fish species was aged (five fish from each 1cm size class). Fish scales were aged using a microfiche reader. Growth was determined by back-calculating lengths at the end of each winter (e.g. L1 is the mean length at the end of the first winter and L2 is the mean length at the end of the second winter, etc.).

## 4. RESULTS

### 4.1 River surveys

#### 4.1.1 The Ballyfinboy River

One site was electric fished on the Ballyfinboy River as part of the WFD surveillance monitoring programme in rivers 2012. The survey site was located in Ballinderry, less than 3km upstream of Lough Derg, Co. Tipperary (Fig. 4.1; Plate 4.1). Three electric-fishing passes were conducted using one boat-based electric fishing unit on the 7<sup>th</sup> of September 2012, along a 35m length of channel. Glide dominated the habitat, while the substrate consisted largely of sand. Vegetation at this site included a small number of aquatic and semi-aquatic mosses and liverworts.



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



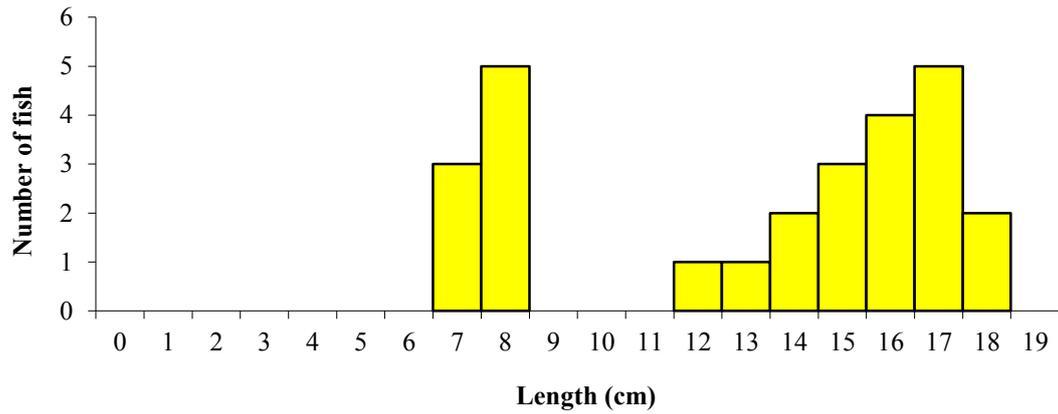
**Plate 4.1. The Ballyfinboy at Ballinderry Bridge, Co. Tipperary**

A total of two fish species were recorded in the Ballyfinboy River (Ballinderry) site (Table 4.1). Brown trout was the most abundant species captured, followed by salmon.

**Table 4.1. Density of fish (no./m<sup>2</sup>), Ballyfinboy River (fish density has been calculated as minimum estimates based on one fishing)**

Common name	2012		
	0+	1+ & older	Total minimum density
Brown trout	0.024	0.059	0.083
Salmon	0.000	0.008	0.008
All Fish	-	-	0.091

Brown trout captured during the 2012 survey ranged in length from 7.3cm to 18.4cm (mean = 13.7cm) (Fig. 4.2). Three age classes (0+, 1+ and 2+) were present, accounting for 31%, 54% and 15% of the total brown trout catch respectively.

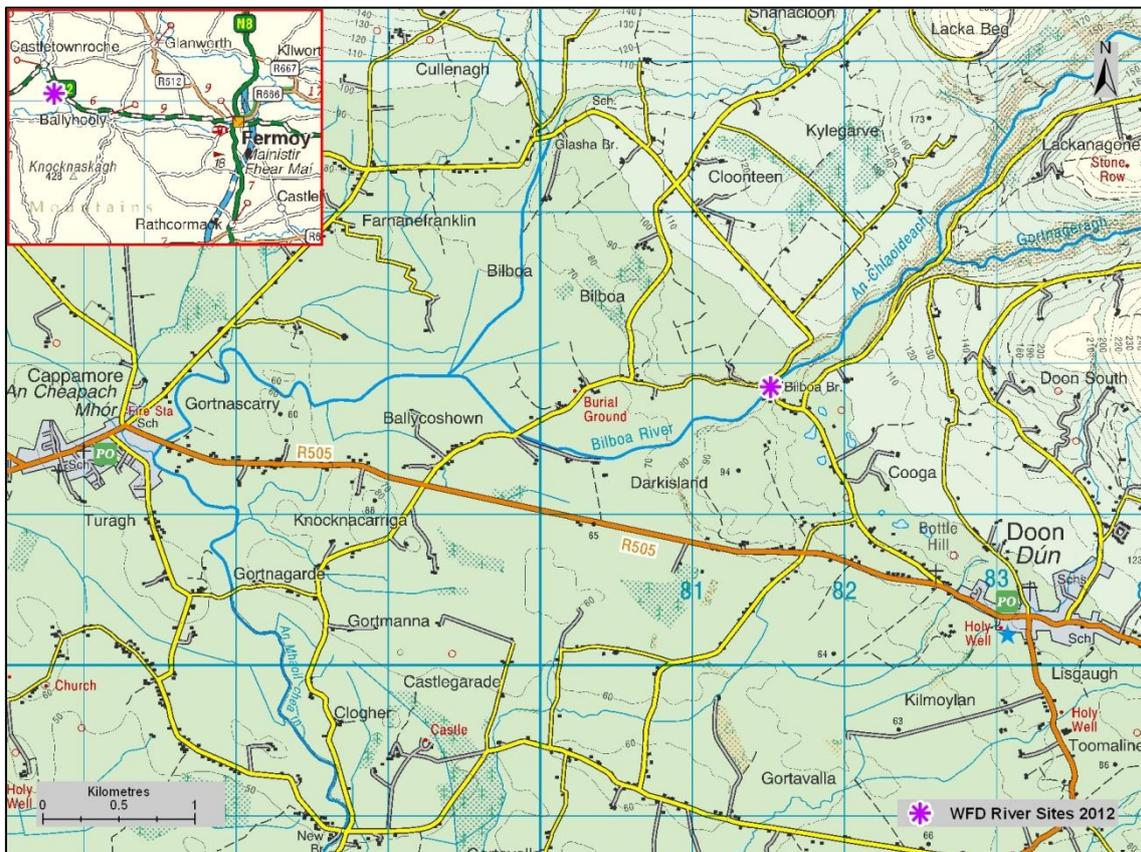


**Fig. 4.2. Length frequency distribution of brown trout in the Ballyfinboy River site, September 2012 (n = 26)**

Only three salmon were recorded at this site, ranging in size from 13.4cm to 17.4cm (mean = 15.2cm). Two age classes (1+ and 2+) were present, accounting for approximately 67% and 33% of the total salmon catch respectively.

### 4.1.2 The Bilboa River

One site was electric fished on the Bilboa River as part of the WFD surveillance monitoring programme in rivers 2012. The survey site was located downstream of Bilboa Bridge approximately 5km east of Cappamore, Co. Limerick (Fig. 4.3; Plate 4.2). Three electric-fishing passes were conducted using four bank-based electric fishing units on the 8<sup>th</sup> of August 2012, along a 40m length of channel. Riffle was the most abundant habitat type present, over a substrate of mainly cobble. Vegetation at this site was diverse, consisting of a variety of aquatic mosses, liverworts and marginal emergent species.



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



**Plate 4.2. The Bilboa River at Bilboa Bridge near Cappamore, Co. Limerick**

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

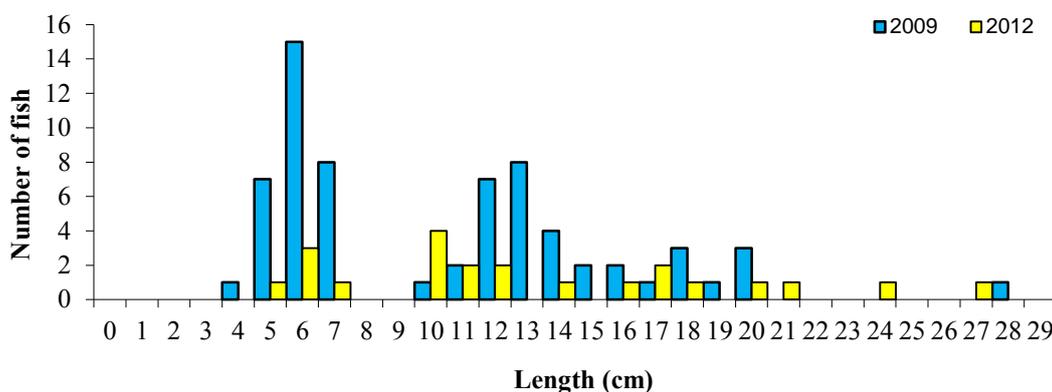
**Table 4.2. Density of fish (no./m<sup>2</sup>), Bilboa River (Bilboa Bridge site) (fish density has been calculated as minimum estimates based on one fishing)**

Common name	2009			2012		
	0+	1+ & older	Total minimum density	0+	1+ & older	Total minimum density
Salmon	0.345	0.233	0.578	0.443	0.246	0.689
Brown trout	0.026	0.031	0.057	0.005	0.016	0.022
Stone loach	-	-	0.002	-	-	0.004
European eel	-	-	0.002	-	-	-
Three-spined stickleback	-	-	0.002	-	-	-
All Fish	-	-	0.639	-	-	0.714

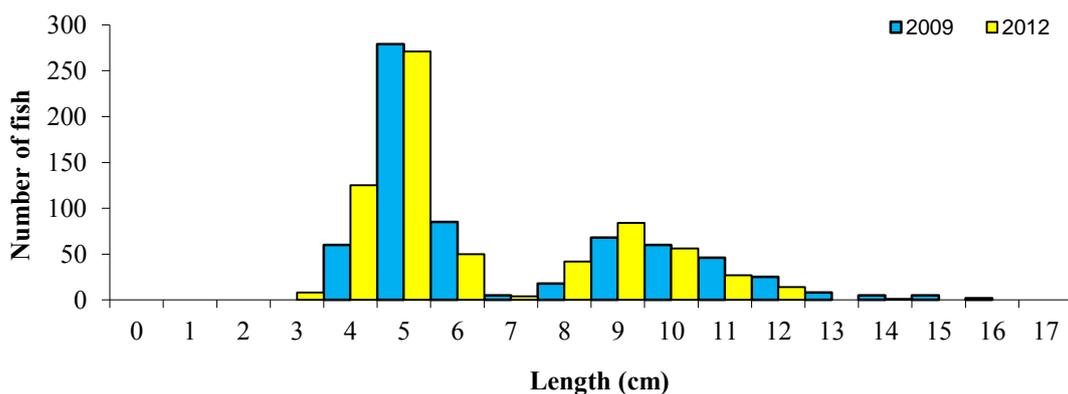
Brown trout captured during the 2012 survey ranged in length from 5.7cm to 27.7cm (mean = 13.7cm) (Fig. 4.4). Three age classes (0+, 1+ and 2+) were present, accounting for 23%, 36% and 41% of the total brown trout catch respectively. Brown trout captured during the 2009 survey ranged

in length from 4.6cm to 28.0cm (mean = 11.0cm). Three age classes were present (0+, 1+ and 2+), accounting for approximately 48%, 37% and 15% of the brown trout catch respectively.

Salmon captured during the 2012 survey ranged in length from 3.2cm to 17.0cm (mean = 6.8cm) (Fig. 4.5). Three age classes (0+, 1+ and 2+) were present, accounting for approximately 67% and 33% and 0.1% of the total salmon catch respectively. Salmon captured during the 2009 survey ranged in length from 4.3cm to 16.3cm (mean = 7.4cm). Three age classes (0+, 1+ and 2+) were also present, accounting for approximately 64%, 33% and 2% of the salmon catch respectively.



**Fig. 4.4. Length frequency distribution of brown trout in the Bilboa River site, August 2009 (n = 66) and August 2012 (n = 22)**



**Fig. 4.5. Length frequency distribution of salmon in the Bilboa River site, August 2009 (n = 666) and August 2012 (n = 682)**

### 4.1.3 The Caher River

One site was electric fished on the Caher River as part of the WFD surveillance monitoring programme in rivers 2012. The survey site was located upstream of a bridge approximately 2km east of Fanore, Co. Clare (Fig. 4.6; Plate 4.3). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 2<sup>nd</sup> of August 2012, along a 45m length of channel. Riffle and glide were the most abundant habitat types present, over a substrate of mainly cobble. Vegetation at this site consisted mainly of mosses and small emergent bankside and riparian plants.



**Fig. 4.6. Location of the Caher River surveillance monitoring site**



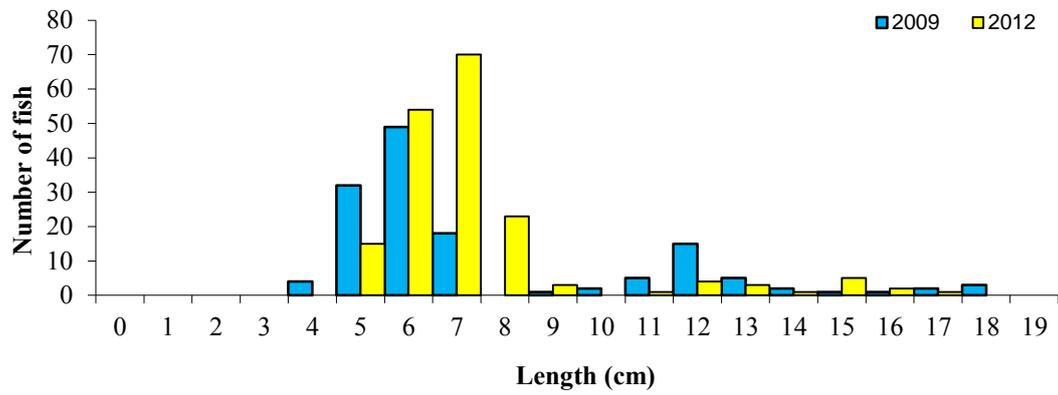
**Plate 4.3. The Caher River near Fanore, Co. Clare**

Only two fish species were recorded in the Caher River site (Table 4.3). Brown trout was the most abundant species, followed by European eels.

**Table 4.3. Density of fish (no./m<sup>2</sup>), Caher River (fish density has been calculated as minimum estimates based on one fishing)**

Common name	2009			2012		
	0+	1+ & older	Total minimum density	0+	1+ & older	Total minimum density
Brown trout	0.181	0.073	0.254	0.422	0.058	0.480
European eel	-	-	0.004	-	-	0.004
All Fish	-	-	0.259	-	-	0.485

Brown trout captured during the 2012 survey ranged in length from 5.2cm to 17.6cm (mean = 7.8cm) (Fig. 4.7). Three age classes (0+, 1+ and 2+) were present, accounting for 91%, 5% and 4% of the total brown trout catch respectively. Brown trout captured during the 2009 survey ranged in length from 4.4cm to 18.5cm (mean = 8.1cm). Two age classes were present (0+ and 1+) accounting for approximately 74%, 26% of the brown trout catch respectively.



**Fig. 4.7. Length frequency distribution of brown trout in the Caher River site, July 2009 (n = 140) and August 2012 (n = 182)**

#### 4.1.4 The Creagh River

One site was electric fished on the Creagh River as part of the WFD surveillance monitoring programme in rivers 2012. The survey site was located upstream of Drumellihy Bridge, near the village of Creagh, approximately 11km north of Kiltrush, Co. Clare (Fig. 4.8; Plate 4.4). Three electric-fishing passes were conducted using one boat-based electric fishing unit on the 10<sup>th</sup> of September 2012, along a 140m length of channel. Glide dominated the habitat, while cobble was the most abundant substrate. Vegetation at this site consisted mainly of aquatic mosses, semi-aquatic liverworts and a number marginal emergent species.



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



**Plate 4.4. The Creegh River at Drumellihy Bridge, Co. Clare**

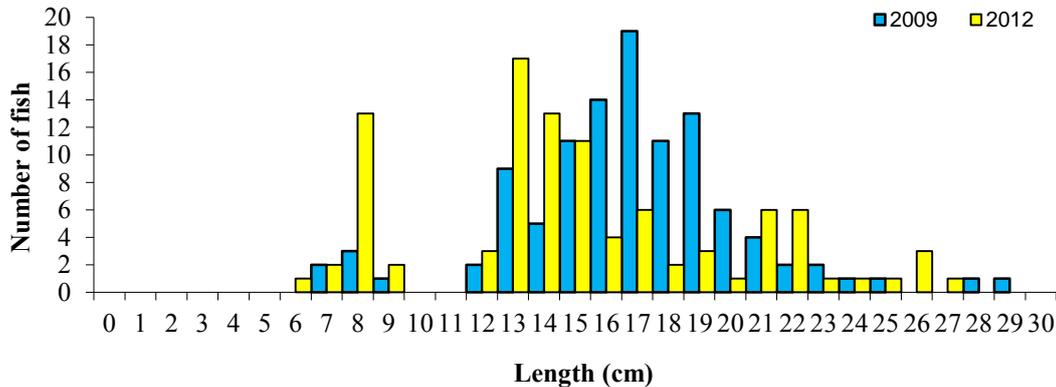
A total of five species were recorded in the Creegh River site (Table 4.4). Brown trout was the most abundant species, followed by salmon, sea trout, flounder and European eels.

**Table 4.4. Density of fish (no./m<sup>2</sup>), Creegh River (Drumellihy Brdge) site (fish density has been calculated as minimum estimates based on one fishing)**

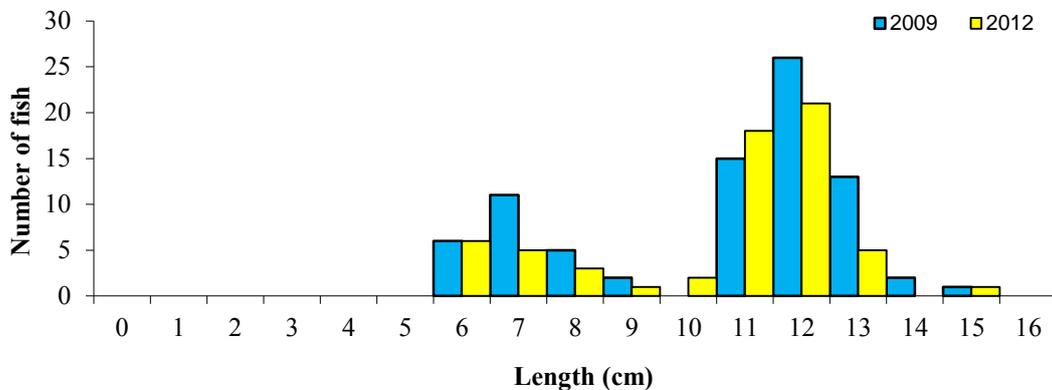
Common name	2009			2012		
	0+	1+ & older	Total minimum density	0+	1+ & older	Total minimum density
Brown trout	0.001	0.028	0.028	0.006	0.040	0.046
Salmon	0.002	0.022	0.022	0.003	0.021	0.023
Sea trout	-	-	-	-	-	0.002
Flounder	-	-	0.002	-	-	0.001
European eel	-	-	0.001	-	-	0.001
Three-spined stickleback	-	-	0.001	-	-	-
All Fish	-	-	0.053	-	-	0.073

Brown trout captured during the 2012 survey ranged in length from 6.8cm to 27.1cm (mean = 15.4cm) (Fig. 4.9). Four age classes (0+, 1+, 2+ and 3+) were present, accounting for 19%, 52%, 21% and 9% of the total brown trout catch respectively. Brown trout captured during the 2009 survey ranged in length from 7.4cm to 29.6cm (mean = 17.2cm). Five age classes were present (0+, 1+, 2+, 3+ and 4+), accounting for approximately 6%, 38%, 40%, 15% and 2% of the brown trout catch respectively.

Salmon captured during the 2012 survey ranged in length from 6.0cm to 15.0cm (mean = 11.0cm) (Fig. 4.10). Two age classes (0+ and 1+) were present, accounting for 23% and 77% of the total brown trout catch respectively. Salmon captured during the 2009 survey ranged in length from 6.0cm to 15.9cm (mean = 11.1cm). Three age classes were present (0+, 1+ and 2+), accounting for approximately 7%, 85% and 6% of the salmon catch respectively.



**Fig. 4.9. Length frequency distribution of brown trout in the Creagh River site, September 2009 (n = 108) and September 2012 (n = 97)**



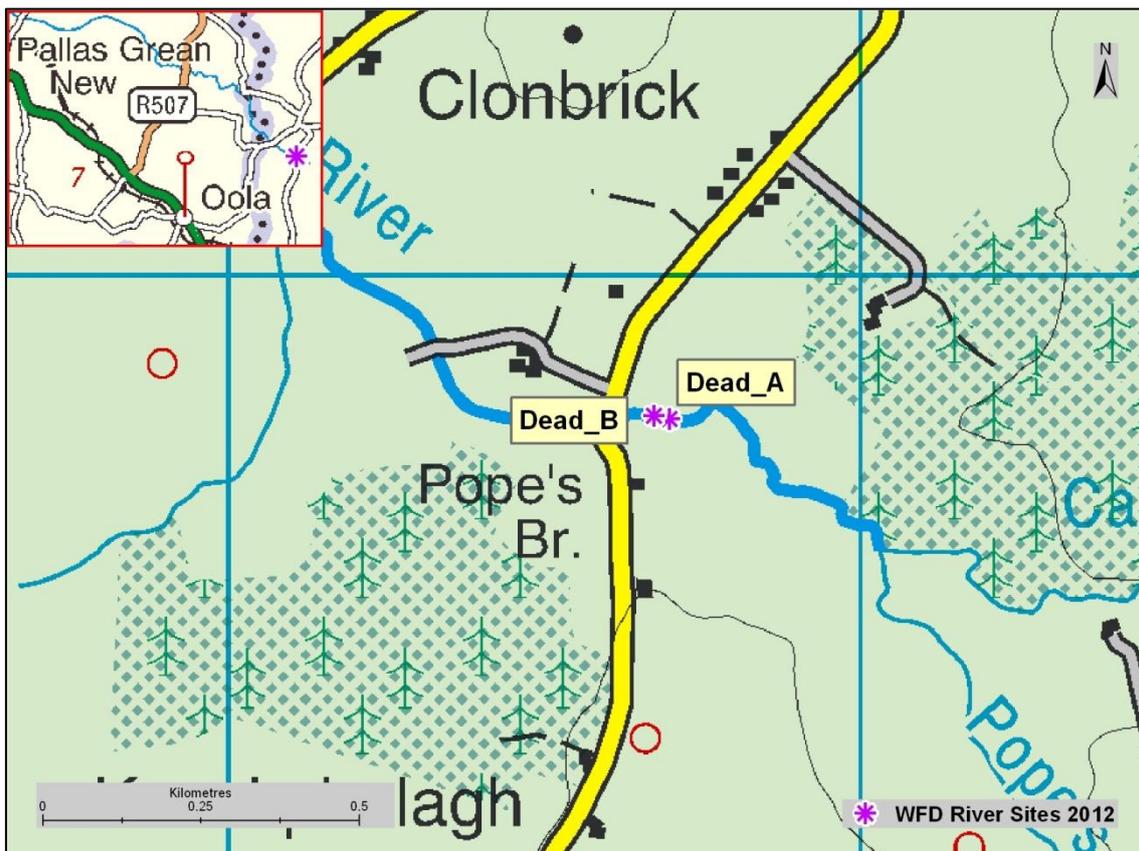
**Fig. 4.10. Length frequency distribution of salmon in the Creagh River site, September 2009 (n = 81, a single adult not shown) and September 2012 (n = 62)**

#### 4.1.5 The Dead River

Two sites were electric fished on the Dead River as part of the WFD surveillance monitoring programme in rivers 2012; the Pope's Br. 'A' and the Pope's Br. 'B'.

The Pope's Br. 'A' survey site was located upstream of Pope's Bridge, approximately 8km north of Tipperary Town, Co. Tipperary (Fig. 4.11). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 1<sup>st</sup> of August 2012, along a 25m length of channel. Glide dominated the habitat, while the substrate consisted largely of cobble. Vegetation at this site consisted of a number of mosses, liverworts and semi-aquatic riparian species.

The Pope's Br. 'B' survey site was located just downstream of the 'A' site (Fig. 4.11; Plate 4.5). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 1<sup>st</sup> of August 2012, along a 40m length of channel. Glide dominated the habitat, while the substrate consisted largely of cobble. Vegetation at this site consisted of a number of mosses, liverworts and semi-aquatic riparian species.



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



**Plate 4.5. The Dead River at Pope's Bridge, Co. Tipperary**

***Dead River (Pope's Bridge A)***

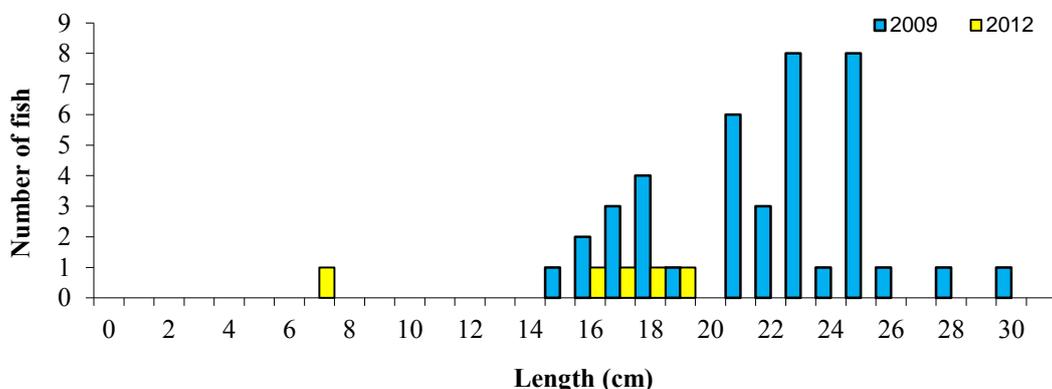
A total of five fish species were recorded in the Dead River, Pope's Bridge A (Table 4.5). Salmon was the most abundant species, followed by brown trout and lamprey, three-spined stickleback and stone loach.

**Table 4.5. Density of fish (no./m<sup>2</sup>), Dead River Pope's Bridge Site A (fish density has been calculated as minimum estimates based on one fishing)**

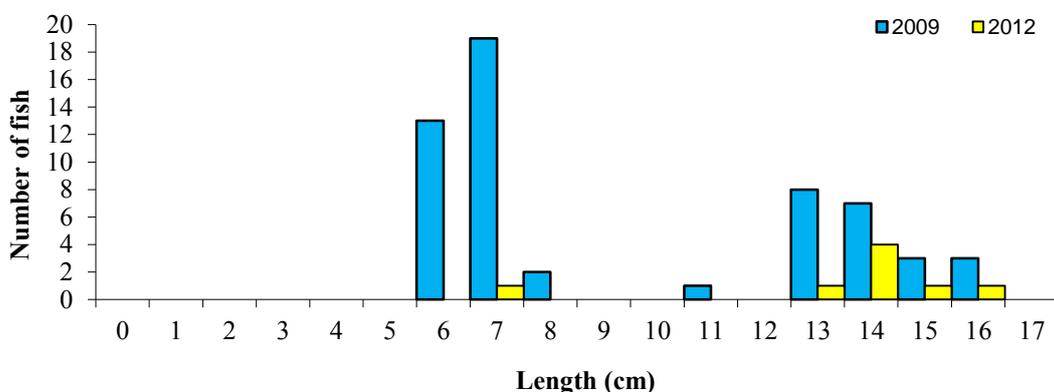
Common name	2009			2012		
	0+	1+ & older	Total minimum density	0+	1+ & older	Total minimum density
Salmon	0.078	0.041	0.119	0.006	0.025	0.025
Brown trout	0.000	0.115	0.115	0.006	0.019	0.019
Lamprey juvenile	-	-	0.012	-	-	0.019
Three-spined stickleback	-	-	-	-	-	0.012
Stone loach	-	-	0.008	-	-	0.012
European eel	-	-	0.008	-	-	-
All Fish	-	-	0.263	-	-	0.087

Brown trout captured during the 2012 survey ranged in length from 7.7cm to 19.7cm (mean = 15.9cm) (Fig. 4.12). Three age classes (0+, 1+ and 2+) were present, accounting for 20%, 40% and 40% of the total brown trout catch respectively. Brown trout captured during the 2009 survey ranged in length from 15.7cm to 30.4cm (mean = 22.2cm). Three age classes were also present (1+, 2+ and 3+), accounting for approximately 25%, 58% and 18% of the brown trout catch respectively.

Salmon captured during the 2012 survey ranged in length from 7.0cm to 16.6cm (mean = 13.8cm) (Fig. 4.13). Two age classes (0+ and 1+) were present, accounting for 13% and 88% of the total brown trout catch respectively. Salmon captured during the 2009 survey ranged in length from 6.0cm to 16.2cm (mean = 9.9cm). Two age classes were present (0+ and 1+), accounting for approximately 61% and 39% of the brown trout catch respectively.



**Fig. 4.12. Length frequency distribution of brown trout in the Dead River, Pope's Bridge A, August 2009 (n = 40) and August 2012 (n = 5)**



**Fig. 4.13. Length frequency distribution of salmon in the Dead River, Pope's Bridge A, August 2009 (n = 56) and August 2012 (n = 8)**

### *Dead River (Site B)*

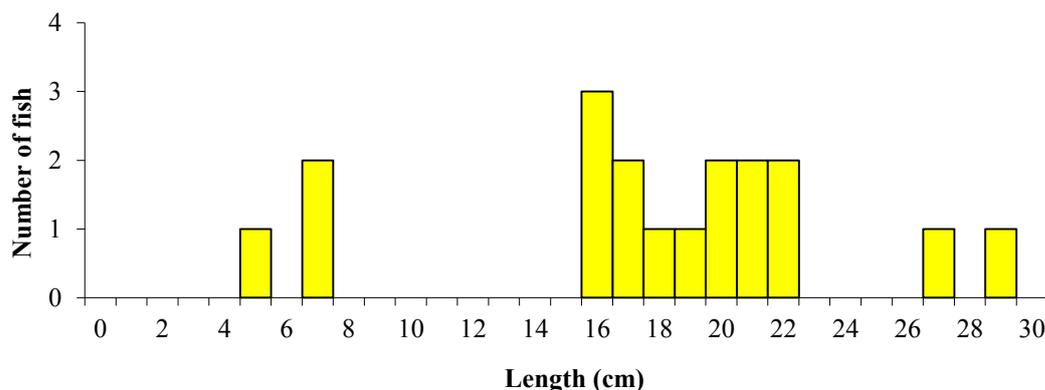
A total of six fish species were recorded in the Dead River, Pope's Bridge B (Table 4.6). Brown trout was the most abundant species, followed by salmon, stone loach, three-spined stickleback, European eels and lamprey.

**Table 4.6. Density of fish (no./m<sup>2</sup>), Dead River Pope's Bridge Site B (fish density has been calculated as minimum estimates based on one fishing)**

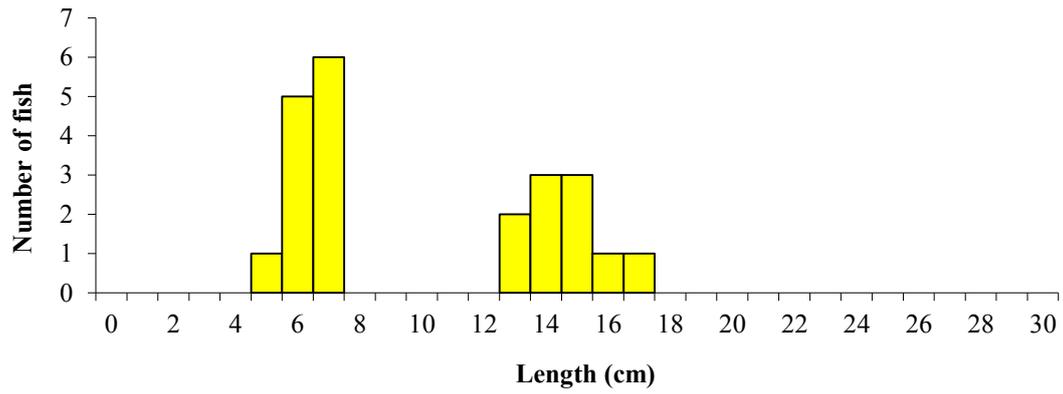
Common name	2012		
	0+	1+ & older	Total minimum density
Brown trout	0.012	0.052	0.064
Salmon	0.024	0.036	0.060
Stone loach	-	-	0.016
Three-spined stickleback	-	-	0.012
European eel	-	-	0.008
Lamprey juvenile	-	-	0.004
All Fish	-	-	0.164

Brown trout captured during the 2012 survey ranged in length from 5.9cm to 29.4cm (mean = 18.2cm) (Fig. 4.14). Four age classes (0+, 1+, 2+ and 3+) were present, accounting for 17%, 28% and 22% and 33% of the total brown trout catch respectively.

Salmon captured during the 2012 survey ranged in length from 5.5cm to 17.0cm (mean = 10.6cm) (Fig. 4.15). Two age classes (0+ and 1+) were present, accounting for 55% and 45% of the total brown trout catch respectively.



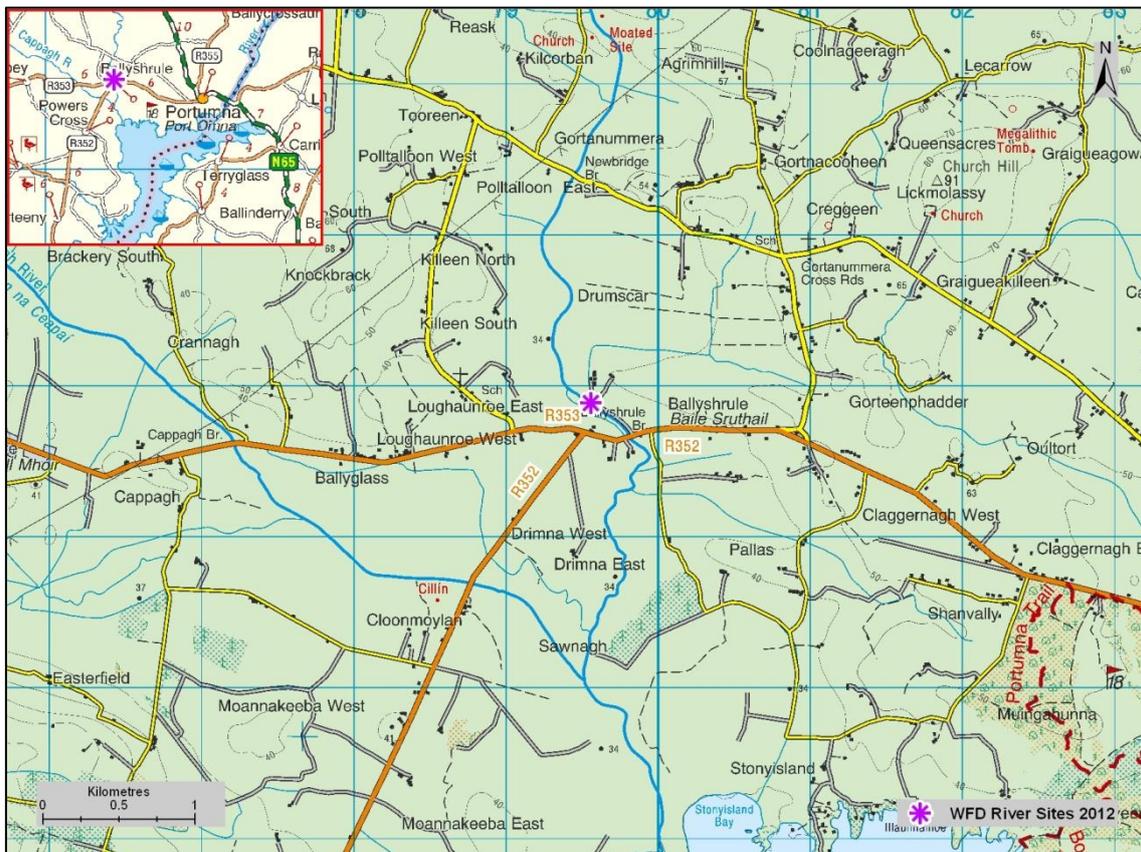
**Fig. 4.14. Length frequency distribution of brown trout in the Dead River B site, August 2012 (n = 18)**



**Fig. 4.15. Length frequency distribution of salmon in the Dead River B site, August 2012 (n = 22)**

#### 4.1.6 The Kilcrow River

One site was electric fished on the Kilcrow River as part of the WFD surveillance monitoring programme in rivers 2012. The survey site was located upstream of Ballyshrule Bridge, approximately 6km west of Portumna, Co. Galway (Fig. 4.16; Plate 4.6). Three electric-fishing passes were conducted using two boat-based electric fishing units on the 14<sup>th</sup> of September 2012, along a 154m length of channel. Glide dominated the habitat, while the substrate consisted mainly of cobble and gravel. Vegetation at this site consisted of tall emergent, and small, marginal, aquatic and semi-aquatic species.



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



**Plate 4.6. The Kilcrow River at Ballyshrul Bridge, Co. Galway**

A total of nine fish species were recorded in the Kilcrow River Ballyshrul Bridge site (Table 4.7). Brown trout was the most abundant species, followed by perch, roach, minnow, gudgeon, salmon, pike, European eels and stone loach.

**Table 4.7. Density of fish (no./m<sup>2</sup>), Kilcrow River (Ballyshrul Bridge) site (fish density has been calculated as minimum estimates based on one fishing)**

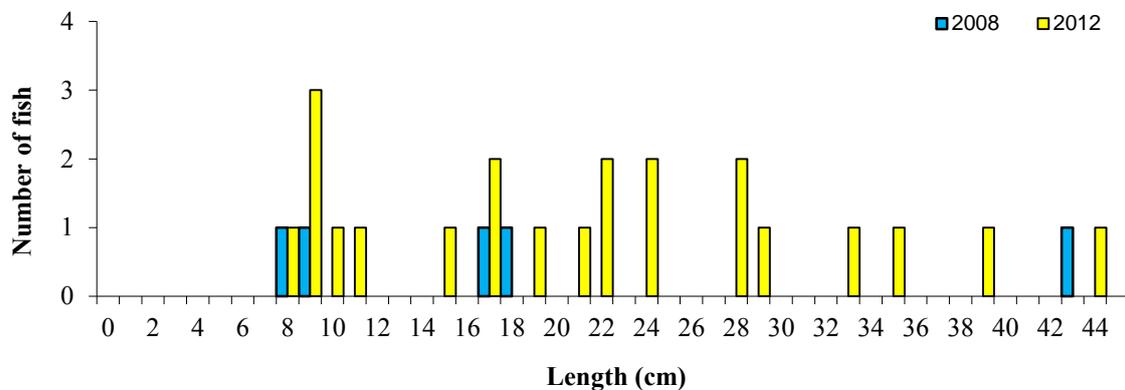
Common name	2008			2012		
	0+	1+ & older	Total minimum density	0+	1+ & older	Total minimum density
Brown trout	0.001	0.001	0.002	0.001	0.008	0.008
Perch	-	-	0.027	-	-	0.007
Roach	-	-	0.022	-	-	0.005
Minnow	-	-	0.001	-	-	0.004
Gudgeon	-	-	0.011	-	-	0.003
Salmon	0.000	0.0004	0.0004	0.000	0.002	0.002
Pike	-	-	0.004	-	-	0.002
European eel	-	-	0.0004	-	-	0.001
Stone loach	-	-	0.001	-	-	0.001
All Fish	-	-	0.068	-	-	0.033

Brown trout captured during the 2012 survey ranged in length from 8.0cm to 44.1cm (mean = 21.8cm) (Fig. 4.17). Five age classes (0+, 1+, 2+, 3+ and 4+) were present, accounting for 5%, 27%, 32%, 27% and 9% of the total brown trout catch respectively. Brown trout captured during the 2008 survey ranged in length from 8.5cm to 43.5cm (mean = 19.5cm). Three age classes were present (0+, 1+ and 3+), accounting for approximately 40%, 40% and 20% of the brown trout catch respectively.

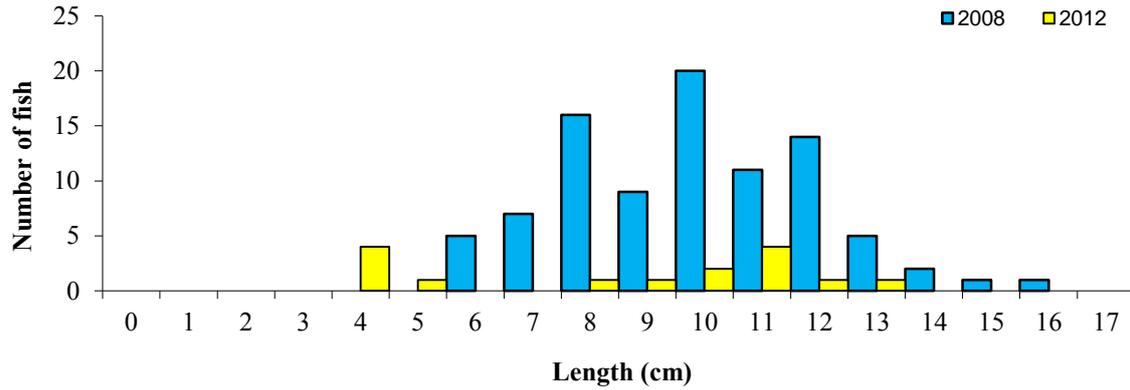
Roach captured during the 2012 survey ranged in length from 4.2cm to 13.8cm (mean = 9.0cm) (Fig. 4.18). Three age classes (0+, 2+ and 3+) were present, accounting for 33%, 60% and 7% of the total brown trout catch respectively. Brown trout captured during the 2009 survey ranged in length from 6.0cm to 16.0cm (mean = 10.3cm). Three age classes were present (1+, 2+ and 3+), accounting for approximately 34%, 58% and 8% of the brown trout catch respectively.

Gudgeon captured during the 2012 survey ranged in length from 6.5cm to 12.8cm (mean = 10.9cm) (Fig. 4.19), while in 2008, they ranged in length from 5.5cm to 10.5cm (mean 8.4cm).

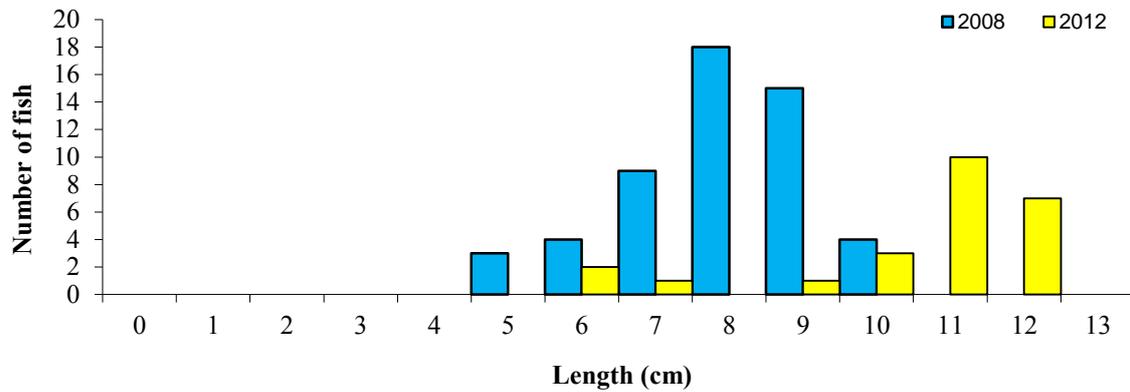
Perch captured during the 2012 survey ranged in length from 6.1cm to 19.5cm (mean = 14.6cm) (Fig. 4.20). Perch captured during the 2008 survey ranged in length from 8.7cm to 23.0cm (mean = 14.3cm).



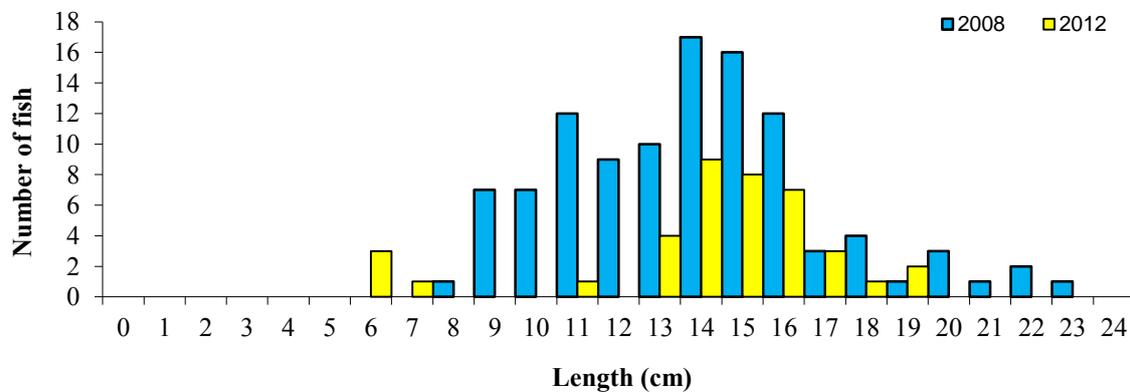
**Fig. 4.17. Length frequency distribution of brown trout in the Kilcrow River site, July 2008 (n = 5) and September 2012 (n = 22)**



**Fig. 4.18. Length frequency distribution of roach in the Kilcrow River site, July 2008 (n = 91) and September 2012 (n = 15)**



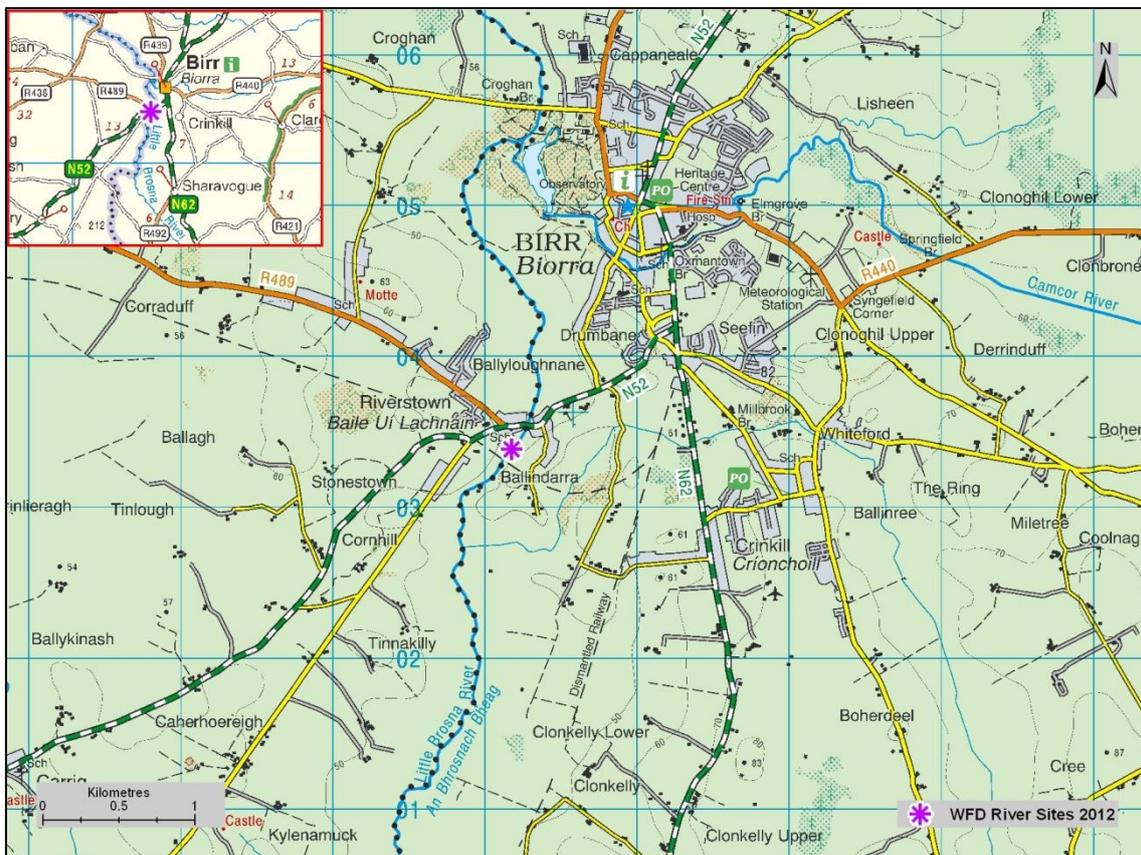
**Fig. 4.19. Length frequency distribution of gudgeon in the Kilcrow River site, July 2008 (n = 53) and September 2012 (n = 24)**



**Fig. 4.20. Length frequency distribution of perch in the Kilcrow River site, July 2008 (n = 106) and September 2012 (n = 39)**

#### 4.1.7 The Little Brosna River

One site was electric fished on the Little Brosna River as part of the WFD surveillance monitoring programme in rivers 2012. The survey site was located downstream of the bridge in Riverstown, approximately 2km south west of Birr, Co. Offaly (Fig. 4.21; Plate 4.7). Three electric-fishing passes were conducted using one boat-based electric fishing unit on the 20<sup>th</sup> of September 2012, along a 144m length of channel. Glide dominated the habitat, while the substrate consisted of a mix of cobble, gravel and sand. Vegetation at this site was diverse, consisting of large amounts of filamentous green algae, mosses and liverworts as well as a number of emergent, floating and submerged species.



**Fig. 4.21. Location of the Little Brosna River surveillance monitoring site**



**Plate 4.7. The Little Brosna at Riverstown, Co. Offaly**

A total of four fish species were recorded in the Little Brosna River (Riverstown) site (Table 4.8). Brown trout was the most abundant species, followed by salmon, lamprey and stone loach.

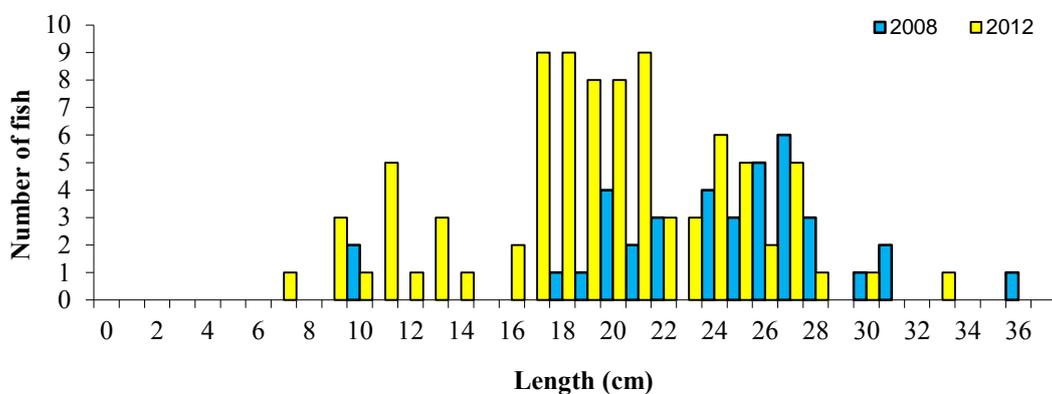
**Table 4.8. Density of fish (no./m<sup>2</sup>), Little Brosna (Riverstown) site (fish density has been calculated as minimum estimates based on one fishing)**

Common name	2008			2012		
	0+	1+ & older	Total minimum density	0+	1+ & older	Total minimum density
Brown trout	0.001	0.017	0.018	0.001	0.028	0.029
Salmon	0.003	0.006	0.009	0.001	0.010	0.011
Lamprey juvenile	-	-	-	-	-	0.001
Stone loach	-	-	0.001	-	-	0.001
All Fish	-	-	0.028	-	-	0.042

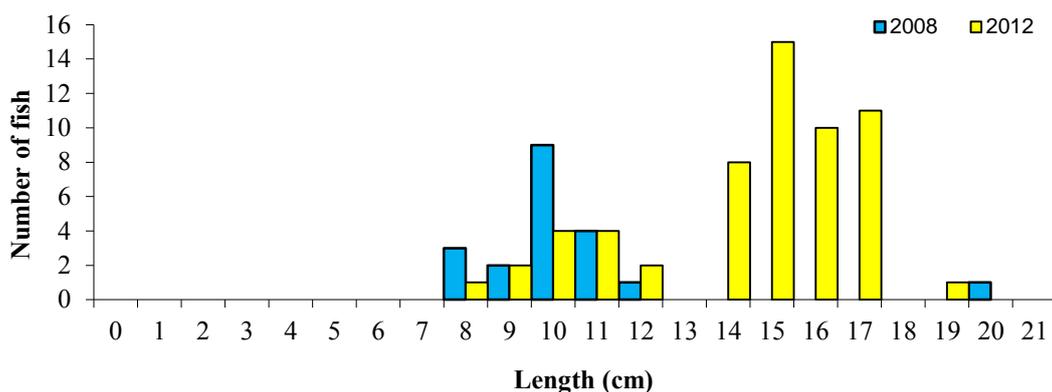
Brown trout captured during the 2012 survey ranged in length from 7.1cm to 33.8cm (mean = 20.0cm) (Fig. 4.22). Four age classes (0+, 1+, 2+ and 3+) were present, accounting for 6%, 39%, 48% and 7% of the total brown trout catch respectively. Brown trout captured during the 2008

survey ranged in length from 10.1cm to 36.4cm (mean = 24.7cm). Three age classes were present (0+, 2+ and 3+), accounting for approximately 5%, 84% and 11% of the brown trout catch respectively.

Salmon captured during the 2012 survey ranged in length from 8.4cm to 19.7cm (mean = 14.9cm) (Fig. 4.23). Three age classes (0+, 1+ and 2+) were present, accounting for 12%, 43% and 45% of the total brown trout catch respectively. Salmon captured during the 2008 survey ranged in length from 8.2cm to 20.9cm (mean = 11.0cm). Three age classes (0+, 1+ and 2+) were present, accounting for approximately 35%, 60% and 5% of the salmon catch respectively.



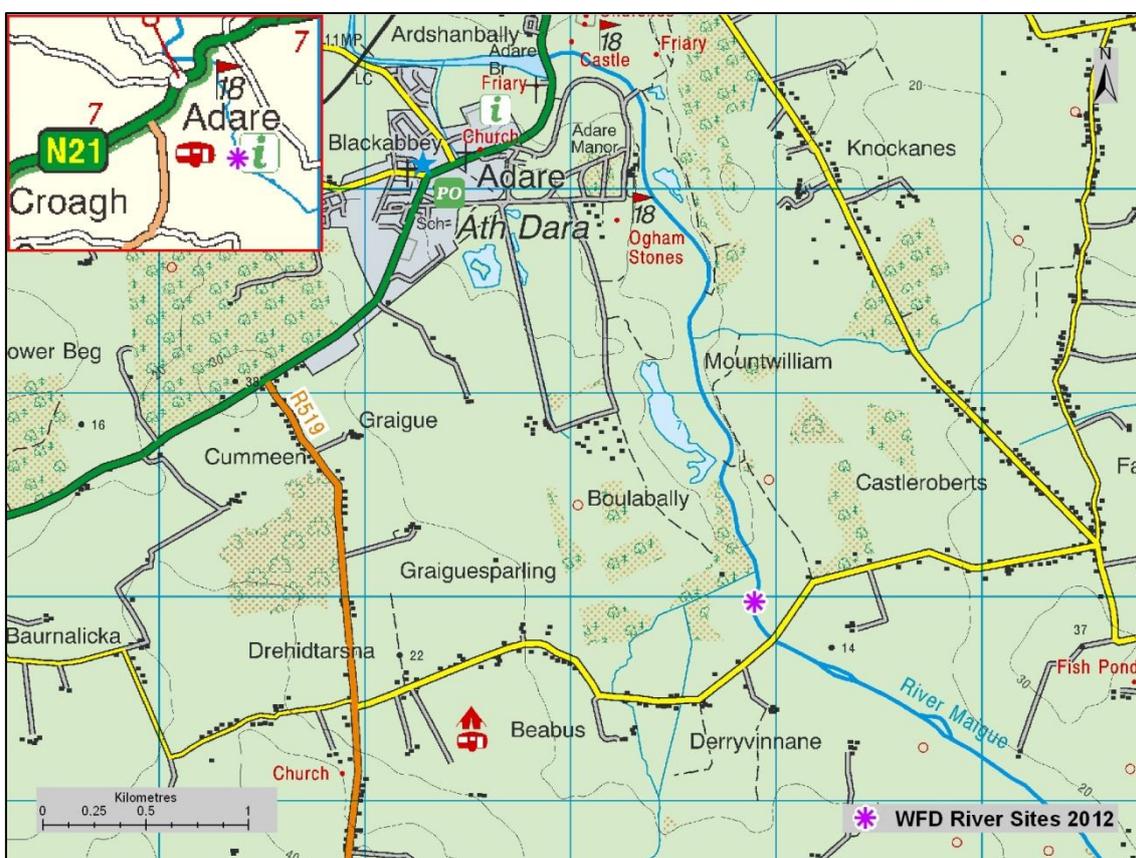
**Fig. 4.22. Length frequency distribution of brown trout in the Little Brosna River site, September 2009 (n = 38) and September 2012 (n = 87)**



**Fig. 4.23. Length frequency distribution of salmon in the Little Brosna River site, September 2009 (n = 20) and September 2012 (n = 58)**

#### 4.1.8 The River Maigue

One site was electric fished on the River Maigue as part of the WFD surveillance monitoring programme in rivers 2012. The survey site was located on both sides of Castleroberts Bridge, between the weir and island, approximately 2.5km southeast of Adare, Co. Limerick (Fig. 4.24; Plate 4.8). One electric-fishing pass was conducted using two boat-based electric fishing units on the 15<sup>th</sup> of May 2012, along a 389m length of channel. This was a partial survey of the entire channel, with fish density estimates reflecting only the area of channel effectively fished. Glide dominated the survey stretch. Vegetation at this site consisted of tall emergent species, large amounts of filamentous green algae and also some floating species.



**Fig. 4.24. Location of the River Maigue surveillance monitoring site**



**Plate 4.8. The River Maigue at Casteroberts Bridge near Adare, Co. Limerick**

A total of seven fish species were recorded in the River Maigue (Castelroberts) site (Table 4.9). Minnow was the most abundant species followed by lamprey, stone loach, European eel, brown trout, three-spined stickleback and salmon.

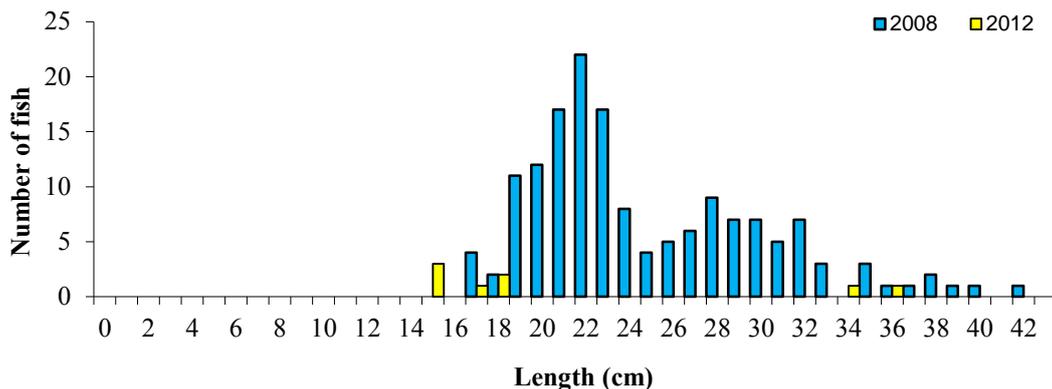
**Table 4.9. Density of fish (no./m<sup>2</sup>), River Maigue (Castleroberts) site (fish density has been calculated as minimum estimates based on one fishing)**

Common name	2008			2012		
	0+	1+ & older	Total minimum density	0+	1+ & older	Total minimum density
Minnow	-	-	0.0002	-	-	0.007
Lamprey juvenile	-	-	0.0001	-	-	0.004
Stone loach	-	-	0.002	-	-	0.004
European eel	-	-	0.002	-	-	0.002
Brown trout	0.000	0.006	0.006	0.000	0.002	0.002
Three-spined stickleback	-	-	-	-	-	0.001
Salmon	0.0001	0.001	0.001	0.0000	0.0002	0.0002
All Fish	-	-	0.010	-	-	0.020

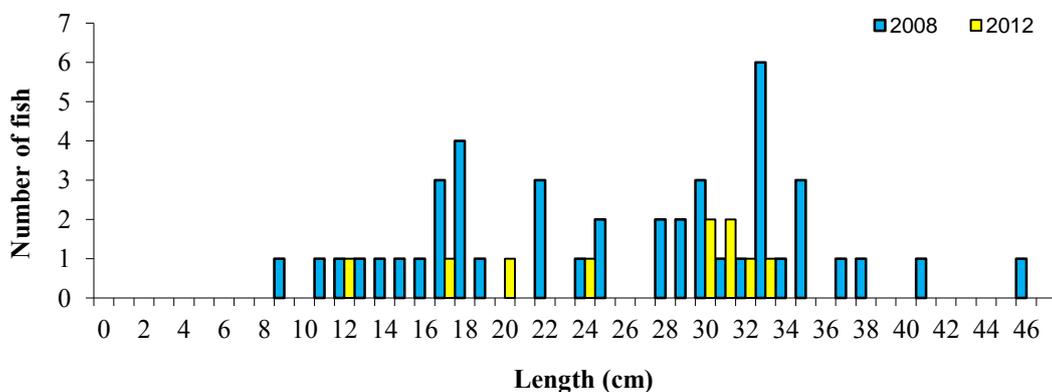
Brown trout captured during the 2012 survey ranged in length from 15.2cm to 36.5cm (mean = 21.5cm) (Fig. 4.25). Three age classes (1+, 3+ and 4+) were present, accounting for 75%, 13% and 13% of the total brown trout catch respectively. Brown trout captured during the 2008 survey ranged

in length from 17.0cm to 42.5cm (mean = 25.3cm). Four age classes were present (1+, 2+, 3+ and 4+), accounting for approximately 32%, 52%, 15% and 0.6% of the brown trout catch respectively.

European eels captured during the 2012 survey ranged in length from 12.2cm to 33.9cm (mean = 26.5cm) (Fig. 4. 26). European eels captured during the 2008 survey ranged in length from 9.2cm to 46.5cm (mean = 26.2cm).



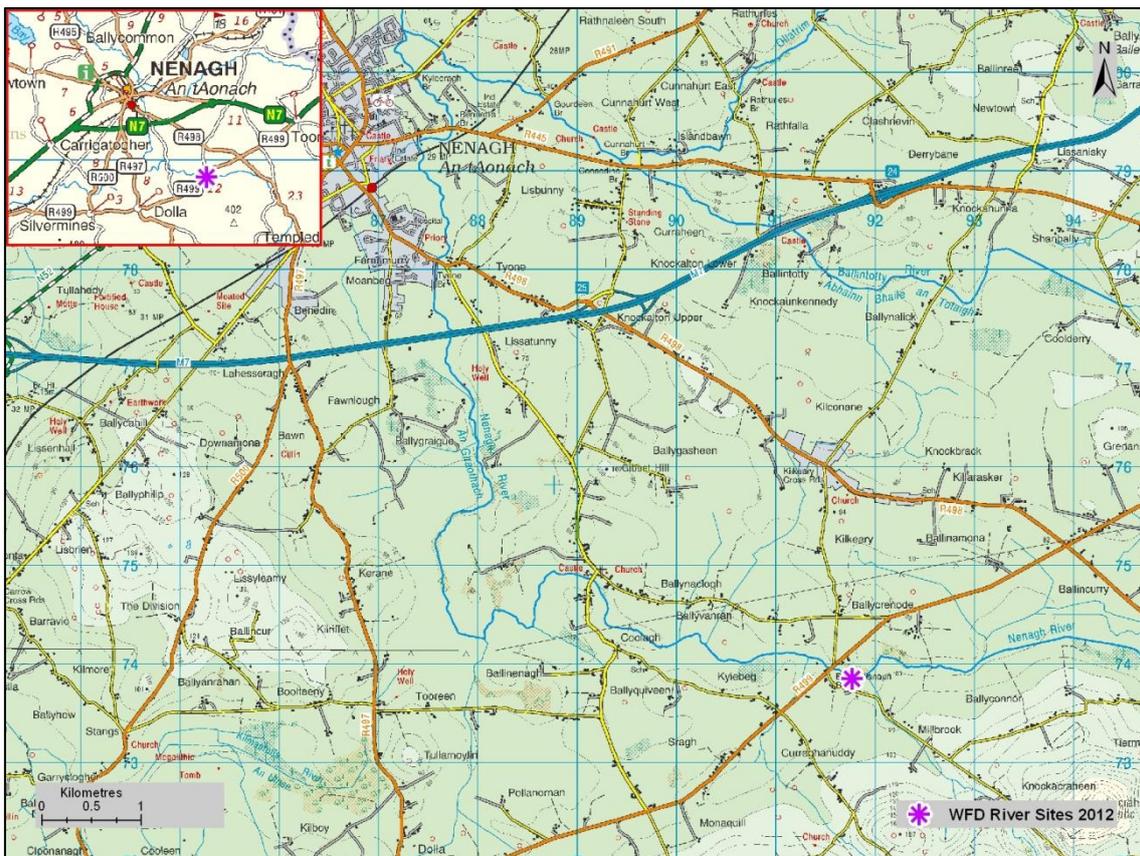
**Fig. 4.25. Length frequency distribution of brown trout in the River Maigue site, July 2008 (n = 156) and May 2012 (n = 8)**



**Fig. 4.26. Length frequency distribution of European eels in the River Maigue site, July 2008 (n = 44) and May 2012 (n = 10)**

#### 4.1.9 The Nenagh River

One site was electric fished on the Nenagh River as part of the WFD surveillance monitoring programme in rivers 2012. The survey site was located south east of Nenagh, Co. Tipperary (Fig. 4.27; Plate 4.9). Three electric-fishing passes were conducted using one boat-based electric fishing unit on the 6<sup>th</sup> of September 2012, along a 116m length of channel. Glide was the most abundant habitat type present, with a substrate of mainly gravel. Vegetation at this site was diverse, with a wide variety of mosses and liverworts as well as emergent and semi-aquatic riparian species present.



**Fig. 4.27. Location of the Nenagh River surveillance monitoring site**



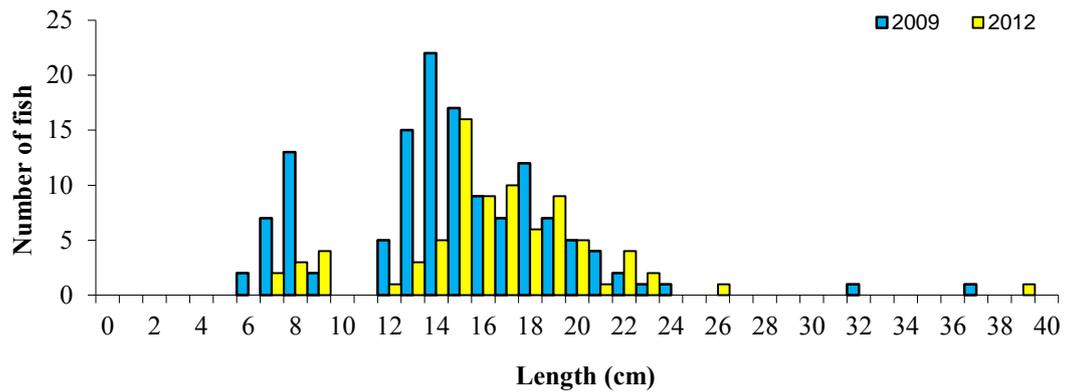
**Plate 4.9. The Nenagh River at Ballysoilshaun Bridge, Co. Tipperary**

A total of five fish species were recorded in the Nenagh river (Ballysoilshaun) site (Table 4.10). Brown trout was the most abundant species, followed by salmon, three-spined stickleback, minnow, stone loach and European eel.

**Table 4.10. Density of fish (no./m<sup>2</sup>), Nenagh River (Ballysoilshaun) site (fish density has been calculated as minimum estimates based on one fishing)**

Common name	2009			2012		
	0+	1+ & older	Total minimum density	0+	1+ & older	Total minimum density
Brown trout	0.014	0.067	0.082	0.002	0.019	0.021
Salmon	0.002	0.002	0.002	0.000	0.002	0.002
Three-spined stickleback	-	-	-	-	-	0.002
Minnow	-	-	0.023	-	-	0.002
Stone loach	-	-	0.003	-	-	0.001
European eel	-	-	0.001	-	-	-
All Fish	-	-	0.111	-	-	0.029

Brown trout captured during the 2012 survey ranged in length from 7.0cm to 39.0cm (mean = 16.9cm) (Fig. 4.28). Five age classes (0+, 1+, 2+, 3+ and 4+) were present, accounting for 11%, 13%, 73%, 1% and 1% of the total brown trout catch respectively. Brown trout captured during the 2009 survey ranged in length from 6.5cm to 37.4cm (mean = 15.1cm). Five age classes were also present (0+, 1+, 2+, 3+ and 4+), accounting for approximately 18%, 53%, 20%, 8% and 2% of the brown trout catch respectively.



**Fig. 4.28. Length frequency distribution of brown trout in the Nenagh River site, August 2009 (n = 133) and September 2012 (n = 82)**

#### 4.1.10 The Owvane River

One site was electric fished on the Owvane River as part of the WFD surveillance monitoring programme in rivers 2012. The survey site was located in Loughill, Co. Limerick, approximately 300m upstream of where it enters the sea (Fig. 4.29; Plate 4.10). Three electric-fishing passes were conducted using three bank-based electric fishing units on the 9<sup>th</sup> of August 2012, along a 40m length of channel. Riffle was the most abundant habitat type present, over a substrate of mainly cobble. Vegetation at this site consisted of mosses, liverworts and a number of emergent bankside species.



**Fig. 4.29. Location of the Owvane River surveillance monitoring site**



**Plate 4.10. The Owvane River at Loughill, Co. Limerick**

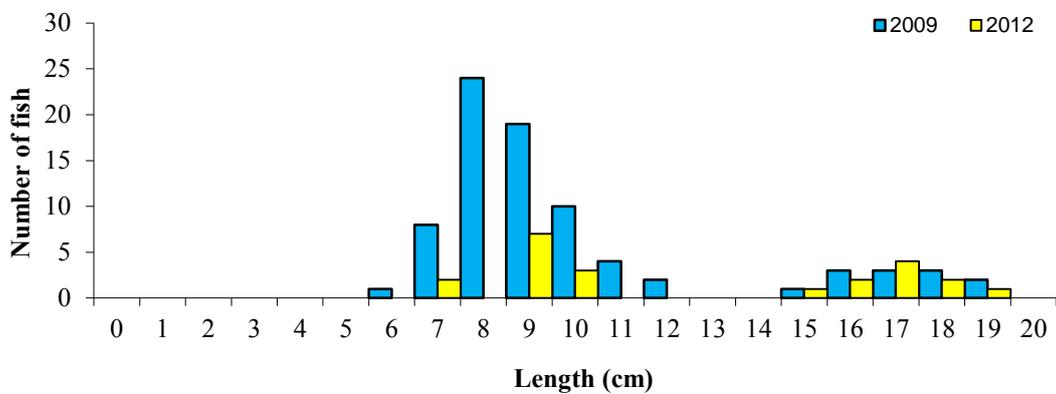
A total of five fish species were recorded in the Owvane river (Loughill) site (Table 4.11). European eel was the most abundant species, followed by brown trout, lamprey, salmon and flounder.

**Table 4.11. Density of fish (no./m<sup>2</sup>), Owvane River (Loughill) site (fish density has been calculated as minimum estimates based on one fishing)**

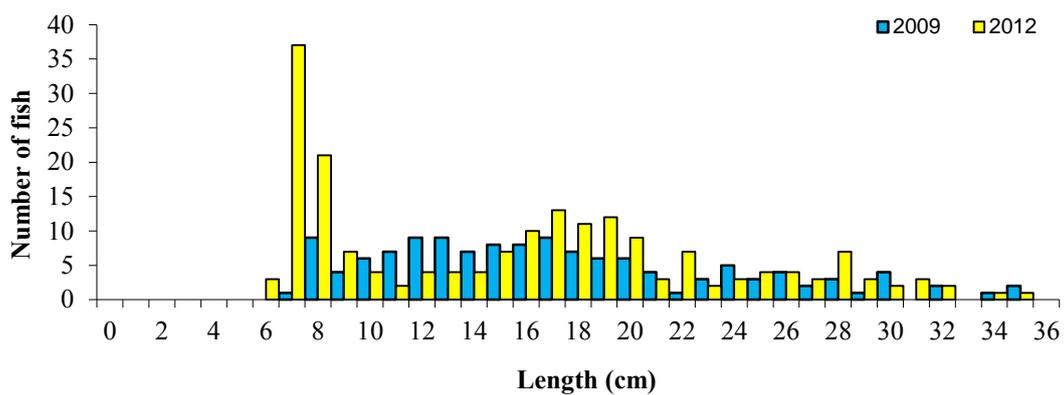
Common name	2009			2012		
	0+	1+ & older	Total minimum density	0+	1+ & older	Total minimum density
European eel	-	-	0.099	-	-	0.161
Brown trout	0.047	0.023	0.070	0.013	0.012	0.025
Lamprey juvenile	-	-	-	-	-	0.007
Salmon	0.081	0.013	0.094	0.003	0.000	0.003
Flounder	-	-	0.036	-	-	0.003
Three-spined stickleback	-	-	0.013	-	-	-
All Fish	-	-	0.311	-	-	0.199

Brown trout captured during the 2012 survey ranged in length from 7.1cm to 19.1cm (mean = 13.1cm) (Fig. 4.30). Two age classes (0+ and 1+) were present, accounting for 55%, 45% of the total brown trout catch respectively. Brown trout captured during the 2009 survey ranged in length from 6.9cm to 19.4cm (mean = 10.4cm). Two age classes were present (0+ and 1+), accounting for approximately 69%, 31% of the brown trout catch respectively.

European eels captured during the 2012 survey ranged in length from 6.9cm to 35.6cm (mean = 16.0cm) (Fig. 4.31). European eels captured during the 2009 survey ranged in length from 7.9cm to 35.7cm (mean = 17.8cm).



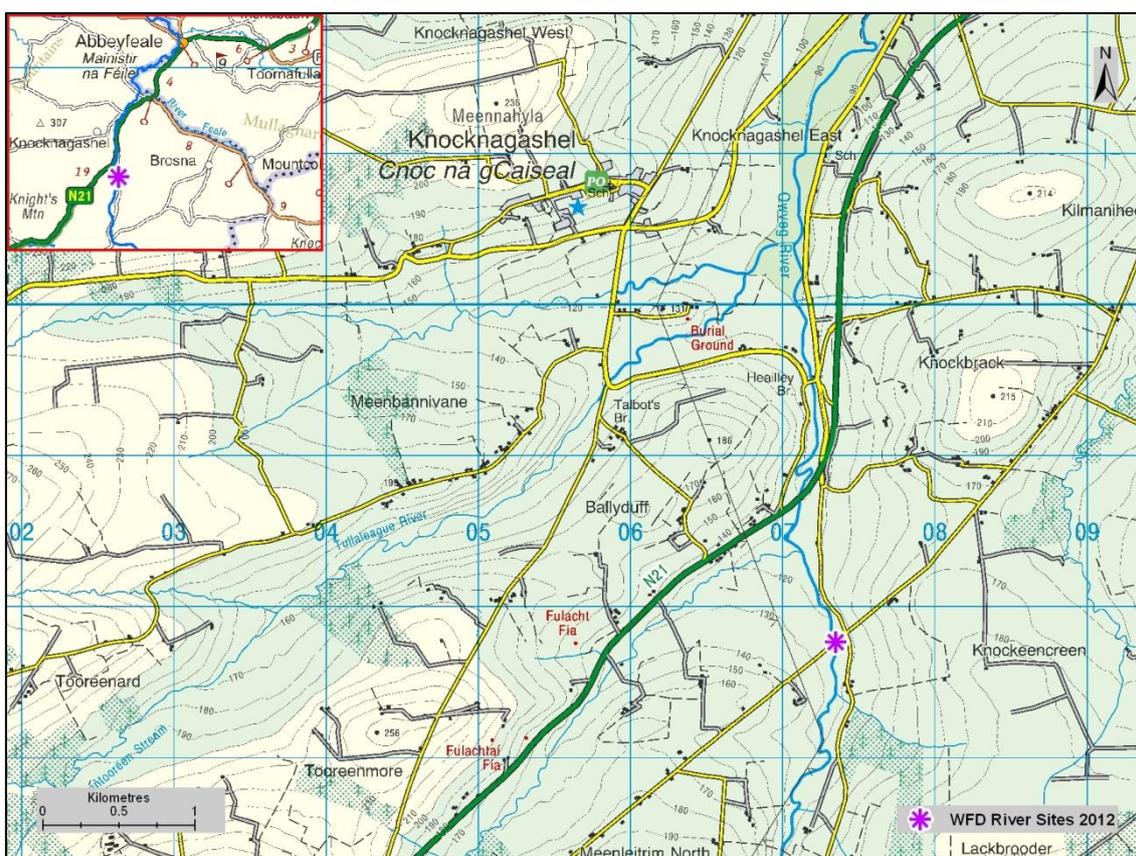
**Fig. 4.30. Length frequency distribution of brown trout in the Owvane River site, September 2009 (n = 80) and August 2012 (n = 22)**



**Fig. 4.31. Length frequency distribution of European eels in the Owvane River site, September 2009 (n = 131) and August 2012 (n = 193)**

#### 4.1.11 The Owveg River

One site was electric fished on the Owveg River as part of the WFD surveillance monitoring programme in rivers 2012. The survey site was located south east of Knocknagashel, Co. Limerick (Fig. 4.32; Plate 4.11). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 10<sup>th</sup> of August 2012, along a 45m length of channel. Riffle was the most abundant habitat type present, with a cobble dominated substrate. Vegetation at this site was diverse, with a wide variety of mosses and liverworts present.



**Fig. 4.32. Location of the Owveg River surveillance monitoring site**



**Plate 4.11. The Owveg River at Owveg Bridge near Knocknagashel, Co. Limerick**

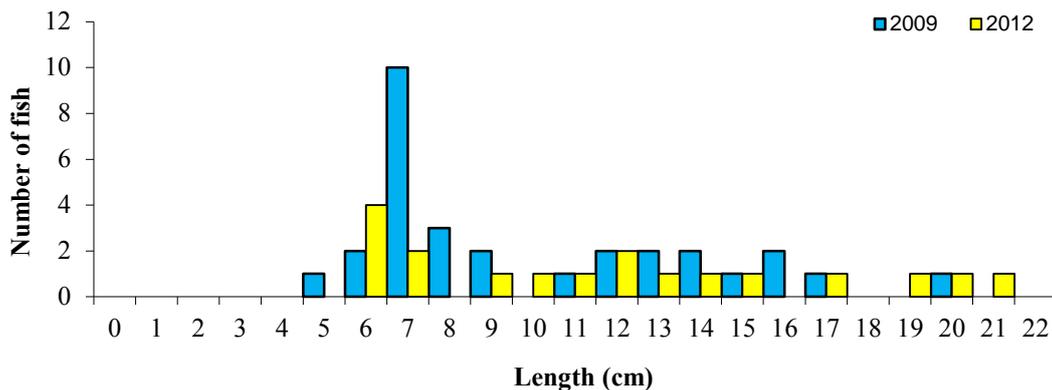
Two fish species were recorded in the Owveg river (Knocknagashel) site (Table 4.12). Salmon was the most abundant species, followed by brown trout.

**Table 4.12. Density of fish (no./m<sup>2</sup>), Owveg River (fish density has been calculated as minimum estimates based on one fishing)**

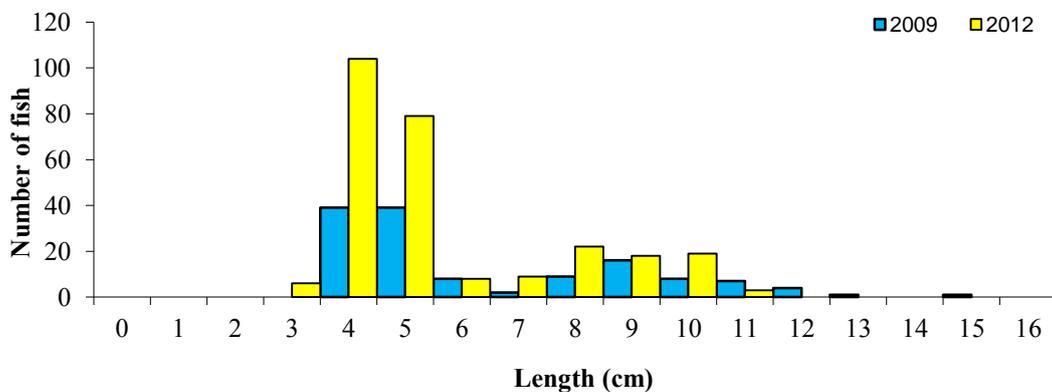
Common name	2009		Total minimum density
	0+	1+ & older	
Salmon	0.144	0.116	0.261
Brown trout	0.048	0.032	0.080
All Fish	-	-	0.341

Brown trout captured during the 2012 survey ranged in length from 6.5cm to 21.6cm (mean = 12.2cm) (Fig. 4.33). Four age classes (0+, 1+, 2+ and 3+) were present, accounting for 39%, 39%, 17% and 6% of the total brown trout catch respectively. Brown trout captured during the 2009 survey ranged in length from 5.9cm to 20.2cm (mean = 10.5cm). Three age classes were present (0+, 1+ and 2+), accounting for approximately 53%, 43% and 3% of the brown trout catch respectively.

Salmon captured during the 2012 survey ranged in length from 3.6cm to 11.6cm (mean = 6.1cm) (Fig. 4.34). Two age classes (0+ and 1+) were present, accounting for 73% and 27% of the total brown trout catch respectively. Salmon captured during the 2009 survey ranged in length from 4.1cm to 15.7cm (mean = 6.9cm). Two age classes (0+ and 1+) were present, accounting for approximately 66% and 34% of the salmon catch respectively.



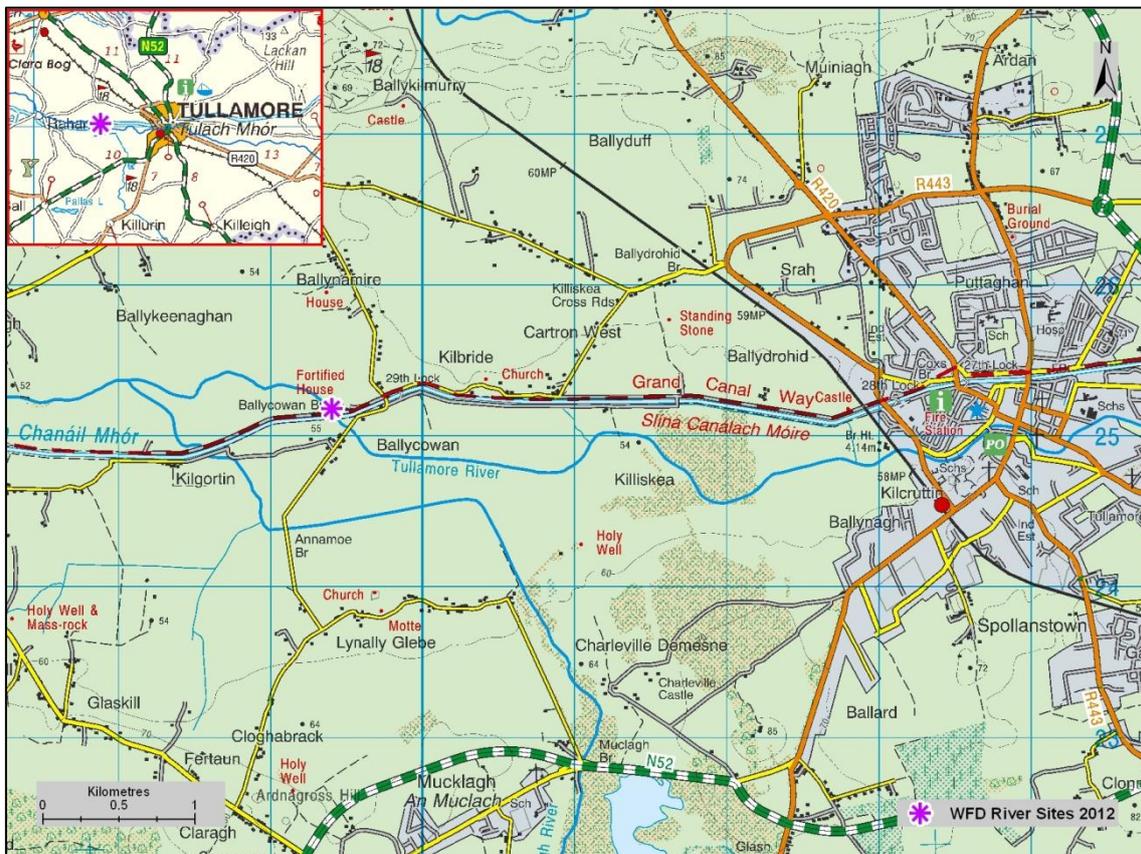
**Fig. 4.33. Length frequency distribution of brown trout in the Owveg River site, September 2009 (n = 30) and August 2012 (n = 18)**



**Fig. 4.34. Length frequency distribution of salmon in the Owveg River site, September 2009 (n = 134) and August 2012 (n = 268)**

#### 4.1.12 The Tullamore River

One site was electric fished on the Tullamore River as part of the WFD surveillance monitoring programme in rivers 2012. The survey site was located upstream of Ballycownen Bridge, approximately 3.5km west of Tullamore, Co. Offaly (Fig. 4.35; Plate 4.12). Three electric-fishing passes were conducted using two boat-based electric fishing units on the 21<sup>st</sup> of September 2012, along a 106m length of channel. Glide dominated the habitat, while the substrate consisted mainly of gravel. The variety of vegetation at this site was poor, consisting mainly of submerged and floating species.



**Fig. 4.35. Location of the Tullamore River surveillance monitoring site**



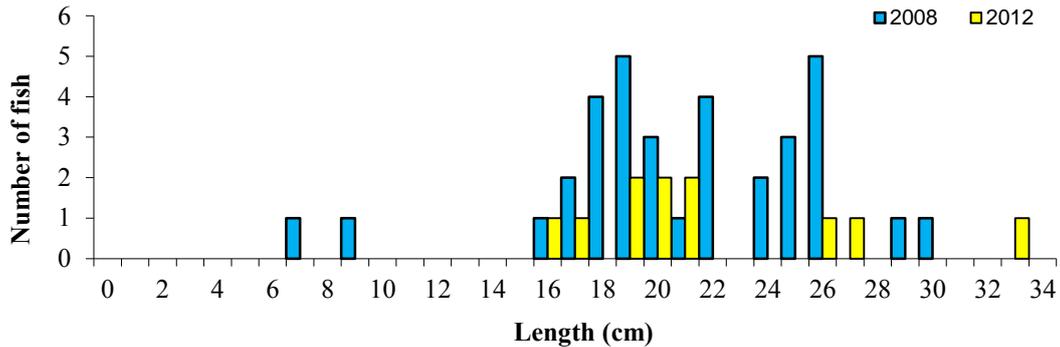
**Plate 4.12. The Tullamore River at Ballycowan Bridge, Co. Offaly**

A total of five fish species were recorded in the Tullamore river (Ballycowan Bridge) site (Table 4.13). Minnow was the most abundant species, followed by brown trout, gudgeon, three-spined stickleback and stone loach.

**Table 4.13. Density of fish (no./m<sup>2</sup>), Tullamore River(Ballycowan Bridge) site (fish density has been calculated as minimum estimates based on one fishing)**

Common name	2008			2012		
	0+	1+ & older	Total minimum density	0+	1+ & older	Total minimum density
Minnow	-	-	0.084	-	-	0.014
Brown trout	0.002	0.018	0.020	0.000	0.006	0.006
Gudgeon	-	-	0.001	-	-	0.006
Three-spined stickleback	-	-	0.004	-	-	0.001
Stone loach	-	-	-	-	-	0.001
Pike	-	-	0.002	-	-	-
Roach	-	-	0.002	-	-	-
All Fish	-	-	0.112	-	-	0.029

Brown trout captured during the 2012 survey ranged in length from 16.7cm to 33.6cm (mean = 22.2cm) (Fig. 4.36). Three age classes (1+, 2+ and 3+) were present, accounting for 55%, 27% and 18% of the total brown trout catch respectively. Brown trout captured during the 2009 survey ranged in length from 7.7cm to 30.4cm (mean = 21.4cm). Five age classes were present (0+, 1+, 2+, 3+ and 4+), accounting for approximately 6%, 9%, 59%, 24% and 3% of the brown trout catch respectively.



**Fig. 4.36. Length frequency distribution of brown trout in the Tullamore River site, September 2008 (n = 34) and September 2012 (n = 11)**

#### 4.1.13 The Tyshe River

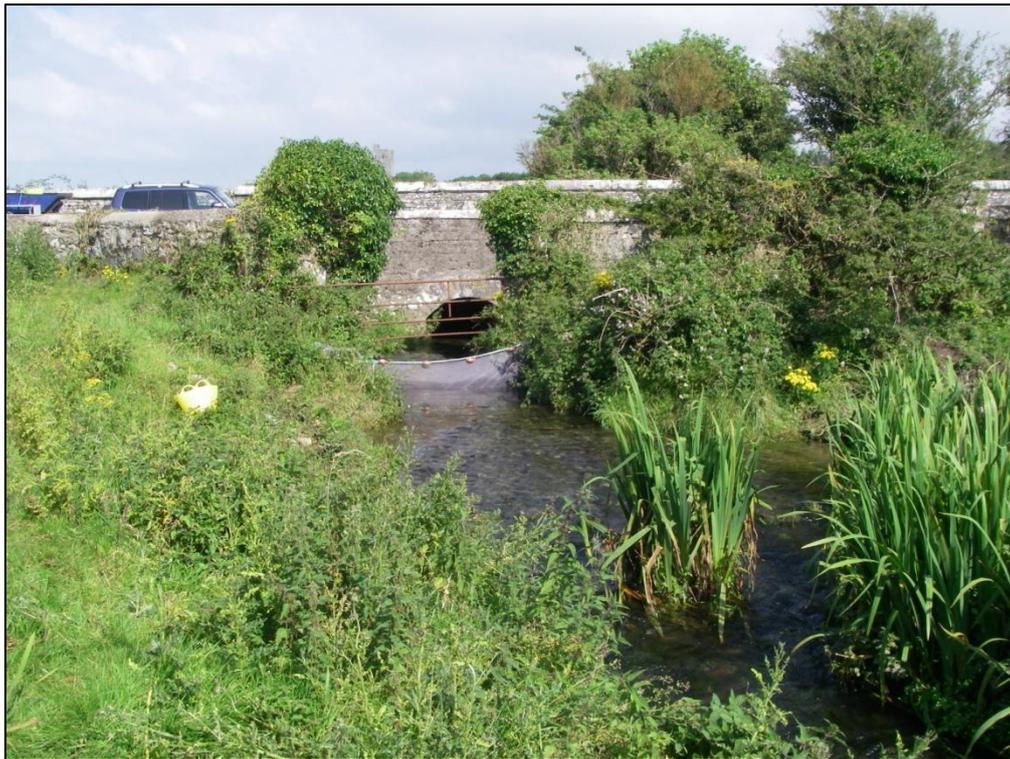
Two sites were electric fished on the Tyshe River as part of the WFD surveillance monitoring programme in rivers 2012, the Tyshe River, Ardfert Friary ‘A’ and Tyshe River, Ardfert Friary ‘B’.

The Ardfert Friary ‘A’ survey site was located just downstream of a bridge in Ardfert, Co. Kerry, in a field opposite the Cathedral (Fig. 4.37; Plate 4.13). Three electric-fishing passes were conducted using one bank-based electric fishing unit on the 9<sup>th</sup> of August 2012, along a 31m length of channel. Pool was the most abundant habitat type present, with a fine muddy substrate. Vegetation at this site mainly consisted of emergent bankside species with some small sized floating species.

The Ardfert Friary ‘B’ survey site was located just a little further downstream of the ‘A’ site, beyond a section of channel completely overgrown with vegetation (Fig. 4.37). Three electric-fishing passes were conducted using one bank-based electric fishing unit on the 9<sup>th</sup> of August 2012, along a 40m length of channel. Pool was the most abundant habitat type present, with a fine muddy substrate. Vegetation at this site mainly consisted of emergent bankside species with some small sized floating species.



**Fig. 4.37. Location of the Tyshe River surveillance monitoring sites**



**Plate 4.13. The Tyshe River at Ardfert, Co. Kerry**

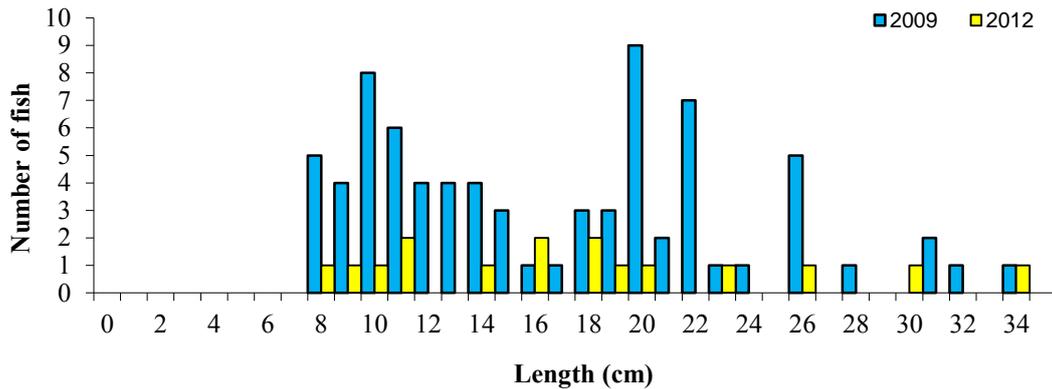
***Tyshe River (Site A)***

Only two fish species were recorded in the Tyshe River, Ardfert Friary A (Table 4.14). Three-spined stickleback was the most abundant species followed by European eel.

**Table 4.14. Density of fish (no./m<sup>2</sup>), Tyshe River Ardfert Friary Site A (fish density has been calculated as minimum estimates based on one fishing)**

Common name	2009			2012		
	0+	1+ & older	Total minimum density	0+	1+ & older	Total minimum density
Three-spined stickleback	-	-	0.030	-	-	0.163
European eel	-	-	0.267	-	-	0.043
All Fish	-	-	0.296	-	-	0.207

European eels captured during the 2012 survey ranged in length from 8.7cm to 34.5cm (mean = 18.1cm) (Fig. 4.38). European eels captured during the 2009 survey ranged in length from 8.2cm to 34.6cm (mean = 17.2cm)



**Fig. 4.38. Length frequency distribution of eel in the Tyshe River site, July 2009 (n = 76) and August 2012 (n = 16)**

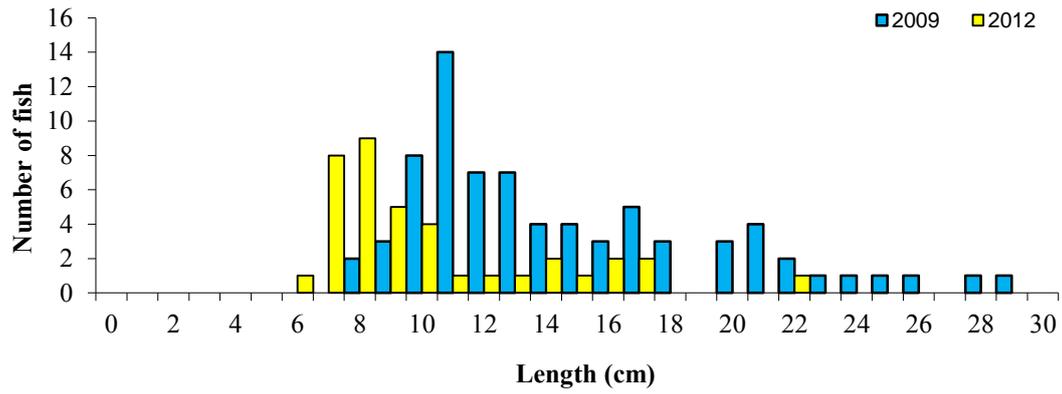
***Tyshe River (Site B)***

Only two fish species were recorded in the Tyshe River, Ardfert Friary B (Table 4.15). Three-spined stickleback was the most abundant species followed by European eel.

**Table 4.15. Density of fish (no./m<sup>2</sup>), Tyshe River Ardfert Friary B (fish density has been calculated as minimum estimates based on one fishing)**

Common name	2009			2012		
	0+	1+ & older	Total minimum density	0+	1+ & older	Total minimum density
Three-spined stickleback	-	-	0.135	-	-	0.406
European eel	-	-	0.315	-	-	0.129
All Fish	-	-	0.337	-	-	0.535

European eels captured during the 2012 survey ranged in length from 6.6cm to 22.1cm (mean = 10.6cm) (Fig. 4.39). European eels captured during the 2009 survey ranged in length from 8.5cm to 29.8cm (mean = 15.0cm).

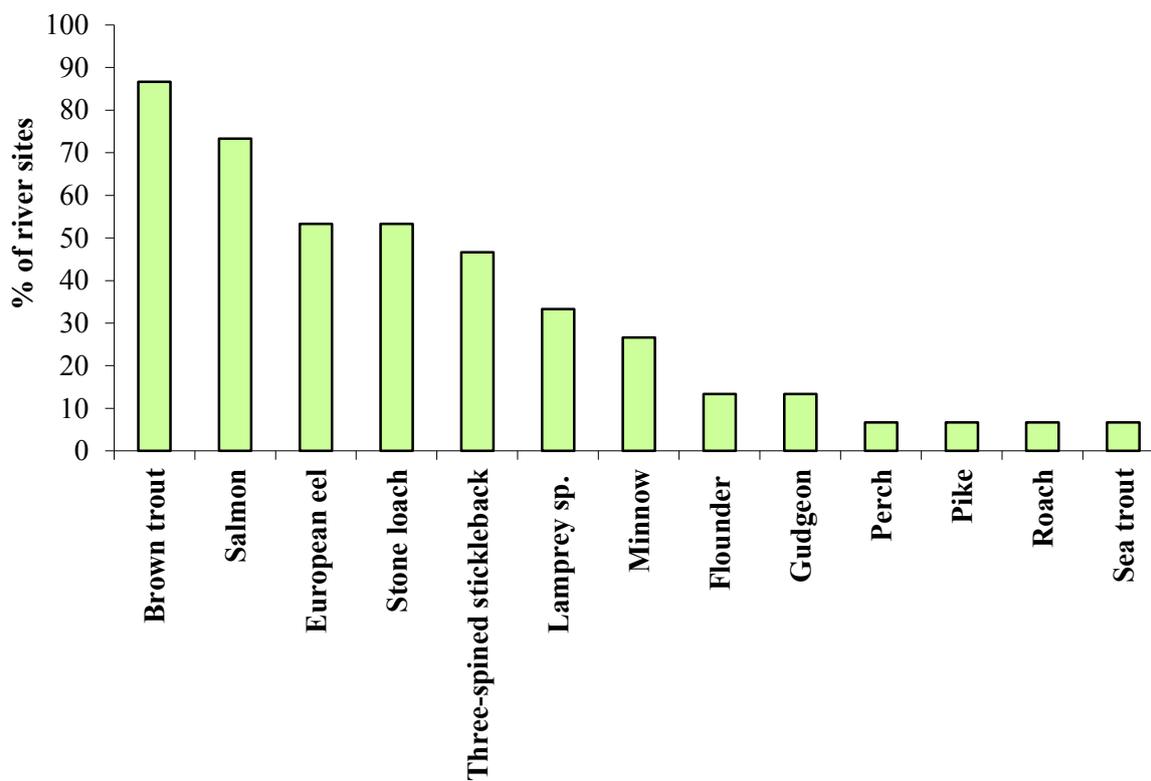


**Fig. 4.39. Length frequency distribution of eel in the Tyshe River site, July 2009 (n = 75) and August 2012 (n = 38)**

## 4.2 Community structure

### 4.2 Species distribution

A total of 13 fish species (sea trout are included as a separate ‘variety’ of trout) were recorded within the 15 ShIRBD sites surveyed during 2012 (Fig. 4.40). Brown trout was the most common species, followed by salmon, European eels, stone loach, three-spined stickleback, lamprey, minnow, flounder and gudgeon. Perch pike, roach and sea trout were only recorded in one site each.

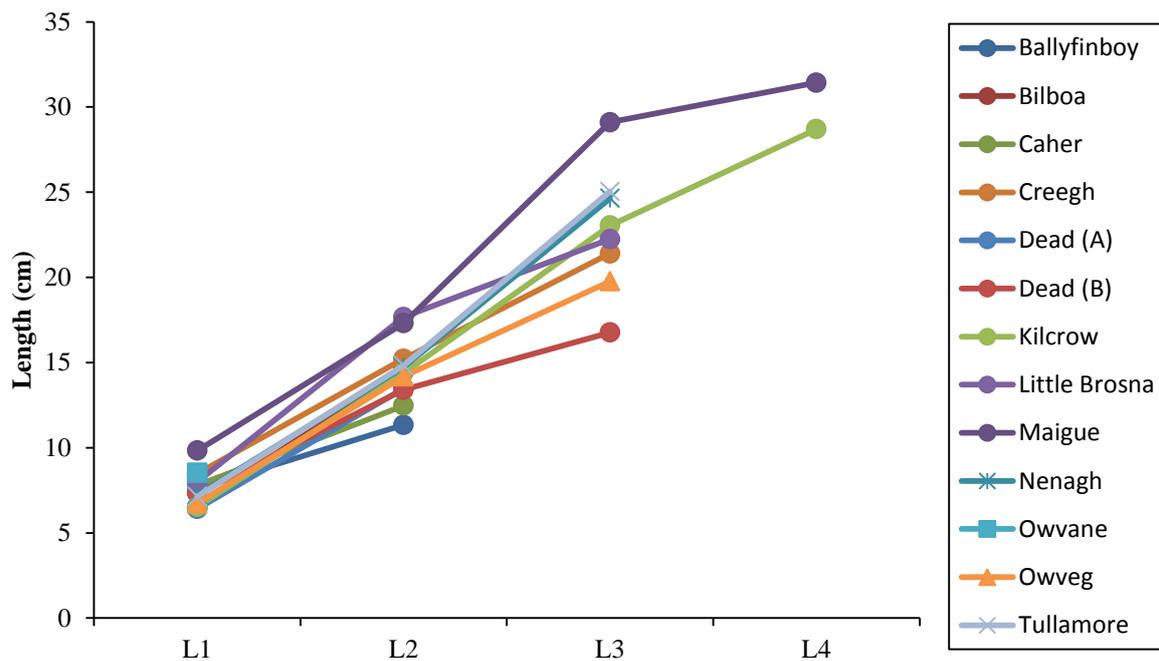


**Fig. 4.40. Percentage of sites where each fish species was recorded in the ShIRBD for WFD SM monitoring 2012**

### 4.3 Age and growth

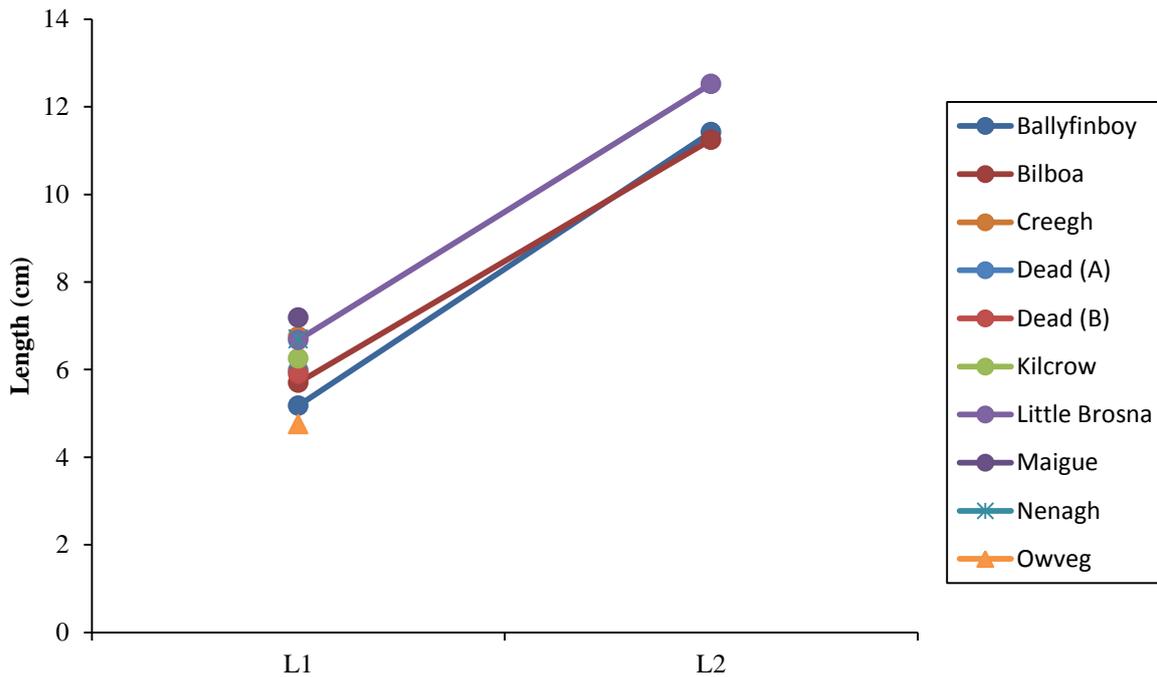
Growth rates based on back-calculated length-at-age data were analysed for brown trout, salmon, roach, pike and sea trout in the ShIRBD during 2012 (Appendix 1 to 5).

Brown trout were present in 13 of the ShIRBD sites surveyed. Brown trout up to age 4+ were recorded at two sites, the Kilcrow and Maigue, while fish aged 3+ were caught in a total of eight sites. Fish aged 0+ comprised the most abundant age class. The largest brown trout recorded in the ShIRBD in 2012 was captured in the Kilcrow River, which measured 41.1cm in length, weighed 940g 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 can only be reliably estimated from fish at sites where individual fish were 2+ or older, and where sufficient numbers were caught. Growth was considered slow at the Bilboa, Creegh and Kilcrow sites and fast at the Little Brosna, Maigue, Nenagh and Tullamore sites (Fig. 4.41 and Appendix 1).



**Fig. 4.41. Back-calculated lengths-at-age for brown trout in the ShIRBD, WFD surveillance monitoring 2012**

Salmon were recorded in 10 sites within the ShIRBD in 2012. Ages ranged from 0+ to 2+, with those aged 0+, comprising the most abundant age class. The largest juvenile recorded in the ShIRBD during 2012 was caught in the Little Brosna River, measured 19.7cm in length, weighed 99g and was aged 1+. The mean back-calculated length-at-age data for salmon in the ShIRBD are shown in Figure 4.42 and Appendix 2.



**Fig. 4.42. Back-calculated lengths-at-age for salmon in the ShIRBD, WFD surveillance monitoring 2012**

Sea trout were only recorded in one site (Creagh) and in low numbers. Their mean back-calculated length-at-age data is shown in appendix 3. Sea trout ageing was carried out as described in Poole (2010). One fish was aged 2B.0+, a 2-year old smolt with additional spring growth from estuarine feeding (denoted by the “B”) prior to going to sea for a few months (finnock, total age 2+). Two fish were aged 3.0+, a 3-year old smolt that returned to freshwater after only a few months at sea (finnock, total age 3+). Finally the last fish was aged as 3B.0+, a 3-year old smolt that returned to freshwater after only a few months at sea but also displays some secondary growth from estuarine feeding prior to going to sea (finnock, total age 3+).

The mean back-calculated length-at-age data for roach and pike in the ShIRBD are shown in Appendices 4 and 5. Roach and pike were both recorded up to age 3+.

#### **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 2012 has been assigned a draft fish classification status (Table 4.16). One site was classed as High, seven sites as Good, five sites as Moderate and two sites as Poor. When comparing the status this year with that from previous years (12 sites from 2008 and 2009), all sites showed no change in status.

**Table 4.16. Ecological status of sites surveyed in the ShIRBD for surveillance monitoring 2012**  
**(figures in brackets indicate confidence in class)**

River	Site Code	Site name	Previous ecological status	Ecological status 2012
<b>ShIRBD Wadeable sites</b>				
Ballyfinboy	25B020750A	Ballinderry Br._A	N/A	Moderate
Bilboa	25B030080A	Br u/s Blackboy Br - Bilboa Br._A	High (2009) (99%)	High
Caher	28C010200A	Br. 2 km d/s Formoyle_A	Good (2009) (65%)	Good
Dead	25D010100A	Pope's Bridge_A	Moderate (2009)	Moderate (88%)
Dead	25D010100B	Pope's Bridge_B	N/A	Good (100%)
Owvane (Limerick)	24O020200A	Br. u/s (SE of) Loughill_A	Good (2009)	Good (65%)
Owveg (Kerry)	23O050200B	Owveg Br._B	N/A	Good
Tyshe	23T020400A	West br. Ardferat at Friary_A	Poor (2009)	Poor
Tyshe	23T020400B	West br. Ardferat at Friary_B	Poor (2009)	Poor
<b>ShIRBD Non-Wadeable sites</b>				
Creagh	28C021500A	Drumellihy Br._A	Good (2009) (76%)	Good (52%)
Kilcrow	25K010700A	Ballyshrule Br._A	Moderate (2008)	Moderate (99%)
Little Brosna	25L020700A	Riverstown Br._A	Good (2008)	Good (96%)
Maigue	24M010900A	Castleroberts Br._A	Moderate (2008) (62%)	Moderate
Nenagh	25N010300A	Ballysoilshaun Br._A	Good (2009) (86%)	Good
Tullamore	25T030400A	Br. SW of Ballycowen Br._A	Moderate (2008) (98%)	Moderate (80%)

## 5. DISCUSSION

A total of 13 fish species (sea trout are included as a separate ‘variety’ of trout) were recorded during the 2012 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 but one site, followed by salmon and European eels. The Kilcrow River was the most diverse site surveyed within the ShIRBD for the Water Framework Directive in 2012 with a total of nine species present. The lowest species diversity recorded was in the Ballyfinboy, Caher, Owveg and Tyshe River sites, with only two species each. The highest abundances of brown trout and salmon were recorded in the Caher River and Bilboa River sites respectively.

Following the methods of Kennedy and Fitzmaurice (1971), brown trout growth was estimated at 12 sites. Growth was slow at the Bilboa, Creegh and Kilcrow sites and fast at the Little Brosna and Nenagh sites.

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 2012 was assigned a draft fish classification status. One site was classed as High, seven sites as Good, five sites as Moderate and two sites as Poor. All sites showed no change in status from previous surveys surveyed in 2008 and 2009.

## 6. REFERENCES

CEN (2003) *Water Quality — Sampling of Fish with Electricity*. European Standard. Ref. No. EN 14011:2000.

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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.

Poole, R. (ED). (2010). Manual on Sea Trout Ageing, Digital Scale Reading and Growth Methodology, Produced by the participants of the Celtic Sea Trout Project Workshop on Sea Trout Age Determination and Digital Scale Reading Methodology. 24<sup>th</sup>-28<sup>th</sup> May 2010. <http://www.celticseatrout.com/>

## APPENDIX 1

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

River		L1	L2	L3	L4	Growth category
<b>Ballyfinboy River</b>	Mean	7.60	11.34			n/a
	S.D.	1.75	0.70			
	S.E.	0.42	0.35			
	n	17	4			
	Min	4.27	10.67			
	Max	10.45	12.13			
<b>Bilboa River</b>	Mean	6.50	14.79			Slow
	S.D.	1.24	2.24			
	S.E.	0.33	0.91			
	n	14	6			
	Min	4.51	11.10			
	Max	7.96	18.12			
<b>Caher River</b>	Mean	7.78	12.48			n/a
	S.D.	1.16	0.79			
	S.E.	0.35	0.46			
	n	11	3			
	Min	5.30	11.82			
	Max	9.07	13.36			
<b>Creegh River</b>	Mean	8.49	15.22	21.40		Slow
	S.D.	1.67	2.63	1.48		
	S.E.	0.25	0.56	0.60		
	n	46	22	6		
	Min	5.25	9.86	19.13		
	Max	11.73	20.61	23.10		
<b>Dead River (Site A)</b>	Mean	6.41	13.48			n/a
	S.D.	1.45	0.32			
	S.E.	0.73	0.23			
	n	4	2			
	Min	4.69	13.26			
	Max	8.24	13.71			
<b>Dead River (Site B)</b>	Mean	7.32	13.40	16.77		n/a
	S.D.	1.58	3.18	0.32		
	S.E.	0.50	1.42	0.23		
	n	10	5	2		
	Min	5.57	9.75	16.54		
	Max	10.92	17.18	16.99		

**APPENDIX 1 continued**

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

<b>River</b>		<b>L1</b>	<b>L2</b>	<b>L3</b>	<b>L4</b>	<b>Growth category</b>
<b>Kilcrow River</b>	Mean	6.54	14.38	23.05	28.70	Slow
	S.D.	1.54	3.14	3.79	n/a	
	S.E.	0.34	0.84	1.43	n/a	
	n	20	14	7	1	
	Min	4.65	10.34	20.00	28.70	
	Max	9.82	22.24	30.46	28.70	
<b>Little Brosna River</b>	Mean	7.99	17.67	22.25		Fast
	S.D.	2.08	5.26	2.54		
	S.E.	0.30	0.99	1.14		
	n	47	28	5		
	Min	4.09	10.05	18.97		
	Max	12.37	28.85	25.18		
<b>Maigue, River</b>	Mean	9.83	17.30	29.10	31.43	n/a
	S.D.	1.28	1.53	6.64	n/a	
	S.E.	0.45	1.08	4.70	n/a	
	n	8	2	2	1	
	Min	7.13	16.22	24.40	31.43	
	Max	11.00	18.39	33.80	31.43	
<b>Nenagh River</b>	Mean	7.22	14.74	24.63		Fast
	S.D.	1.66	2.98	n/a		
	S.E.	0.26	0.53	n/a		
	n	41	32	1		
	Min	4.35	9.60	24.63		
	Max	10.08	19.65	24.63		
<b>Owveg River (Kerry)</b>	Mean	6.73	14.19	19.76		n/a
	S.D.	1.09	2.46	n/a		
	S.E.	0.34	1.23	n/a		
	n	10	4	1		
	Min	4.76	10.57	19.76		
	Max	8.05	15.83	19.76		
<b>Tullamore River</b>	Mean	7.13	14.82	25.03		n/a
	S.D.	1.35	3.97	1.98		
	S.E.	0.41	1.78	1.40		
	n	11	5	2		
	Min	4.44	11.09	23.64		
	Max	9.32	20.61	26.43		

## APPENDIX 2

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

River		L1	L2
<b>Ballyfinboy River</b>	Mean	5.18	11.42
	S.D.	1.90	n/a
	S.E.	1.10	n/a
	n	3	1
	Min	3.53	11.42
	Max	7.25	11.42
<b>Bilboa River</b>	Mean	5.70	11.25
	S.D.	1.58	n/a
	S.E.	0.31	n/a
	n	26	1
	Min	3.50	11.25
	Max	9.10	11.25
<b>Creagh River</b>	Mean	6.76	
	S.D.	1.11	
	S.E.	0.25	
	n	19	
	Min	4.87	
	Max	8.63	
<b>Dead River (Site A)</b>	Mean	5.99	
	S.D.	0.56	
	S.E.	0.23	
	n	6	
	Min	5.36	
	Max	6.82	
<b>Dead River (Site B)</b>	Mean	5.90	
	S.D.	1.24	
	S.E.	0.44	
	n	8	
	Min	3.95	
	Max	7.33	
<b>Kilcrow River</b>	Mean	6.25	
	S.D.	1.23	
	S.E.	0.55	
	n	5	
	Min	4.99	
	Max	8.00	

**APPENDIX 2 continued**

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

<b>River</b>		<b>L1</b>	<b>L2</b>
<b>Little Brosna River</b>	Mean	6.68	12.52
	S.D.	1.79	1.52
	S.E.	0.37	0.51
	n	24	9
	Min	3.36	8.95
	Max	10.75	14.05
<b>Maigue, River</b>	Mean	7.19	
	S.D.	n/a	
	S.E.	n/a	
	n	1	
	Min	7.19	
	Max	7.19	
<b>Nenagh River</b>	Mean	6.70	
	S.D.	n/a	
	S.E.	n/a	
	n	1	
	Min	6.70	
	Max	6.70	
<b>Owveg River (Kerry)</b>	Mean	4.76	
	S.D.	1.10	
	S.E.	0.26	
	n	18	
	Min	3.20	
	Max	6.89	

### APPENDIX 3

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

River		L1	L2	L3
Creegh River	Mean	8.12	15.93	19.82
	S.D.	1.90	0.68	0.79
	S.E.	0.95	0.34	0.46
	n	4	4	3
	Min	5.65	15.12	19.10
	Max	9.85	16.59	20.66

### APPENDIX 4

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

River		L1	L2	L3
Kilcrow River	Mean	2.26	6.48	8.31
	S.D.	0.46	1.35	n/a
	S.E.	0.14	0.43	n/a
	n	10	10	1
	Min	1.60	4.39	8.31
	Max	3.21	8.60	8.31

### APPENDIX 5

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

River		L1	L2	L3
Kilcrow River	Mean	14.36	35.14	49.91
	S.D.	3.93	n/a	n/a
	S.E.	1.76	n/a	n/a
	n	5	1	1
	Min	8.99	35.14	49.91
	Max	19.96	35.14	49.91



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