Sampling Fish for the Water Framework Directive

Rivers 2015

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Sampling Fish for the Water Framework Directive, Rivers 2015

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EXECUTIVE SUMMARY

The Water Framework Directive (WFD) (2000/60/EC) came into force in 2000 and was subsequently transposed into Irish law in 2003 (S.I. No. 722 of 2003), with the principal aim of preserving those water bodies where the ecological status is currently 'High' or 'Good', and restoring those water bodies that are currently impaired, to achieve at least 'Good' ecological status in all water bodies by 2015 or by designated extended deadlines.

A key step in this process is that each Member State must assess the current ecological status of surface water bodies (rivers, lakes and transitional waters) by monitoring a range of physical, chemical and biological quality elements including phytoplankton, macrophytes, phytobenthos, benthic invertebrates and fish. IFI have been undertaking fish stock surveys in rivers for the WFD since 2008. All river surveys are conducted using electric-fishing. This report summarises the main findings of the 2015 surveillance monitoring programme for rivers and highlights the current status of each water body in accordance with the fish populations present. A total of 31 river sites were surveyed during 2015 using boat-based electric-fishing gear for the non-wadeable sites and bank based (hand-set) electric-fishing gear for the wadeable sites. However an additional 153 sites were surveyed on the River Barrow and its tributaries and the results from this survey are presented in a separate report.

A total of 13 fish species (sea trout are included as a separate 'variety' of trout) and one type of hybrid (roach x bream) were recorded at the 31 sites. Brown trout was the most common fish species recorded, being present in 100% of sites surveyed, followed by salmon (71.0%), European eel (48.4%), minnow (38.7%), stone loach (35.5%), three-spined stickleback (32.3%), lamprey sp. (25.8%), perch (16.1%), gudgeon (12.9%), pike (12.9%), flounder (6.5%), roach 9.7%, roach x bream hybrids (3.2%) and sea trout (3.2%).

The ecological status classification tool for fish in Irish rivers 'FSC2 Ireland' (SNIFFER, 2011) along with expert opinion, was used to classify all river sites surveyed during 2015; one site was classified as High status, 11 as Good, 15 as Moderate and four as Poor.

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1. INTRODUCTION

Fish stock surveys were undertaken at 31 river sites in 17 catchments throughout Ireland during the summer of 2015 as part of Inland Fisheries Irelands programme of surveillance monitoring (SM) of fish for the Water Framework Directive (WFD). These surveys are required by both national and European law (S.I. No. 722 of 2003; 2000/60/EC), 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 in rivers are examined (Council of the European Communities, 2000).

In addition a total of 153 sites were surveyed on the River Barrow and its tributaries within the South Eastern River Basin District (SERBD) in 2015, with the results of this work contributing to a number of other studies including, a study on intercalibrating and optimising methods for wadeable streams (Matson *et al., submitted for publication*), the development of methods for using boom boats on large deep channels and an overall fish stock survey report for the River Barrow catchment (Delanty *et al*., 2017). The ecological status of fish at many of these sites has also been calculated for WFD purposes (Delanty *et al*., 2017).

There were also 12 additional sites surveyed on the River Dodder, Vartry River (ERBD) and White River (NBIRBD) as part of the on-going fish kill recovery assessment programme (Matson and Kelly, in prep).

Continued surveying of the WFD SM and additional river sites will provide a useful baseline and time-series dataset for WFD and fisheries management purposes. This in turn will provide information for River Basin District (RBD) managers to compile and implement programmes of measures to improve degraded water bodies. 2015 is the eighth year of the fish in river WFD SM sampling programme, with many of the sites surveyed this year being repeat surveys of those carried out in other years. As a result, much of the data from 2015 can be compared with that from at least one previous sampling occasion, to determine whether the status of fish in rivers is improving or deteriorating.

This report summarises the results of the fish stock surveys carried out within each River Basin District (RBD), as part of the WFD SM programme 2015.

2. STUDY AREA

Twenty-six sites were wadeable and surveyed using bank-based electric fishing equipment; the remaining five non-wadeable sites were surveyed using boat based equipment. Sites ranged in surface area from 105m^2 at the Burnfoot River (Br. in Burnfoot_B) site to 2,053m^2 for the Scramoge River (Br. N.E. of Riverdale_A).

Summary details for each site's location and physical characteristics are given in Appendix 1 to 3 and the distribution map of sites throughout Ireland is shown in Fig. 2.1.

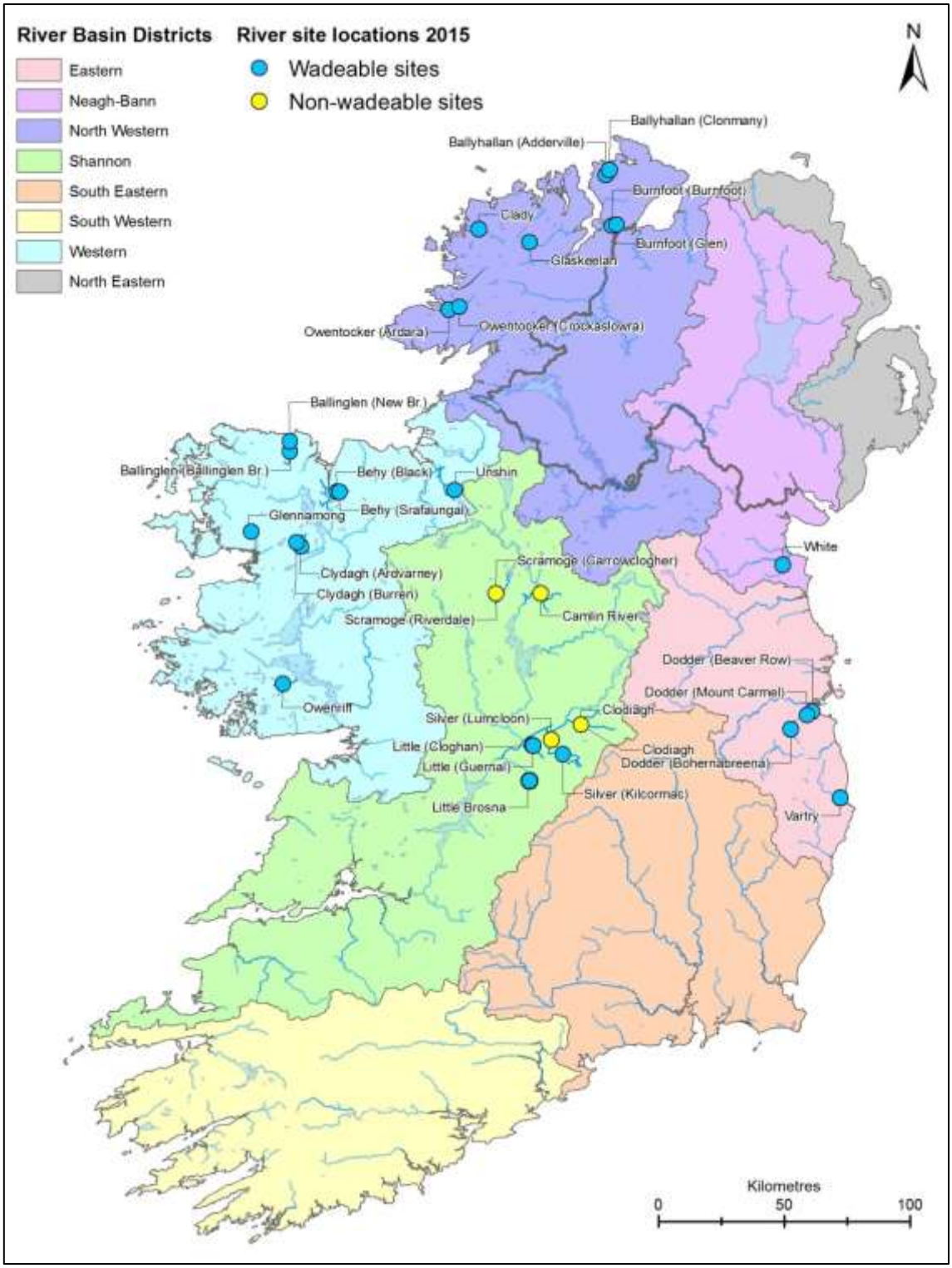

Fig. 2.1. Location map of river sites surveyed throughout the country for WFD fish surveillance monitoring, 2015

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, each fish was identified to species, 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 coarse fish species and pike. 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 minimum density for each species.

A subsample of the dominant fish species was aged (five fish from each 1cm size class). Fish 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.).

Plate 3.1. Electric-fishing using bank-based equipment on the Monefelim River at Barraghcore Br.

Plate 3.2. Electric-fishing using boat-based equipment on the Camlin River (Br. W. of Lisnabo_A)

Plate 3.3. Processing electric-fishing samples

4. RESULTS

4.1. River Surveys

4.1.1. Eastern River Basin District (ERBD)

Four river sites were surveyed in two river catchments within the Eastern River Basin District (ERBD). Catchments with sites surveyed on them included the Dodder and Vartry. All sites were wadeable (Fig. 4.1).

Fig. 4.1. Map of the ERBD showing all sites surveyed for WFD fish surveillance monitoring 2015

River Dodder

Three sites were electric fished on the River Dodder, at Beaver Row, Mount Carmel Hospital and Bohernabreena.

Dodder, River (D/s Piperstown Stream, Bohernabreena_A)

The Bohernabreena survey site was located along the Dublin Mountains Way, approximately 2.5km south of Oldbawn, Co. Dublin (Plate 4.1). Three electric-fishing passes were conducted using three bank-based electric fishing units on the 14th of July 2015, along a 43m length of channel. Riffle dominated the habitat over a substrate of cobble and boulder.

Plate 4.1. The River Dodder at Bohernabreena, South Co. Dublin

Brown trout was the most abundant species recorded at this site and the density was higher than the previous two years, due to an increase in 0+ numbers (Table 4.1 and Fig 4.2).

Table 4.1. Minimum density of fish (no. /m^2), River Dodder (D/s Piperstown Stream, Bohernabreena_A)

	Minimum density		
Species	**2013**	**2014**	**2015**
Brown trout	0.086	0.067	0.268
0+ brown trout	-	0.022	0.242
1+ & older brown trout	0.086	0.044	0.026
Stone loach	0.003	0.003	0.004
European eel	-	0.003	-
All Fish	0.089	0.073	0.272

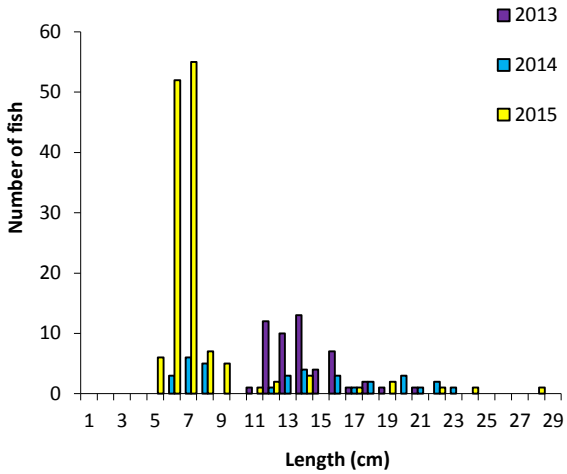

Fig. 4.2. Length frequency distribution of brown trout in the River Dodder (d/s Piperstown Stream, Bohernabreena_A), 2013 (n=52), 2014 (n=35) and 2015 (n=137)

Dodder, River (Foot Br. Beaver Row_B)

The Beaver Row survey site was located downstream of the weir near Donnybrook, Dublin (Plate 4.2). Two electric-fishing passes were conducted using three bank-based electric-fishing units on the 16th of July 2015, along a 37m length of channel. Glide dominated the habitat, over a substrate of mainly cobble and boulder.

Plate 4.2. The River Dodder at Beaver Row, Donnybrook, Dublin

Brown trout was the most abundant species recorded at this site, with an increase in density observed since 2013 (Table 4.2 and Fig. 4.3). Salmon and eel density was lower in 2015 than the previous two years (Figs. 4.4 and 4.5).

Table 4.2. Minimum density of fish (no./m^2), River Dodder (Foot Br. Beaver Row_B)

Species	Minimum density 2011	2013	2015
Brown trout	0.297	0.134	0.249
0+ brown trout	0.292	0.126	0.243
1+ & older brown trout	0.005	0.008	0.006
Minnow	0.008	-	0.052
Salmon	0.586	0.226	0.019
0+ salmon	0.567	0.208	0.015
1+ & older salmon	0.019	0.017	0.004
European eel	0.027	0.052	0.022
Stone loach	0.010	0.004	0.004
Flounder	-	0.004	0.006
Lamprey sp.	-	0.002	-
3-spined stickleback	0.010	0.002	-
All Fish	0.938	0.424	0.351

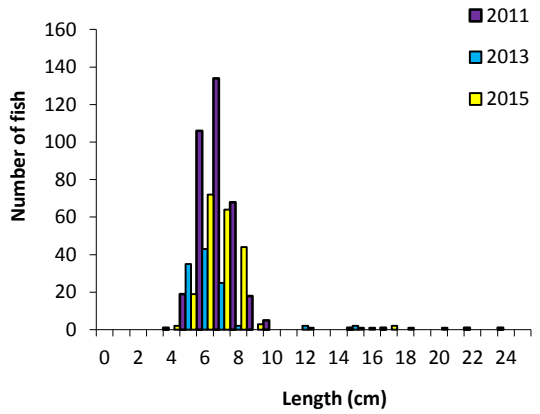

Fig. 4.3. Length frequency distribution of brown trout in the River Dodder (Foot br. Beaver Row_B), 2011 (n=355), 2013 (n=110) and 2015 (n=210)

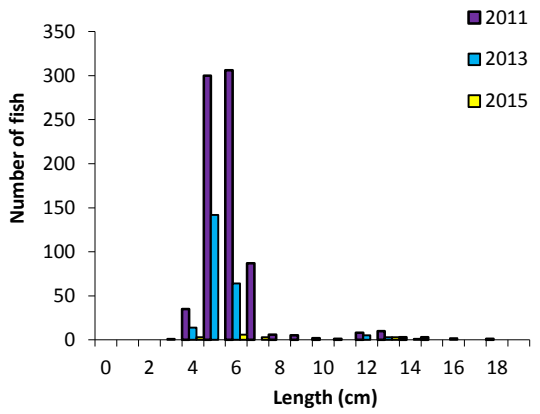

Fig. 4.4. Length frequency distribution of salmon in the River Dodder (Foot br. Beaver Row_B), 2011 (n=767), 2013 (n=231) and 2015 (n=16)

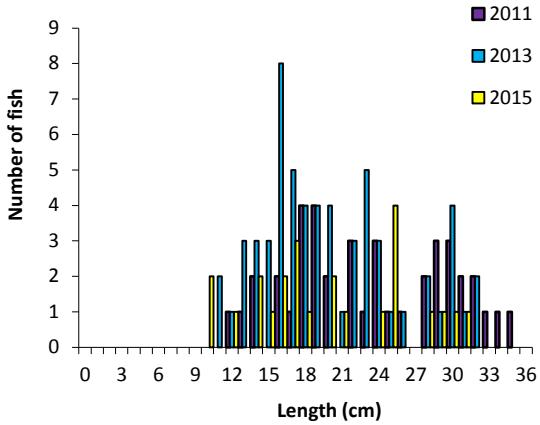

Fig. 4.5. Length frequency distribution of European eel in the River Dodder (Foot br. Beaver Row_B), 2011 (n=41), 2013 (n=61) and 2015 (n=24)

Dodder, River (Mount Carmel Hospital_A)

The survey site was located just downstream of a foot bridge on the river near Mount Carmel Hospital in Rathfarnham (Plate 4.3). Three electric-fishing passes were conducted using three bank-based electric-fishing units on the 13th of July 2015, along a 37m length of channel. There was a good mix of habitat present, with a substrate of mainly cobble.

Plate 4.3. The River Dodder at Mount Carmel, South Co. Dublin

Brown trout was the most abundant species at this site, with the 0+ cohort increasing noticeably from the previous two years (Table 4.3 and Fig. 4.6).

Table 4.3. Minimum density of fish (no./m^2), River Dodder (Mount Carmel Hospital_A)

	Minimum density		
Species	**2013**	**2014**	**2015**
Brown trout	0.221	0.126	0.350
0+ brown trout	0.150	0.089	0.307
1+ & older brown trout	0.071	0.036	0.043
Minnow	-	0.120	0.116
Stone loach	-	0.042	0.021
European eel	0.009	0.003	0.006
3-spined stickleback	-	0.003	-
All Fish	0.230	0.293	0.493

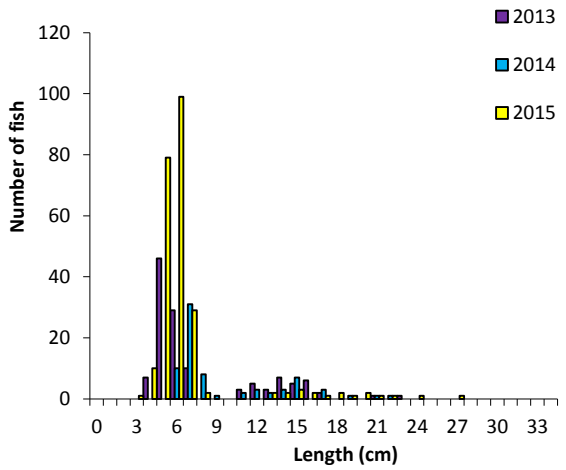

Fig. 4.6. Length frequency distribution of brown trout in the River Dodder (Mount Carmel Hospital_A), 2013 (n=125), 2014 (n=73) and 2015 (n=239)

Vartry River (Newrath Br._A)

The site was located downstream of Newrath Bridge, halfway between Ashford and Rathnew, Co. Wicklow (Plate 4.4). Three electric-fishing passes were conducted using three bank-based electric fishing units on the 8th of September 2015, along a 42m length of channel. Riffle and pool dominated the habitat, over an evenly mixed substrate.

Plate 4.4. The Vartry River at Newrath Br., Co. Wicklow

Brown trout was the most abundant species recorded at this site (Table 4.4). There was an even mix of both 0+ and 1+ and older captured, with both increasing in abundance when compared to the previous two years (Table 4.4 and Fig. 4.7). Overall, salmon density was lower in 2015 than 2014 but higher than 2013, although there was an increase in 1+ and older from the previous surveys (Table 4.4 and Fig. 4.8). Eel density remained unchanged from 2014 (Fig. 4.9). Adult sea trout were also recorded (Fig. 4.10).

Table 4.4. Minimum density of fish (no./m^2), Vartry River (Newrath Br._A)

	Minimum density		
Species	**2013**	**2014**	**2015**
Brown trout	0.098	0.052	0.164
0+ brown trout	0.072	0.022	0.082
1+ & older brown trout	0.026	0.031	0.082
Salmon	0.058	0.148	0.091
0+ salmon	0.052	0.136	0.046
1+ & older salmon	0.006	0.012	0.046
European eel	0.014	0.043	0.043
Sea trout	0.014	0.015	0.027
Flounder	0.029	0.003	0.009
3-spined stickleback	0.006	-	0.006
Minnow	0.012	0.009	0.003
Lamprey sp.	0.003	0.015	-
All Fish	0.233	0.287	0.344

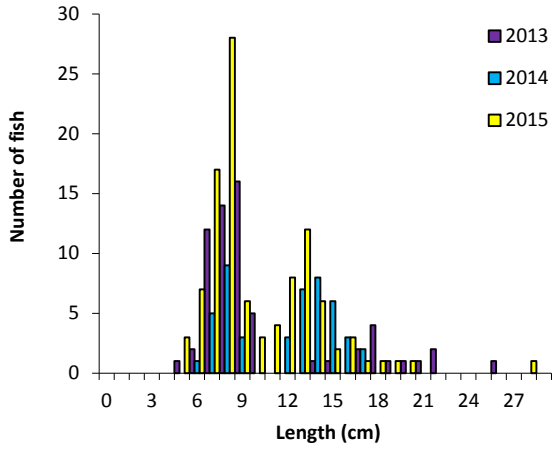

Fig. 4.7. Length frequency distribution of brown trout in the Vartry River (Newrath Br._A), 2013 (n=64), 2014 (n=47) and 2015 (n=104)

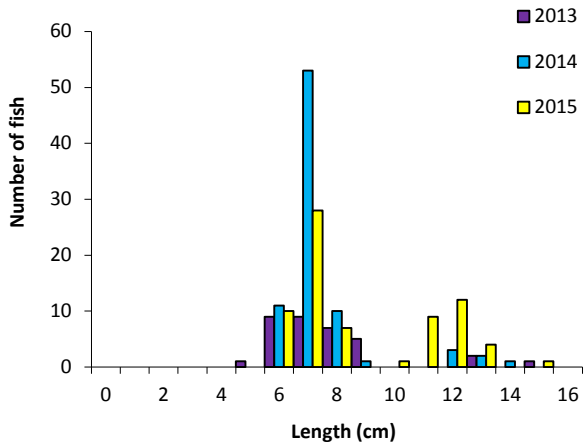

Fig. 4.8. Length frequency distribution of salmon in the Vartry River (Newrath Br._A), 2013 (n=34), 2014 (n=81) and 2015 (n=72)

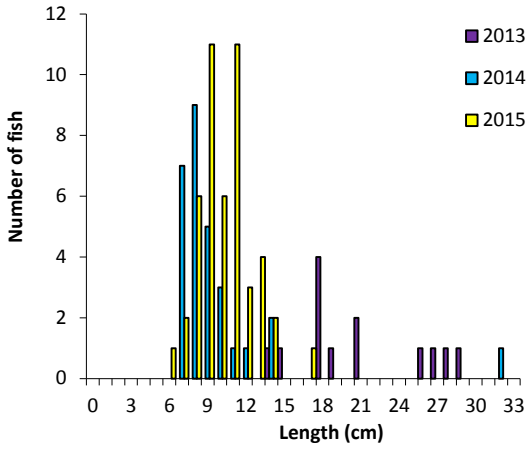

Fig. 4.9. Length frequency distribution of European eel in the Vartry River (Newrath Br._A), 2011 (n=13), 2013 (n=29) and 2015 (n=47)

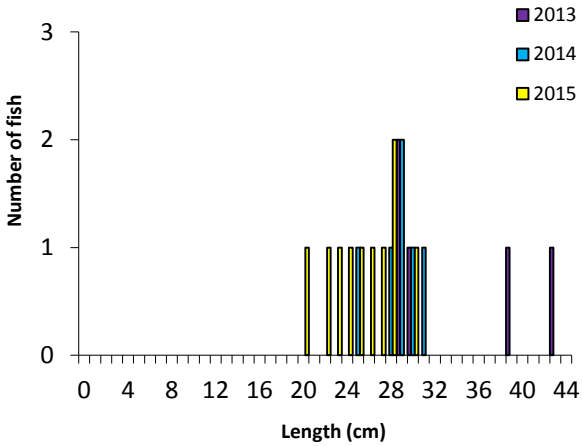

Fig. 4.10. Length frequency distribution of sea trout in the Vartry River (Newrath Br._A), 2011 (n=5), 2013 (n=6) and 2015 (n=10)

4.1.2. Neagh-Bann International River Basin District (NBIRBD)

One river site was surveyed on the White River in the Neagh-Bann International River Basin District (NBIRBD). The Dee was the only catchment with a survey conducted on it and this site was wadeable (Fig. 4.10).

Fig. 4.11. Map of the NBIRBD showing the site surveyed for WFD fish surveillance monitoring 2015

White River (Coneyburrow Br._B)

The survey site was located just upstream of Coneyburrow Br., Dunleer, Co. Louth (Plate 4.5). Three electric-fishing passes were conducted using three bank-based electric fishing units on the 12th of August 2015, along a 45m length of channel. The habitat was almost entirely composed of glide, while the dominant substrate was gravel.

Plate 4.5. The White River at Coneyburrow Br., Co. Louth

Minnow was the most abundant species recorded at this site in 2015 (Table 4.5). The density of three-spined stickleback was also higher than 2014 but were still fewer in number than 2013. Brown trout and salmon density increased in 2015 (Figs. 4.12 and 4.13).

Table 4.5. Minimum density of fish (no./m^2), White River (Coneyburrow_B)

	Minimum density		
Species	**2013**	**2014**	**2015**
Minnow	0.214	0.386	0.487
3-spined stickleback	1.760	0.112	0.245
Brown trout	0.007	0.011	0.155
0+ brown trout	0.003	0.006	0.142
1+ & older brown trout	0.007	0.006	0.013
Salmon	0.014	0.003	0.019
0+ salmon	0.010	0.003	0.016
1+ & older salmon	0.003	-	0.003
Lamprey sp.	-	0.011	0.006
European eel	0.007	-	-
Stone loach	0.160	0.059	0.065
All Fish	2.161	0.581	0.978

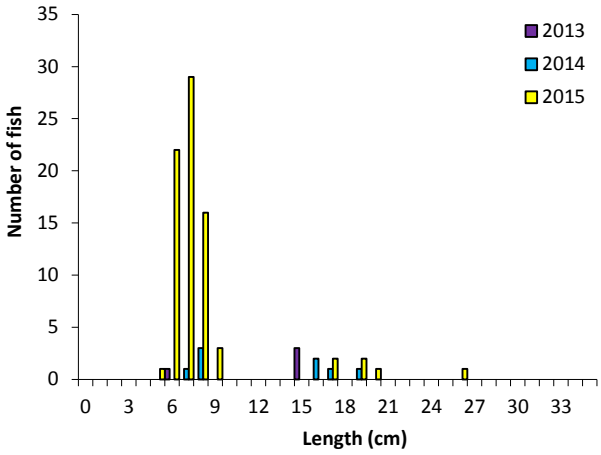

Fig. 4.12. Length frequency distribution of brown trout in the White River (Coneyburrow Br._B), 2013 (n=4), 2014 (n=8) and 2015 (n=77)

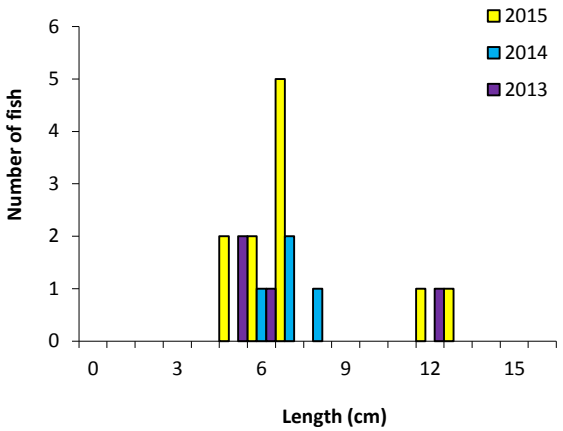

Fig. 4.13. Length frequency distribution of salmon in the White River (Coneyburrow Br._B), 2013 (n=4), 2014 (n=4) and 2015 (n=11)

4.1.3. Shannon International River Basin District (ShIRBD)

Nine river sites were surveyed in five river catchments within the Shannon International River Basin District (ShIRBD) during 2015. Catchments with surveys on them included, the Camlin, Clodiagh, Little Brosna, Little (Cloghan), Scramoge and Silver. Four of these sites were wadeable and five were non-wadeable (Fig. 4.13).

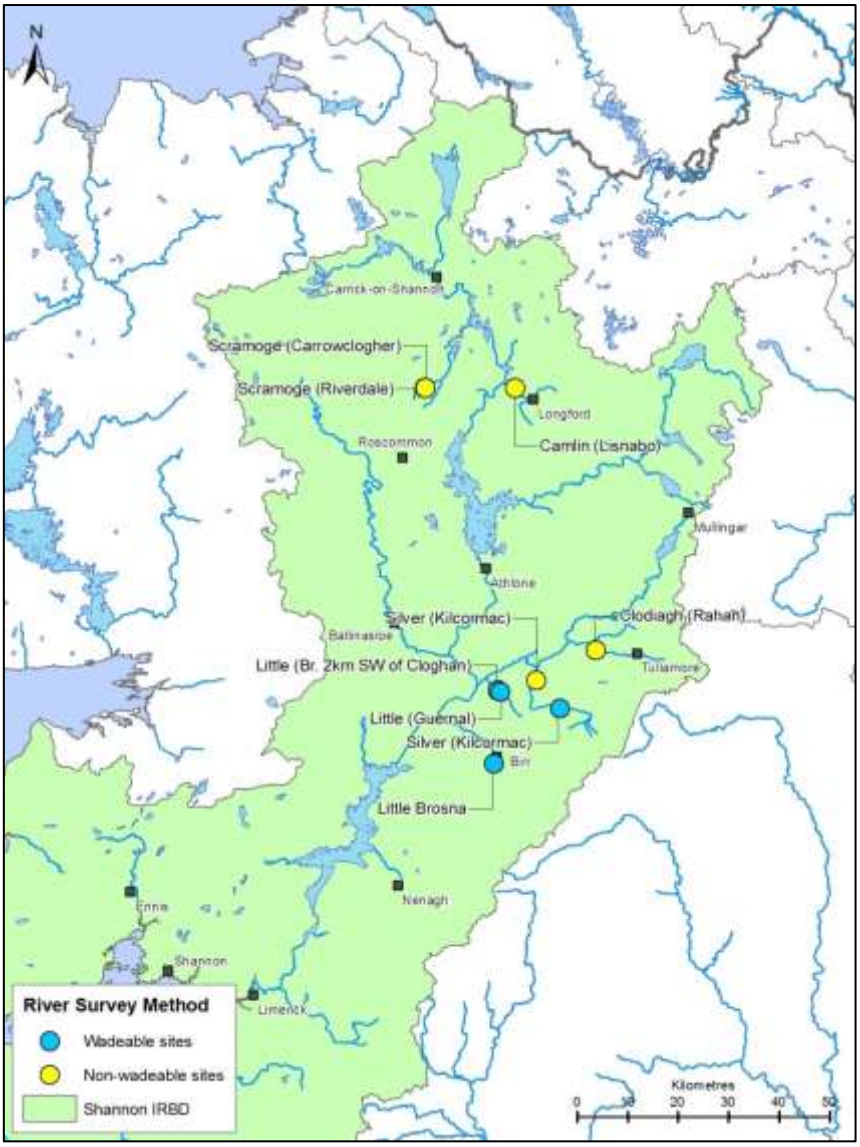

Fig. 4.14. Map of the ShIRBD showing all sites surveyed for WFD fish surveillance monitoring 2015

Little (Cloghan) River (Br. 2km SW of Cloghan_A)

The survey site was located upstream of the bridge, on the main road between Cloghan and Banagher (Plate 4.6). Three electric-fishing passes were conducted using one bank-based electric fishing unit on the 24th of August 2015, along a 35m length of channel. Glide dominated the habitat, over a substrate largely composed of gravel.

Plate 4.6. The Little River at Cloghan, Co. Offaly

Brown trout was the most abundant species recorded at this site with fry density higher than the previous two years (Table 4.6 and Fig. 4.15). Gudgeon and roach have not been recorded since the 2008 survey.

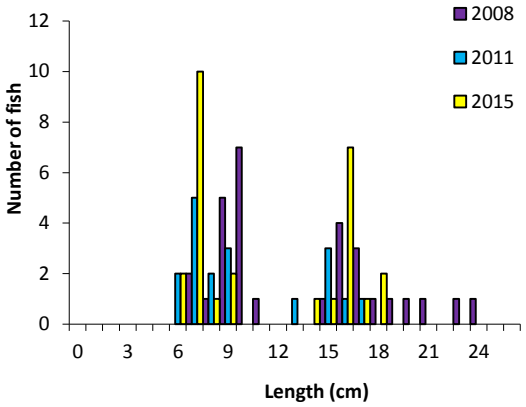

Fig. 4.15. Length frequency distribution of brown trout in the Little River (Cloghan) (Br. 2km SW of Cloghan_A), 2008 (n=30), 2011 (n=18) and 2015 (n=27)

Little (Cloghan) River (Guernal_A)

The Guernal survey site was located several hundred metres upstream of the previous site. Three electric-fishing passes were conducted using one bank-based electric fishing unit on the 24th of August 2015, along a 33m length of channel.

Brown trout (Fig. 4.16) was the most abundant species followed by three-spined stickleback (Table 4.7).

Table 4.6. Minimum density of fish (no./m^2), Little River (Cloghan)(Br. 2km SW of Cloghan_A)

	Minimum density		
Species	**2008**	**2011**	**2015**
Brown trout	0.111	0.102	0.134
0+ brown trout	0.047	0.058	0.085
1+ & older brown trout	0.064	0.044	0.049
Minnow	0.199	0.044	0.035
Lamprey sp.	0.012	0.015	0.007
Gudgeon	0.006	-	-
Roach	0.006	-	-
Stone loach	-	0.007	-
3-spined stickleback	0.012	0.007	-
All Fish	0.345	0.175	0.176

Table 4.7. Minimum density of fish (no./m^2), Little River (Cloghan)(Guernal_A)

	Minimum density
Species	**2015**
Brown trout	0.074
0+ brown trout	0.041
1+ & older brown trout	0.033
3-spined stickleback	0.050
Stone loach	0.025
Minnow	0.017
Lamprey sp.	0.008
All Fish	0.165

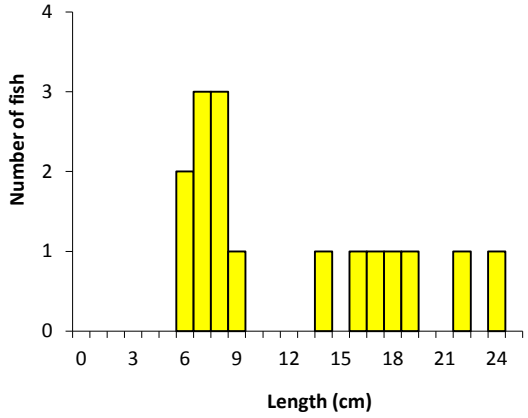

Fig. 4.16. Length frequency distribution of brown trout in the Little River (Guernal_A), 2015 (n=35).

Little Brosna River (Riverstown Br._A)

The survey site was located downstream of the bridge in Riverstown, approximately 2km south west of Birr, Co. Offaly (Plate 4.7). Two electric-fishing passes were conducted using three bank-based electric fishing units on the 17th of September 2015, along a 31m length of channel. Glide dominated the habitat, while the substrate consisted of a mix of cobble, gravel and sand.

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

Brown trout was the most abundant species recorded at this site followed by minnow (Table 4.8 and Fig. 4.17). Salmon and roach were also present (Table 4.8 and Fig. 4.18).

Table 4.8. Minimum density of fish (no./m^2), Little Brosna River (Riverstown_A)

Species	Minimum density 2015
Brown trout	0.196
0+ Brown trout	0.046
1+ & older brown trout	0.151
Minnow	0.108
Salmon	0.046
0+ salmon	-
1+ & older salmon	0.046
Roach	0.022
Stone loach	0.011
Lamprey sp.	0.003
3-spined stickleback	0.003
All Fish	0.387

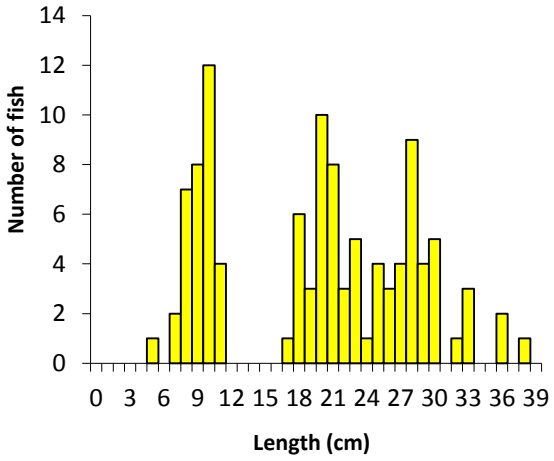

Fig. 4.17. Length frequency distribution of brown trout in the Little Brosna River (Riverstown_A), 2015 (n=107)

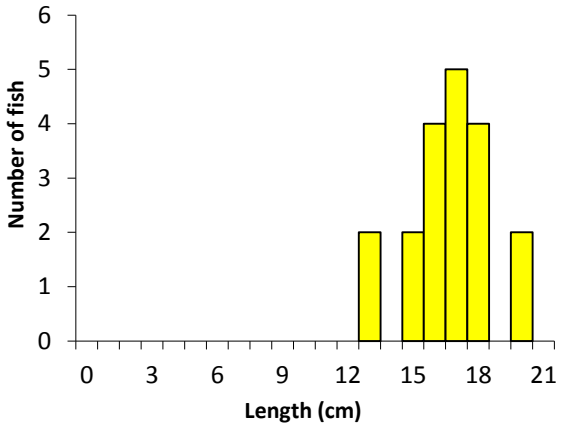

Fig. 4.18. Length frequency distribution of salmon in the Little Brosna River (Riverstown_A), 2015 (n=19)

Silver (Kilcormac) River (Kilcormac Village_A)

This survey site was located downstream of a bridge in Kilcormac Village, Co. Offaly (Plate 4.8). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 25th of August 2015, along a 45m length of channel. Glide dominated the habitat, over a substrate of predominantly gravel.

Plate 4.8. The Silver River at Kilcormac Village, Co. Offaly

Brown trout was the most abundant species recorded at this site, with the majority of these 0+ (Table 4.9 and Fig. 4.19). Salmon were also recorded but in small numbers, with only 0+ present.

Table 4.9. Minimum density of fish (no./m^2), Silver River (Kilcormac Village_A)

Species	Minimum density 2015
Brown trout	0.188
0+ Brown trout	0.155
1+ & older brown trout	0.033
Stone loach	0.026
3-spined stickleback	0.024
Salmon	0.014
0+ salmon	0.014
1+ & older salmon	-
Lamprey sp.	0.002
Minnow	0.002
All Fish	0.256

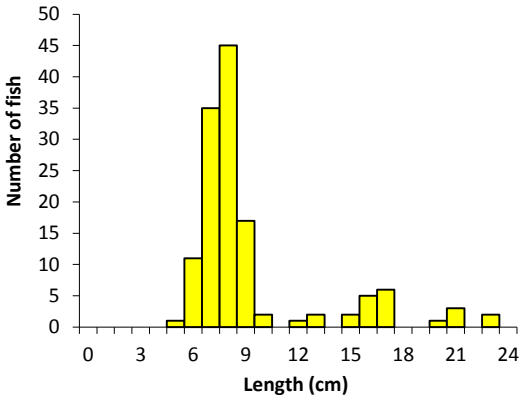

Fig. 4.19. Length frequency distribution of brown trout in the Silver River (Kilcormac Village_A), 2015 (n=133)

Clodiagh River (Br. at Rahan_A)

The survey site was located 8.5km west of Tullamore, Co. Offaly (Plate 4.10). Three electric-fishing passes were conducted using two boat-based electric fishing units on the 16th of September 2015, along a 160m length of channel. Glide dominated the habitat, over a mixed substrate of cobble, gravel and sand.

Plate 4.10. The Clodiagh River, Rahan, Co. Offaly

Brown trout was the most abundant species recorded at this site, with 1+ and older outnumbering 0+ significantly (Table 4.10 and Fig. 4.20). Salmon were not recorded in 2015.

Table 4.10. Minimum density of fish (no./m^2), *Clodiagh River (Br. at Rahan_A)*

Species	Minimum density 2008	2011	2015
Brown trout	0.044	0.041	0.033
0+ brown trout	0.001	-	0.001
1+ & older brown trout	0.044	0.041	0.032
Minnow	0.001	0.002	0.005
Perch	-	-	0.001
Stone loach	0.002	0.001	0.001
3-spined stickleback	0.002	0.001	-
European eel	0.001	-	-
Gudgeon	-	0.002	-
Lamprey sp.	0.001	-	-
Salmon	0.001	-	-
0+ salmon	-	-	-
1+ & older salmon	0.001	-	-
All Fish	0.051	0.046	0.038

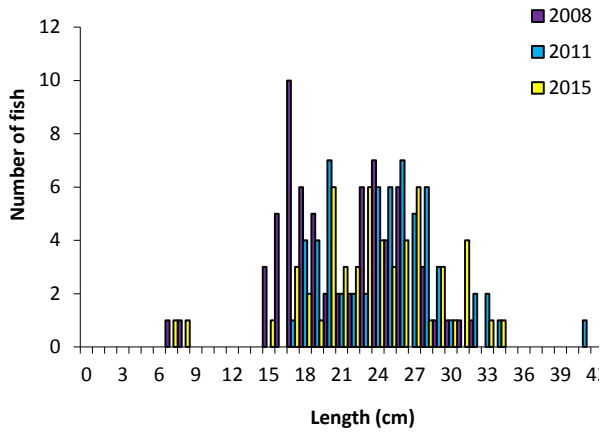

Fig. 4.20. Length frequency distribution of brown trout in the Clodiagh River (Br. at Rahan_A), 2008 (n=67), (n=62) and 2015 (n=55)

Camlin River (Br. W. of Lisnabo_A)

The survey site was located upstream of Ballykenny Bridge, approximately 2.5km from where it enters the River Shannon (Plate 4.9). Three electric-fishing passes were conducted using two boat-based electric fishing units on the 9th of September 2015, along a 103m length of channel. Glide dominated the habitat, over a substrate of mostly cobble.

Plate 4.9. The Camlin River at Lisnabo, Co. Longford

Roach was the most abundant species recorded at this site, followed by gudgeon and perch (Table. 4.10 and Figs. 4.20 and 4.21). Only 0+ brown trout were recorded in 2015, while in the previous surveys only 1+ and older brown trout were encountered (Table 4.10).

Table 4.11. Minimum density of fish (no./m^2), *Camlin River (Br. W. of Lisnabo_A)*

Species	Minimum density 2008	2011	2015
Roach	0.006	0.232	0.093
Gudgeon	0.002	0.011	0.013
Perch	0.006	0.010	0.008
Brown trout	0.001	0.002	0.004
0+ brown trout	-	-	0.004
1+ & older brown trout	0.001	0.002	-
Pike	0.002	0.003	0.004
3-spined stickleback	-	-	0.003
Roach x bream hybrid	-	-	0.001
Stone loach	-	0.004	0.001
Lamprey sp.	-	0.001	-
9-spined stickleback	-	0.001	-
All Fish	0.017	0.262	0.126

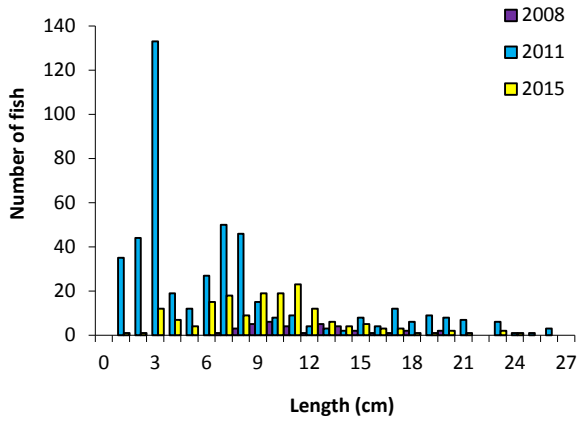

Fig. 4.21. Length frequency distribution of roach in the Camlin River (Br. W. of Lisnabo_A), 2008 (n=37), 2011 (n=472) and 2015 (n=169)

Scramoge River (Br. N.E. of Riverdale_A)

The survey site was located downstream of Cloonconny Bridge approximately 4km southwest of Strokestown (Plate 4.11). Three electric-fishing passes were conducted using one boat-based electric fishing unit on the 10th of September 2015, along a 236m length of channel. Glide dominated the habitat, over a substrate of mainly mud and silt.

Plate 4.11. The Scramoge River at Riverdale near Strokestown, Co. Roscommon

Roach was the most abundant species recorded at this site, followed by brown trout and perch (Table 4.12). No eels were encountered in 2015, having been recorded during the previous two surveys. Perch abundance was lower than 2008 and 2011 (Table 4.12 and Fig. 4.23). Roach were only present within a very narrow length range in 2015 (Fig. 4.24).

Table 4.12. Minimum density of fish (no./m^2), Scramoge River (Br. N.E. of Riverdale_A)

	Minimum density		
Species	**2008**	**2011**	**2015**
Roach	0.006	0.002	0.003
Brown trout	-	0.001	0.002
0+ brown trout	-	0.001	0.001
1+ & older brown trout	-	0.000	0.001
Perch	0.015	0.021	0.001
Gudgeon	-	0.009	0.0005
Lamprey sp.	-	0.002	0.0005
Pike	0.003	0.004	0.0005
Stone loach	-	0.002	0.0005
European eel	0.0003	0.001	-
All Fish	0.026	0.041	0.008

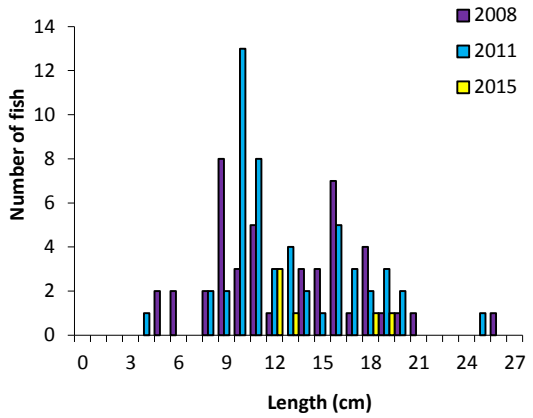

Fig. 4.22. Length frequency distribution of perch in the Scramoge River (Br. N.E. of Riverdale_A), 2008 (n=45), 2011 (n=52) and 2015 (n=6)

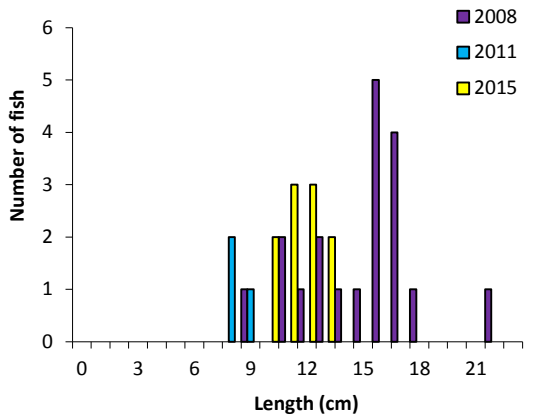

Fig. 4.23. Length frequency distribution of roach in the Scramoge River (Br. N.E. of Riverdale_A), 2008 (n=19), 2011 (n=3) and 2015 (n=10)

Scramoge River (Carrowclogher_A)

The Carrowclogher survey site was located directly downstream of the previous site (Plate 4.12). Three electric-fishing passes were conducted using one boat-based electric fishing unit on the 10th of September 2015, along a 108m length of channel. Glide dominated the habitat, over a substrate of mainly bedrock.

Plate 4.12. The Scramoge River at Carrowclogher near Strokestown, Co. Roscommon

Gudgeon was the most abundant species recorded at this site followed by stone loach (Table 4.13). Brown trout were only present in low numbers and no 0+ were encountered.

Table 4.13. Minimum density of fish (no./m^2), Scramoge River (Carrowclogher_A)

	Minimum density	
Species	**2011**	**2015**
Gudgeon	0.002	0.007
Stone loach	0.003	0.003
Brown trout	0.002	0.001
0+ brown trout	0.002	-
1+ & older brown trout	-	0.001
European eel	0.002	0.001
Perch	0.015	0.001
Pike	0.003	0.001
All Fish	0.026	0.013

Silver (Kilcormac) River (Lumcloon Br._A)

The survey site was located just downstream of Lumcloon Bridge, approximately 3km upstream of the Silver River's confluence with the River Brosna (Plate 4.13). Two electric-fishing passes were conducted using one boat-based electric fishing unit on the 25th of August 2015, along a 134m length of channel. Glide dominated the habitat, over a substrate of largely gravel, mud and silt.

Plate 4.13. Silver River at Lumcloon Br., Co. Offaly

Brown trout was the most abundant species recorded at this site, with the majority of these 1+ and older (Table 4.14 and Fig. 4.25). Salmon aged 0+ were present in 2015 having been absent in 2008 and 2011, while 1+ and older were absent.

Table 4.14. Minimum density of fish (no./m^2), Silver River (Lumcloon Br._A)

	Minimum density		
Species	**2008**	**2011**	**2015**
Brown trout	0.042	0.085	0.070
0+ brown trout	0.000	0.042	0.003
1+ & older brown trout	0.042	0.044	0.067
Minnow	-	0.057	0.009
Salmon	0.001	0.001	0.002
0+ salmon	-	-	0.002
1+ & older salmon	0.001	0.001	-
Gudgeon	0.002	0.005	0.001
Perch	-	-	0.001
3-spined stickleback	-	0.001	-
Stone loach	0.002	0.001	-
All Fish	0.047	0.150	0.082

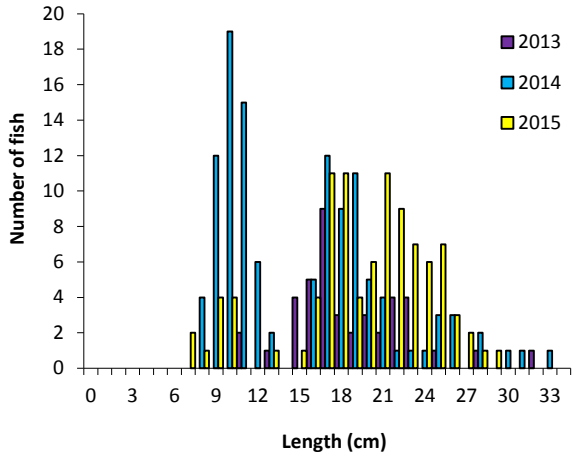

Fig. 4.24. Length frequency distribution of brown trout in the Silver River (Lumcloon Br._A), 2008 (n=42), 2011 (n=118) and 2015 (n=96)

4.1.4. North Western International River Basin District (NWIRBD)

Eight river sites were surveyed in five river catchments within the North Western International River Basin District (NWIRBD). Catchments where surveys were undertaken included the Ballyhallan, Burnfoot, Clady, Glaskeelan and Owentocker (Fig. 4.25). All of these sites were wadeable.

Fig. 4.25. Map of the NWIRBD showing all sites surveyed for WFD fish surveillance monitoring 2015

Ballyhallan River (Br. u/s Clonmany River_A)

The survey site was located on the downstream side of a bridge, just upstream of the confluence with the Clonmany River (Plate 4.14). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 30th of June 2015, along a 44m length of channel. Riffle and glide dominated the habitat, over a substrate of cobble.

Plate 4.14. The Ballyhallan River near the Clonmany River Confluence, Co. Donegal

Salmon was the most abundant species recorded at this site, with high densities of brown trout also present (Table 4.16, Fig. 4.28 and Fig. 4.29). Total salmon density decreased only slightly between both years, with much higher densities of 0+ in 2015. Total density of brown trout was similar between the two survey occasions (Table 4.16).

Table 4.16. Minimum density of fish (no./m^2), Ballyhallan *River (Br. u/s Clonmany River_A)*

	Minimum density	
Species	**2008**	**2015**
Salmon	0.316	0.298
0+ salmon	0.164	0.238
1+ & older salmon	0.153	0.060
Brown trout	0.192	0.191
0+ brown trout	0.107	0.042
1+ & older brown trout	0.085	0.149
European eel	0.034	0.006
All Fish	0.542	0.494

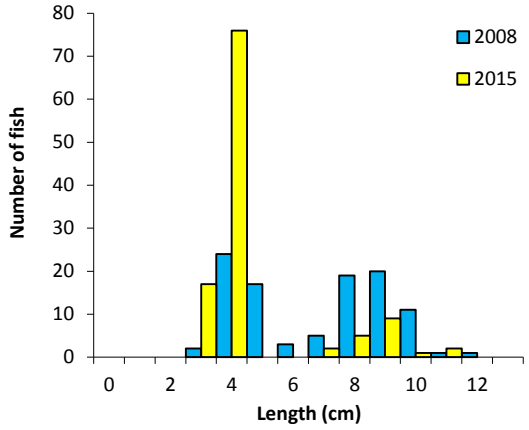

Fig. 4.26. Length frequency distribution of salmon in the Ballyhallan River (Br. u/s Clonmany River_A), 2008 (n=103) and 2015 (n=112)

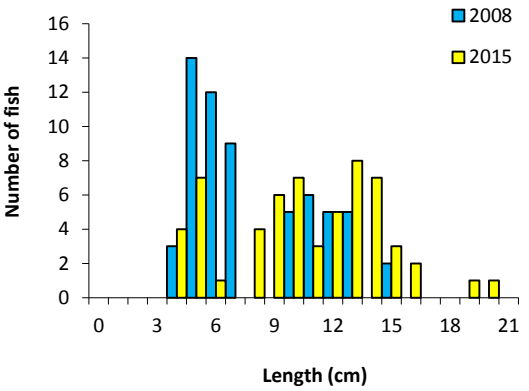

Fig. 4.27. Length frequency distribution of brown trout in the Ballyhallan River (Br. u/s Clonmany River_A), 2008 (n=61) and 2015 (n=59)

Ballyhallan River (Adderville_A)

The survey site was located approximately 2.5km southwest of Clonmany, Co. Donegal. Three electric-fishing passes were conducted using one backpack and one bank-based electric fishing unit on the 30th of June 2015, along a 44m length of channel. Riffle dominated the habitat, over a substrate of mainly cobble and gravel.

Brown trout was the only species recorded at this site, with 0+ comprising the majority of those captured (Table 4.15 and Fig. 4.27).

Table 4.15. Minimum density of fish (no./m^2), Ballyhallan River (Adderville_A)

Species	Minimum density 2015
Brown trout	0.219
0+ brown trout	0.180
1+ & older brown trout	0.039
All Fish	0.219

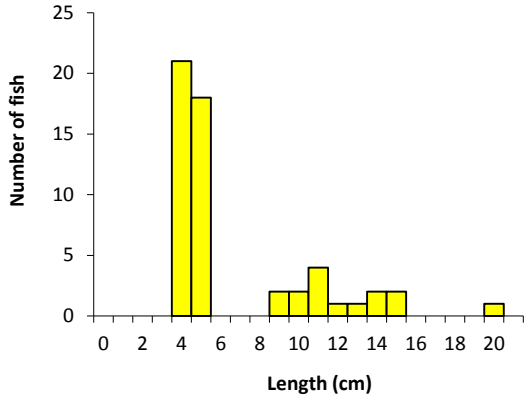

Fig. 4.28. Length frequency distribution of brown trout in the Ballyhallan River (Adderville_A), 2015 (n=54)

Burnfoot River (Br. in Burnfoot_B)

The survey site was located downstream of the bridge on the north end of Burnfoot Village (Plate 4.15). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 2nd of July 2015, along a 22m length of channel. There was a mix of habitat, composed mainly of glide, over a range of substrate types including boulder, cobble, gravel and sand.

Plate 4.15. The Burnfoot River at Burnfoot Village, Co. Donegal

Brown trout was the most abundant species recorded at this site followed by lamprey (Table 4.17). The 0+ cohort for both salmon and trout was absent in 2015 (Figs. 4.29 and 4.30).

Table 4.17. Minimum density of fish (no./m^2), Burnfoot River (Br. in Burnfoot_B)

Species	Minimum density 2008	2015
Brown trout	0.199	0.114
0+ brown trout	0.157	-
1+ & older brown trout	0.041	0.114
Lamprey sp.	0.041	0.048
European eel	0.008	0.029
Salmon	0.041	0.010
0+ salmon	0.041	-
1+ & older salmon	0.000	0.010
3-spined stickleback	0.074	0.010
All Fish	0.364	0.153

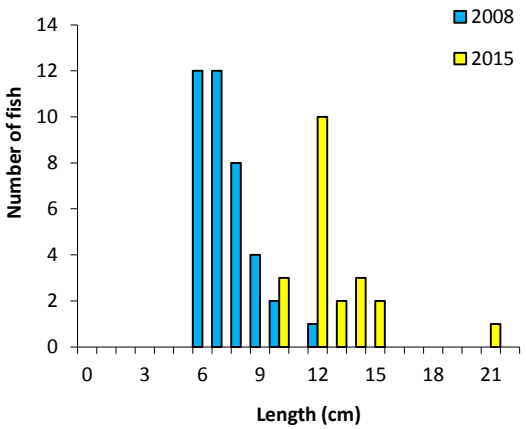

Fig. 4.29. Length frequency distribution of brown trout in the Burnfoot River (Br. in Burnfoot_B) 2008 (n=39) and 2015 (n=21)

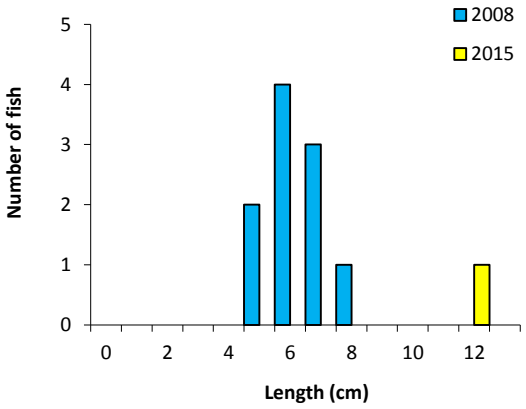

Fig. 4.30. Length frequency distribution of salmon in the Burnfoot River (Br. in Burnfoot_B) 2008 (n=10) and 2015 (n=1)

Burnfoot River (Glen_A)

The site was located at Tropperstown, approximately 2km upstream of the first site in Burnfoot Co. Donegal (Plate 4.16). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 2nd of July 2015, along a 44m length of channel.

Plate 4.16. The Burnfoot River, at Glen near Burnfoot, Co. Donegal

Brown trout was the most abundant species recorded at this site, with the majority of these 0+ (Table 4.18 and Fig. 4.31). A relatively high density of eels was also recorded at this site.

Table 4.18. Minimum density of fish (no./m^2), Burnfoot River (Glen_A)

Species	Minimum density 2015
Brown trout	0.161
0+ brown trout	0.017
1+ & older brown trout	0.145
European eel	0.095
Lamprey sp.	0.039
Salmon	0.017
0+ salmon	0.006
1+ & older salmon	0.011
3-spined stickleback	0.006
All Fish	0.317

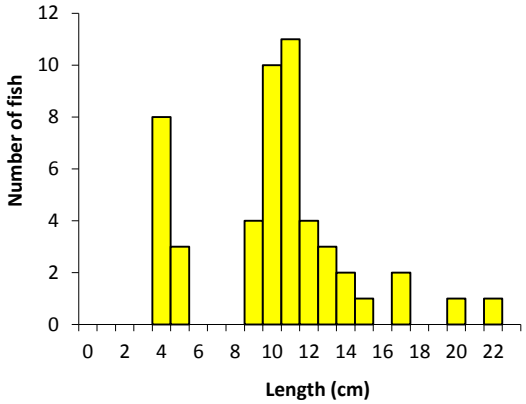

Fig. 4.31. Length frequency distribution of brown trout in the Burnfoot River (Glen_A) 2015 (n=50).

Clady River (Bryan's Br._A)

The survey site was located downstream of a bridge, just outside of Gweedore, Co. Donegal. (Plate 4.17). Three electric-fishing passes were conducted using three bank-based electric fishing units on the 8th of July 2015, along a 34m length of channel. Riffle and glide dominated the habitat, over a substrate dominated by cobble.

Plate 4.17. The Clady River at Bryan's Br. near Gweedore, Co. Donegal

Salmon was the most abundant species recorded at this site (Table 4.19). No brown trout 0+ were captured in 2015 (Fig. 4.32), while most of the salmon recorded were 1+ and older (Fig. 4.33). In addition, no sea trout were encountered during this year's survey.

Table 4.19. Minimum density of fish (no./m^2), Clady River (Bryan's Br._A)

Species	Minimum density 2009	2012	2015
Salmon	0.221	0.292	0.218
0+ salmon	0.089	0.200	0.040
1+ & older salmon	0.132	0.092	0.179
Brown trout	0.034	0.039	0.030
0+ brown trout	0.012	0.021	-
1+ & older brown trout	0.022	0.018	0.030
European eel	0.005	0.003	0.026
Sea trout	-	0.003	-
All Fish	0.259	0.337	0.275

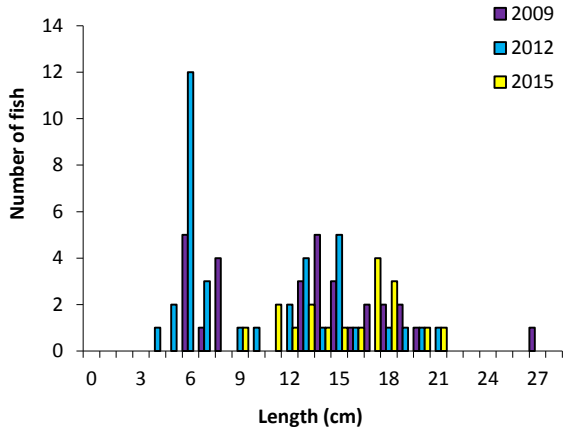

Fig. 4.32. Length frequency distribution of brown trout in the Clady River (Bryan's Br._A), 2009 (n=30), 2012 (n=37), and 2015 (n=18)

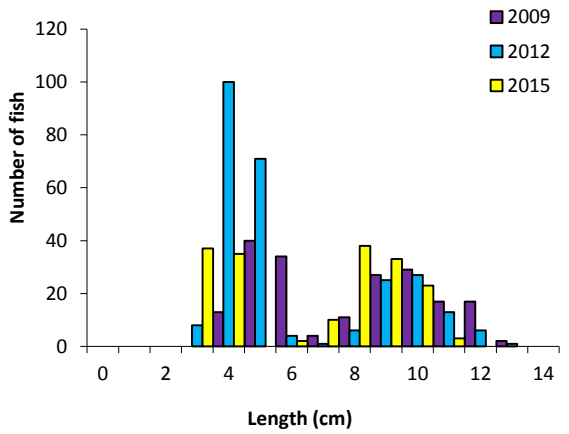

Fig. 4.33. Length frequency distribution of salmon in the Clady River (Bryan's Br._A), 2009 (n=194), 2012 (n=262) and 2015 (n=181)

Glaskeelan River (Br. W. of Roshin (L. Gartan)_A)

The Glaskeelan site was located downstream of Glaskeelan Bridge approximately 1km upstream of where it enters Gartan Lough (Plate 4.18). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 29th of June 2015, along a 44m length of channel. Glide and pool dominated the habitat, over a substrate of mostly cobble.

Plate 4.18. The Glaskeelan River near Gartan Lough, Co. Donegal

Salmon was the most abundant species recorded at this site, with relatively even numbers of 0+ and 1+ and older recorded since 2011 (Table 4.20 and Fig. 4.34). Brown trout numbers have also remained quite steady for the past number of years, with equal abundances of 0+ and 1+ and older recorded in 2015 (Table 4.32 and Fig. 4.35).

Table 4.20. Minimum density of fish (no./m^2), Glaskeelan River (Br. W. of Roshin (Lough Gartan)_A)

Species	Minimum density 2008	2011	2015
Salmon	0.250	0.141	0.168
0+ salmon	0.070	0.071	0.082
1+ & older salmon	0.180	0.071	0.086
Brown trout	0.088	0.082	0.070
0+ brown trout	0.035	0.051	0.035
1+ & older brown trout	0.053	0.031	0.035
3-spined stickleback	-	0.004	-
All Fish	0.337	0.227	0.238

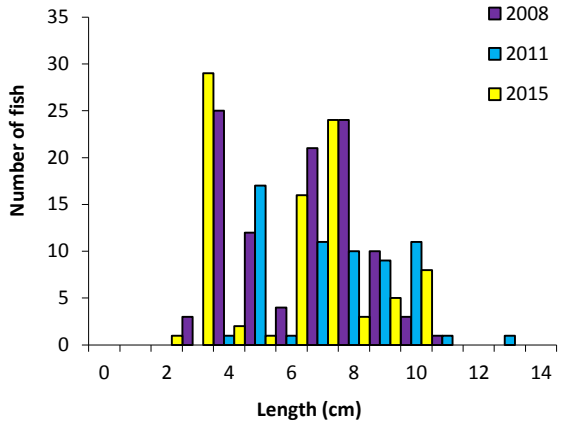

Fig. 4.34. Length frequency distribution of salmon in the Glaskeelan River (Br. W. of Roshin (Lough Gartan)_A), 2008 (n=103), 2011 (n=62) and 2015 (n=89).

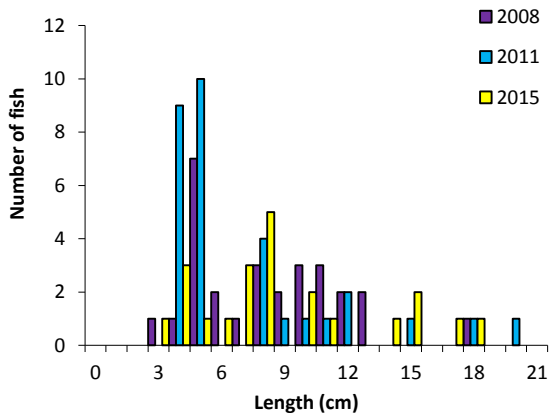

Fig. 4.35. Length frequency distribution of brown trout in the Glaskeelan River (Br. W. of Roshin (Lough Gartan)_A) 2008 (n=28), 2011 (n=31) and 2015 (n=22)

Owentocker River (500 m d/s Br. in Ardara_A)

The site was located approximately 500m downstream of Ardara, Co. Donegal close to where it enters the Owenea Estuary (Fig. 4.20). Three electric-fishing passes were conducted using three bank-based electric fishing units on the 1st of July 2015, along a 42m length of channel. Riffle dominated the habitat, over a substrate of mainly cobble and gravel.

Plate 4.19. The Owentocker River at Ardara, Co. Donegal

Salmon was the most abundant species recorded at this site, although their density was lower than the previous two surveys in 2008 and 2011 (Table 4.21 and Fig. 4.36). Total brown trout abundance was higher than previouis surveys, with an increase in 1+ and older numbers explaining this (Table 4.20 and Fig. 4.37).

Table 4.21. Minimum density of fish (no./m^2), Owentocker River (500 m d/s Br. in Ardara_A)

Species	Minimum density		
	2008	2011	2015
Salmon	0.490	0.706	0.222
0+ salmon	0.260	0.361	0.105
1+ & older salmon	0.229	0.344	0.117
Brown trout	0.017	0.034	0.048
0+ brown trout	0.007	0.020	0.017
1+ & older brown trout	0.009	0.014	0.031
European eel	0.007	0.028	0.017
All Fish	0.513	0.768	0.287

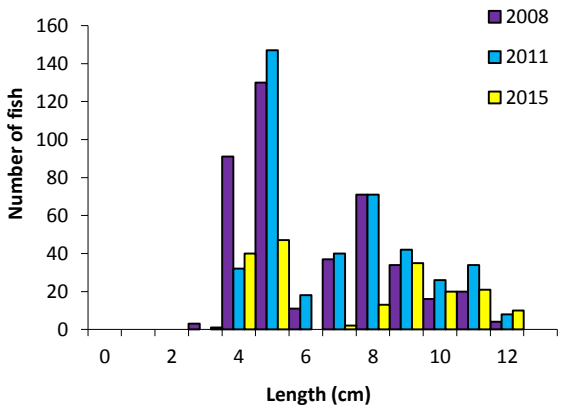

Fig. 4.36. Length frequency distribution of salmon in the Owentocker River (500 m d/s Bridge in Ardara_A) 2008 (n=417 excl 1 adult (50cm)), 2011 (n=418) and 2015 (n=189)

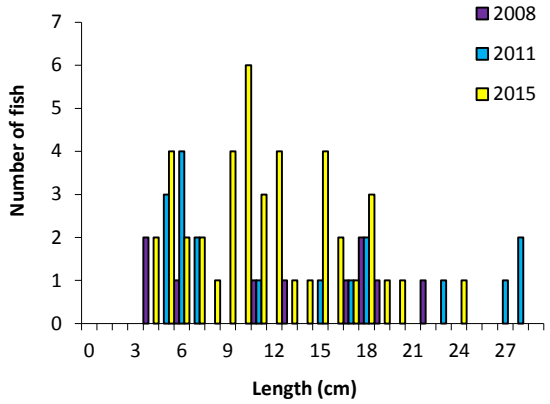

Fig. 4.37. Length frequency distribution of brown trout in the Owentocker River (Br. W. of Roshin (500 m d/s Bridge in Ardara_A) 2008 (n=10), 2011 (n=18) and 2015 (n=43)

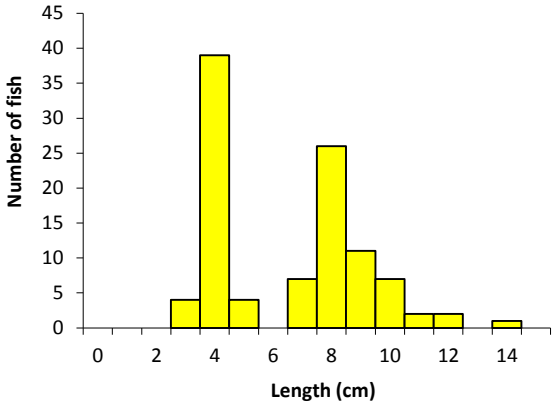

Fig. 4.38. Length frequency distribution of salmon in the Owentocker River (Crockaslowra_A) 2015 (n=103)

Owentocker River (Crockaslowra_A)

The survey site was located midway between Ardara and Glenties Co. Donegal. Three electric-fishing passes were conducted using three bank-based electric fishing units on the 1st of July 2015, along a 44m length of channel. Riffle dominated the habitat, over a substrate of cobble and gravel.

Salmon was the most abundant species recorded at this site, with 1+ and older outnumbering 0+ (Table 4.22 and Fig. 4.38). Brown trout (Fig. 4.39) and European eel were also present at this site.

Table 4.22. Minimum density of fish (no./m^2), Owentocker River (Crockaslowra_A)

Species	Minimum density 2015
Salmon	0.170
0+ salmon	0.069
1+ & older salmon	0.102
Brown trout	0.014
0+ brown trout	0.008
1+ & older brown trout	0.005
European eel	0.003
All Fish	0.187

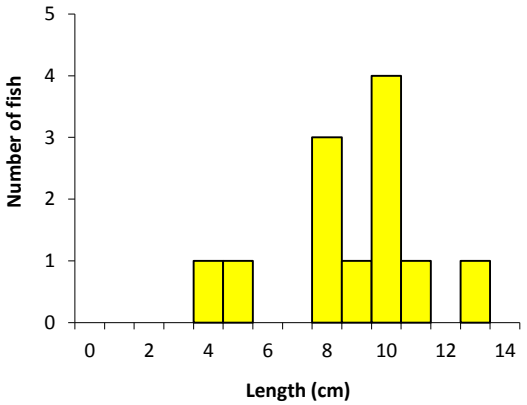

Fig. 4.39. Length frequency distribution of brown trout in the Owentocker River (Crockaslowra_A) 2015 (n=12)

4.1.5. Western River Basin District (WRBD)

Nine river sites were surveyed in six river catchments within the Western River Basin District (WRBD) during 2015 (Fig. 4.40). Catchments with sites surveyed included, the Ballinglen, Behy, Clydagh, Glennamong, Owenriff and Unshin. All of these sites were wadeable.

Fig. 4.40. Map of the WRBD showing all sites surveyed for WFD fish surveillance monitoring 2015

Ballinglen River (Ballinglen Br._B)

This survey site was located upstream of Ballinglen Br. approximately 4.0km south of Ballycastle, Co. Mayo (Plate 4.20). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 19th of August 2015, along a 40m length of channel. Riffle dominated the habitat, over a substrate of cobble.

Plate 4.20. The Ballinglen River near Ballycastle, Co. Mayo

Salmon was the most abundant species recorded at this site (Table 4.23), with the majority 1+ and older (Fig. 4.41). Salmon abundance was lower in 2015 in comparison to the previous two surveys (Table 4.23 and Fig. 4.41). Brown trout density was also lower than in 2008, again with 1+ and older making up the largest cohort (Table 4.23 and Fig. 4.42).

Table 4.23. Minimum density of fish (no./m^2), Ballinglen River (Ballinglen Br._B)

Species	Minimum density		
	2008	2011	2015
Salmon	0.398	0.402	0.043
0+ salmon	0.158	0.265	0.014
1+ & older salmon	0.240	0.137	0.028
Brown trout	0.107	0.026	0.023
0+ brown trout	0.010	0.010	0.003
1+ & older brown trout	0.097	0.026	0.020
European eel	0.026	0.019	0.017
All Fish	0.531	0.447	0.082

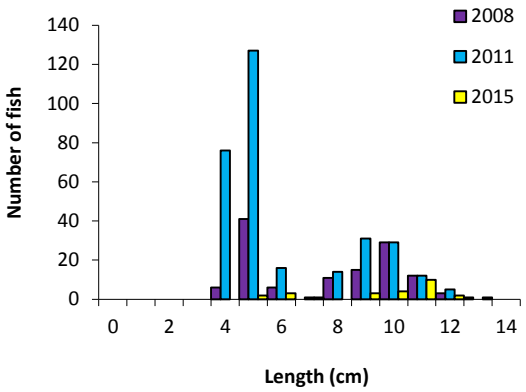

Fig. 4.41. Length frequency distribution of salmon in the Ballinglen River (Ballinglen Br._B), 2008 (n=124), 2011 (n=311) and 2015 (n=26)

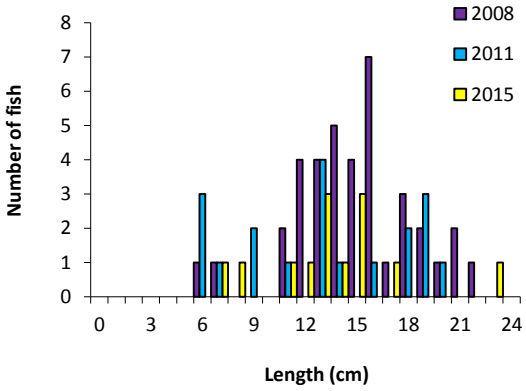

Fig. 4.42. Length frequency distribution of brown trout in the Ballinglen River (Ballinglen Br._B), 2008 (n=38), 2011 (n=19) and 2015 (n=30)

Ballinglen River (New Br._A)

This survey site was located upstream of New Br., just north of Ballycastle, Co. Mayo (Plate 4.21). Three electric-fishing passes were conducted using three bank-based electric fishing units on the 19th of August 2015, along a 40m length of channel. Riffle and glide dominated the habitat, over a substrate of mainly cobble.

Plate 4.21. The Ballinglen River at New Br., just outside Ballycastle, Co. Mayo

Salmon was the most abundant species recorded at this site followed by brown trout (Table 4.24). For both species, 0+ outnumbered 1+ and older (Figs. 4.43 and 4.44). European eel was also recorded.

Table 4.24. Minimum density of fish (no./m^2), Ballinglen River (New Br._A)

Species	Minimum density 2015
Salmon	0.062
0+ salmon	0.055
1+ & older salmon	0.007
Brown trout	0.050
0+ brown trout	0.032
1+ & older brown trout	0.017
European eel	0.020
3-spined stickleback	0.002
All Fish	0.134

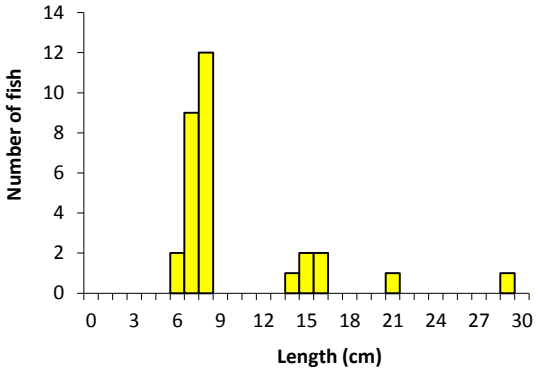

Fig. 4.43. Length frequency distribution of salmon in the Ballinglen River (New Br._A), 2015 (n=42)

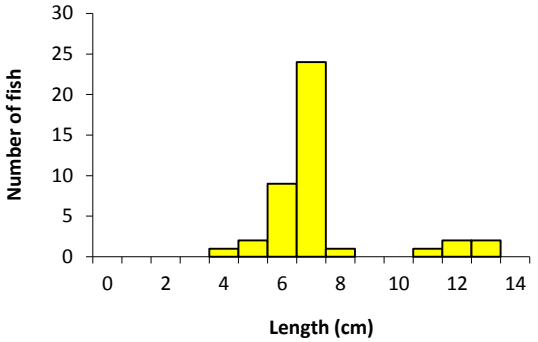

Fig. 4.44. Length frequency distribution of brown trout in the Ballinglen River (New Br._A), 2015 (n=30)

Behy (Black) River (Behy Br._A)

This survey site was located approximately 3km east of Ballina, Co. Mayo (Plate 4.22). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 11th of August 2015, along a 42m length of channel. Glide dominated the habitat, over a substrate of cobble and gravel.

Plate 4.22. The Behy (Black) River near Ballina, Co. Mayo

Salmon was the most abundant species recorded, with 1+ and older density lower than 2011 (Table 4.25 and Fig. 4.45). Brown trout density was also lower than 2011 (Fig. 4.46).

Table 4.25. Minimum density of fish (no./m^2), Behy (Black) River (Behy Br._A)

Species	Minimum density 2011	2015
Salmon	0.206	0.133
0+ salmon	0.041	0.042
1+ & older salmon	0.165	0.091
Brown trout	0.120	0.062
0+ brown trout	0.017	0.006
1+ & older brown trout	0.103	0.055
European eel	0.003	0.016
3-spined stickleback	0.007	0.013
All Fish	0.337	0.224

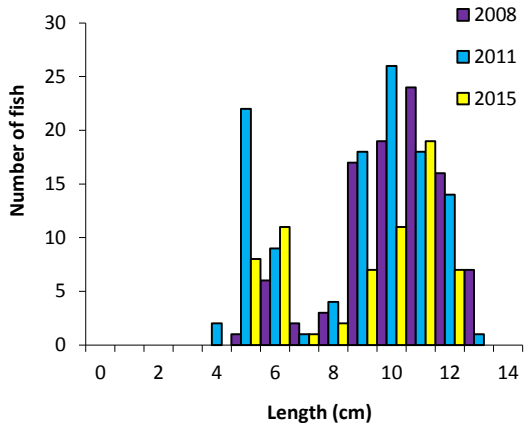

Fig. 4.45. Length frequency distribution of salmon in the Behy River (Behy Br._A) 2008 (n=95), 2011 (n=115) and 2015 (n=66)

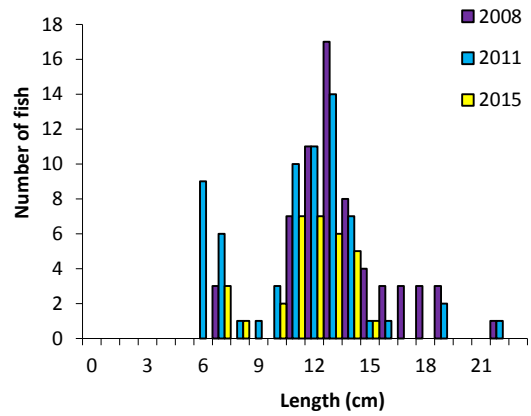

Fig. 4.46. Length frequency distribution of brown trout in the Behy River (Behy Br._A) 2008 (n=63), 2011 (n=67) and 2015 (n=32)

Behy (Srafaungal) River (Megalithic Tomb_A)

This survey site was located approximately 1km upstream of the Behy (Black) River site. Three electric-fishing passes were conducted using one bank-based electric fishing unit on the 18th of August 2015, along a 40m length of channel.

Brown trout was the most abundant species recorded at this site, followed by salmon (Table 4.26). The brown trout present were mostly 0+ while for salmon, 0+ and older was the dominant age class (Table 4.26, Fig. 4.47 and Fig. 4.48).

Table 4.26. Minimum density of fish (no./m^2), Srafaungal *River (Megalithic Tomb_A)*

Species	Minimum density 2015
Brown trout	0.040
0+ brown trout	0.034
1+ & older rown trout	0.006
Salmon	0.040
0+ salmon	0.017
1+ & older salmon	0.023
All Fish	0.080

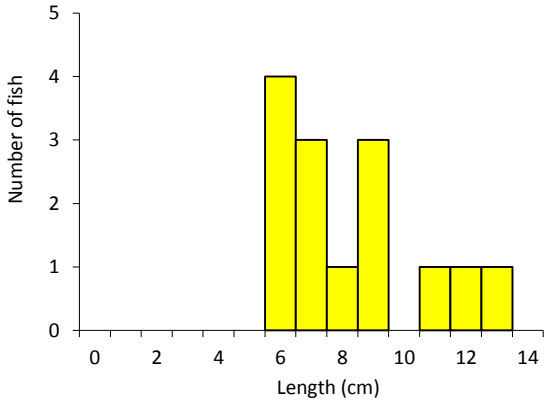

Fig. 4.47. Length frequency distribution of brown trout in the Srafaungal River (Megalithic Tomb_A), 2015 (n=14)

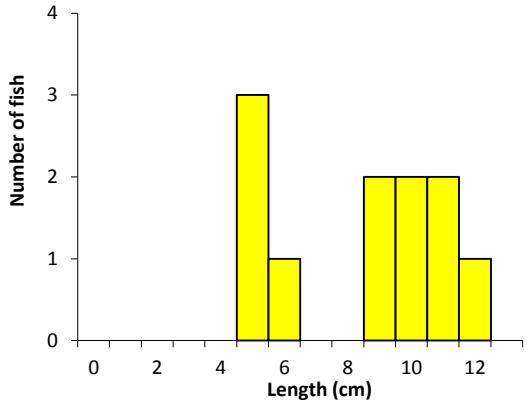

Fig. 4.48. Length frequency distribution of salmon in the Srafaungal River (Megalithic Tomb_A), 2015 (n=11)

Clydagh River (Castlebar) (Br. NW Ardvarney_B)

This survey site was located downstream of a bridge, approximately 4km north of Castlebar, Co. Mayo (Plate 4.23). Two electric-fishing passes were conducted using two bank-based electric fishing units on the 20th of August 2015, along a 46m length of channel. Riffle dominated the habitat, over a mixed substrate of boulder, cobble and gravel.

Plate 4.23. The Clydagh River at Ardvarney near Castlebar, Co. Mayo

Salmon and brown trout were the only species recorded at this site, with the density of salmon higher than that of brown trout (Table 4.27). Salmon density decreased in 2015 from 2011, similar to 2008. Brown trout increased in 2015 but no 0+ were recorded.

Table 4.27. Minimum density of fish (no./m^2), Clydagh River (Br. NW Ardvarney_B)

Species	Minimum density		
	2008	2011	2015
Salmon	0.055	0.266	0.055
0+ salmon	0.004	0.098	0.004
1+ & older salmon	0.055	0.168	0.051
Brown trout	0.047	0.008	0.013
0+ brown trout	0.016	-	-
1+ & older brown trout	0.031	0.008	0.013
All Fish	0.102	0.273	0.068

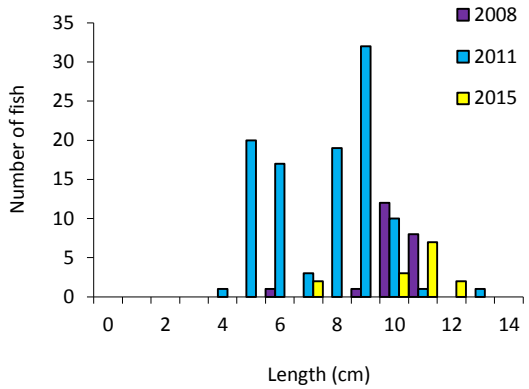

Fig. 4.49. Length frequency distribution of salmon in the Clydagh River (Br. NW Ardvarney_B) 2008 (n=22), 2011 (n=104) and 2015 (n=14)

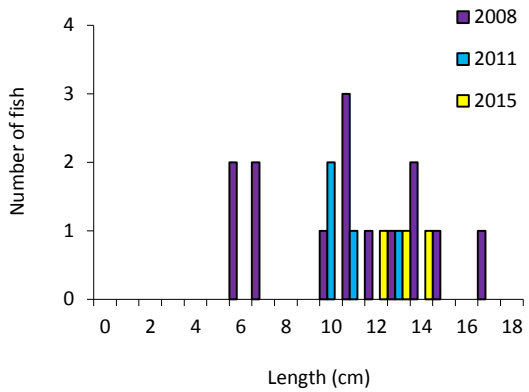

Fig. 4.50. Length frequency distribution of brown trout in the Clydagh River (Br. NW Ardvarney_B) 2008 (n=14), 2011 (n=4) and 2015 (n=3)

Clydagh River (Castlebar) (Burren_A)

This survey site was located about 2km further upstream of the first Clydagh site, near the headwaters of the river (Plate 4.24). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 20th of August 2015, along a 37m length of channel. Riffle dominated the habitat, over a substrate of boulder and cobble.

Plate 4.24. The Clydagh River towards the headwaters at Burren near Castlebar, Co. Mayo

Only brown trout and salmon were recorded at this site, with brown trout dominant (Table 4.28). Of the brown trout captured, most of them were 0+ (Fig. 4.51).

Table 4.28. Minimum density of fish (no./m^2), Clydagh River (Burren_A)

Species	Minimum density 2015
Brown trout	0.066
0+ brown trout	0.045
1+ & older Brown trout	0.020
Salmon	0.010
0+ salmon	-
1+ & older salmon	0.010
All Fish	0.076

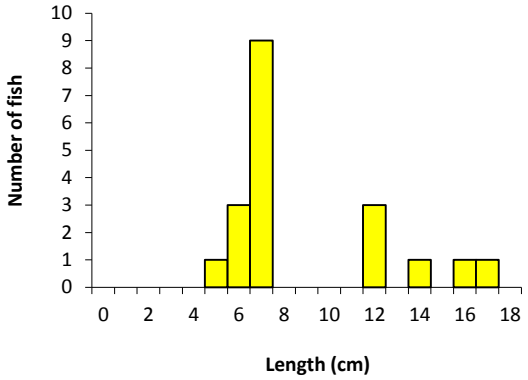

Fig. 4.51. Length frequency distribution of brown trout in the Clydagh River (Burren_A) 2015 (n=19)

Glennamong River (Br. u/s Lough Feeagh_B)

This survey site was located approximately 1km upstream of Lough Feeagh, about 10km north of Newport, Co. Mayo (Plate 4.25). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 31st of August 2015, along a 45m length of channel. Riffle dominated the habitat, over a substrate of boulder.

Plate 4.25. The Glennamong River, upstream of Lough Feeagh, Co. Mayo

Salmon was the most abundant species at this site (Table 4.29 and Fig. 4.52), with the majority of these being 1+ and older. Brown trout (Fig. 4.53) were also present, with 1+ and older dominant.

Table 4.29. Minimum density of fish (no./m^2), *Glennamong River (Br. u/s Lough Feeagh_B)*

Species	Minimum density 2008	2011	2015
Salmon	0.018	0.072	0.044
0+ salmon	0.003	0.003	0.007
1+ & older salmon	0.018	0.069	0.037
Brown trout	0.006	0.034	0.022
0+ brown trout	0.006	0.016	0.007
1+ & older brown trout	0.003	0.019	0.015
European eel	0.003	0.016	0.005
All Fish	0.027	0.122	0.071

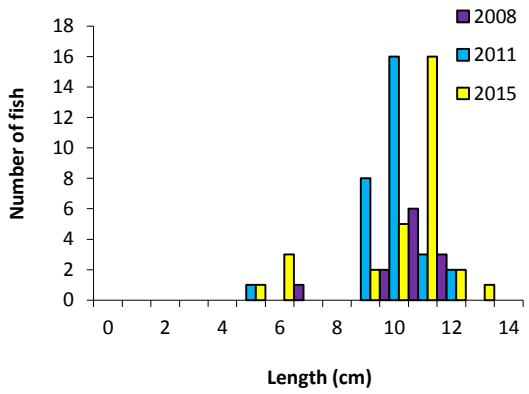

Fig. 4.52. Length frequency distribution of salmon in the Glennamong River (Br. u/s Lough Feeagh_B) 2008 (n=12), 2011 (n=30) and 2015 (n=30)

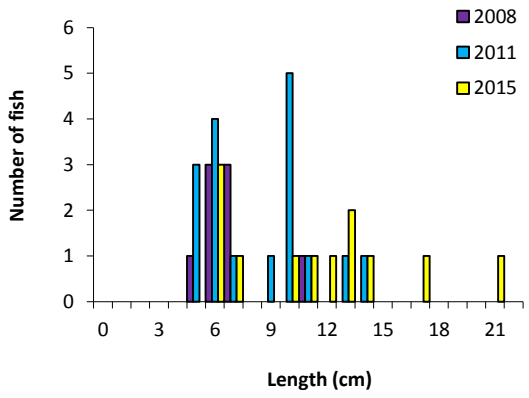

Fig. 4.53. Length frequency distribution of brown trout in the Glennamong River (Br. u/s Lough Feeagh_B) 2008 (n=8), 2011 (n=17) and 2015 (n=12)

Owenriff River (1km d/s of Lough Agraffard_A)

This survey site was located downstream of Lough Agraffard, about 4km west of Oughterard, Co. Galway (Plate 4.26). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 1st of September 2015, along a 40m length of channel. Riffle dominated the habitat, over a substrate of cobble.

Plate 4.26. The Owenriff River below Lough Agraffard, Oughterard, Co. Galway

Salmon were abundant at this site, with the majority of them 0+ (Table 4.30 and Fig. 4.54). Brown trout (all 0+) (Fig. 4.55) and minnow were also encountered as well as a single pike (Table 4.30).

Table 4.30. Minimum density of fish (no./m^2), Owenriff River (1km d/s of Lough Agraffard_A)

Species	Minimum density 2010	2015
Salmon	0.131	0.305
0+ salmon	0.082	0.288
1+ & older salmon	0.049	0.017
Minnow	0.154	0.029
Brown trout	0.013	0.011
0+ brown trout	0.003	0.011
1+ & older brown trout	0.0098	-
Pike	-	0.003
All Fish	0.298	0.348

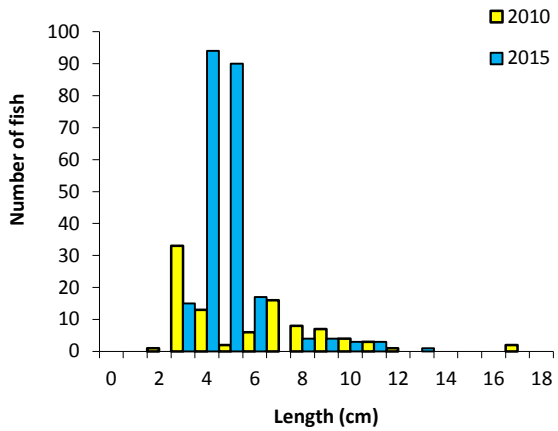

Fig. 4.54. Length frequency distribution of salmon in the Owenriff River (1km d/s of Lough Agraffard_A), 2010 (n=96) and 2015 (n=231).

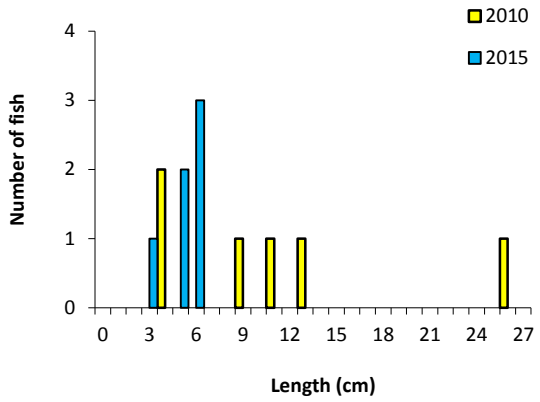

Fig. 4.55. Length frequency distribution of brown trout in the Owenriff River (1km d/s of Lough Agraffard_A), 2010 (n=6) and 2015 (n=6).

Unshin River (Along road at Fidwog_A)

This survey site was located approximately 2km southeast of Riverstown, Co. Sligo, along one of the main roads into the village (Plate 4.27). Three electric-fishing passes were conducted using three bank-based electric fishing units on the 17th of August 2015, along a 38m length of channel. Riffle dominated the habitat, over a substrate of both cobble and gravel.

Plate 4.27. The Unshin River near Riverstown, Co. Sligo

Brown trout was the most abundant species recorded at this site, with 0+ the more abundant cohort (Fig. 4.56). Perch and pike, which were recorded in 2009 were not recorded in 2015. Salmon were also present, with relatively even numbers of both 0+ and 1+ and older (Table 4.31 and Fig. 4.57).

Table 4.31. Minimum density of fish (no./m^2), Unshin River (Along road at Fidwog_A)

Species	Minimum density 2009	2015
Brown trout	0.058	0.046
0+ brown trout	0.036	0.035
1+ & older brown trout	0.021	0.012
Salmon	0.413	0.214
0+ salmon	0.276	0.101
1+ & older salmon	0.137	0.113
Minnow	0.012	0.009
European eel	-	0.003
Perch	0.009	-
Pike	0.003	-
All Fish	0.495	0.271

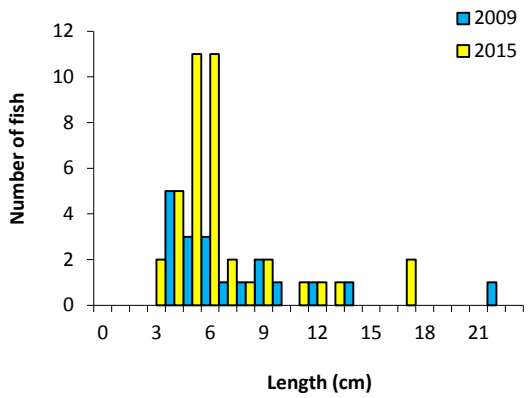

Fig. 4.56. Length frequency distribution of brown trout in the Unshin River (Along road at Fidwog_A) 2009 (n=19) and 2015 (n=39)

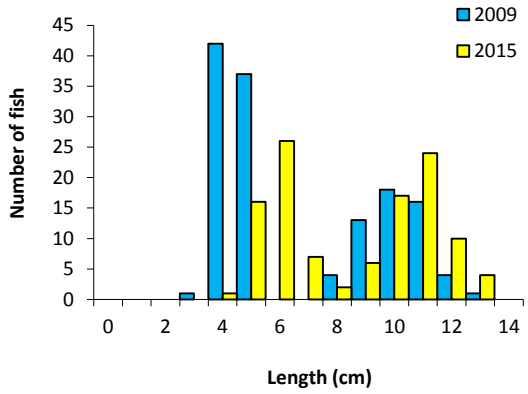

Fig. 4.57. Length frequency distribution of salmon in the Unshin River (Along road at Fidwog_A) 2009 (n=136) and 2015 (n=113)

4.2 Community Structure

A total of 13 fish species (sea trout are included as a separate 'variety' of brown trout) and one hybrid were recorded within the 31 sites surveyed during 2015 (Table 4.32). Brown trout was the most common fish species recorded, occurring in all 31 sites, followed by salmon, European eel, minnow, stone loach, three-spined stickleback, lamprey, perch, gudgeon, pike, roach and flounder. Roach x bream hybrids and sea trout were only recorded at one site each (Table 4.32).

Table 4.32 List of fish species recorded in the 31 river sites surveyed during 2015

	Scientific name	Common name	Number of river sites	% of river sites
1	*Salmon trutta*	Brown trout	31	100.0
		Sea trout	1	3.2
2	*Salmo salar*	Salmon	22	71.0
3	*Anguilla anguilla*	European eel	15	48.4
4	*Phoxinus phoxinus*	Minnow	12	38.7
5	*Barbatula barbatula*	Stone loach	11	35.5
6	*Gasterosteus aculeatus*	Three-spined stickleback	10	32.3
7	*Lampetra* sp.	Lamprey	8	25.8
8	*Perca fluviatilis*	Perch	5	16.1
9	*Esox lucius*	Pike	4	12.9
10	*Gobio gobio*	Gudgeon	4	12.9
11	*Rutilus rutilus*	Roach	3	9.7
12	*Platichthys flesus*	Flounder	2	6.5
13	*Rutilus rutilus x Abramis brama*	Roach x Bream	1	3.2

*Sea trout are included as a separate "variety" of brown trout

4.3 Age and growth

Brown trout were recorded at all 31 sites. Ages ranged from 0+ to 4+, with fish aged 0+ and 1+ comprising the most abundant age classes. Older brown trout cohorts were encountered much less frequently, with 3+ and 4+ individuals recorded in only twelve and three sites respectively. The largest brown trout recorded in the 31 sites surveyed was caught in the Little Brosna River (Riverstown_A) site, which measured 36.2cm in length and was aged 3+. The mean back-calculated length-at-age data for brown trout, where individuals aged 1+ and older were recorded are shown in Appendix 4 and Fig 4.59. Faster growth was generally observed in the more alkaline rivers of the ShIRBD such as the Little River and Little Brosna (Fig. 4.58).

Salmon were recorded at 22 sites. Salmon ranged in age from 0+ to 2+, with those within the 0+ and 1+ the most common age classes present. Nine sites recorded salmon aged 2+. Adult salmon were intentionally avoided during these surveys to avoid damaging them, but were observed at a small number of sites. The mean back-calculated length-at-age data for salmon, where individuals aged 1+ and older were recorded are shown in Fig. 4.60 and Appendix 5. The fastest growth rate at L1 was observed on the Little Brosna River (Riverdale_A) site and L2 was on the Clydagh River (Br. NW Ardvarney_B) (Fig. 4.59).

Six age classes of pike were recorded (0+ to 5+) at four sites. The Camlin River recorded the widest range of age classes, with a total of five present (1+ to 5+) and was the only site where individuals aged 5+ were encountered. The largest pike (4+) was recorded on the Scramoge (Carrowclogher_A) site and measured 63.2cm. The mean back-calculated length-at-age data for pike, where individuals aged 1+ and older were recorded are shown in Figure 4.61 and Appendix 6. The fastest pike growth was observed in the Camlin River (Br. W. of Lisnabo_A) (Fig 4.60).

Roach were only recorded at three sites, the Little Brosna River (Riverstown_A), The Scramoge River (Br. N.E. or Riverdale_A) and Camlin River (Br. W. of Lisnabo_A)(Fig. 4.60). Eight age classes were recorded (0+ to 7+), with the Camlin River site containing the widest range of age classes (0+ to 7+). The largest roach (7+) was recorded in the Camlin River (Lisnabo_A) and measured 24.8cm. The mean back-calculated length-at-age data for roach, where individuals aged 1+ and older were recorded, are shown in Figure 4.62 and Appendix 7. The fastest growth was generally observed in the Scramoge River (Br. N.E. of Riverdale_A) (Fig. 4.61).

Roach x bream hybrids were observed at only one site, the Camlin River (Br. W. of Lisnabo_A). The largest recorded measured 30.5cm and was aged at 8+. The mean back-calculated length-at-age data for roach x bream hybrids are shown in Appendix 8.

Sea trout were only recorded in the Vartry River (Newrath Br._A). Two age classes were recorded, 1.0+ and 2.0+ (all finnock). The largest sea trout recorded measured 30.8cm. The mean back-calculated length-at-age data for sea trout hybrids are shown in Appendix 9.

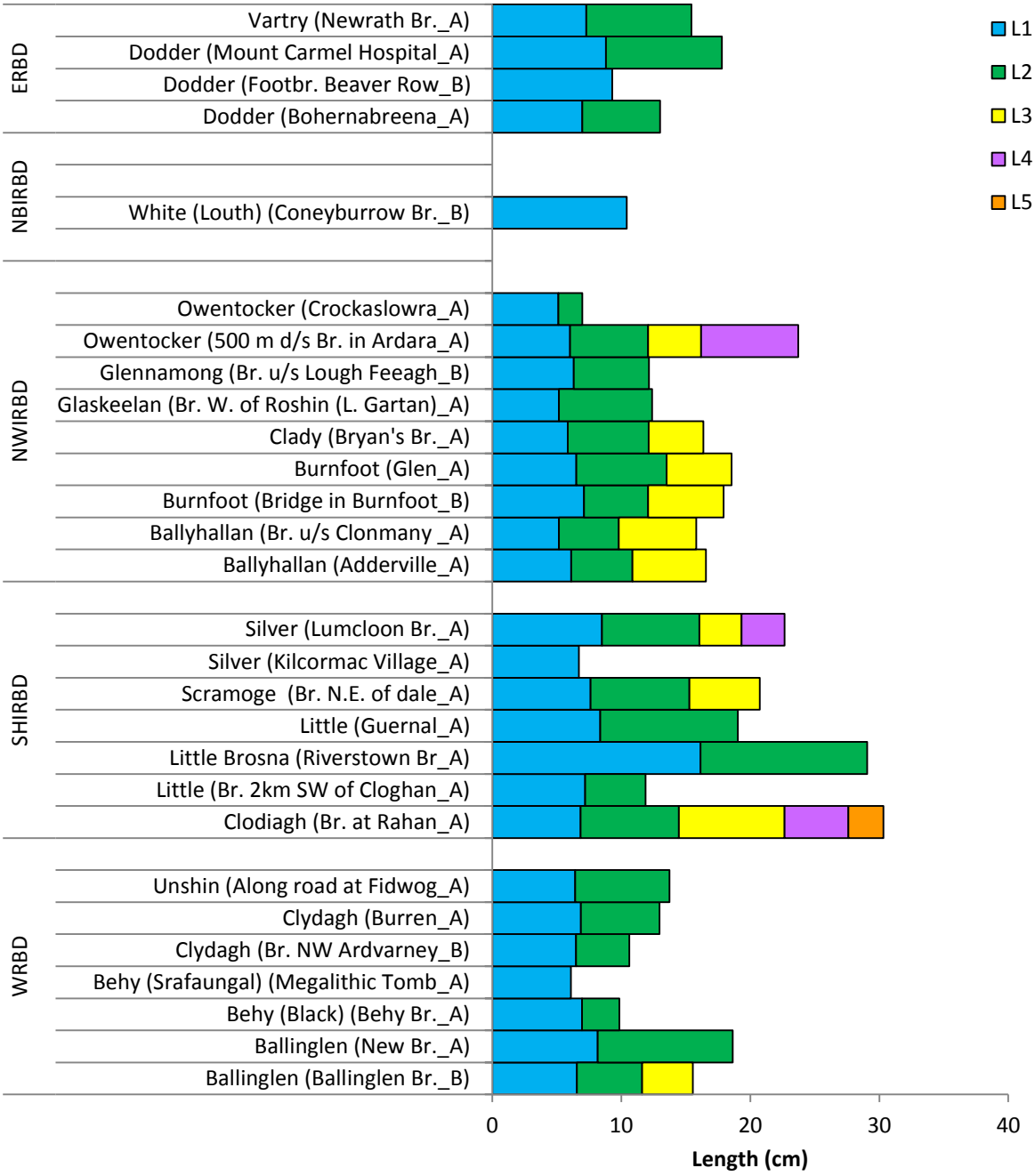

Fig. 4.58. Mean length at age values (L1, L2, L3, etc.) for brown trout across all sites surveyed in 2015

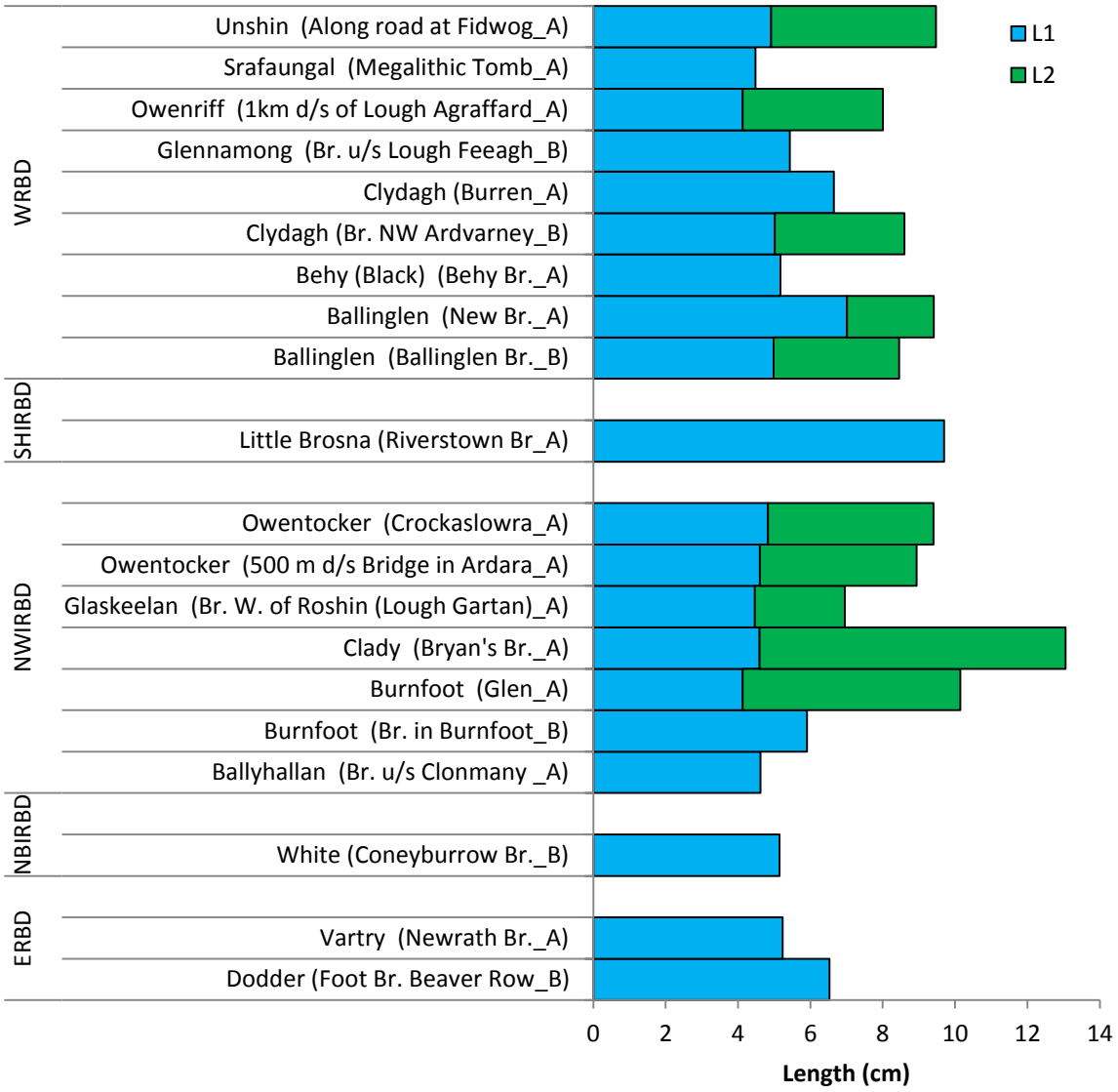

Fig. 4.59. Mean length at age values (L1, L2, L3, etc.) for salmon across all sites surveyed in 2015

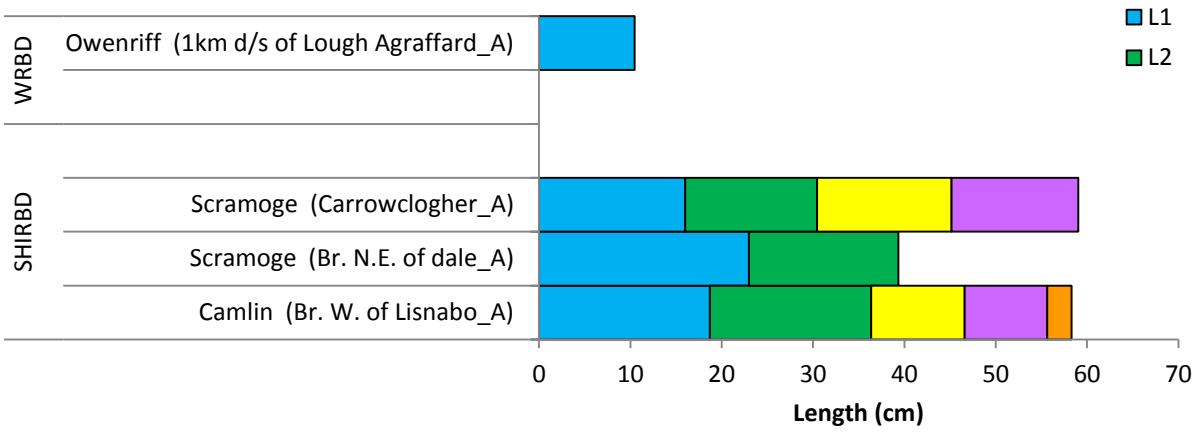

Fig. 4.60. Mean length at age values (L1, L2, L3, etc.) for pike across all sites surveyed in 2015

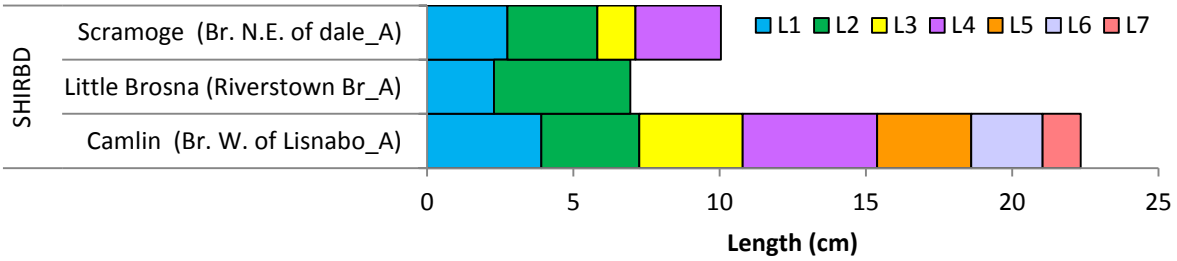

Fig. 4.61. Mean length at age values (L1, L2, L3, etc.) for roach across all sites surveyed in 2015

River sites where 1+ and older brown trout were present were divided into three categories based on their alkalinity; these were low = <35 mg$CaCO_3$ l^{-1}, moderate = 35 - 100 mg$CaCO_3$ l^{-1}, and high > 100 mg$CaCO_3$ l^{-1}. Six river sites were characterised as low alkalinity, seven as moderate alkalinity and 15 as high alkalinity. The mean length at age data for each alkalinity category is shown in Fig. 4.62. Statistical analysis revealed that there was a significant difference across alkalinity groups for L1 (Kruskal-Wallis, H=12.16, df=2, p<0.01), with a significant difference between the Low and High and Medium and High categories (Mann-Whitney Pairwise, P<0.01). For L2, there was also a difference across the alkalinity groups (ANOVA, F=5.156, df=2, p<0.05, with a significant difference between the Medium and High categories (Tukey's Pairwise, p<0.05). There was no difference observed between alkalinity categories for L3, although length at age data for fish of this size was limited. There was insufficient data to determine if there were any alkalinity differences for L4 or L5 brown trout.

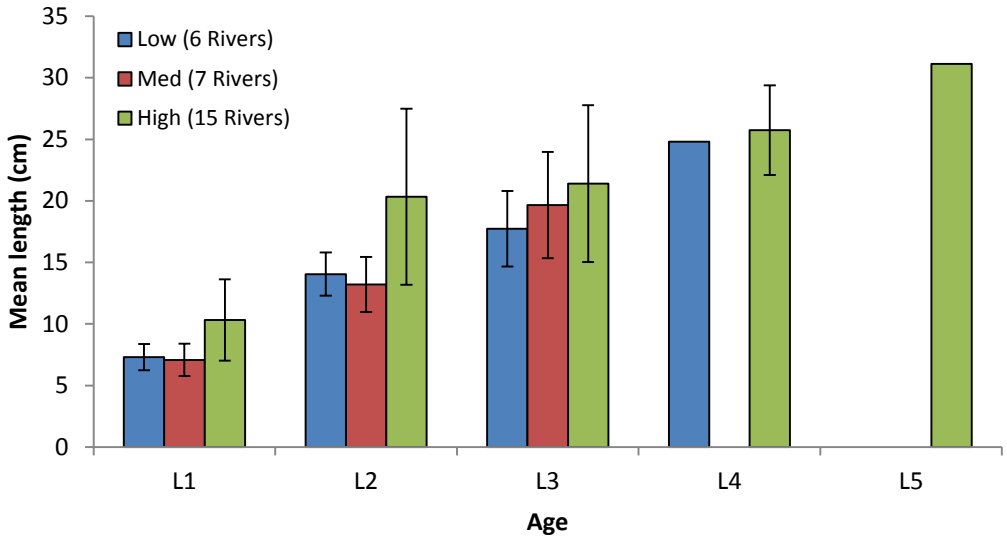

Fig. 4.62. Mean (±S.D.) back calculated lengths at age for brown trout in rivers within each alkalinity class

The brown trout at each river site were assigned growth categories based on a new classification scheme under development using length at age data (L1, L2, L3 and L4) (Matson and Kelly, in prep) (Table 4.32).

Descriptive growth categories were assigned to brown trout for each river site using this new classification scheme (Table 4.33)

Five sites were categorised as slow, 18 as moderate, one as fast and two as very fast. Two sites (both Clydagh River sites) had insufficient data to determine a growth category reliably.

Table 4.32. Length at age limits for each growth (Matson and Kelly, in prep)

Growth Category	L1	L2	L3	L4
Very Slow	<5	<10	<14.5	<20
Slow	5 to 5.5	10 to 12	14.5 to 18	20 to 24
Moderate	5.5 to 9	12 to 18.5	18 to 24.5	24 to 32
Fast	9 to 10	18.5 to 21.5	24.5 to 29.5	32 to 36.5
Very Fast	>10	>21.5	>29.5	>36.5

Table 4.33. Categories of brown trout growth in the WFD river sites surveyed in 2015

River/Site		Growth category
Dodder (Bohernabreena_A)	ERBD	Moderate
Dodder (Footbr. Beaver Row_B)		Fast
Dodder (Mount Carmel Hospital_A)		Moderate
Vartry (Newrath Br._A)		Moderate
White (Coneyburrow Br._B)	NBIRBD	Very fast
Ballyhallan (Adderville_A)	NWIRBD	Slow
Ballyhallan (Br. u/s Clonmany River_A)		Slow
Burnfoot (Br. in Burnfoot_B)		Moderate
Burnfoot (Glen_A)		Moderate
Clady (Bryan's Br._A)		Moderate
Glaskeelan (Br. W. of Roshin (L. Gartan)_A)		Slow
Glennamong (Br. u/s L. Feeagh_B)		Moderate
Owentocker (500 m d/s Br. in Ardara_A)		Moderate
Owentocker (Crockaslowra_A)		Slow
Clodiagh (Br. at Rahan_A)	SHIRBD	Moderate
Little Brosna (Riverstown_A)		Very fast
Little (Br. 2km SW of Cloghan_A)		Moderate
Little (Guernal_A)		Moderate
Scramoge (Br. N.E. of Riverdale_A)		Moderate
Silver (Kilcormac Village_A)		Moderate
Silver (Lumcloon Br._A)		Moderate
Ballinglen (New Br._A)	WRBD	Moderate
Ballinglen (Ballinglen Br._B)		Slow
Behy (Behy Br._A)		Moderate
Behy (Srafaungal) (Megalithic Tomb_A)		Moderate
Clydagh (Br. NW Ardvarney_B)		N/A
Clydagh (Burren_A)		N/A
Unshin (Along road at Fidwog_A)		Moderate

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. The Fisheries Classification Scheme 2 (FCS2-Ireland) has been developed to assign ecological status to fish in rivers for the Republic of Ireland and Northern Ireland to comply with the requirements of the WFD (Sniffer, 2011). FCS2-Ireland is a geostatistical model based on Bayesian probabilities that make probabilistic comparisons of observed fish counts with expected (predicted) fish counts under reference (un-impacted) conditions. This classification system generates Ecological Quality Ratings (EQRs) between 1 and 0 for each site, corresponding to the five different ecological status classes of High, Good, Moderate, Poor and Bad (Sniffer, 2011). 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 (SNIFFER, 2013). The tool has been intercalibrated in a cross-Europe exercise (EC, 2013).

Using this tool and expert opinion, each site surveyed in 2015 was assigned a draft fish classification status (Table 4.34). Where applicable, the status is also given for previous surveys.

The ecological status of one site was classed as High, 11 as Good, 15 as Moderate and four as Poor. When comparing the ecological status this year with that from the previous survey, no sites showed an improvement in status, seven sites deteriorated and 16 sites remained unchanged. Eight sites were surveyed for the first time in 2015 and had no previous status information available for them.

Table 4.34. Ecological status for 2015 WFD surveillance monitoring sites, including previous status where applicable

River/Site		2008	2009	2010	2011	2012	2013	2014	2015
Dodder (Bohernabreena_A)	ERBD				G		M	M	M
Dodder (Footbr. Beaver Row_B)					H		G		M
Dodder (Mount Carmel Hospital_A)					M		M	M	M
Vartry (Newrath Br._A)		G					G	H	H
	NBIRBD								
White (Coneyburrow Br._B)						M	P	P	M
Ballyhallan (Adderville_A)	NWIRBD								M
Ballyhallan (Br. u/s Clonmany River_A)		G							G
Burnfoot (Br. in Burnfoot_B)		M							M
Burnfoot (Glen_A)									M
Clady (Bryan's Br._A)			G			H			G
Glaskeelan (Br. W. of Roshin (Lough Gartan)_A)		G			G				G
Glennamong (Br. u/s Lough Feeagh_B)		G			G				G
Owentocker (500 m d/s Br. in Ardara_A)		H			H				G
Owentocker (Crockaslowra_A)									M
Camlin (Br. W. of Lisnabo_A)	SHIRBD						P		P
Clodiagh (Br. at Rahan_A)		G			M				P
Little Brosna (Riverstown_A)		G				G			G
Little (Br. 2km SW of Cloghan_A)		M			M				M
Little (Guernal_A)									M
Scramoge (Br. N.E. of Riverdale_A)		M			M				M
Scramoge (Carrowclogher_A)					P				P
Silver (Kilcormac Village_A)									M
Silver (Lumcloon Br._A)		G			M				M
Ballinglen (New Br._A)	WRBD								M
Ballinglen (Ballinglen Br._B)		G			G				M
Behy (Behy Br._A)		G			G				G
Srafaungal (Megalithic Tomb_A)									P
Clydagh (Br. NW Ardvarney_B)		H			H				G
Clydagh (Burren_A)									G
Owenriff (1km d/s of Lough Agraffard_A)				G					G
Unshin (Along road at Fidwog_A)			G						G

5. SUMMARY

A total of 13 fish species (including sea trout) and one hybrid were recorded during the 2015 WFD surveillance monitoring programme across Ireland. Brown trout was the most commonly encountered species, recorded in all 31 sites. The Camlin River (Br. W. of Lisnabo_A) was the most diverse site surveyed, recording a total of seven species and one hybrid. Two other sites, the Scramoge River (Br. N.E. of Riverdale_A) and Vartry River (Newrath Br._A) also recorded seven species (sea trout are counted as a separate "variety" of brown trout). The lowest diversity (only a single species) was recorded in the Ballyhallan River (Adderville_A) site in Co. Donegal. The greatest abundances of brown trout and salmon were recorded in the River Dodder (Mount Carmel Hospital_A) and Owenriff River (1km d/s of Lough Agraffard_A) sites respectively.

The growth of brown trout was assigned by ranking sites according to length at age data for each length class (L1, L2, L3 etc.). Sites were then split into growth categories. Only sites with sufficient fish caught could be assigned a growth rate category (Matson and Kelly, *In Prep*). The majority of sites were classed as having moderate growth. Among those with the highest growth rates were the high alkalinity sites within the ShIRBD.

Each site surveyed in 2015 was assigned a draft fish classification status using FCS2-Ireland and expert opinion. One site was classed as High, 11 as Good, 15 as Moderate and four as Poor.

6. REFERENCES

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

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.

Delanty, K., Kelly, F.L., McLoone, P., Matson, R., O'Briain, R., Gordon, P., Cierpal, D., Connor, L., Corcoran, W., Coyne, J., Feeney, R., Morrissey, E., (2017) *Fish Stock Assessment of the River Barrow Catchment 2015*. Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24, Ireland.

EC (2013) Commission Decision of 20 September 2013 establishing, pursuant to Directive 2000/60/EC of the European Parliament and of the Council the values of the Member State monitoring system classifications as a result of the intercalibration exercise and repealing Decision 2008/915/EC. Official Journal of the European Union L266/1

Matson R. P. and Kelly, F.L. (*in prep*) Brown trout growth in rivers of varying alkalinity.

Matson R. P., Delanty, K., Shephard, S., Kelly, F. and Coughlan, B. (*in press*). Moving from multiple pass depletion to single pass timed electrofishing for fish community assessment in wadeable streams.

SNIFFER (2011) *River Fish Classification Tool: Science Work*. WFD68c, Phase 3, Final Report. Scotland and Northern Ireland Forum for Environmental Research.

APPENDIX 1

Site location information for WFD surveillance monitoring, 2015

River name	Site name	Easting	Northing
ERBD (Wadeable sites)			
Dodder, River	Bohernabreena_A	308860	224074
Dodder, River	Footbr. Beaver Row_B	317675	231093
Dodder, River	Mount Carmel Hospital_A	315381	229554
Vartry River	Newrath Br._A	328823	196717
NBIRBD (Wadeable sites)			
White River (Louth)	Coneyburrow Br._B	305715	289279
NWIRBD (Wadeable sites)			
Ballyhallan River	Adderville_A	235546	443824
Ballyhallan River	Br. u/s Clonmany River_A	236982	446111
Burnfoot River	Br. in Burnfoot_B	238000	423682
Burnfoot River	Glen_A	239906	424218
Clady River (Donegal)	Bryan's Br._A	185132	422554
Glaskeelan River	Br. W. of Roshin (L. Gartan)_A	205196	417314
Glennamong River	Br. u/s Lough Feeagh_B	94726	302402
Owentocker River	500 m d/s Br. in Ardara_A	173259	390626
Owentocker River	Crockaslowra_A	177419	391598
SHIRBD (Wadeable sites)			
Little River (Cloghan)	Br. 2km SW of Cloghan_A	206305	217767
Little River (Cloghan)	Guernal_A	206780	217382
Little Brosna River	Riverstown_A	205248	203489
Silver (Kilcormac) River	Kilcormac Village_A	218561	214101
SHIRBD (Non-wadeable sites)			
Camlin River	Br. W. of Lisnabo_A	209658	277708
Clodiagh River (Tullamore)	Br. at Rahan_A	225711	225632
Scramoge River	Br. N.E. of Riverdale_A	191810	277709
Scramoge River	Carrowclogher_A	191912	277726
Silver (Kilcormac) River	Lumcloon Br._A	213811	219892
WRBD (Wadeable sites)			
Ballinglen River	New Br._A	110133	338245
Ballinglen River	Ballinglen Br._B	110239	334187
Behy (Black) River	Behy Br._A	128741	318141
Behy (Srafaungal) River	Megalithic Tomb_A	129866	318212
Clydagh River (Castlebar)	Br. NW Ardvarney_B	114313	296528
Clydagh River (Castlebar)	Burren_A	112759	298048
Owenriff River	1km d/s of Lough Agraffard_A	107413	242007
Unshin River	Along road at Fidwog_A	175576	318797

APPENDIX 2

Site coding information for WFD surveillance monitoring, 2015

River	Site name	Catchment	Site code	Waterbody code
ERBD (Wadeable sites)				
Dodder, River	Bohernabreena_A	Liffey	09D010100A_a	EA_09D010100
Dodder, River	Footbr. Beaver Row_B	Liffey	09D010900A_a	EA_09D010900
Dodder, River	Mount Carmel Hospital_A	Liffey	09D010680A_a	EA_09D010900
Vartry River	Newrath Br._A	Vartry	10V010300A_a	EA_10V010300
NBIRBD (Wadeable sites)				
White River (Louth)	Coneyburrow Br._B	Dee	06W010500B_a	NB_06W010500
NWIRBD (Wadeable sites)				
Ballyhallan River	Adderville_A	Clonmany	40B010090A_a	NW_40B010200
Ballyhallan River	Br. u/s Clonmany River_A	Clonmany	40B010200A_a	NW_40B010200
Burnfoot River	Br. in Burnfoot_B	Burnfoot	39B020600B_a	NW_39B020600
Burnfoot River	Glen_A	Burnfoot	39B020400B_a	NW_39B020600
Clady River (Donegal)	Bryan's Br._A	Clady	38C040150A_a	NW_38C040150
Glaskeelan River	Br. W. of Roshin (L. Gartan)_A	Leannan	39G050100A_a	NW_39G050100
Glennamong River	Br. u/s Lough Feeagh_B	Srahmore	32G030100A_a	WE_32G030100
Owentocker River	500 m d/s Br. in Ardara_A	Owentocker	38O060300A_a	NW_38O060300
Owentocker River	Crockaslowra_A	Owentocker	38O060100A_a	NW_38O060300
SHIRBD (Wadeable sites)				
Little River (Cloghan)	Br. 2km SW of Cloghan_A	Shannon Lwr	25L010200A_a	SH_25L010200
Little River (Cloghan)	Guernal_A	Shannon Lwr	25L010150A_a	SH_25L010200
Little Brosna	Riverstown Br._A	Brosna	25_633_30A_a	SH_25L020700
Silver (Kilcormac) River	Kilcormac Village_A	Barrow	25S020320A_a	SH_25S020400
SHIRBD (Non-wadeable sites)				
Camlin River	Br. W. of Lisnabo_A	Shannon Upr	26C011000A_a	SH_26C011000
Clodiagh River	Br. at Rahan_A	Shannon Lwr	25C060500A_a	SH_25C060500
Scramoge River	Br. N.E. of Riverdale_A	Shannon Upr	26S010320A_a	SH_26S010600
Scramoge River	Carrowclogher_A	Shannon Upr	26S010330A_a	SH_26S010600
Silver (Kilcormac) River	Lumcloon Br._A	Shannon Lwr	25S020700A_a	SH_25S020700
WRBD (Wadeable sites)				
Ballinglen River	Ballinglen Br._B	Ballinglen	33B010100B_a	WE_33B010100
Ballinglen River	New Br._A	Ballinglen	33_2092_74_a	WE_33B010200
Behy (Black) River	Behy Br._A	Moy	34B080400A_a	WE_34B080400
Behy (Srafaungal) River	Megalithic Tomb_A	Moy	34_3723_13_a	WE_34B080400
Clydagh River (Castlebar)	Br. NW Ardvarney_B	Moy	34C050030B_a	WE_34C050100
Clydagh River (Castlebar)	Burren_A	Moy	34_1380_10_a	WE_34C050100
Owenriff River	1km d/s of Lough Agraffard_A	Corrib	30O020070A_a	WE_30O020070
Unshin River	Along road at Fidwog_A	Ballysadare	35_2083_11_a	WE_35U010200

APPENDIX 3

Details of river sites surveyed for WFD surveillance monitoring, 2015

River	Site name	Catchment area (km^2)	Width (m)	Surface area (m^2)	Mean depth (m)	Max depth (m)
ERBD (Wadeable sites)						
Dodder, River	Bohernabreena_A	31.82	6.25	269	0.18	0.73
Dodder, River	Footbr. Beaver Row_B	104.58	14.55	538	0.21	0.76
Dodder, River	Mount Carmel Hospital_A	93.22	8.88	329	0.18	0.37
Vartry River	Newrath Br._A	102.98	7.82	328	0.23	0.53
NBIRBD (Wadeable sites)						
White River (Louth)	Coneyburrow Br._B	55.13	6.88	310	0.18	0.36
NWIRBD (Wadeable sites)						
Ballyhallan River	Adderville_A	4.76	2.90	128	0.13	0.34
Ballyhallan River	Br. u/s Clonmany River_A	8.72	3.82	168	0.17	0.50
Burnfoot River	Br. in Burnfoot_B	20.80	4.77	105	0.17	0.39
Burnfoot River	Glen_A	16.95	4.08	180	0.17	0.50
Clady River (Donegal)	Bryan's Br._A	78.63	9.02	302	0.27	0.55
Glaskeelan River	Br. W. of Roshin (L. Gartan)_A	16.45	5.82	256	0.21	0.45
Glennamong River	Br. u/s Lough Feeagh_B	15.27	9.04	407	0.22	0.39
Owentocker River	500 m d/s Br. in Ardara_A	43.09	9.96	418	0.23	0.53
Owentocker River	Crockaslowra_A	33.19	8.28	364	0.17	0.60
SHIRBD (Wadeable sites)						
Little River (Cloghan)	Br. 2km SW of Cloghan_A	29.90	4.05	142	0.38	0.76
Little River (Cloghan)	Guernal_A	27.94	3.67	121	0.27	0.44
Little Brosna	Riverstown Br._A	317.55	12	372	0.70	0.78
Silver (Kilcormac) River	Kilcormac Village_A	91.17	9.45	425	0.15	0.30
SHIRBD (Non-wadeable sites)						
Camlin River	Br. W. of Lisnabo_A	260.43	10.92	1124	0.69	0.80
Clodiagh River	Br. at Rahan_A	253.35	7.83	1253	0.62	1.00
Scramoge River	Br. N.E. of Riverdale_A	137.07	8.70	2053	1.08	1.70
Scramoge River	Carrowclogher_A	137.17	6.40	691	0.71	0.75
Silver (Kilcormac) River	Lumcloon Br._A	156.41	8.22	1101	0.54	0.97
WRBD (Wadeable sites)						
Ballinglen River	Ballinglen Br._B	33.11	8.80	352	0.35	0.80
Ballinglen River	New Br._A	41.74	10.04	402	0.19	0.37
Behy (Black) River	Behy Br._A	35.33	7.35	309	0.36	0.69
Behy (Srafaungal) River	Megalithic Tomb_A	13.45	4.40	176	0.13	0.25
Clydagh River (Castlebar)	Br. NW Ardvarney_B	6.25	5.14	236	0.09	0.16
Clydagh River (Castlebar)	Burren_A	4.52	5.36	198	0.11	0.26
Owenriff River	1km d/s of Lough Agraffard_A	44.10	8.77	351	0.21	0.52
Unshin River	Along road at Fidwog_A	76.24	9.12	346	0.42	0.61

APPENDIX 4

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

River		L1	L2	L3	L4	L5	Growth category
Ballinglen River	Mean	6.56	11.61	15.55			Slow
(Ballinglen Br._B)	S.D.	1.55	2.60	3.84			
	n	11	7	3			
	Min	3.38	7.95	11.52			
	Max	8.74	15.33	19.17			
Ballinglen River	Mean	8.17	18.64				Moderate
(New Br._A)	S.D.	2.14	3.15				
	n	7	2				
	Min	4.70	16.41				
	Max	11.22	20.87				
Ballyhallan	Mean	6.11	10.87	16.56			Slow
(Adderville_A)	S.D.	1.16	2.46	4.02			
	n	12	6	2			
	Min	4.65	8.46	13.72			
	Max	8.27	15.42	19.40			
Ballyhallan River	Mean	5.17	9.80	15.81			Slow
Br. u/s Clonmany River_A)	S.D.	1.00	1.40	n/a			
	n	11	8	1			
	Min	3.73	7.93	15.81			
	Max	6.94	12.30	15.81			
Behy (Black) River	Mean	6.94	9.84				Moderate
(Behy Br._A)	S.D.	1.44	n/a				
	n	11	1				
	Min	4.74	9.84				
	Max	9.17	9.84				
Burnfoot River	Mean	7.10	12.07	17.94			Moderate
(Bridge in Burnfoot_B)	S.D.	1.93	n/a	n/a			
	n	6	1	1			
	Min	4.66	12.07	17.94			
	Max	10.29	12.07	17.94			
Burnfoot River	Mean	6.52	13.51	18.55			Moderate
(Glen_A)	S.D.	1.13	1.81	0.64			
	n	19	6	2			
	Min	4.89	10.35	18.09			
	Max	8.43	15.17	19.00			
Clady River	Mean	5.84	12.12	16.36			Moderate
(Bryan's Br._A)	S.D.	1.55	1.39	2.38			
	n	13	10	4			
	Min	3.57	9.38	13.23			
	Max	8.04	13.50	18.95			
Clodiagh River	Mean	6.85	14.45	22.65	27.60	30.33	Moderate
(Br. at Rahan_A)	S.D.	1.24	3.39	2.71	3.72	4.77	
	n	33	30	9	4	2	
	Min	4.61	8.74	18.12	22.31	26.95	
	Max	9.07	20.26	26.38	30.70	33.70	

APPENDIX 4 continued

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

River		L1	L2	L3	L4	L5	Growth category
Clydagh River (Castlebar)	Mean	6.49	10.62				N/A
(Br. NW Ardvarney_B)	S.D.	2.04	0.16				
	n	3	2				
	Min	5.20	10.51				
	Max	8.85	10.74				
Clydagh River (Castlebar)	Mean	6.85	12.96				N/A
(Burren_A)	S.D.	0.41	n/a				
	n	3	1				
	Min	6.48	12.96				
	Max	7.30	12.96				
Dodder, River	Mean	6.98	13.01				Moderate
(Bohernabreena_A)	S.D.	1.54	0.75				
	n	9	3				
	Min	4.54	12.15				
	Max	9.65	13.53				
Dodder, River	Mean	9.30					Fast
(Footbr. Beaver Row_B)	S.D.	1.09					
	n	4					
	Min	8.36					
	Max	10.50					
Dodder, River	Mean	8.80	17.79				Moderate
(Mount Carmel Hospital_A)	S.D.	1.68	2.70				
	n	17	6				
	Min	5.36	14.29				
	Max	12.30	21.03				
Glaskeelan River	Mean	5.16	12.38				Slow
(Br. W. of Roshin (L. Gartan)_A)	S.D.	1.90	2.29				
	n	10	5				
	Min	2.43	9.84				
	Max	8.16	15.05				
Glennamong River	Mean	6.31	12.13				Moderate
(Br. u/s Lough Feeagh_B)	S.D.	1.27	2.05				
	n	7	3				
	Min	4.49	9.83				
	Max	8.20	13.76				
Little (Cloghan)	Mean	7.20	11.87				Moderate
(Br. 2km SW of Cloghan_A)	S.D.	1.05	n/a				
	n	10	1				
	Min	5.16	11.87				
	Max	8.54	11.87				
Little Brosna	Mean	16.14	29.06				Very fast
(Riverstown Br_A)	S.D.	8.49	10.77				
	n	9	6				
	Min	8.31	18.21				
	Max	32.42	49.23				

APPENDIX 4 continued

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

River		L1	L2	L3	L4	L5	Growth category
Little (Cloghan)	Mean	8.36	19.03				Moderate
(Guernal_A)	S.D.	1.53	n/a				
	n	5	1				
	Min	6.41	19.03				
	Max	10.71	19.03				
Owentocker River	Mean	6.03	12.08	16.18	23.71		Moderate
(500 m d/s Br. in Ardara_A)	S.D.	1.36	2.80	2.76	n/a		
	n	17	11	4	1		
	Min	3.63	7.80	13.74	23.71		
	Max	8.50	17.44	20.13	23.71		
Owentocker River	Mean	5.13	6.97				Slow
(Crockaslowra_A)	S.D.	1.33	n/a				
	n	5	1				
	Min	3.03	6.97				
	Max	6.25	6.97				
Scramoge River	Mean	7.62	15.28	20.74			Moderate
(Br. N.E. of Riverdale_A)	S.D.	0.41	1.63	n/a			
	n	3	3	1			
	Min	7.21	13.98	20.74			
	Max	8.03	17.11	20.74			
Silver (Kilcormac) River	Mean	6.70					Moderate
(Kilcormac Village_A)	S.D.	1.51					
	n	13					
	Min	4.66					
	Max	9.32					
Silver (Kilcormac) River	Mean	8.51	16.06	19.33	22.65		Moderate
(Lumcloon Br._A)	S.D.	2.49	3.46	3.50	3.14		
	n	54	39	9	4		
	Min	2.52	5.46	12.60	18.06		
	Max	18.33	21.60	24.42	25.03		
Srafaungal River	Mean	6.09					Moderate
(Megalithic Tomb_A)	S.D.	0.95					
	n	5					
	Min	4.82					
	Max	7.39					
Unshin River	Mean	6.41	13.73				Moderate
(Along road at Fidwog_A)	S.D.	1.97	n/a				
	n	7	1				
	Min	3.66	13.73				
	Max	9.55	13.73				
Vartry River	Mean	7.28	15.44				Moderate
(Newrath Br._A)	S.D.	1.60	4.02				
	n	12	4				
	Min	4.24	11.80				
	Max	9.42	19.88				

APPENDIX 4 continued

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

River		L1	L2	L3	L4	L5	Growth category
White River (Louth)	Mean	10.42					Very fast
(Coneyburrow Br._B)	S.D.	1.97					
	n	6					
	Min	8.58					
	Max	13.96					

APPENDIX 5

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

River		L1	L2
Ballinglen River	Mean	4.98	8.46
(Ballinglen Br._B)	S.D.	0.73	0.86
	n	11	2
	Min	3.84	7.85
	Max	6.19	9.07
Ballinglen River	Mean	7.01	9.41
(New Br._A)	S.D.	2.13	n/a
	n	5	1
	Min	3.49	9.41
	Max	9.26	9.41
Ballyhallan River	Mean	4.62	
(Br. u/s Clonmany River_A)	S.D.	1.35	
	n	4	
	Min	3.15	
	Max	6.40	
Behy (Black) River	Mean	5.17	
(Behy Br._A)	S.D.	0.51	
	n	5	
	Min	4.82	
	Max	6.08	
Burnfoot River	Mean	5.90	
(Br. in Burnfoot_B)	S.D.	n/a	
	n	1	
	Min	5.90	
	Max	5.90	
Burnfoot River	Mean	4.13	10.15
(Glen_A)	S.D.	0.10	n/a
	n	2	1
	Min	4.06	10.15
	Max	4.20	10.15
Clady River	Mean	4.59	13.05
(Bryan's Br._A)	S.D.	1.00	n/a
	n	25	1
	Min	3.20	13.05
	Max	7.02	13.05
Clydagh River (Castlebar)	Mean	5.02	8.60
(Br. NW Ardvarney_B)	S.D.	1.00	n/a
	n	4	1
	Min	3.57	8.60
	Max	5.80	8.60
Clydagh River (Castlebar)	Mean	6.65	
(Burren_A)	S.D.	0.32	
	n	4	
	Min	6.28	
	Max	7.07	

APPENDIX 5 continued

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

River		L1	L2
Dodder, River	Mean	6.53	
(Foot Br. Beaver Row_B)	S.D.	1.61	
	n	4	
	Min	4.81	
	Max	8.70	
Glaskeelan River	Mean	4.46	6.95
(Br. W. of Roshin (Lough Gartan)_A)	S.D.	1.62	0.63
	n	15	5
	Min	2.22	5.98
	Max	8.05	7.52
Glennamong River	Mean	5.44	
(Br. u/s Lough Feeagh_B)	S.D.	1.49	
	n	6	
	Min	3.76	
	Max	7.80	
Little Brosna	Mean	9.70	
(Riverstown Br_A)	S.D.	5.41	
	n	6	
	Min	4.37	
	Max	17.09	
Owenriff River	Mean	4.13	8.00
(Owenriff_A)	S.D.	1.07	2.10
	n	13	3
	Min	2.88	5.81
	Max	7.25	10.01
Owentocker River	Mean	4.60	8.94
(500 m d/s Bridge in Ardara_A)	S.D.	0.96	1.24
	n	12	6
	Min	3.26	7.28
	Max	6.31	10.95
Owentocker River	Mean	4.83	9.40
(Crockaslowra_A)	S.D.	0.65	1.19
	n	10	5
	Min	3.55	8.29
	Max	5.87	11.10
Srafaungal River	Mean	4.49	
(Megalithic Tomb_A)	S.D.	0.51	
	n	3	
	Min	3.99	
	Max	5.01	
Unshin River	Mean	4.92	9.47
(Along road at Fidwog_A)	S.D.	1.03	n/a
	n	19	1
	Min	2.95	9.47
	Max	6.60	9.47

APPENDIX 5 continued

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

River		L1	L2
Vartry River	Mean	5.23	
(Newrath Br._A)	S.D.	0.75	
	n	3	
	Min	4.45	
	Max	5.95	
White River (Louth)	Mean	5.15	
(Coneyburrow Br._B)	S.D.	1.59	
	n	2	
	Min	4.02	
	Max	6.28	

APPENDIX 6

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

River		L1	L2	L3	L4	L5
Camlin River	Mean	18.72	36.36	46.61	55.65	58.31
(Br. W. of Lisnabo_A)	S.D.	4.10	5.67	3.54	3.85	n/a
	n	8	5	4	2	1
	Min	15.00	26.91	43.96	52.93	58.31
	Max	25.93	41.94	51.46	58.38	58.31
Owenriff River	Mean	10.47				
(1km d/s of Lough Agraffard_A)	S.D.	n/a				
	n	1				
	Min	10.47				
	Max	10.47				
Scramoge River	Mean	22.99	39.35			
(Br. N.E. of Riverdale_A)	S.D.	7.20	10.50			
	n	3	2			
	Min	17.03	31.92			
	Max	30.99	46.78			
Scramoge River	Mean	16.01	30.45	45.17	59.04	
(Carrowclogher_A)	S.D.	2.06	5.16	4.33	n/a	
	n	2	2	2	1	
	Min	14.55	26.80	42.11	59.04	
	Max	17.46	34.09	48.23	59.04	

APPENDIX 7

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

River		L1	L2	L3	L4	L5	L6	L7
Camlin River	Mean	3.91	7.25	10.79	15.39	18.61	21.04	22.34
(Br. W. of Lisnabo_A)	S.D.	2.90	2.54	2.92	2.65	2.34	1.32	n/a
	n	20	18	11	7	3	2	1
	Min	1.21	3.62	5.03	11.27	17.09	20.11	22.34
	Max	14.16	14.37	14.82	18.49	21.30	21.98	22.34
Little Brosna	Mean	2.28	6.94					
(Riverstown Br_A)	S.D.	0.63	2.05					
	n	7	7					
	Min	1.60	3.89					
	Max	3.36	9.89					
Scramoge River	Mean	2.75	5.82	7.12	10.04			
(Br. N.E. of Riverdale_A)	S.D.	0.70	0.95	0.87	1.82			
	n	6	6	3	2			
	Min	1.85	4.61	6.15	8.75			
	Max	3.43	6.56	7.82	11.33			

APPENDIX 8

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

River		L1	L2	L3	L4	L5	L6	L7	L8
Camlin River	Mean	4.16	7.80	10.98	14.79	19.39	22.95	25.19	27.64
(Br. W. of Lisnabo_A)	S.D.	0.22	1.42	2.47	2.40	2.20	1.83	2.13	0.97
	n	5	5	5	5	5	5	5	3
	Min	3.94	6.38	8.50	11.54	17.64	21.54	23.60	26.80
	Max	4.46	9.46	13.66	17.88	23.09	26.07	28.80	28.69

APPENDIX 9

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

River		L1	L2
Vartry River	Mean	8.56	16.12
(Newrath Br._A)	S.D.	1.35	1.27
	n	8	7
	Min	7.05	13.74
	Max	10.51	17.61

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