



Sampling Fish for the Water Framework Directive

Rivers 2013

**North Western
International River
Basin District**



Iascach Intíre Éireann
Inland Fisheries Ireland

Water Framework Directive Fish Stock Survey of Rivers in the North Western International River Basin District, 2013

Fiona L. Kelly, Ronan Matson, Lynda Connor, Rory Feeney, Emma Morrissey, John Coyne and
Kieran Rocks

Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24

CITATION: Kelly, F.L., Matson, R., Connor, L., Feeney, R., Morrissey, E., Coyne, J. and Rocks, K. (2014) Water Framework Directive Fish Stock Survey of Rivers in the North Western International River Basin District. Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24, Ireland.

Cover photo: WFD team electric-fishing © Inland Fisheries Ireland

ACKNOWLEDGEMENTS

The authors wish to gratefully acknowledge the help and co-operation of the regional director Dr. Milton Matthews and staff from IFI Ballyshannon as well as various other offices throughout the region. The authors also gratefully acknowledge the help and cooperation of colleagues in IFI Swords.

We would like to thank the landowners and angling clubs that granted us access to their land and respective fisheries.

Furthermore, the authors would like to acknowledge the funding provided for the project from the Department of Communications, Energy and Natural Resources for 2013.

PROJECT STAFF

Project Director/Senior Research Officer:	Dr. Fiona Kelly
Project Manager:	Ms. Lynda Connor
Research Officer:	Dr. Ronan Matson
Technician	Mr. Rory Feeney
Technician:	Ms. Emma Morrissey
Technician:	Mr. John Coyne
GIS Officer:	Mr. Kieran Rocks
Fisheries Assistant:	Mr. Johannes Bulfin (Jul 2013 – Dec 2013)
Fisheries Assistant:	Mr. John Finn (Jul 2013 – Dec 2013)
Fisheries Assistant:	Ms. Karen Kelly (Jul 2013 – Dec 2013)
Fisheries Assistant:	Ms. Roisín O’Callaghan (Jul 2013 – Dec 2013)
Fisheries Assistant:	Ms. Laura Walsh (Jul 2013 – Dec 2013)

The report includes Ordnance Survey Ireland data reproduced under OSi Copyright Permit No. MP 007508.

*Unauthorised reproduction infringes Ordnance Survey Ireland and Government of Ireland copyright.
© Ordnance Survey Ireland, 2013.*

TABLE OF CONTENTS

1. INTRODUCTION.....	3
2. STUDY AREA.....	4
3. METHODS	6
4. RESULTS	7
4.1 River surveys.....	7
4.1.1 The Annalee River.....	7
4.1.2 The Cullies River.....	11
4.1.3 The Dromore River.....	14
4.1.4 The River Erne	17
4.1.5 The Finn River	23
4.2 Community Structure.....	27
4.2 Species distribution.....	27
4.3 Age and growth.....	28
4.4 Ecological status.....	31
5. DISCUSSION	32
6. REFERENCES.....	33
APPENDIX 1.....	34
APPENDIX 2.....	35
APPENDIX 3.....	36
APPENDIX 4.....	37
APPENDIX 5.....	37

1. INTRODUCTION

Fish stock surveys were undertaken in 75 river sites (56 waterbodies) throughout Ireland during the summer of 2013 as part of the programme of sampling fish for the Water Framework Directive (WFD). These surveys are required by both national and European law, with Annex V of the WFD stipulating that rivers are included within the monitoring programme and that the composition, abundance and age structure of fish fauna are examined (Council of the European Communities, 2000). Six river sites were surveyed in the North Western International River Basin District (NWIRBD) in August 2013 by staff from Inland Fisheries Ireland (Table 2.1, 2.2 and Fig. 2.1).

Although fish survey work has been carried out in Ireland in the past, no project to date has been as extensive as the current on-going monitoring programme in providing data appropriate for WFD compliance. Continued surveying of these and additional river sites will provide a useful baseline and time-series dataset for future monitoring of water quality. This in turn will provide information for River Basin District (RBD) managers to compile and implement programmes of measures to improve degraded water bodies. As 2013 is the sixth year of the rivers sampling programme, many of the sites surveyed this year are repeat surveys of those carried out in previous years. As a result, surveys this year can be compared with those from before, to determine whether the status of our rivers is improving or deteriorating.

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

2. STUDY AREA

Six river sites were surveyed in the River Erne catchment within the NWIRBD during 2013 (Table 2.1). The sites ranged in surface area from 252m² at the Dromore River (Drummuck) to 5304m² at the River Erne (Belturbet). The sites were divided into two categories for reporting purposes: wadeable sites, which were surveyed with bank-based electric fishing units, and non-wadeable sites, which were surveyed with boat-based electric fishing units. Summary details of each site's location and physical characteristics are given in Tables 2.1 and 2.2, and the distribution of sites throughout the NWIRBD is shown in Figure 2.1.

Table 2.1. Location and codes of river sites surveyed for WFD surveillance monitoring, NWIRBD 2013

River	Site name	Catchment	Site Code	Waterbody code
NWIRBD Wadeable sites				
Cullies River	Kilbrackan Br._A	Erne	36C030600A	NW_36_2032
Dromore River	Drummuck_A	Erne	36D020125A	NW_36_30
NWIRBD Non-Wadeable sites				
Annalee River	Cavan confl_A	Erne	36A021400A	NW_36_2417
Erne, River	Bellahillan Br._A	Erne	36E011100A	NW_36_1746
Erne, River	Belturbet_A	Erne	36E011400A	XB_36_east_4
Finn River (Monaghan)	Cumber Br._A	Erne	36F010500A	XB_36_east_3

Table 2.2. Details of river sites surveyed for WFD surveillance monitoring, NWIRBD 2013

Site name	Upstream catchment (km ²)	Wetted width (m)	Surface area (m ²)	Mean depth (m)	Max depth (m)
NWIRBD Wadeable sites					
Cullies (Kilbrackan Br._A)	110.44	6.50	254	0.38	0.72
Dromore (Drummuck_A)	37.14	6.30	252	0.28	0.57
NWIRBD Non-Wadeable sites					
Annalee (Cavan confl_A)	859.02	16.75	3300	0.53	1.20
Erne (Bellahillan Br._A)	336.37	13.10	2921	1.10	2.25
Erne (Belturbet Br._A)	1495.99	20.17	5304	0.72	1.00
Finn (Monaghan)(Cumber Br._A)	121.61	11.80	2372	0.80	2.50

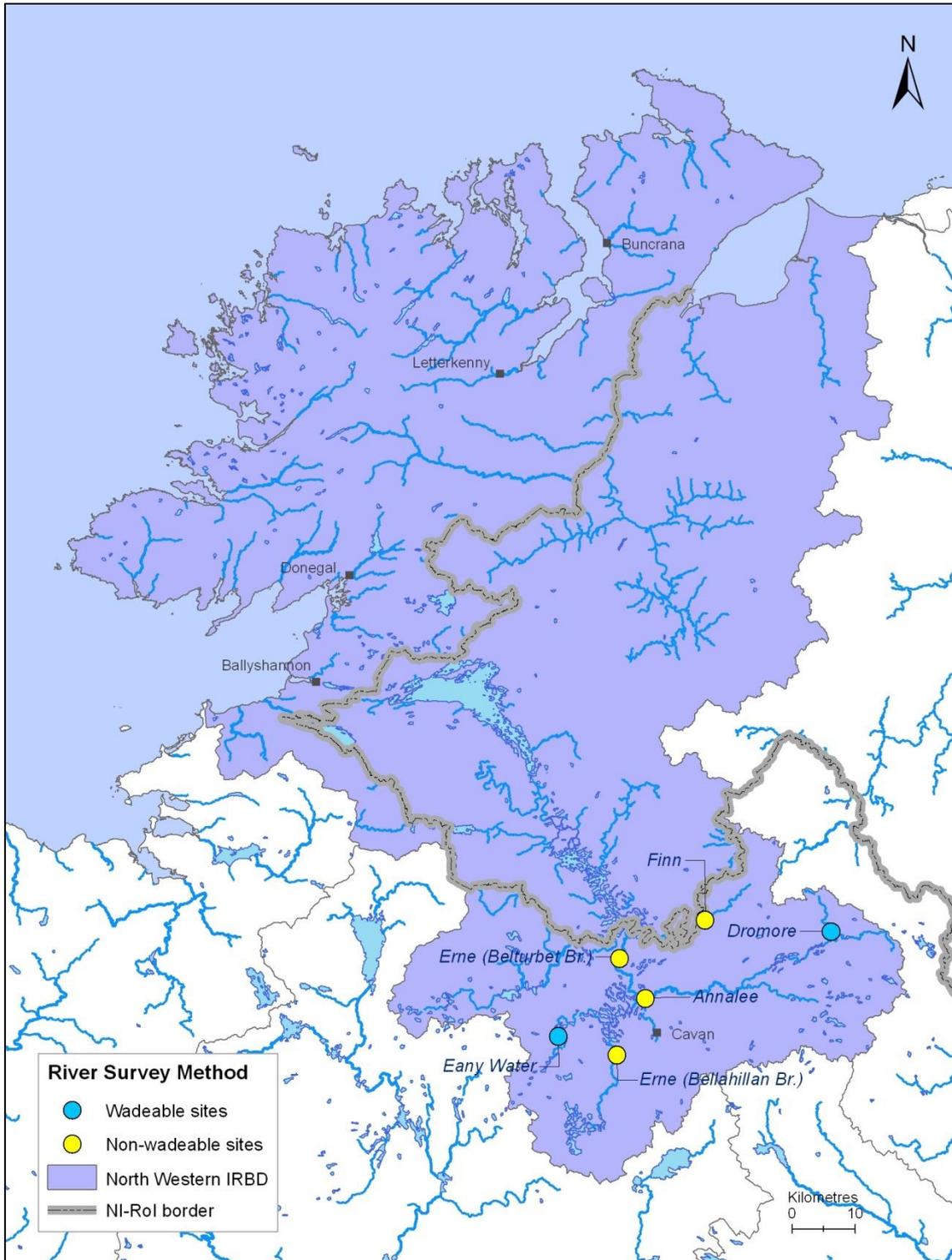


Fig. 2.1. Location map of river sites surveyed throughout the NWIRBD for WFD fish surveillance monitoring 2013

3. METHODS

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

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

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

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

4. RESULTS

4.1 River surveys

4.1.1 The Annalee River

One site was electric fished on the Annalee River as part of the WFD surveillance monitoring programme in rivers 2013. The survey site was located downstream of the Annalee's confluence with the Cavan River in Drummany, west of Butler's Bridge, Co. Cavan (Fig. 4.1; Plate 4.1). Three electric-fishing passes were conducted using four boat-based electric fishing units on the 14th of August 2013, along a 197m length of channel. Glide dominated the habitat, while the substrate was a mix of, cobble and gravel. The vegetation at this site was diverse, consisting mainly of emergent species along the banks.

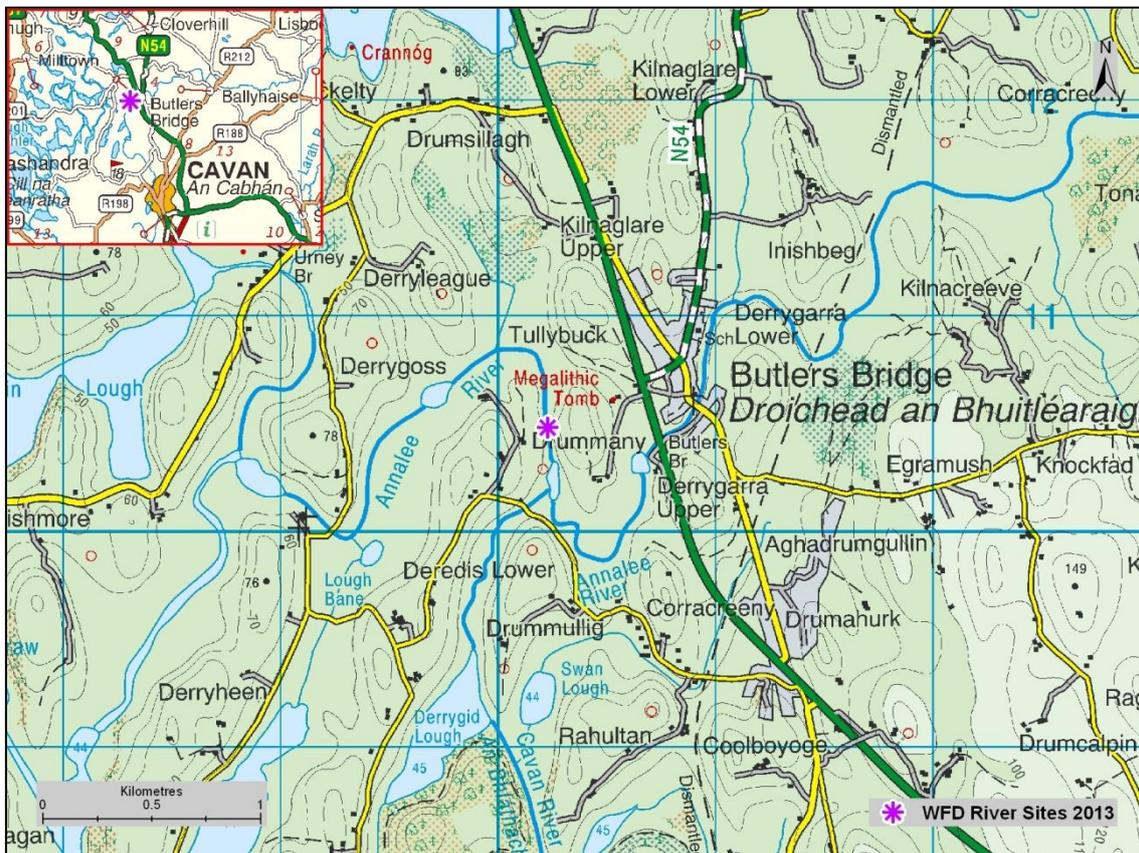


Fig. 4.1. Location of the Annalee River (Cavan confl._A) surveillance monitoring site



Plate 4.1. The Annalee River (Cavan confl._A), Co. Cavan

Nine fish species were recorded in the Annalee River during the 2013 survey (Table 4.1). Roach was the most abundant species recorded, followed by gudgeon, perch, pike, minnow, brown trout, bream, European eel and roach × bream hybrid.

Table 4.1. Density of fish (no./m²), Annalee River (Cavan confl_A) site (fish density has been calculated as minimum estimates based on one fishing)

Species	Total minimum density	
	2008	2013
Roach	0.131	0.037
Gudgeon	0.033	0.037
Perch	0.055	0.021
Pike	0.003	0.003
Minnow	-	0.001
Brown trout	0.005	0.001
0+ Brown trout	0.000	0.000
1++ Brown trout	0.005	0.001
Bream	0.003	0.001
European eel	0.001	0.001
Roach x bream hybrid	0.0004	0.0003
Lamprey sp.	0.0004	-
All Fish	0.232	0.102

Roach captured during the 2013 survey ranged in length from 2.0cm to 23.2cm (mean = 10.5cm) (Fig. 4.2). Nine age classes (0+ to 8+ inclusive, and 10+) were present, accounting for 17%, 21%, 8%, 25%, 9%, 9%, 7%, 3%, 1% and 0.4% of the total roach catch respectively. Roach captured during the 2008 survey ranged in length from 2cm to 28.5cm (mean = 14cm). Nine age classes (0+ to 9+) were present, accounting for 0.2%, 3%, 20%, 44%, 13%, 5%, 5%, 6%, 0.7% and 0.5% of the roach catch respectively.

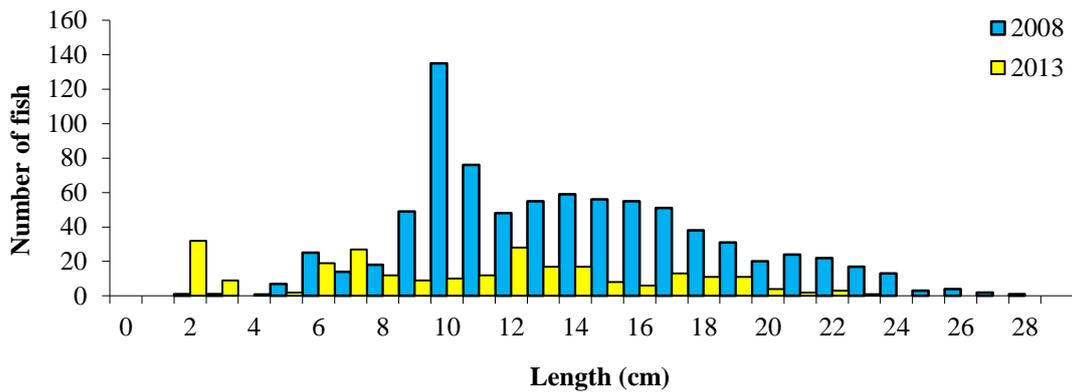


Fig. 4.2. Length frequency distribution for roach in the Annalee River (Cavan confl_A), July 2008 (n = 825) and August 2013 (n = 254)

Perch captured during the 2013 survey ranged in length from 2.6cm to 21.5cm (mean = 9.7cm) (Fig. 4.3). Perch captured during the 2008 survey ranged in length from 6cm to 20cm (mean = 13cm). Five age classes (1+, 2+, 3+, 4+ and 5+) were present in a sample of the 2008 perch population, accounting for 11%, 63%, 6%, 16% and 3% of the perch catch respectively.

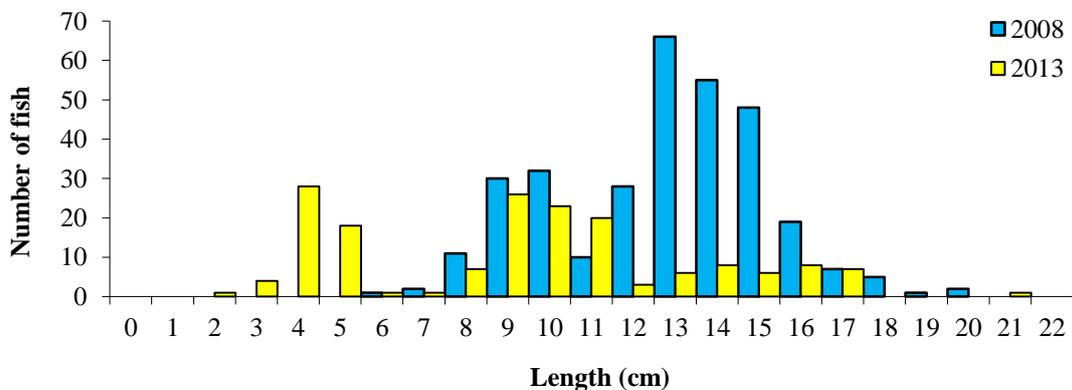


Fig. 4.3. Length frequency distribution for perch in the Annalee River (Cavan confl_A), July 2008 (n = 317) and August 2013 (n = 168)

Gudgeon captured during the 2013 survey ranged in length from 3.6cm to 13.5cm (mean = 8.6cm) (Fig. 4.4). Gudgeon captured during the 2008 survey ranged in length from 6cm to 12.5cm (mean = 10cm).

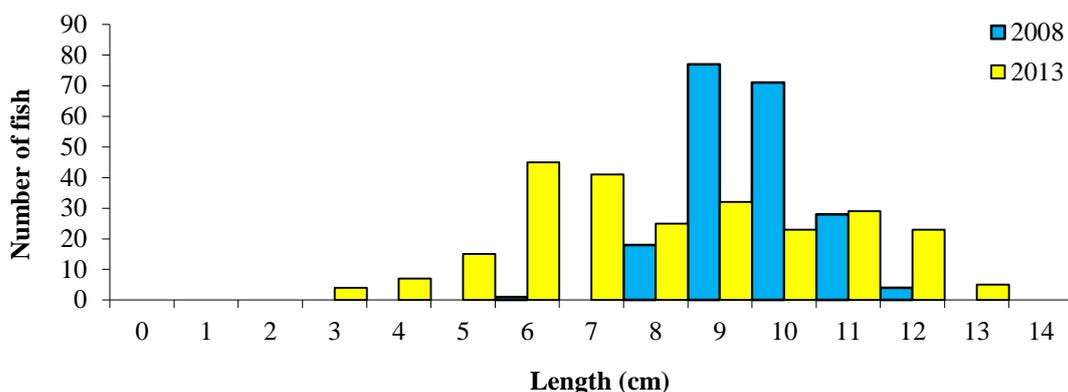


Fig. 4.4. Length frequency distribution for gudgeon in the Annalee River (Cavan confl_A), July 2008 (n = 199) and August 2013 (n = 249)

Brown trout captured during the 2013 survey ranged in length from 17.3cm to 19.9cm (mean = 19.1cm) (Fig. 4.5). Two age classes (1+ and 2+) were present, accounting for 75% and 25% of the total brown trout catch respectively. Brown trout captured during the 2008 survey ranged in length from 16.4cm to 26.0cm (mean = 20.6cm). Two age classes (1+ and 2+) were present, accounting for 45% and 55% of the total brown trout catch respectively.

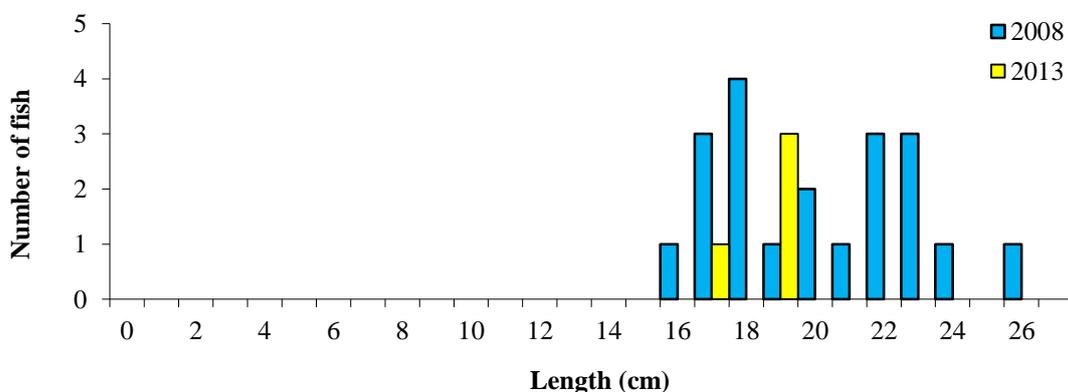


Fig. 4.5. Length frequency distribution for brown trout in the Annalee River (Cavan confl_A), July 2008 (n = 20) and August 2013 (n = 4)

4.1.2 The Cullies River

One site was electric fished on the Cullies River as part of the WFD surveillance monitoring programme in rivers 2013. The survey site was located downstream of Kilbrackan Br. on the Leitrim, Cavan border, approximately 6km south west of Killashandra (Fig. 4.6; Plate 4.2). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 7th of August 2013, along a 39m length of channel. Glide dominated the habitat, while the substrate was mostly gravel. The vegetation at this site was dominated by emergent species, found mainly along the deep, muddy right-hand bank.



Fig. 4.6. Location of the Cullies River (Kilbrackan Br.) surveillance monitoring site



Plate 4.2. The Cullies River at Kilbrackan Br.

Five fish species were recorded in the Cullies River during the 2013 survey (Table 4.2). Roach was the most abundant species recorded, followed by perch, gudgeon, pike and lamprey.

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

Species	Total minimum density	
	2010	2013
Roach	0.477	0.185
Perch	0.437	0.130
Gudgeon	0.004	0.118
Pike	0.018	0.012
Lamprey sp.	0.009	0.004
Bream	0.013	-
Brown trout	0.018	-
0+ Brown trout	0.000	-
1++ Brown trout	0.018	-
European eel	0.004	-
Roach x bream hybrid	0.0265	-
All Fish	1.007	0.450

Roach captured during the 2013 survey ranged in length from 5.4cm to 22.0cm (mean = 10.3cm) (Fig. 4.7). Seven age classes (1+ to 7+) were present, accounting for 47%, 21%, 12%, 8%, 9%, 3% and 1% of the total roach catch respectively. Roach captured during the 2010 survey ranged in length from 8.4cm to 24.4cm (mean = 13.7cm). Six age classes (2+, 3+, 4+, 5+, 6+ and 7+) were present, accounting for 41%, 15%, 29%, 7%, 5% and 3% of the total roach catch respectively. One hundred and five cyprinid fry measuring 1cm to 3cm in length also captured at the site are likely to have been 0+ roach.

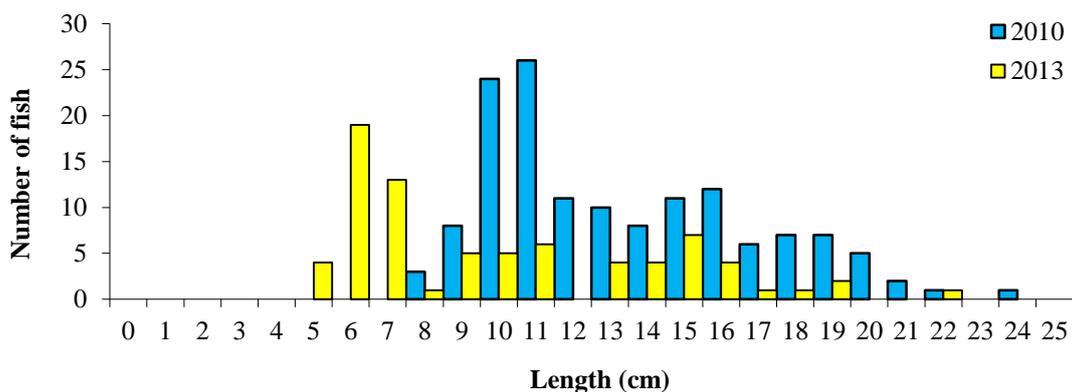


Fig. 4.7. Length frequency distribution of roach in the Cullies River (Kilbrackan Br.) site, June 2010 (n = 142) and August 2013 (n = 77)

Perch captured during the 2013 survey ranged in length from 3.6cm to 18.0cm (mean = 7.9cm) (Fig. 4.8). Perch captured during the 2010 survey ranged in length from 3.0cm to 22.5cm (mean = 13cm).

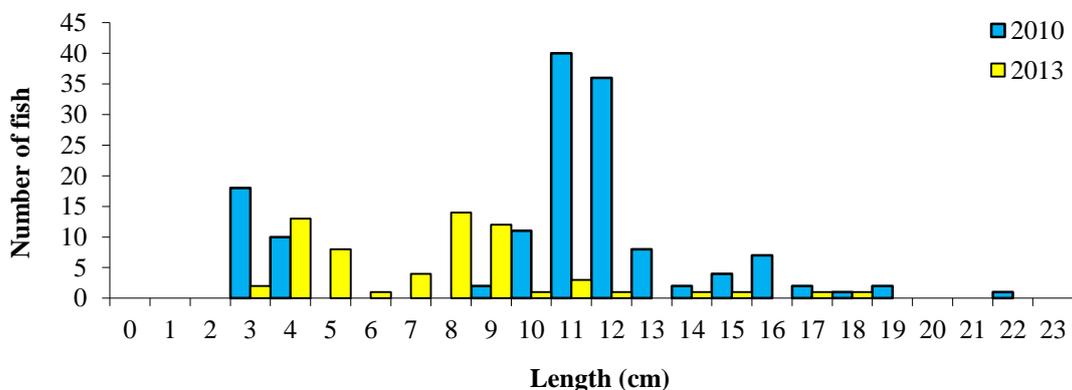


Fig. 4.8. Length frequency distribution of perch in the Cullies River (Kilbrackan Br.) site, June 2010 (n = 144) and August 2013 (n = 63)

4.1.3 The Dromore River

One site was electric fished on the Dromore River as part of the WFD surveillance monitoring programme in rivers 2013. The survey site was located upstream of a bridge on a disused railway line in Drummuck, approximately 2km west of Ballybay, Co. Monaghan (Fig. 4.9; Plate 4.3). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 16th of August 2013, along a 40m length of channel. Glide dominated the habitat, with a substrate of mainly cobble. The vegetation at this site was dominated by emergent bank-side and riparian species.

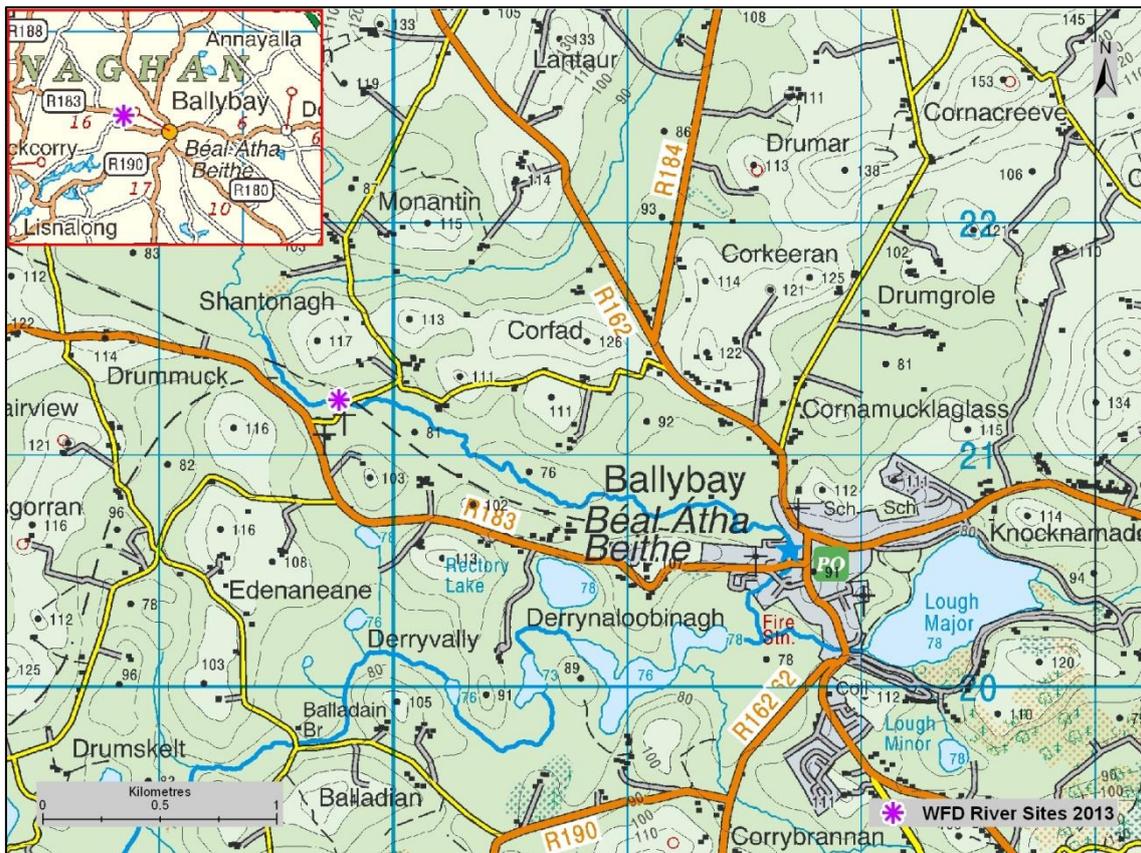


Fig. 4.9. Location of the Dromore River (Drummuck) surveillance monitoring site



Plate 4.3. The Dromore River at Drummuck near Ballybay, Co. Monaghan

Six fish species were recorded in the Dromore River during the 2013 survey (Table 4.3). Three-spined stickleback was the most abundant species recorded, followed by lamprey, brown trout, minnow, perch and nine-spined stickleback.

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

Species	Total minimum density	
	2011	2013
Three-spined stickleback	0.677	0.071
Lamprey sp.	0.018	0.048
Brown trout	0.031	0.032
0+ Brown trout	0.022	0.000
1++ Brown trout	0.009	0.032
Minnow	0.343	0.008
Perch	0.018	0.008
Nine-spined stickleback	0.018	0.004
Roach	0.004	-
All Fish	1.091	0.171

Brown trout captured during the 2013 survey ranged in length from 16.4cm to 33.3cm (mean = 23.7cm) (Fig. 4.10). Three age classes (1+, 2+ and 3+) were present, accounting for 44%, 44% and 11% of the total brown trout catch respectively. Brown trout captured during the 2011 survey ranged in length from 6.9cm to 20.5cm (mean = 9.5cm). Three age classes (0+, 1+ and 2+) were present, accounting for 89%, 6% and 6% of the total brown trout catch respectively.

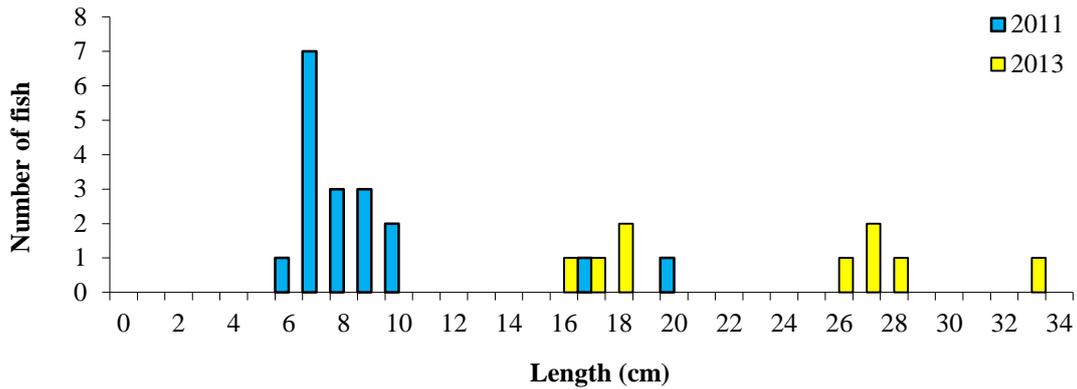


Fig. 4.10. Length frequency distribution of brown trout in the Dromore River (Drummuck) site, August 2011 (n = 18) and August 2013 (n = 9)

4.1.4 The River Erne

Two sites were electric fished on the River Erne as part of the WFD surveillance monitoring programme in rivers 2013; the River Erne, Bellahillan Br. and River Erne, Belturbet.

The Bellahillan Br. survey site was located upstream of Bellahillan Br., approximately 3km upstream of Lough Oughter, Co. Cavan (Fig. 4.11; Plate 4.4). Three electric-fishing passes were conducted using two boat-based electric fishing units on the 13th of August 2013, along a 223m length of channel. Glide dominated the habitat, while the substrate consisted largely of cobble. Vegetation at this site consisted of a emergent, floating and submerged species.

The Belturbet Br. survey site was located upstream of the bridge in Belturbet, Co. Cavan (Fig. 4.12; Plate 4.5). One electric-fishing pass was conducted using four boat-based electric fishing units on the 12th of August 2013, along a 263m length of channel. Glide dominated the habitat, while the substrate consisted largely of cobble. Vegetation at this relatively deep site consisted mainly of emergent bank-side species, with a few submerged and floating species.

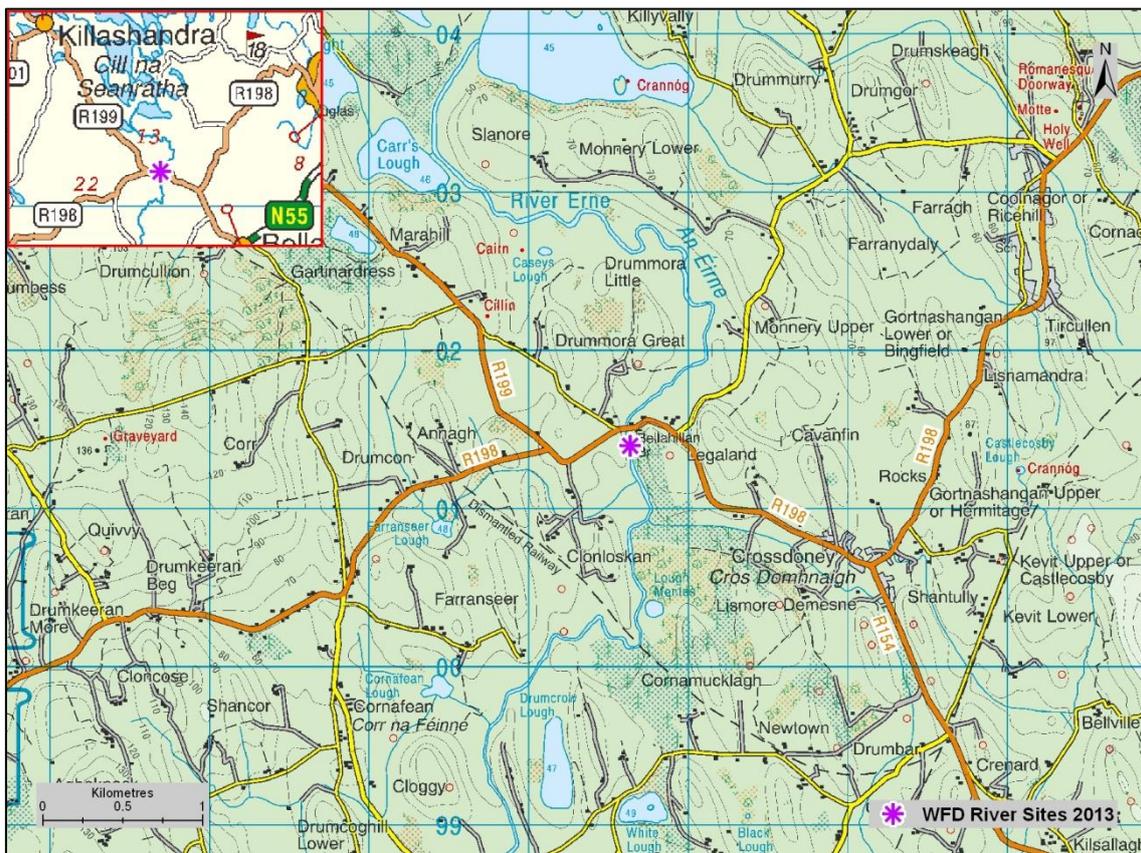


Fig. 4.11. Location of the River Erne (Bellahillan Br.) surveillance monitoring site

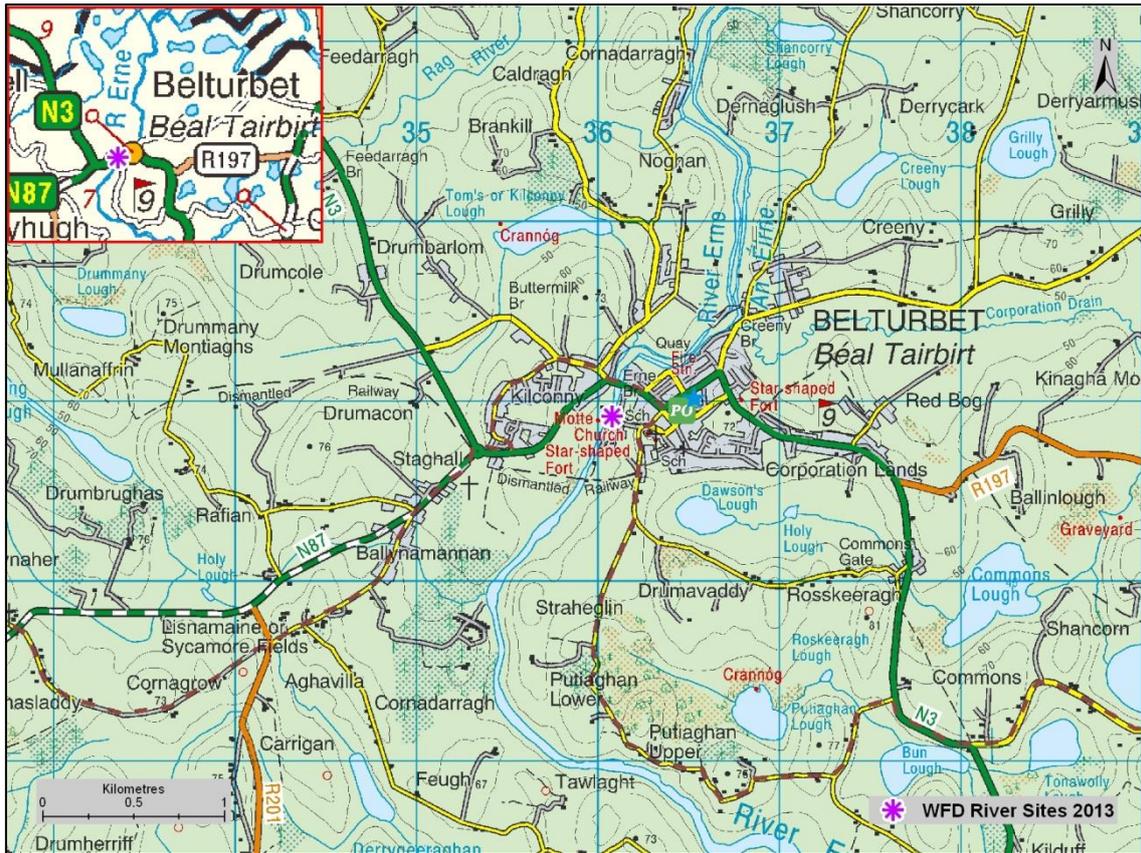


Fig. 4.12. Location of the River Erne (Belturbet Br.) surveillance monitoring site



Plate 4.4. The River Erne River at Bellahillan Br., Co. Cavan



Plate 4.5. The River Erne at Belturbet Br., Co. Meath

River Erne (Bellahillan Br.)

Seven fish species were recorded in the River Erne (Bellahillan Br.) site during the 2013 survey (Table 4.4). Roach was the most abundant species recorded, followed by perch.

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

Species	Total minimum density	
	2009	2013
Roach	0.001	0.049
Perch	0.001	0.030
Gudgeon	0.001	0.005
Pike	0.001	0.003
Lamprey sp.	0.000	0.002
Brown trout	-	0.001
0+ Brown trout	-	0.000
1++ Brown trout	-	0.0010
European eel	0.0003	0.0003
All Fish	0.004	0.090

Perch captured during the 2013 survey ranged in length from 4.0cm to 29.4cm (mean = 10.1cm) (Fig. 4.13). Perch captured during the 2009 survey ranged in length from 10.1cm to 19.1cm (mean = 15.0cm).

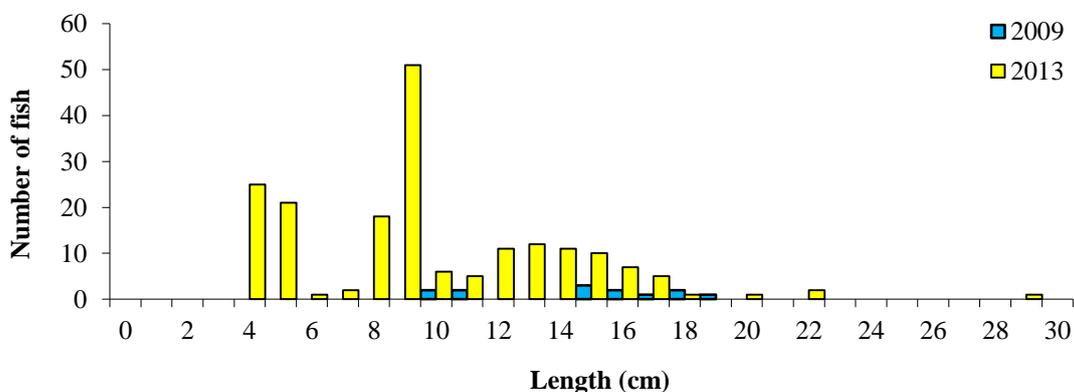


Fig. 4.13. Length frequency distribution of perch in the Erne River (Bellahillan Br.), October 2009 (n = 13) and August 2013 (n = 190)

Roach captured during the 2013 survey ranged in length from 3.0cm to 21.7cm (mean = 7.6cm) (Fig. 4.14). Nine age classes (0+ to 8+) were present, accounting for 33%, 14%, 26%, 15%, 5%, 4%, 1%, 1% and 0.3% of the roach catch respectively. Roach captured during the 2009 survey ranged in length from 11.7cm to 14.8cm (mean = 13.3cm). Two age classes (3+ and 4+) were present, accounting for 50% and 50% of the total roach catch respectively.

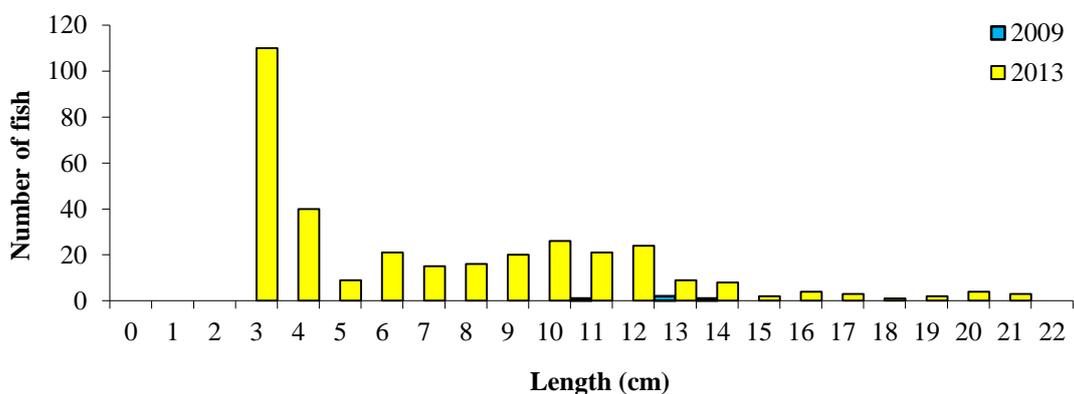


Fig. 4.14. Length frequency distribution of roach in the Erne River (Bellahillan Br.), October 2009 (n = 4) and August 2013 (n = 338)

River Erne (Belturbet Br.)

Six fish species were recorded in the River Erne (Belturbet Br.) site during the 2013 survey (Table 4.5). Roach was the most abundant species recorded, followed by perch.

Table 4.5. Density of fish (no./m²), River Erne (Belturbet Br.) site (fish density has been calculated as minimum estimates based on one fishing)

Species	Total minimum density	
	2008	2013
Roach	0.057	0.018
Perch	0.007	0.009
Brown trout	0.004	0.004
0+ Brown trout	0.000	0.000
1++ Brown trout	0.004	0.004
Gudgeon	0.002	0.002
Pike	0.001	0.001
European eel	0.003	0.001
All Fish	0.075	0.036

Roach captured during the 2013 survey ranged in length from 3.7cm to 20.8cm (mean = 11.5cm) (Fig. 4.15). Eight age classes (0+ to 7+) were present, accounting for 9%, 9%, 16%, 32%, 8%, 13%, 3% and 9% of the roach catch respectively. Roach captured during the 2008 survey ranged in length from 2.0cm to 26.1cm (mean = 11cm). Eight age classes (0+ to 7+) were present, accounting for 1%, 25%, 20%, 38%, 9%, 5%, 0.8% and 0.5% of the roach catch respectively.

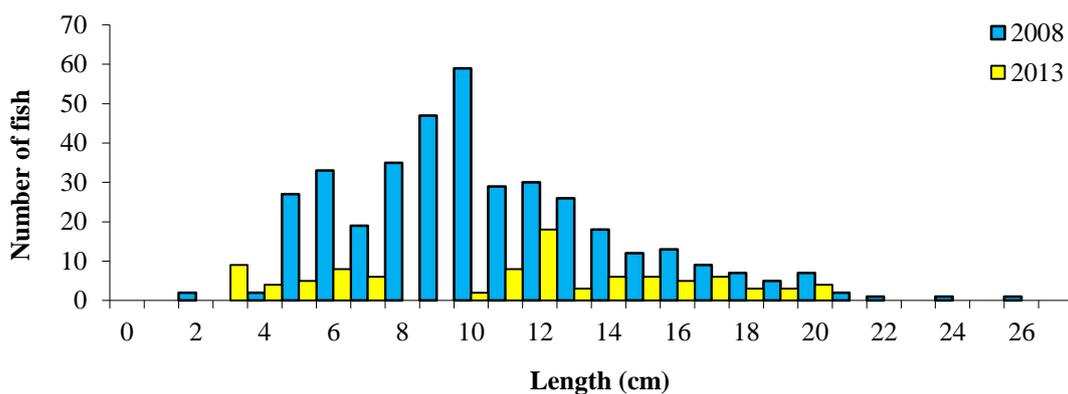


Fig. 4.15. Length frequency distribution for roach in the River Erne (Belturbet Br.), June 2008 (n = 385) and August 2013(n = 96)

Perch captured during the 2013 survey ranged in length from 4.2cm to 21.0cm (mean = 12.4cm) (Fig. 4.16). Perch captured during the 2008 survey ranged in length from 3cm to 22cm (mean = 13cm). Four age classes (1+, 2+, 3+ and 4+) were present, Five age classes (1+, 2+, 3+ and 4+) were present in a sample of the 2008 perch population, accounting for 29%, 39%, 29% and 4% of the perch catch respectively.

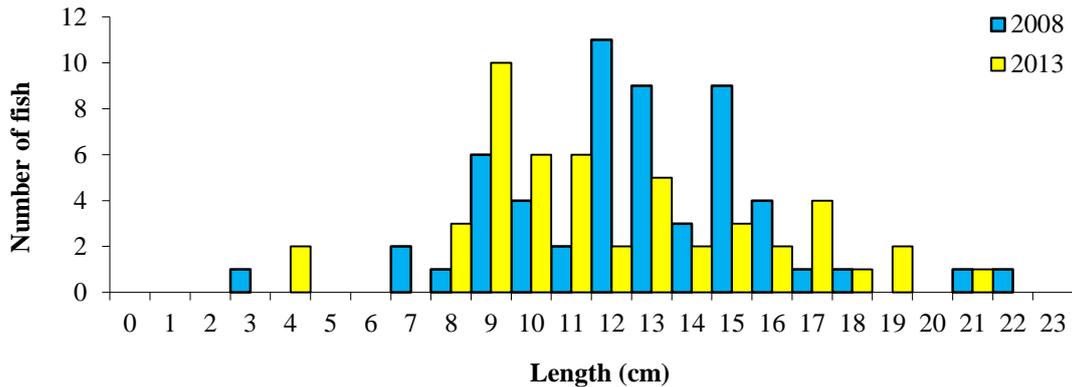


Fig. 4.16. Length frequency distribution for perch in the River Erne (Belturbet Br.), June 2008 (n = 56) and August 2013(n = 49)

Brown trout captured during the 2013 survey ranged in length from 12.7cm to 29.7cm (mean = 20.6cm) (Fig. 4.17). Three age classes (1+, 2+ and 3+) were present, accounting for 48%, 39% and 13% of the total brown trout catch respectively. Brown trout captured during the 2008 survey ranged in length from 13.2cm to 28.2cm (mean = 22.1cm). Three age classes (1+, 2+ and 3+) were present, accounting for 9%, 42% and 49% of the total brown trout catch respectively.

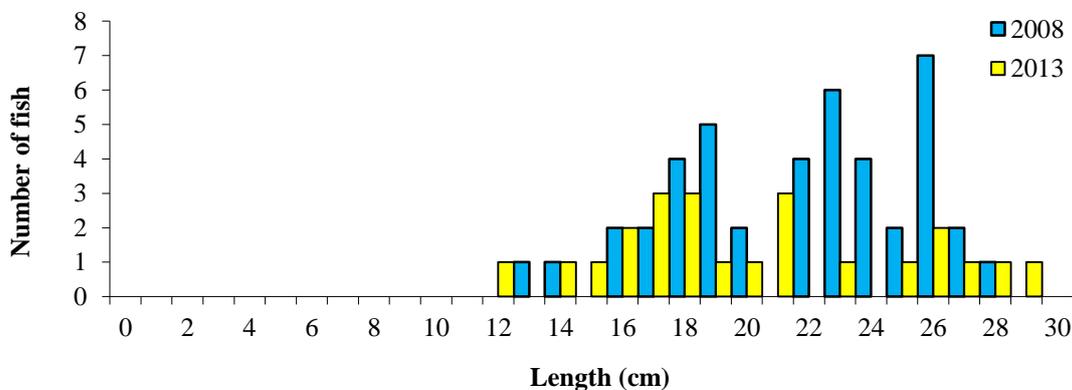


Fig. 4.17. Length frequency distribution for brown trout in the River Erne (Belturbet Br.), June 2008 (n = 43) and August 2013(n = 23)

4.1.5 The Finn River

One site was electric fished on the Finn River as part of the WFD surveillance monitoring programme in rivers 2013. The survey site was located downstream of Cumber Br. approximately 3km south of Clones, Co. Monaghan (Fig. 4.18; Plate 4.6). Two electric-fishing passes were conducted using two boat-based electric fishing units on the 15th of August 2013, along a 201m length of channel. Glide dominated the habitat, while the substrate was a mix of mud, gravel and cobble. The vegetation at this site was diverse, consisting of a large number of submerged, floating and emergent species.

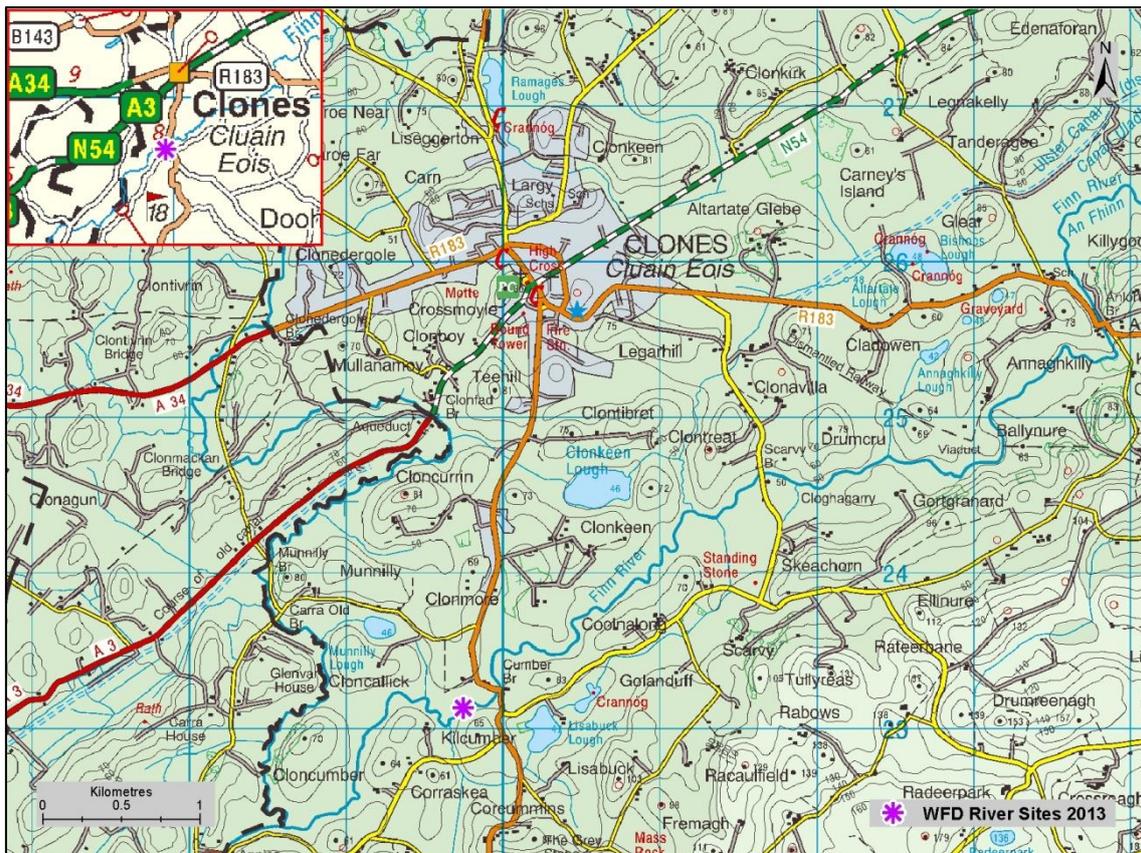


Fig. 4.18. Location of the Finn River (Cumber Br.) surveillance monitoring site



Plate 4.6. The Finn River at Cumber Br., Clones, Co. Monaghan

Seven fish species were recorded in the Finn River during the 2013 survey (Table 4.6). Roach was the most abundant species recorded, followed by gudgeon.

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

Species	Total minimum density	
	2009	2013
Roach	0.017	0.060
Gudgeon	0.032	0.037
Perch	0.001	0.017
Brown trout	0.012	0.008
0+ Brown trout	0.005	0.000
1++ Brown trout	0.008	0.008
Pike	0.001	0.002
Three-spined stickleback	0.0004	0.0008
Lamprey sp.	0.0004	0.0004
European eel	0.0004	-
Stone loach	0.0004	-
All Fish	0.064	0.126

Roach captured during the 2013 survey ranged in length from 3.1cm to 25.3cm (mean = 11.6cm) (Fig. 4.2). Ten age classes (0+ to 8+ inclusive, and 11+) were present, accounting for 7%, 0.5%, 8%, 86%, 45%, 28%, 13%, 8%, 0.5% and 0.5% of the total roach catch respectively. Roach captured during the 2009 survey ranged in length from 3.1cm to 18.6cm (mean = 6.4cm). Six age classes (0+, 1+, 2+, 3+, 4+ and 5+) were present, accounting for 37%, 41%, 3%, 12%, 7% and 1% of the total roach catch respectively

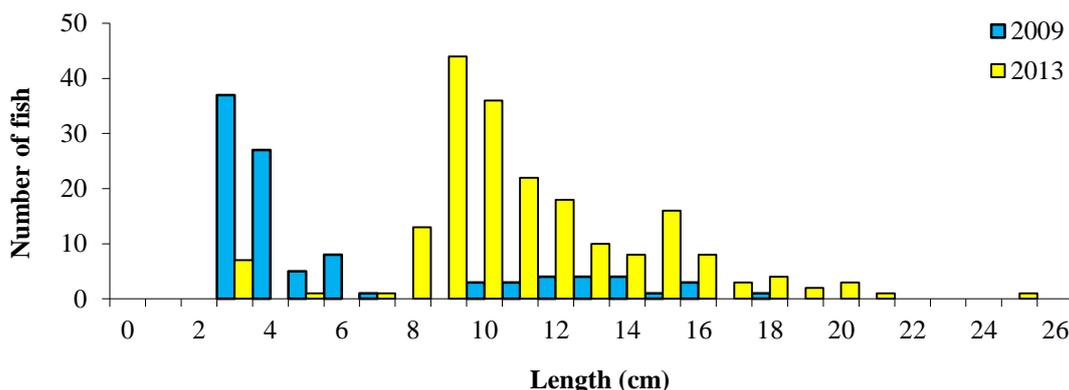


Fig. 4.19. Length frequency distribution of roach in the Finn River (Cumber Br.), October 2009 (n = 101) and August 2013 (n = 198)

Gudgeon captured during the 2013 survey ranged in length from 3.7cm to 12.6cm (mean = 10.3cm) (Fig. 4.20). Gudgeon captured during the 2009 survey ranged in length from 6.2cm to 13.5cm (mean = 10.8cm).

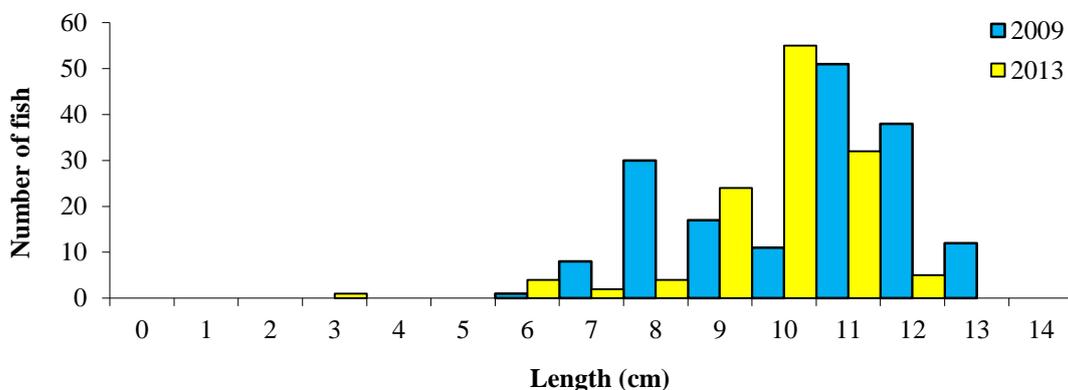


Fig. 4.20. Length frequency distribution of gudgeon in the Finn River (Cumber Br.), October 2009 (n = 168) and August 2013 (n = 127)

Perch captured during the 2013 survey ranged in length from 5.1cm to 18.8cm (mean = 10.4cm) (Fig. 4.21). Perch captured during the 2009 survey ranged in length from 6.0cm to 18.1cm (mean = 10.7cm).

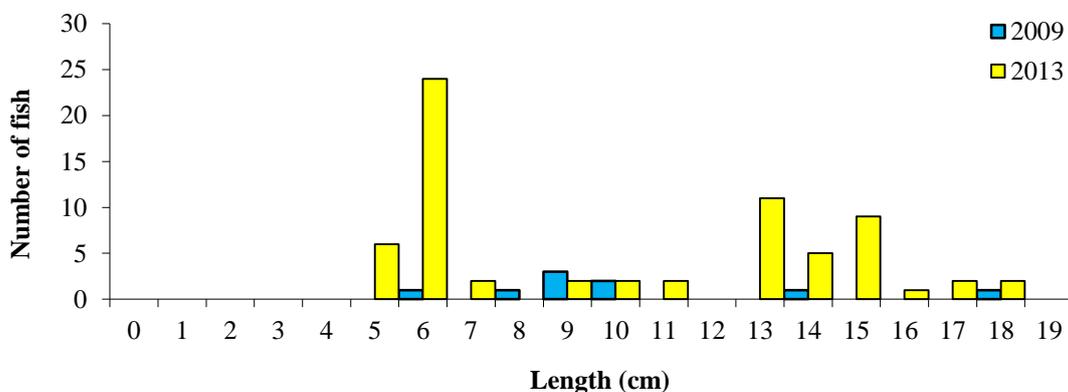


Fig. 4.21. Length frequency distribution of perch in the Finn River (Cumber Br.), October 2009 (n = 9) and August 2013 (n = 68)

Brown trout captured during the 2013 survey ranged in length from 9.1cm to 26.8cm (mean = 18.6cm) (Fig. 4.22). Three age classes (0+, 1+ and 2+) were present, accounting for 4%, 70% and 26% of the total brown trout catch respectively. Brown trout captured during the 2009 survey ranged in length from 6.4cm to 26.9cm (mean = 14.3cm). Three age classes (0+, 1+ and 2+) were present, accounting for 49%, 42% and 9% of the total brown trout catch respectively.

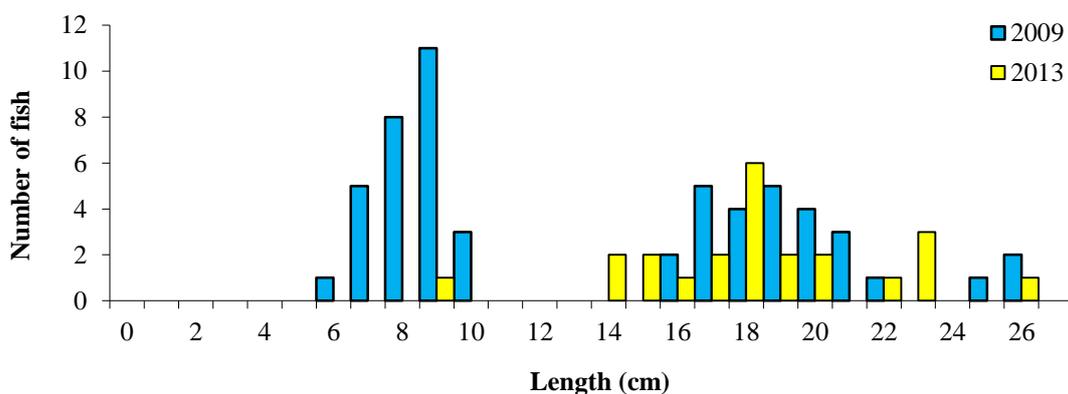


Fig. 4.22. Length frequency distribution of brown trout in the Finn River (Cumber Br.), October 2009 (n = 55) and August 2013 (n = 23)

4.2 Community Structure

4.2 Species distribution

A total of eleven fish species and one hybrid were recorded within the six NWIRBD sites surveyed during 2013 (Fig. 4.23). Perch was the most common fish species recorded, occurring in all six sites, followed by brown trout, gudgeon, roach, pike, lamprey, European eel three-spined stickleback and minnow. Nine-spined stickleback, bream and roach x bream hybrids were only recorded at one site each.

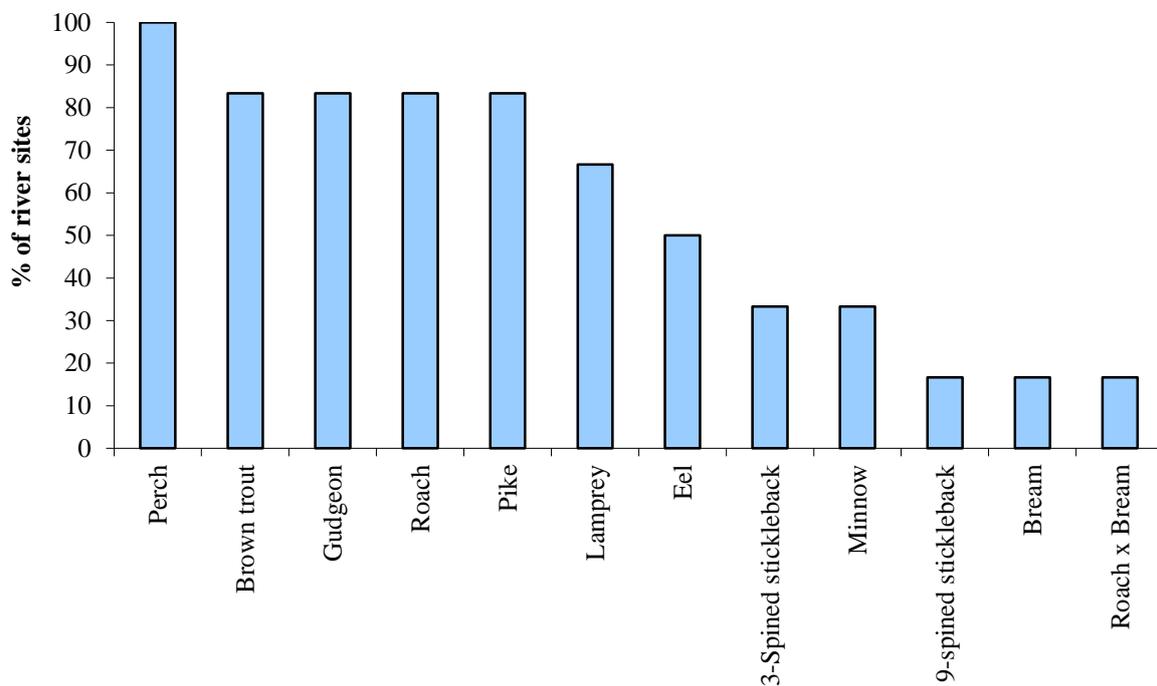


Fig. 4.23. Percentage of sites where each fish species was recorded in the NWIRBD for WFD SM monitoring 2013

4.3 Age and growth

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

The mean back-calculated length-at-age data for brown trout in the NWIRBD are shown in Figure 4.24 and Appendix 1. Brown trout were recorded at five of the six sites. All of these sites had brown trout aged 1+ and older, while only the Finn River had fry aged 0+. Ages ranged from 0+ to 3+, with fish aged 1+ and 2+ comprising the most abundant age classes within the region. The largest brown trout recorded in the NWIRBD in 2013 was caught in the Dromore River, which measured 33.3cm in length, weighed 457g and was aged 3+. The brown trout at each river site were assigned growth categories described by Kennedy and Fitzmaurice (1971), who examined the relationship between alkalinity and growth of brown trout in Irish streams and rivers. Using this method, the growth rate can only be reliably estimated from fish at sites where individual fish are 2+ or older, and where sufficient numbers are caught. Growth was considered fast at the Finn River and River Erne (Belturbet Br.) and very fast at the Dromore River (Appendix 1).

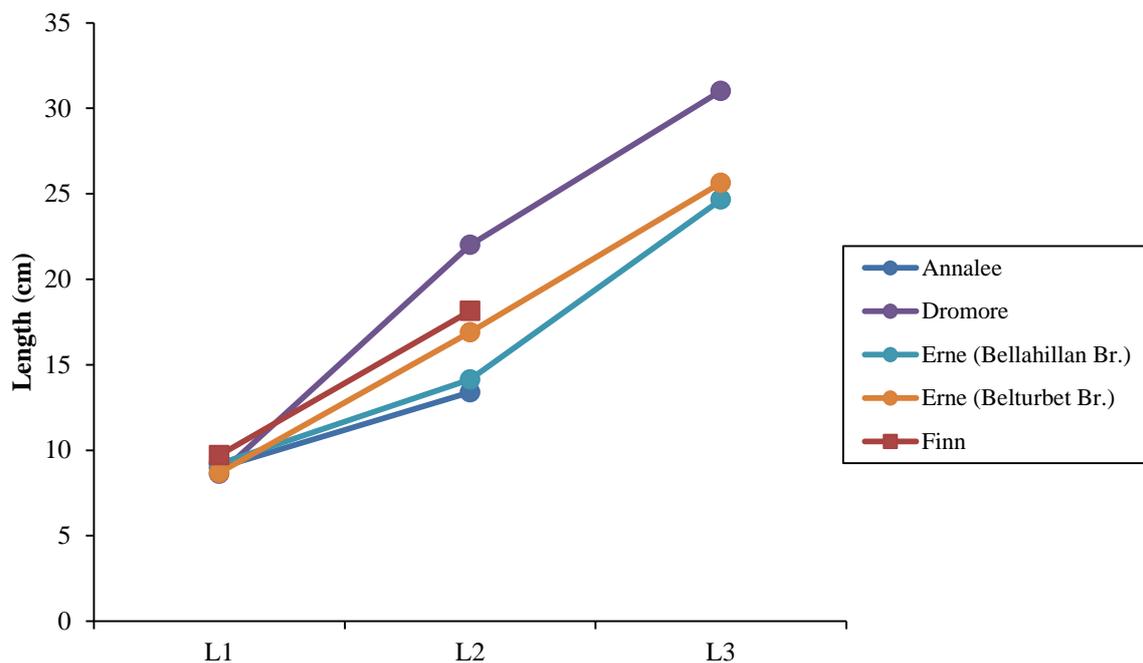


Fig. 4.24. Back calculated lengths for brown trout in each river site, WFD surveillance monitoring 2013

The mean back-calculated length-at-age data for roach in the NWIRBD are shown in Figure 4.25 and Appendix 2. Roach were recorded in five river sites and ranged in age from 0+ to 11+ (except 9+). The most abundant age class was 3+, with those aged between 0+ and 2+ also highly represented. The largest roach recorded in the NWIRBD during 2013 was caught in the Finn River site, measured 25.3cm, weighed 254g and was aged 11+.

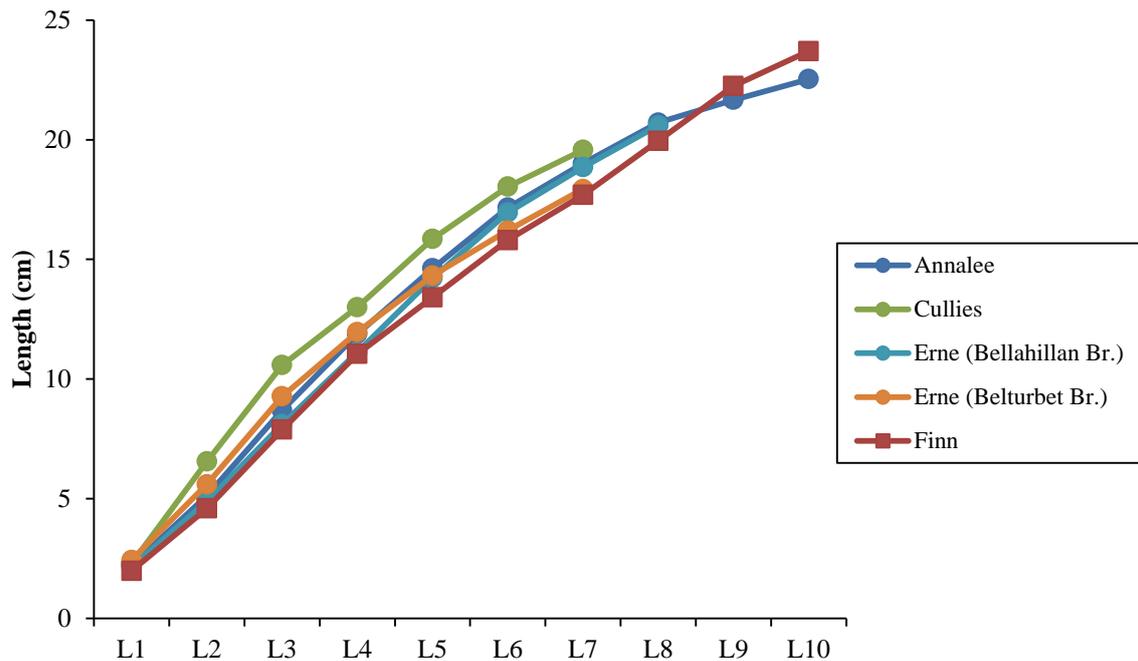


Fig. 4.25. Back calculated lengths for roach in each river, WFD surveillance monitoring 2013

The mean back-calculated length-at-age data for pike in the NWIRBD are shown in Figure 4.26 and Appendix 3. Pike were recorded in five river sites and ranged in age from 0+ to 6+ (except 5+). The most abundant age class was 1+. The largest pike recorded in the NWIRBD during 2013 was caught in the River Erne (Bellahillan Br.) site, measured 69.3cm, weighed 69g and was aged 6+.

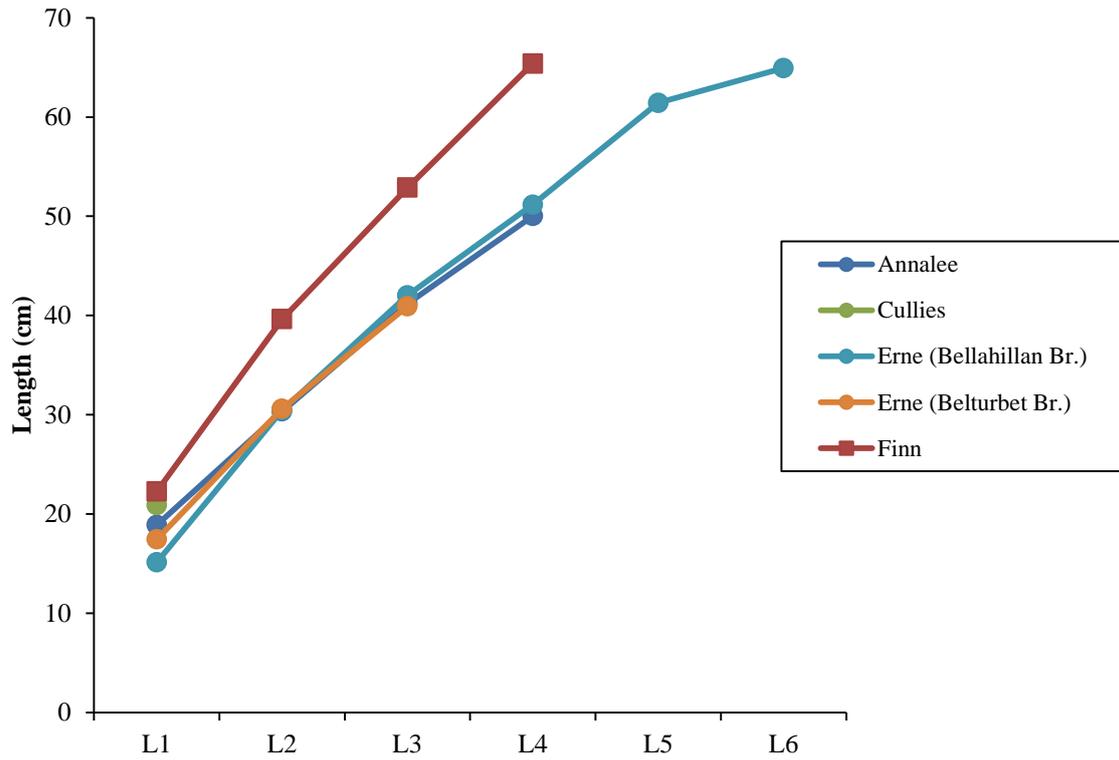


Fig. 4.26. Back calculated lengths for pike in each river, WFD surveillance monitoring 2013

4.4 Ecological status

An essential step in the WFD process is the classification of the ecological status of lakes, rivers and transitional waters, which in turn will assist in identifying objectives that must be set in the individual River Basin District Management Plans. Following an approach similar to that developed by the Environment Agency in England and Wales, the Fisheries Classification Scheme 2 (FCS2) has been developed for the Republic of Ireland and Northern Ireland, along with a separate version for Scotland, to comply with the requirements of the WFD. Agencies throughout each of the three regions contributed data to be used in the model, which was developed under the management of the Scotland & Northern Ireland Forum for Environmental Research (SNIFFER). This method is a geostatistical model based on Bayesian probabilities, that makes probabilistic comparisons of observed fish counts with expected (predicted) fish counts under reference (un-impacted conditions). This classification system (SNIFFER, 2011) generates Ecological Quality Ratings (EQRs) between 1 and 0 for each site, corresponding to the five different ecological status classes of High, Good, Moderate, Poor and Bad. Confidence levels are then assigned to each class and represented as probabilities. The confidence level for a site is expressed as the probability of that site being assigned to each different status class, with the highest class probability being the overall classification.

Using this tool and expert opinion, each site surveyed in 2013 was assigned a draft fish classification status (Table 4.7). Four sites were classed as Moderate and two as Poor. When comparing the status this year with that from previous years, there was no change in status.

Table 4.7. Ecological status of sites surveyed in the NWIRBD for surveillance monitoring 2013 (figures in brackets indicate confidence of site status being correct)

River	Site name	Site Code	Previous ecological status	Ecological status 2013
NWIRBD Wadeable sites				
Cullies	Kilbrackan Br._A	36C030600A	Poor (93%)(2010)	Poor
Dromore	Drummuck_A	36D020125A	Poor (2011)	Poor (100%)
NWIRBD Non-Wadeable sites				
Annalee	Cavan confl._A	36A021400A	Moderate (69%)(2008)	Moderate
Erne	Bellahillan Br._A	36E011100A	Moderate (2009)	Moderate
Erne	Belturbet Br._A	36E011400A	Moderate (92%)(2008)	Moderate (99%)
Finn (Monaghan)	Cumber Br._A	36F010500A	Moderate (77%)(2009)	Moderate (98%)

5. DISCUSSION

A total of 11 fish species and one hybrid were recorded during the 2013 WFD surveillance monitoring programme for fish in rivers within the NWIRBD. Perch was the most commonly encountered species in the NWIRBD, recorded in all six sites. The Annalee River was the most diverse site surveyed within the NWIRBD in 2013 with a total of eight species and one hybrid recorded. The site that recorded the lowest diversity in this region was the Cullies River with five species present. The greatest abundance of brown trout was recorded in the Dromore River, while no salmon were recorded in any of the six sites.

Following the methods of Kennedy and Fitzmaurice (1971), growth was considered fast at the Finn River and River Erne (Belturbet Br.) and very fast at the Dromore River (Appendix 1).

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

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

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

APPENDIX 1

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

River		L1	L2	L3	Growth category
Annalee (Cavan confl.)	Mean	8.98	13.39		n/a
	S.D.	2.18	n/a		
	S.E.	1.09	n/a		
	n	4	1		
	Min	6.15	13.39		
	Max	11.28	13.39		
Dromore (Drummuck)	Mean	8.62	22.01	31.01	Very Fast
	S.D.	1.06	1.56	n/a	
	S.E.	0.37	0.78	n/a	
	n	8	4	1	
	Min	7.51	20.57	31.01	
	Max	10.34	23.44	31.01	
Erne (Bellahillan Br.)	Mean	9.21	14.14	24.66	n/a
	S.D.	2.34	n/a	n/a	
	S.E.	1.35	n/a	n/a	
	n	3	1	1	
	Min	6.57	14.14	24.66	
	Max	11.05	14.14	24.66	
Erne (Belturbet Br.)	Mean	8.68	16.89	25.63	Fast
	S.D.	1.16	1.90	0.98	
	S.E.	0.25	0.55	0.57	
	n	22	12	3	
	Min	5.82	12.51	24.69	
	Max	10.62	19.18	26.65	
Finn (Cumber Br.)	Mean	9.71	18.14		Fast
	S.D.	1.47	2.95		
	S.E.	0.32	1.21		
	n	21	6		
	Min	6.35	15.60		
	Max	11.63	23.27		

APPENDIX 2

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

River		L1	L2	L3	L4	L5	L6	L7	L8	L9	L10
Annalee (Cavan Confl.)	Mean	2.22	5.12	8.70	11.89	14.62	17.16	19.00	20.71	21.67	22.53
	S.D.	0.52	1.28	1.80	1.62	1.22	1.22	1.17	0.83	n/a	n/a
	S.E.	0.06	0.16	0.25	0.28	0.23	0.31	0.39	0.42	n/a	n/a
	n	67	65	54	34	27	16	9	4	1	1
	Min	1.43	2.59	5.62	7.63	12.18	14.66	17.54	20.01	21.67	22.53
	Max	4.05	8.68	14.20	14.10	16.70	18.73	20.91	21.90	21.67	22.53
Cullies (Kilbrackan Br.)	Mean	2.29	6.55	10.58	13.00	15.85	18.03	19.57			
	S.D.	0.45	1.14	1.79	1.32	0.79	1.12	n/a			
	S.E.	0.08	0.19	0.39	0.37	0.26	0.65	n/a			
	n	34	34	21	13	9	3	1			
	Min	1.37	4.31	7.07	11.44	14.72	17.14	19.57			
	Max	3.35	9.42	14.20	15.23	16.82	19.29	19.57			
Erne (Bellahillan Br.)	Mean	2.16	4.90	8.11	11.12	14.22	16.96	18.85	20.59		
	S.D.	0.51	1.08	1.55	1.56	1.18	1.26	0.41	n/a		
	S.E.	0.07	0.15	0.24	0.29	0.27	0.45	0.18	n/a		
	n	54	53	42	29	19	8	5	1		
	Min	1.23	2.68	4.44	8.50	12.53	15.57	18.49	20.59		
	Max	3.33	7.67	11.91	14.50	16.51	19.32	19.48	20.59		
Erne (Belturbet Br.)	Mean	2.44	5.60	9.27	11.96	14.32	16.20	17.94			
	S.D.	0.54	1.21	1.70	1.89	1.76	1.54	1.18			
	S.E.	0.09	0.19	0.27	0.38	0.40	0.47	0.42			
	n	40	40	39	25	19	11	8			
	Min	1.56	2.74	6.41	9.31	11.85	13.91	16.24			
	Max	3.70	7.64	14.00	17.31	19.34	18.91	20.02			
Finn (Cumber Br.)	Mean	1.99	4.59	7.89	11.05	13.42	15.80	17.69	19.95	22.25	23.70
	S.D.	0.37	0.89	1.23	1.20	1.35	1.56	1.59	0.77	n/a	n/a
	S.E.	0.05	0.12	0.17	0.18	0.25	0.38	0.50	0.55	n/a	n/a
	n	57	57	54	42	29	17	10	2	1	1
	Min	1.35	3.08	5.72	8.41	10.47	12.53	15.12	19.41	22.25	23.70
	Max	2.83	6.37	10.83	14.16	16.46	18.67	20.25	20.50	22.25	23.70

APPENDIX 3

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

River		L1	L2	L3	L4	L5	L6
Annalee (Cavan confl.)	Mean	18.88	30.34	41.19	50.02		
	S.D.	3.12	3.27	2.70	3.15		
	S.E.	0.70	1.64	1.56	2.23		
	n	20.00	4.00	3.00	2.00		
	Min	13.76	27.23	38.15	47.79		
	Max	26.12	34.95	43.27	52.24		
Cullies (Kilbracken Br.)	Mean	20.90					
	S.D.	n/a					
	S.E.	n/a					
	n	1.00					
	Min	20.90					
	Max	20.90					
Erne (Bellahillan Br.)	Mean	15.13	30.44	42.02	51.17	61.43	64.93
	S.D.	2.21	4.01	4.36	5.12	1.12	1.56
	S.E.	0.49	1.16	1.54	1.94	0.79	1.10
	n	20.00	12.00	8.00	7.00	2.00	2.00
	Min	10.94	22.48	35.12	43.39	60.64	63.83
	Max	18.21	35.41	47.49	55.45	62.23	66.04
Erne (Belturbet Br.)	Mean	17.43	30.62	40.93			
	S.D.	4.14	6.32	n/a			
	S.E.	1.69	4.47	n/a			
	n	6.00	2.00	1.00			
	Min	10.90	26.15	40.93			
	Max	21.44	35.08	40.93			
Finn (Cumber Br.)	Mean	22.26	39.62	52.89	65.38		
	S.D.	4.90	3.11	4.83	n/a		
	S.E.	2.45	1.79	3.41	n/a		
	n	4.00	3.00	2.00	1.00		
	Min	19.07	36.09	49.48	65.38		
	Max	29.55	41.92	56.30	65.38		

APPENDIX 4

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

River		L1	L2	L3	L4	L5	L6
Annalee (Cavan confl.)	Mean	2.40	6.25	11.18	14.55	19.83	21.52
	S.D.	n/a	n/a	n/a	n/a	n/a	n/a
	S.E.	n/a	n/a	n/a	n/a	n/a	n/a
	n	1	1	1	1	1	1
	Min	2.40	6.25	11.18	14.55	19.83	21.52
	Max	2.40	6.25	11.18	14.55	19.83	21.52

APPENDIX 5

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

River		L1	L2	L3	L4	L5	L6	L7	L8	L9
Annalee (Cavan confl.)	Mean	2.96	7.06	11.86	15.08	20.39	22.81	27.19	27.35	30.65
	S.D.	0.29	0.64	1.82	1.52	2.68	4.04	3.70	n/a	n/a
	S.E.	0.21	0.45	1.29	1.07	1.90	2.86	2.61	n/a	n/a
	n	2	2	2	2	2	2	2	1	1
	Min	2.75	6.61	10.57	14.00	18.50	19.95	24.57	27.35	30.65
	Max	3.17	7.51	13.15	16.15	22.29	25.67	29.80	27.35	30.65



**IFI Dublin,
3044 Lake Drive,
Citywest Business Campus,
Dublin 24,
Ireland**

**www.fisheriesireland.ie
dublin@fisheriesireland.ie
+353 1 8842 600**