

Sampling Fish for the Water Framework Directive

Rivers 2014



Sampling Fish for the Water Framework Directive, Rivers 2014

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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.

Inland Fisheries Ireland has been assigned the responsibility by the EPA of delivering the fish monitoring requirements of the WFD in Ireland. Over 300 water bodies, encompassing rivers, lakes and transitional waters are required to be surveyed in a three year rolling programme.

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 2014 surveillance monitoring programme for rivers and highlights the current status of each water body in accordance with the fish populations present.

A total of 70 river sites were surveyed during 2014 using boat-based electric-fishing gear for the non-wadeable sites and bank based (hand-set) electric-fishing gear for the wadeable sites. A total of 14 fish species (sea trout are included as a separate 'variety' of trout) and one type of hybrid (roach x bream) were recorded. Brown trout was the most common fish species recorded, being present in 95.7% of sites surveyed, followed by salmon (77.1%), European eel (55.7%), stone loach (50.0%), minnow, and three-spined stickleback (38.6%), lamprey sp. (34.3%), roach (22.9%), perch (18.6%), pike (14.3%), gudgeon (12.9%), sea trout (11.3%), flounder (10.0%), dace (5.7%) and roach x bream hybrids (1.4%). Brown trout and salmon population densities were greater in wadeable streams, sampled using bank-based electric-fishing gear, when compared to the deeper rivers surveyed using boat-based gear. This is mainly due to the preference for large numbers of juvenile salmonids to inhabit shallow riffle areas.

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 2014; three sites were classed as High, 38 as Good, 25 as Moderate and two as Poor. Two sites were not classified.





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TABLE OF CONTENTS

| | |
|--|-----|
| EXECUTIVE SUMMARY | 1 |
| ACKNOWLEDGEMENTS | 3 |
| PROJECT STAFF | 3 |
| 1. INTRODUCTION..... | 5 |
| 2. STUDY AREA..... | 5 |
| 3. METHODS | 3 |
| 4. RESULTS..... | 4 |
| 4.1 River surveys..... | 4 |
| 4.1.1 Eastern River Basin District - wadeable sites..... | 4 |
| 4.1.2 Eastern River Basin District - non-wadeable sites..... | 8 |
| 4.1.3 Neagh-Bann International River Basin District - wadeable sites..... | 10 |
| 4.1.5. North Western River Basin District - wadeable sites | 14 |
| 4.1.6. South Eastern River Basin District - wadeable sites | 19 |
| 4.1.7. South Eastern River Basin District - non-wadeable sites | 29 |
| 4.1.8. Shannon International River Basin District - wadeable sites | 44 |
| 4.1.9. Shannon International River Basin District - non-wadeable sites | 49 |
| 4.1.10. South Western River Basin District - wadeable sites..... | 53 |
| 4.1.11. Western River Basin District - wadeable sites | 59 |
| 4.1.12. Western River Basin District - non-wadeable sites | 64 |
| 4.2 Community Structure | 72 |
| 4.3 Age and growth..... | 73 |
| 4.4 Ecological status..... | 78 |
| 5. DISCUSSION | 83 |
| 6. REFERENCES..... | 83 |
| APPENDIX 1 | 84 |
| APPENDIX 2 | 86 |
| APPENDIX 3 | 88 |
| APPENDIX 4 | 90 |
| APPENDIX 5 | 98 |
| APPENDIX 6 | 103 |
| APPENDIX 7 | 104 |
| APPENDIX 8 | 106 |
| APPENDIX 9 | 108 |



1. INTRODUCTION

Fish stock surveys were undertaken at 70 river sites in 29 catchments throughout Ireland during the summer of 2014 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).

Although fish stock surveys have been carried out in Ireland in the past, no project to date has been as extensive as the current on-going monitoring programme. Continued surveying of these 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. 2014 is the seventh year of the fish in river 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 2014 can be compared with that from at least one previous sampling occasion, to determine whether the status of our rivers is improving or deteriorating.

This report summarises the results of the 2014 fish stock surveys carried out within each River Basin District (RBD), as part of the Water Framework Directive surveillance monitoring programme.

2. STUDY AREA

Thirty-six sites were wadeable and surveyed using bank-based electric fishing equipment; the remaining 34 non-wadeable sites were surveyed using boat based equipment. Sites ranged in surface area from 114m² at the Tubbercurry River site just upstream of the River Moy confluence to 19,445m² for the River Nore at Brownsbarn.

Summary details for each site's location and physical characteristics are given in Tables 2.1 and 2.2, and the distribution map of sites throughout Ireland is shown in Figure 2.1.

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 minimum 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.).



Plate 2.1. Electric-fishing using bank-based equipment on the the River Duag at Ballyporeen



Plate 2.1. Electric-fishing using boat-based equipment on the the Aherlow River at Old Cappa Br.



Plate 2.3. Processing samples on the River Suir at Kilsheelan Br.

4. RESULTS

4.1 River surveys

4.1.1 Eastern River Basin District - wadeable sites

Six river sites were surveyed in four river catchments within the Eastern River Basin District (ERBD). The ERBD covers a land area of around 6,300km² and sea area of approximately 350km².

It is situated mainly over the north-eastern part of Leinster, with a coastline of about 130km, stretching from south Co. Cavan in the north to Co. Wexford in the south. Catchments with sites surveyed on them included the Boyne, Dargle, Liffey and Vartry. Four sites were wadeable and two were non-wadeable (Fig. 4.1).



Fig. 4.1. Map of the ERBD showing all sites surveyed in 2014

Dargle River (Bahana_A)

This site was located on the upstream side of a bridge, approximately 1.5km below Powerscourt Waterfall, near Enniskerry Co. Wicklow (Plate 4.1). One electric-fishing pass was conducted using two bank-based electric fishing units on the 7th of July 2014, along a 37m length of channel. Glide dominated the habitat, over a substrate of mainly cobble.



Plate 4.1. The Dargle River at Bahana Br., Co. Wicklow

Brown trout was the only species recorded (Table 4.1 and Fig. 4.2), although salmon were previously recorded during the 2012 survey. A change in age structure of brown trout was observed at the site between the two survey occasions (Table 4.1 and Fig. 4.2).

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

| Species | Total minimum density | |
|------------------------|-----------------------|-------|
| | 2012 | 2014 |
| Brown trout | 0.119 | 0.210 |
| 0+ brown trout | 0.087 | 0.051 |
| 1+ & older brown trout | 0.032 | 0.159 |
| Salmon | 0.003 | - |
| 0+ salmon | - | - |
| 1+ & older salmon | 0.003 | - |
| All Fish | 0.122 | 0.210 |

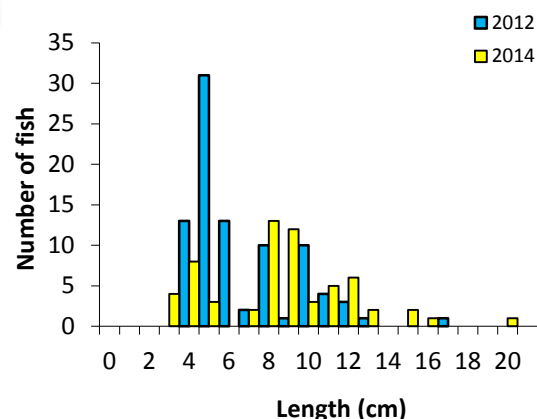


Fig. 4.2. Length frequency distribution of brown trout in the Dargle River (Bahana_A), August 2012 (n=89) and July 2014 (n=62)

River Dodder

Two sites were electric fished on the River Dodder, one at Mount Carmel Hospital and another at Bohernabreena.

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



Plate 4.2. The River Dodder at Bohernabreena, South Co. Dublin

The Bohernabreena survey site was located along the Dublin Mountains Way, approximately 2.5km south of Oldbawn, Co. Dublin (Plate 4.2). Three electric-fishing passes were conducted using one three bank-based electric fishing units on the 16th of July 2014, along a 43m length of channel. Riffle dominated the habitat, over a substrate of cobble and boulder.

Brown trout was the most common species encountered in 2014 (Table 4.2 and Fig. 4.3). Fry (0+) were present again in 2014 after an absence



in 2013 but were still much fewer than in the first survey in 2011.

Table 4.2. Density of fish (no./m²), River Dodder (d/s Piperstown Stream, Bohernabreena_A)

| Species | Total minimum density | | |
|------------------------|-----------------------|-------|-------|
| | 2011 | 2013 | 2014 |
| Brown trout | 0.234 | 0.086 | 0.067 |
| 0+ brown trout | 0.095 | - | 0.022 |
| 1+ & older brown trout | 0.139 | 0.086 | 0.044 |
| European eel | 0.004 | - | 0.003 |
| Stone loach | 0.004 | 0.003 | 0.003 |
| All Fish | 0.241 | 0.089 | 0.073 |



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

Brown trout was the most commonly encountered species in 2014 (Table 4.3 and Fig. 4.4), followed closely by minnow. Three-spined stickleback, stone loach and minnow were all recorded again in 2014 after an absence in 2013.

Table 4.3. Density of fish (no./m²), River Dodder (Mount Carmel Hospital_A)

| Species | Total minimum density | | |
|--------------------------|-----------------------|-------|-------|
| | 2011 | 2013 | 2014 |
| Brown trout | 0.111 | 0.221 | 0.126 |
| 0+ brown trout | 0.091 | 0.150 | 0.089 |
| 1+ & older brown trout | 0.020 | 0.071 | 0.036 |
| European eel | 0.002 | 0.009 | 0.003 |
| Minnow | 0.002 | - | 0.120 |
| Stone loach | 0.034 | - | 0.042 |
| Three-spined stickleback | 0.069 | - | 0.003 |
| All Fish | 0.219 | 0.230 | 0.293 |

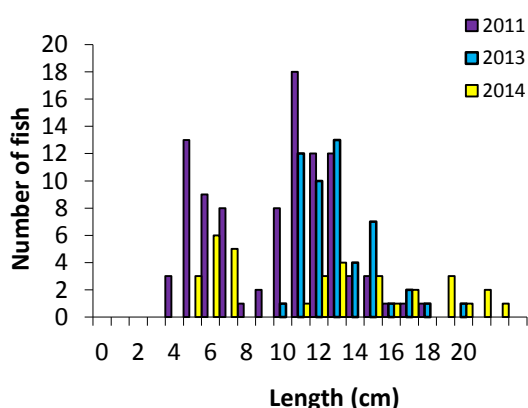


Fig. 4.3. Length frequency distribution of brown trout in the River Dodder (d/s Piperstown stream, Bohernabreena_A), July 2011 (n=95), July 2013 (n=52) and July 2014 (n=35).

Dodder, River (Mount Carmel Hospital_A)

The Mount Carmel 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 16th of July 2014, along a 37m length of channel. Glide dominated the habitat, over a substrate of mainly cobble.

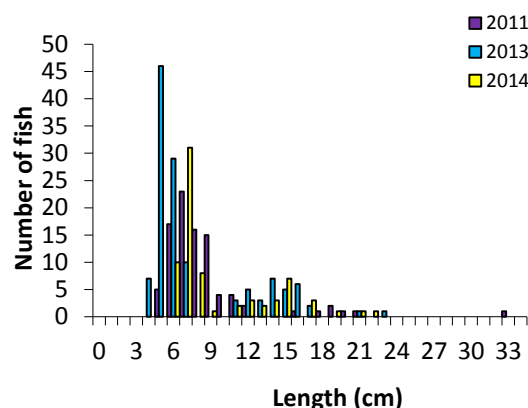


Fig. 4.4. Length frequency distribution of brown trout in the River Dodder (Mount Carmel Hospital_A), September 2011 (n=93), July 2013 (n=125) and July 2014 (n=73)

Vartry River (Newrath Br._A)

This survey site was located downstream of Newrath Br., 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 12th of August 2014, along a 42m length of channel. Riffle and pool dominated the habitat, over a substrate of cobble and gravel.



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

Salmon was the most commonly encountered species in 2014, followed by brown trout and European eel (Table 4.1 and Figs. 4.5 and 4.6). All species present in 2013 were recorded again in 2014, except for three-spined stickleback.

Table 4.4. Density of fish (no./m²), Vartry River (Newrath Br._A)

| Species | Total minimum density | |
|------------------------|-----------------------|-------|
| | 2013 | 2014 |
| Brown trout | 0.098 | 0.052 |
| 0+ brown trout | 0.072 | 0.022 |
| 1+ & older brown trout | 0.026 | 0.031 |
| European eel | 0.014 | 0.043 |
| Flounder | 0.029 | 0.003 |
| Lamprey sp. | 0.003 | 0.015 |
| Minnow | 0.012 | 0.009 |
| Salmon | 0.058 | 0.148 |
| 0+ salmon | 0.052 | 0.136 |
| 1+ & older salmon | 0.006 | 0.012 |
| Sea trout | 0.014 | 0.015 |
| 3-spined stickleback | 0.006 | - |
| All Fish | 0.233 | 0.287 |

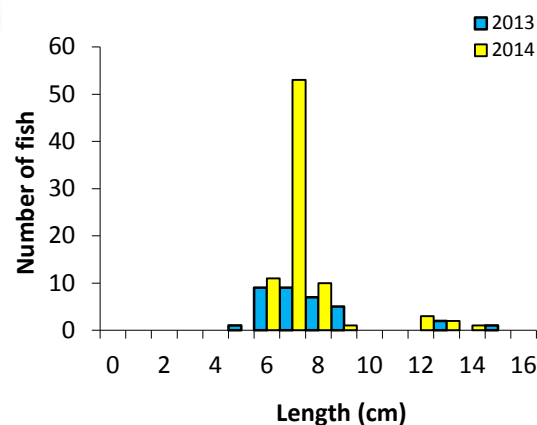


Fig. 4.5. Length frequency distribution of salmon in the Vartry River (Newrath Br._A), September 2013 (n=34) and August 2014 (n=81)

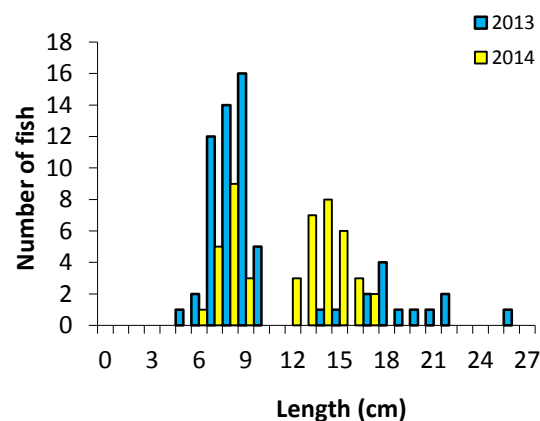


Fig. 4.6. Length frequency distribution of brown trout in the Vartry River (Newrath Br._A), September 2013 (n=64) and August 2014 (n=47)

4.1.2 Eastern River Basin District - non-wadeable sites

Boyne, River (Boyne Br._A)

This survey site was located close to the river's source, approximately 1.5km north of Edenderry (Plate 4.5). Three electric-fishing passes were conducted using one boat-based electric fishing unit on the 8th of July 2014, along a 134m length of channel. Glide dominated the habitat, over a substrate of mud and silt.



Plate 4.5. The River Boyne at Boyne Br., on the Kildare/Offaly border

Brown trout was the most commonly encountered species (Table 4.5 and Fig. 4.7). Only three fish species were recorded during the 2010 and 2014 survey, down from a total of six in 2009.

Table 4.5. Density of fish (no./m²), River Boyne (Boyne Br._A)

| Species | Total minimum density | | |
|------------------------|-----------------------|-------|-------|
| | 2009 | 2010 | 2014 |
| Brown trout | 0.073 | 0.050 | 0.089 |
| 0+ brown trout | - | 0.001 | - |
| 1+ & older brown trout | 0.073 | 0.049 | 0.089 |
| European eel | 0.002 | - | - |
| Lamprey sp. | 0.007 | - | - |
| Minnow | 0.005 | 0.002 | - |
| Stone loach | 0.003 | - | 0.002 |
| 3-spined stickleback | 0.005 | 0.004 | 0.004 |
| All Fish | 0.096 | 0.057 | 0.095 |

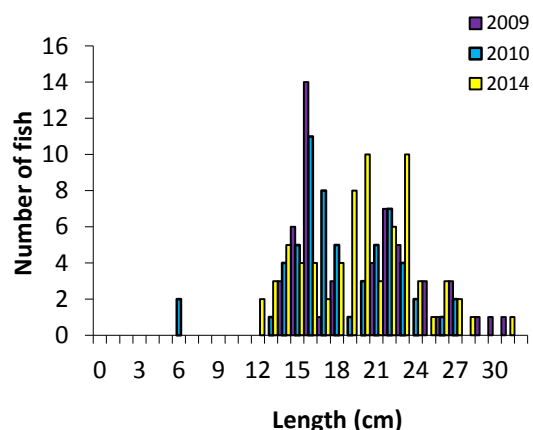


Fig. 4.7. Length frequency distribution of brown trout in the River Boyne (Boyne Br._A), August 2009 (n=53), July 2010 (n=61) and July 2014 (n=72)

River Liffey (Lucan Br._A)

This survey site was located downstream of the bridge in Lucan (Plate 4.6). One electric-fishing pass was conducted using four boat-based electric fishing units (two boats fishing parallel to each bank separately) on the 11th of July 2014, along a 249m length of channel. Glide dominated the habitat, over a substrate of mainly cobble.



Plate 4.6. The River Liffey at Lucan, South Co. Dublin

Salmon was the most commonly encountered species and showed a similar age structure between the two surveys (Table 4.6 and Fig. 4.8). Brown trout were recorded across a wide range of sizes, while gudgeon, absent in 2009, were recorded in 2014 (Fig. 4.9 and Table 4.6).

Table 4.6. Density of fish (no./m²), River Liffey (Lucan Br._A)

| Species | Total minimum density | |
|------------------------|-----------------------|--------|
| | 2009 | 2014 |
| Brown trout | 0.008 | 0.003 |
| 0+ brown trout | 0.001 | 0.0004 |
| 1+ & older brown trout | 0.007 | 0.003 |
| European eel | 0.002 | 0.002 |
| Gudgeon | - | 0.0002 |
| Lamprey sp. | 0.0004 | 0.0004 |
| Minnow | 0.012 | 0.019 |
| Roach | 0.0004 | 0.0004 |
| Salmon | 0.031 | 0.030 |
| 0+ salmon | 0.010 | 0.005 |
| 1+ & older salmon | 0.021 | 0.024 |
| Stone loach | 0.001 | 0.001 |
| All Fish | 0.054 | 0.056 |

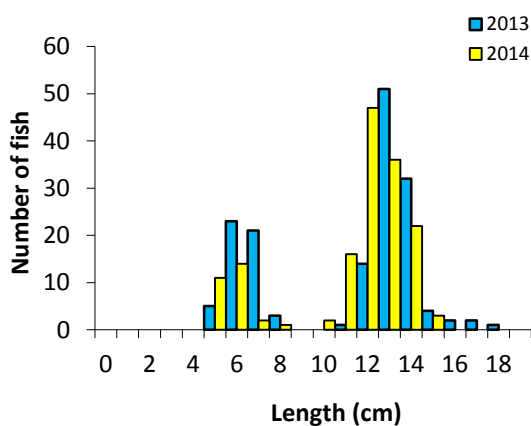


Fig. 4.8. Length frequency distribution of salmon in the River Liffey (Lucan_A), August 2009 (n=159) and July 2014 (n=154).

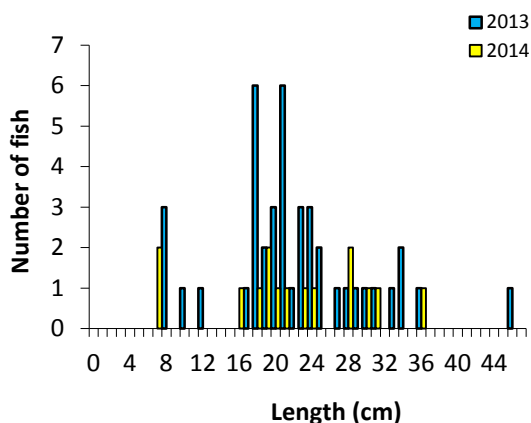


Fig. 4.9. Length frequency distribution of brown trout in the River Liffey (Lucan_A), August 2009 (n=42) and July 2014 (n=15)



4.1.3 Neagh-Bann International River Basin District - wadeable sites

Three river sites were surveyed within two river catchments within the Neagh-Bann International River Basin District (NBIRBD). The NBIRBD is one of three international river basin districts on the island of Ireland. Most of its area, some 6,000km²,

is situated within Northern Ireland while the remainder (2,000km²) is situated within the Republic of Ireland. The NBIRBD has the smallest stretch of coastline among all eight RBDs throughout Ireland (north and south). Catchments with surveys on them included, the Monaghan Blackwater and Dee. Two of these sites were wadeable and one was non-wadeable (Fig. 4.10).



Fig. 4.10. Map of the NBIRBD showing all sites surveyed in 2014

River Blackwater (Monaghan)(Corvally_A)

This survey site was located at Corvally, approximately 3km northeast of Monaghan Town (Plate 4.7). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 9th of July 2014, along a 40m length of channel. Glide and pool dominated the habitat, over a substrate of cobble, bedrock and gravel.



Plate 4.7. The River Blackwater at Corvally, Co. Monaghan

Brown trout was the most commonly encountered species (Table 4.7 and Fig. 4.11), followed by salmon.

Table 4.7. Density of fish (no./m²), River Blackwater (Monaghan)(Corvally_A)

| Species | Total minimum density 2014 |
|------------------------|-------------------------------|
| Brown trout | 0.061 |
| 0+ brown trout | 0.022 |
| 1+ & older brown trout | 0.039 |
| Gudgeon | 0.005 |
| Salmon | 0.007 |
| 0+ salmon | 0.005 |
| 1+ & older salmon | 0.002 |
| Stone loach | 0.005 |
| 3-spined stickleback | 0.002 |
| All Fish | 0.080 |

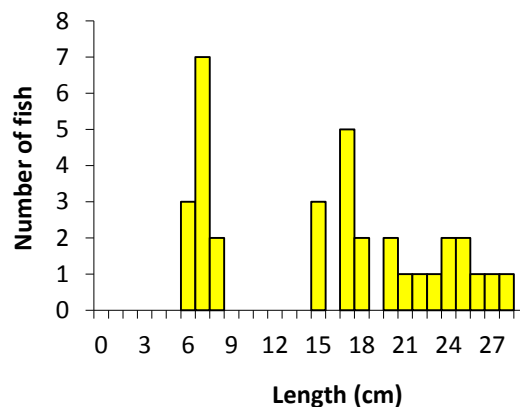


Fig. 4.11. Length frequency distribution of brown trout in the River Blackwater (Monaghan), July 2014 (n=34)

White River (Louth) (Coneyburrow Br._B)

This survey site was located upstream of Coneyburrow Br., 1km north of Dunleer, Co. Louth (Plate 4.8). Three electric-fishing passes were conducted using three bank-based electric fishing units on the 5th of August 2014, along a 45m length of channel. Glide dominated the habitat, over a mixed substrate of gravel, cobble and sand.



Plate 4.8. The White River at Coneyburrow Br., Co. Louth

Minnow was the most commonly encountered species (Table 4.8), followed by three-spined stickleback. Brown trout and salmon were present in relatively low densities (Table 4.8; Figs. 4.12 and 4.13).



Table 4.8. Density of fish (no./m²), White River (Louth) (Coneyburrow Br._B)

| Species | Total minimum density | | |
|------------------------|-----------------------|-------|-------|
| | 2012 | 2013 | 2014 |
| Brown trout | 0.123 | 0.007 | 0.011 |
| 0+ brown trout | 0.087 | 0.003 | 0.006 |
| 1+ & older brown trout | 0.036 | 0.007 | 0.006 |
| European eel | 0.003 | 0.007 | - |
| Lamprey sp. | 0.008 | - | 0.011 |
| Minnow | 0.081 | 0.214 | 0.386 |
| Salmon | 0.025 | 0.014 | 0.003 |
| 0+ salmon | 0.022 | 0.010 | 0.003 |
| 1+ & older salmon | 0.003 | 0.003 | - |
| Stone loach | 0.006 | 0.160 | 0.059 |
| 3-spined stickleback | 0.008 | 1.760 | 0.112 |
| All Fish | 0.254 | 2.161 | 0.581 |

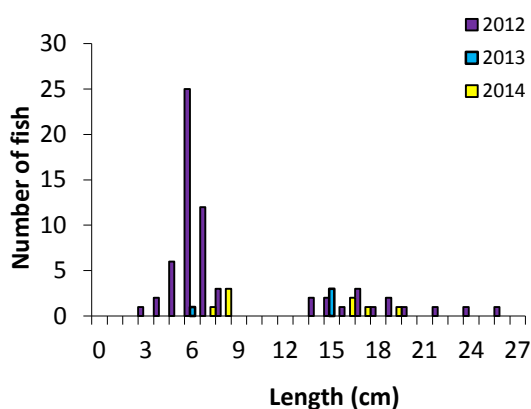


Fig. 4.12. Length frequency distribution of brown trout in the White River (Coneyburrow Br._B), July 2012 (n=64), August 2013 (n=4) and August 2014 (n=8)

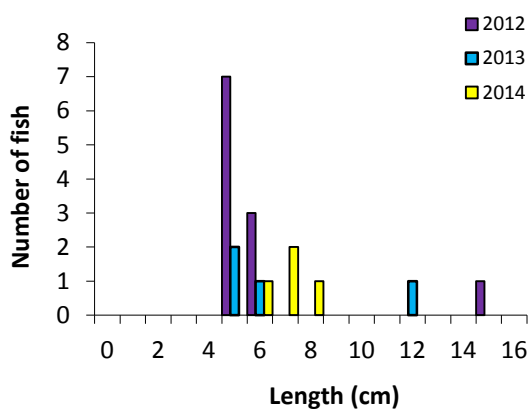


Fig. 4.13. Length frequency distribution of salmon in the White River (Coneyburrow Br._B), July 2012 (n=7), August 2013 (n=4) and August 2014 (n=7)

4.1.4 Neagh-Bann International River Basin District - non-wadeable Sites

Dee, River (Burley Br._A)

This survey site was located downstream of Burley Bridge between Mandistown and Ballygowan, Co. Meath (Plate 4.9). Three electric-fishing passes were conducted using one boat-based electric fishing unit on the 10th of July 2014, along a 150m length of channel. The habitat was made up of glide, over a substrate of mostly cobble.



**Plate 4.9. The River Dee at Burley Br.,
Louth/Meath Border**

Minnow was the most abundant species captured in 2014, followed by brown trout and roach (Table 4.9). Four fish species recorded in 2009 were absent from the 2014 survey, including three-spined stickleback, stone loach, gudgeon and European eel. Furthermore, only one salmon fry was captured in 2014.

**Table 4.9. Density of fish (no./m²), River Dee
(Burley Br._A)**

| Species | Total minimum density | |
|------------------------|-----------------------|-------|
| | 2009 | 2014 |
| Brown trout | 0.011 | 0.015 |
| 0+ brown trout | - | - |
| 1+ & older brown trout | 0.011 | 0.015 |
| European eel | 0.001 | - |
| Gudgeon | 0.002 | - |
| Minnow | 0.002 | 0.018 |
| Roach | 0.010 | 0.009 |
| Salmon | 0.004 | 0.001 |
| 0+ salmon | 0.001 | 0.001 |
| 1+ & older salmon | 0.003 | - |
| Stone loach | 0.003 | - |
| 3-spined stickleback | 0.016 | - |
| All Fish | 0.050 | 0.043 |

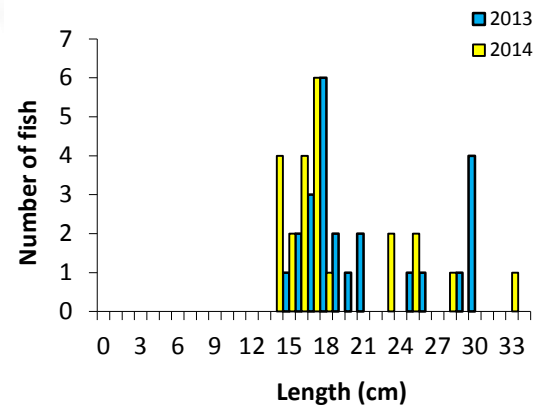


Fig. 4.14. Length frequency distribution of brown trout in the River Dee (Burley Br._A), August 2009 (n=24) and July 2014 (n=23)

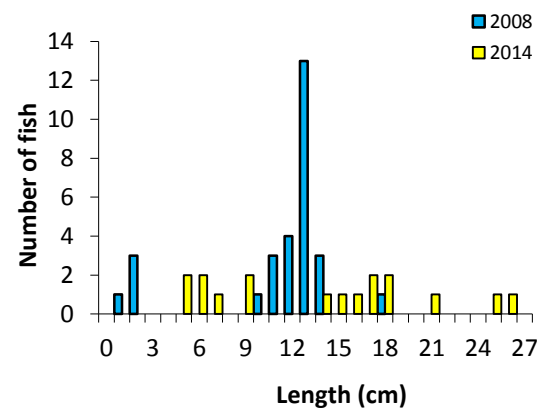


Fig. 4.15. Length frequency distribution of roach in the River Dee (Burley Br._A), August 2009 (n=29) and July 2014 (n=17)

4.1.5. North Western River Basin District - wadeable sites

Five river sites were surveyed in three river catchments within the North Western International River Basin District (NWIRBD). The NWIRBD is another cross-border RBD, shared with Northern Ireland. It encompasses all of Co. Donegal and parts of many other counties along

the border. It has a land surface area of approximately 12,300km² and a marine area (most of which belongs to Co. Donegal) of approximately 2,500km². Catchments where surveys were undertaken included the Clady, Erne and Swilly. All of these sites were wadeable (Fig. 4.16).



Fig. 4.16. Map of the NWIRBD showing all sites surveyed in 2014



Cronaniv Burn

Two sites were electric fished on the Cronaniv Burn, both upstream of Dunlewy Lough.

Cronaniv Burn (Br. u/s Dunlewy Lough_A)

The Dunlewy Lough survey site was located just upstream of the confluence with a sister stream, approximately 0.5km upstream of Dunlewy Lough (Plate 4.10). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 15th of July 2014, along a 45m length of channel. Riffle dominated the habitat, over a substrate of cobble, boulder and gravel.



Plate 4.10. The Cronaniv Burn upstream of Dunlewy Lough, Co. Donegal

Salmon and brown trout were the only two species encountered on all three survey occasions, with salmon consistently being the most abundant species recorded (Table 4.10).

Table 4.10. Density of fish (no./m²), Cronaniv Burn (Br. u/s Dunlewy Lough_A)

| Species | Total minimum density | | |
|------------------------|-----------------------|-------|-------|
| | 2008 | 2011 | 2014 |
| Brown trout | 0.026 | 0.032 | 0.038 |
| 0+ brown trout | 0.015 | 0.008 | 0.014 |
| 1+ & older brown trout | 0.011 | 0.024 | 0.024 |
| Salmon | 0.113 | 0.171 | 0.091 |
| 0+ salmon | 0.023 | 0.067 | 0.057 |
| 1+ & older salmon | 0.090 | 0.103 | 0.033 |
| All Fish | 0.140 | 0.202 | 0.129 |

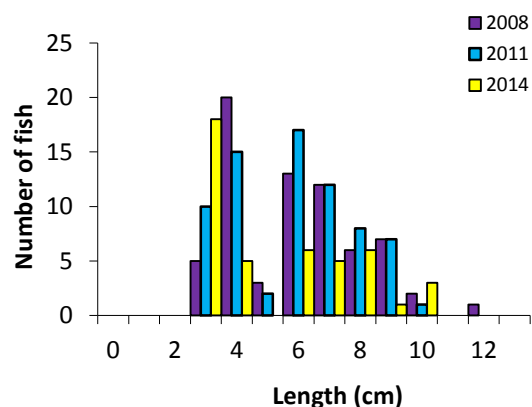


Fig. 4.17. Length frequency distribution of salmon in the Cronaniv Burn (Br. u/s Dunlewy Lough_A), September 2009 (n=69), August 2011 (n=72) and July 2014 (n=44)

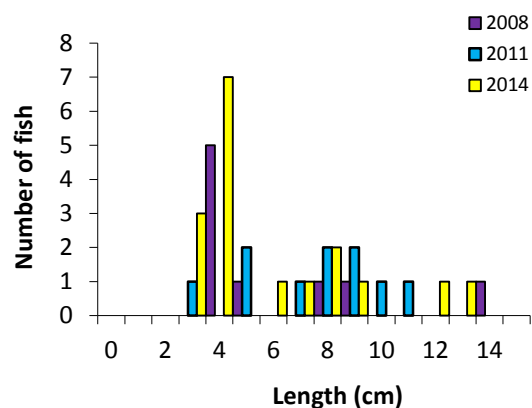


Fig. 4.18. Length frequency distribution of brown trout in the Cronaniv Burn (Br. u/s Dunlewy Lough_A), September 2009 (n=9), August 2011 (n=10) and July 2014 (n=17)

Cronaniv Burn (0.2km u/s Dunlewy Lough_A)

The survey site was located approximately 300m downstream of the first site, just upstream of a bridge near Dunlewy Lough (Plate 4.11). Three electric-fishing passes were conducted using three bank-based electric fishing units on the 15th of July 2014, along a 42m length of channel. Riffle dominated the habitat, over a substrate of mainly cobble and boulder.



Plate 4.11. The Cronaniv Burn at Dunlewy, Co. Donegal

Salmon and brown trout were the only two species encountered at this site, with salmon the more abundant of the two species (Table 4.11).

Table 4.11. Density of fish (no./m²), Cronaniv Burn (0.2km u/s dunlewy Lough_A)

| Species | Total minimum density 2014 |
|------------------------|----------------------------|
| Brown trout | 0.022 |
| 0+ brown trout | 0.017 |
| 1+ & older brown trout | 0.006 |
| Salmon | 0.168 |
| 0+ salmon | 0.124 |
| 1+ & older salmon | 0.045 |
| All Fish | 0.191 |

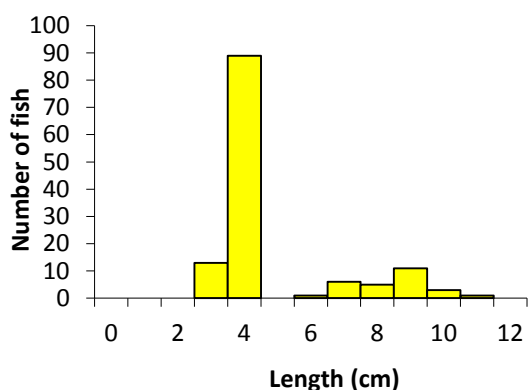


Fig. 4.19. Length frequency distribution of salmon in the Cronaniv Burn (Dunlewy_A), July 2014 (n=129)

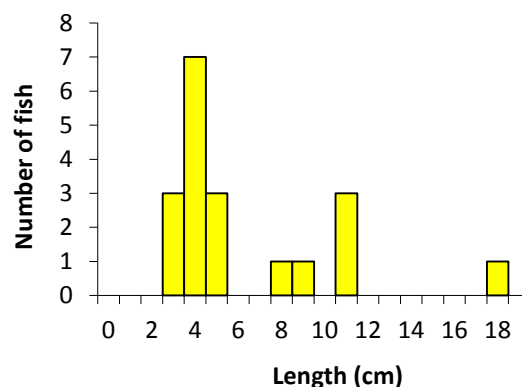


Fig. 4.20. Length frequency distribution of brown trout in the Cronaniv Burn (Dunlewy_A), July 2014 (n=19)

Swanlinbar River (Swanlinbar Br. (Carpark)_A)

This survey site was located downstream of the N87 bridge on the Drumcona side of Swanlinbar town, just upstream of the River Blackwater confluence (Plate 4.12). Three electric-fishing passes were conducted using three bank-based electric fishing units on the 14th of July 2014, along a 46m length of channel. There was a good mix of habitat, composed of glide, pool and riffle, over a substrate of mainly cobble.



Plate 4.12. The Swanlinbar River at Swanlinbar, Co. Cavan

Brown trout was the most common species encountered at this site on both occasions (Table 4.12). A greater spread of brown trout sizes were recorded in 2014 (Fig. 4.21), while there was a shift from in salmon age class dominance between years; fry were dominant in 2011 while only parr were captured in 2014 (Fig. 4.22).

Table 4.12. Density of fish (no./m²), Swanlinbar River (Swanlinbar Br. (Carpark)_A)

| Species | Total minimum density | |
|------------------------|-----------------------|-------|
| | 2011 | 2014 |
| Brown trout | 0.145 | 0.104 |
| 0+ brown trout | 0.041 | 0.013 |
| 1+ & older brown trout | 0.104 | 0.092 |
| European eel | 0.005 | 0.010 |
| Gudgeon | 0.003 | - |
| Lamprey sp. | - | 0.003 |
| Salmon | 0.013 | 0.020 |
| 0+ salmon | 0.010 | - |
| 1+ & older salmon | 0.003 | 0.020 |
| All Fish | 0.165 | 0.137 |

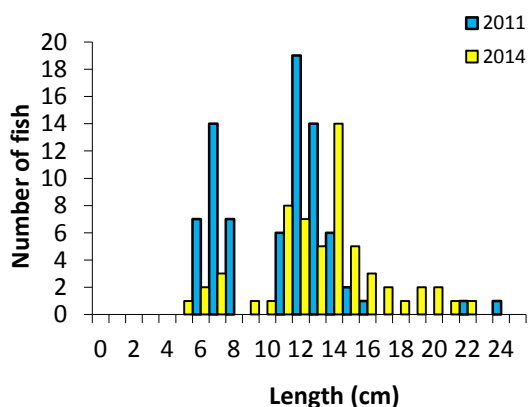


Fig. 4.21. Length frequency distribution of brown trout in the Swanlinbar River (Carpark_A), August 2011 (n=78) and July 2014 (n=59)

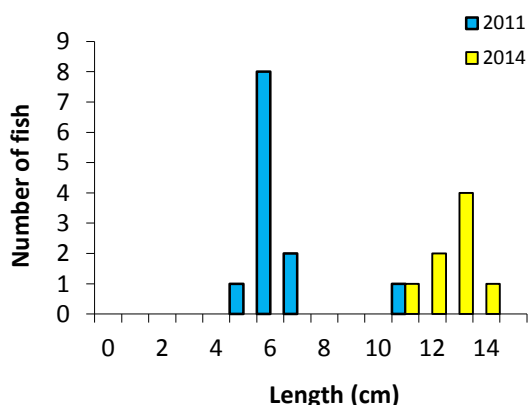


Fig. 4.22. Length frequency distribution of salmon in the Swanlinbar River (Carpark_A), August 2011 (n=12) and July 2014 (n=8)

River Swilly

Two sites were electric fished on the River Swilly, one at Altadush and another at Swilly Br.

River Swilly (Altadush_A)

The Altadush site was located near Altadush close to the river's source, approximately 15km west of Letterkenny, Co. Donegal (Plate 4.13). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 16th of July 2014, along a 46m length of channel. Riffle dominated the habitat, over a mixed substrate of cobble, boulder and gravel.



Plate 4.13. The River Swilly at altadush, Co. Donegal

Brown trout was the only species caught at this site (Table 4.13), with 1+ & older abundance far outnumbering fry (0+) (Fig. 4.23).

Table 4.13. Density of fish (no./m²), River Swilly (Altadush_A)

| Species | Total minimum density |
|------------------------|-----------------------|
| | 2014 |
| Brown trout | 0.089 |
| 0+ brown trout | 0.009 |
| 1+ & older brown trout | 0.080 |
| All Fish | 0.089 |

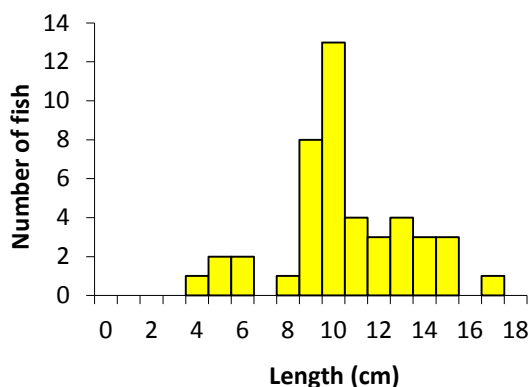


Fig. 4.23. Length frequency distribution of brown trout in the River Swilly (Altadush_A), July 2014 (n=45)

River Swilly (Swilly Br. (near Breenagh)_A)

The Swilly Br. site was located approximately 1.5km further downstream of the Altadush site near Breenagh (Plate 4.14). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 16th of July 2014, along a 45m length of channel. Glide dominated the habitat, over a substrate dominated by cobble.



Plate 4.14. The River Swilly near Breenagh, Co. Donegal

Brown trout was the most common species recorded, followed by salmon (Table 4.14). Brown trout fry numbers were relatively high in 2014 compared to previous survey occasions (Fig. 4.24), while the salmon density and size range were more comparable with those recorded in 2008 (Fig. 4.25).

Table 4.14. Density of fish (no./m²), River Swilly (Swilly Br. (near Breenagh)_A)

| Species | Total minimum density | | |
|------------------------|-----------------------|-------|-------|
| | 2008 | 2011 | 2014 |
| Brown trout | 0.059 | 0.129 | 0.219 |
| 0+ brown trout | 0.028 | 0.073 | 0.177 |
| 1+ & older brown trout | 0.031 | 0.056 | 0.042 |
| European eel | 0.006 | 0.006 | 0.004 |
| Lamprey sp. | 0.016 | 0.009 | - |
| Salmon | 0.087 | 0.050 | 0.096 |
| 0+ salmon | 0.053 | 0.026 | 0.019 |
| 1+ & older salmon | 0.034 | 0.023 | 0.077 |
| All Fish | 0.168 | 0.194 | 0.319 |

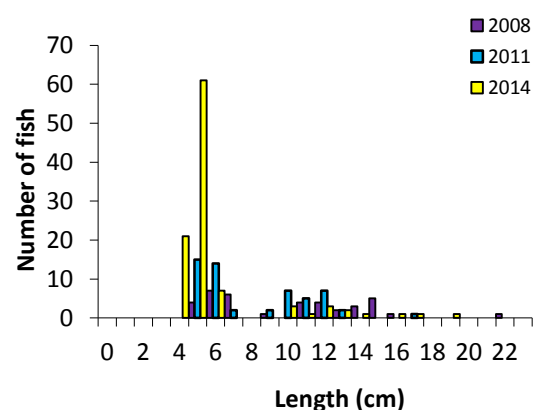


Fig. 4.24. Length frequency distribution of brown trout in the River Swilly (Swilly Br. (near Breenagh_A), September 2008 (n=38), August 2011 (n=55) and July 2014 (n=102)

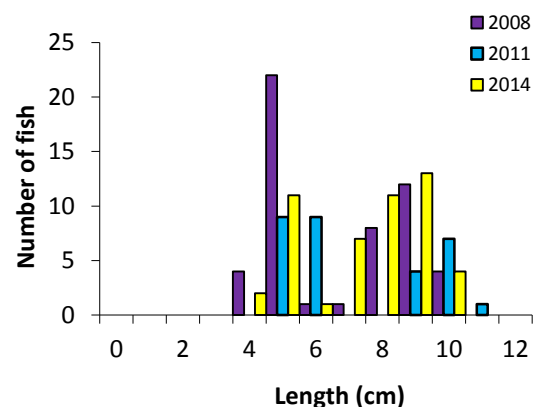


Fig. 4.25. Length frequency distribution of salmon in the River Swilly (Swilly Br. (near Breenagh)_A), September 2008 (n=52), August 2011 (n=30) and July 2014 (n=49)



4.1.6. South Eastern River Basin District - wadeable sites

Twenty-five river sites were surveyed in seven river catchments within the South Eastern River Basin District (SERBD). The SERBD is the second largest RBD in Ireland, covering a land area of

approximately 13,000km². It also encompasses a further 1,000km² of marine waters off the coast of Counties Wexford and Waterford. Catchments where surveys were undertaken included, the Barrow, Duncormick, Mahon, Nore, Owenduff, Slaney and Suir. Nine of these sites were wadeable and 19 were non-wadeable (Fig. 4.26).



Fig. 4.26. Map of the SERBD showing all sites surveyed in 2014



Derry River

Two sites were electric fished on the Derry River one at Balisland Bridge and another at Ballyknocker.

Derry River (Balisland Br._A)

The Balisland Bridge site was located downstream of Balisland Br., 3km south of Shillelagh, Co. Wicklow (Plate 4.15). Three electric-fishing passes were conducted using three bank-based electric fishing units on the 20th of August 2014, along a 43m length of channel. Glide dominated the habitat, over a substrate of mainly cobble and gravel.



Plate 4.15. The Derry River at Balisland Br., Co. Wicklow

Minnow was the most common species, followed by salmon and brown trout (Table 4.15). The number of salmon fry (0+) was far greater than 1+ & older cohorts (Fig. 4.28), with an opposite trend apparent for brown trout (Fig. 4.27).

Table 4.15. Density of fish (no./m²), Derry River (Balisland Br._A)

| Species | Total minimum density 2014 |
|------------------------|-------------------------------|
| Brown trout | 0.028 |
| 0+ brown trout | 0.006 |
| 1+ & older brown trout | 0.021 |
| Lamprey sp. | 0.011 |
| Minnow | 0.224 |
| Salmon | 0.083 |
| 0+ salmon | 0.083 |
| 1+ & older salmon | 0.002 |
| Stone loach | 0.009 |
| 3-spined stickleback | 0.013 |
| All Fish | 0.366 |

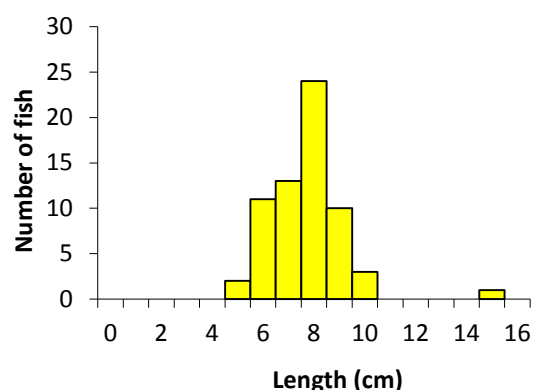


Fig. 4.27. Length frequency distribution of salmon in the Derry River (Balisland Br._A), August 2014 (n=64)

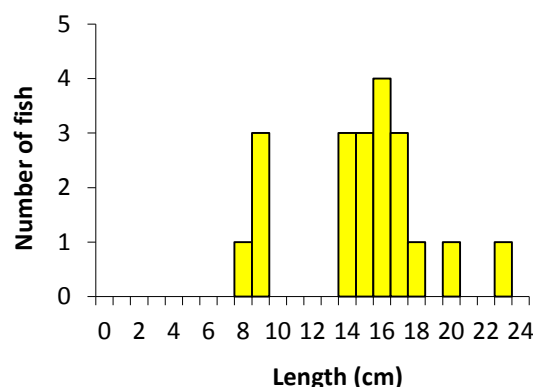


Fig. 4.28. Length frequency distribution of brown trout in the Derry River (Balisland Br._A), August 2014 (n=20)

Derry River (Ballyknocker_A)

The Ballyknocker site was located downstream of a bridge on a private road, approximately 3km upstream of the Balisland Br. site (Plate 4.15). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 20th of August 2014, along a 40m length of channel. Glide and riffle dominated the habitat, over a mixed substrate of cobble, gravel and sand.



Plate 4.15. The Derry River at Ballyknocker, Co. Wicklow

Salmon was the most abundant species, followed by brown trout (Table 4.15). The number of fry (0+) outnumbered the amount of 1+ & older cohorts for both salmon (Fig. 4.29) and brown trout (Fig. 4.30).

Table 4.16. Density of fish (no./m²), Derry River (Ballyknocker_A)

| Species | Total minimum density 2014 |
|------------------------|-------------------------------|
| Brown trout | 0.092 |
| 0+ brown trout | 0.060 |
| 1+ & older brown trout | 0.032 |
| European eel | 0.002 |
| Lamprey sp. | 0.002 |
| Minnow | 0.010 |
| Salmon | 0.239 |
| 0+ salmon | 0.231 |
| 1+ & older salmon | 0.008 |
| Sea trout | 0.002 |
| Stone loach | 0.020 |
| 3-spined stickleback | 0.002 |
| All Fish | 0.369 |

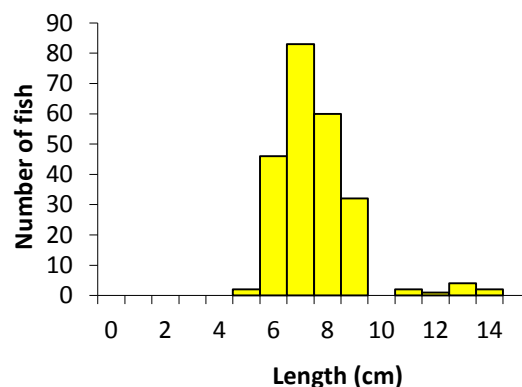


Fig. 4.29. Length frequency distribution of salmon in the Derry River (Ballyknocker_A), August 2014 (n=232)

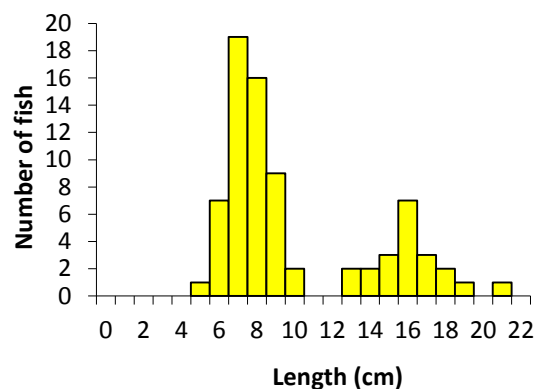


Fig. 4.30. Length frequency distribution of brown trout in the Derry River (Ballyknocker_A), August 2014 (n=75)

River Duag

Two sites were electric fished on the Duag River, one at Ballyporeen and another at Kilnamona.

River Duag (Br. u/s Ballyporeen_B)

The Ballyporeen survey site was located downstream of a bridge located approximately 1.5 km west of Ballyporeen in Co. Tipperary (Plate 4.17). Three electric-fishing passes were conducted using one bank-based electric fishing unit on the 3rd of September 2014, along a 45m length of channel. Glide dominated the habitat, over a substrate of mainly gravel and cobble.



Plate 4.17. The River Duag at Ballyporeen, Tipperary

Brown trout was the most commonly encountered species at this site (Table 4.17). Brown trout and salmon fry densities were more comparable between 2008 and 2014, than with 2011, where their abundance was much greater (Table 4.17; Figs. 4.31 and 3.32). Juvenile lamprey abundance was low in 2014 when compared with the two previous surveys (Table 4.17 and Fig. 4.33).

Table 4.17. Density of fish (no./m²), River Duag, (Br. u/s Ballyporeen_B)

| Species | Total minimum density | | |
|------------------------|-----------------------|-------|-------|
| | 2008 | 2011 | 2014 |
| Brown trout | 0.130 | 0.524 | 0.207 |
| 0+ brown trout | 0.102 | 0.487 | 0.167 |
| 1+ & older brown trout | 0.028 | 0.037 | 0.040 |
| European eel | 0.023 | - | - |
| Lamprey sp. | 0.034 | 0.037 | 0.007 |
| Salmon | 0.068 | 0.042 | 0.027 |
| 0+ salmon | 0.011 | 0.042 | 0.013 |
| 1+ & older salmon | 0.056 | - | 0.013 |
| Stone loach | - | 0.011 | 0.027 |
| 3-spined stickleback | 0.006 | 0.005 | 0.007 |
| All Fish | 0.260 | 0.619 | 0.273 |

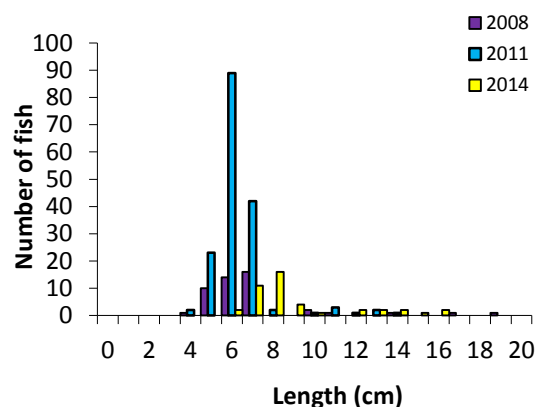


Fig. 4.31. Length frequency distribution of brown trout in the Duag River (Br. u/s Ballyporeen_B), July 2008 (n=47), July 2011 (n=166) and September 2014 (n=43)

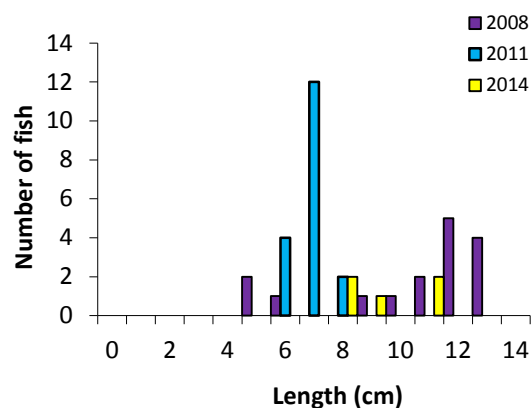


Fig. 4.32. Length frequency distribution of salmon in the Duag River (Br. u/s Ballyporeen_B), July 2008 (n=16), July 2011 (n=18) and September 2014 (n=5)

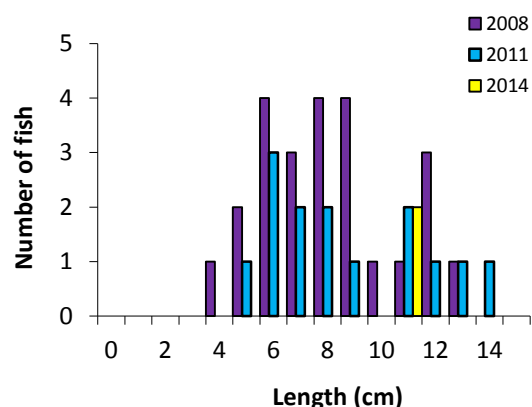


Fig. 4.33. Length frequency distribution of Lamprey sp. in the Duag River (Br. u/s Ballyporeen_B), July 2008 (n=24), July 2011 (n=14) and September 2014 (n=2)

Duag, River (Kilnamona_A)

The Kilnamona survey site was located downstream of a bridge, 700m upstream from the Ballyporeen site (Plate 4.18). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 3rd of September 2014, along a 42m length of channel. Riffle dominated a mixed habitat, with an assorted substrate of cobble, gravel, sand and boulder.



Plate 4.18. The River Duag at Kilnamona, Co. Tipperary

Brown trout was the most abundant species encountered at this site (Table 4.18), while fry (0+) dominated the catch (Fig. 4.34).

| Table 4.18. Duag, River (Kilnamona_A) | |
|--|-----------------------------------|
| Species | Total minimum density 2014 |
| Brown trout | 0.123 |
| 0+ brown trout | 0.113 |
| 1+ & older brown trout | 0.010 |
| Lamprey sp. | 0.015 |
| Salmon | 0.005 |
| 0+ salmon | 0.005 |
| 1+ & older salmon | - |
| Stone loach | 0.020 |
| 3-spined stickleback | 0.029 |
| All Fish | 0.191 |

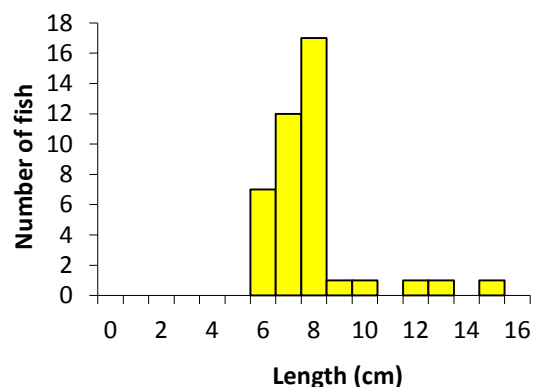


Fig. 4.34. Length frequency distribution of brown trout in the Duag River (Kilnamona_A), September 2014 (n=41)

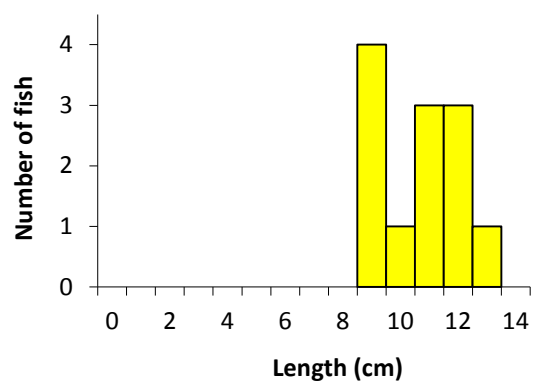


Fig. 4.35. Length frequency distribution of lamprey sp. in the Duag River (Kilnamona_A), September 2014 (n=12)

Duncormick River (W) Br. nr Duncormick Rly St_B)

This survey site was located just downstream of a railway bridge near Duncormick village (Plate 4.19). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 18th of August 2014, along a 45m length of channel. Glide and pool dominated the habitat, over a mixed substrate of sand, gravel, cobble, mud and silt.



Plate 4.19. The Duncormick River near Duncormick, Co. Cork

Brown trout was by far the most abundant species recorded, with European eel also present in relatively good numbers (Table 4.19). Brown trout abundance increased from 2008 to 2014 and this can mainly be attributed to an increase in 1+ & older fish (Fig. 4.36). In contrast, European eel density decreased each year, with the abundance of smaller individuals much lower in 2014 and 2011, than that recorded in 2008 (Fig. 4.37).

Table 4.19. Density of fish (no./m²), Duncormick River ((W) Br. nr Duncormick Rly St_B)

| Species | Total minimum density | | |
|------------------------|-----------------------|-------|-------|
| | 2008 | 2011 | 2014 |
| Brown trout | 0.162 | 0.244 | 0.336 |
| 0+ brown trout | 0.106 | 0.022 | 0.025 |
| 1+ & older brown trout | 0.055 | 0.222 | 0.311 |
| European eel | 0.047 | 0.033 | 0.030 |
| Flounder | 0.004 | - | - |
| Salmon | 0.034 | - | - |
| 0+ salmon | 0.026 | - | - |
| 1+ & older salmon | 0.009 | - | - |
| Sea trout | - | | 0.005 |
| Stone loach | 0.009 | 0.011 | 0.005 |
| 3-spined stickleback | 0.026 | 0.006 | 0.030 |
| All Fish | 0.281 | 0.294 | 0.377 |

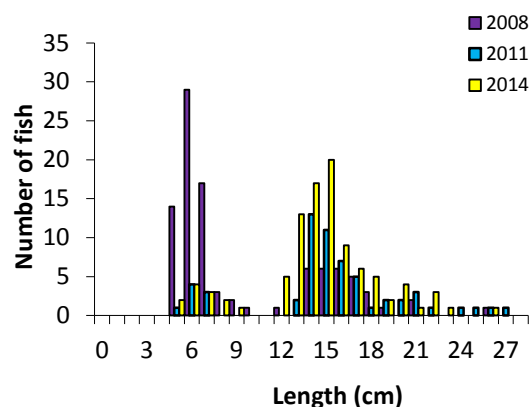


Fig. 4.36. Length frequency distribution of brown trout in the Duncormick River ((W) Br. nr Duncormick Rly St_B), July 2008 (n=97), July 2011 (n=59) and August 2014 (n=99)

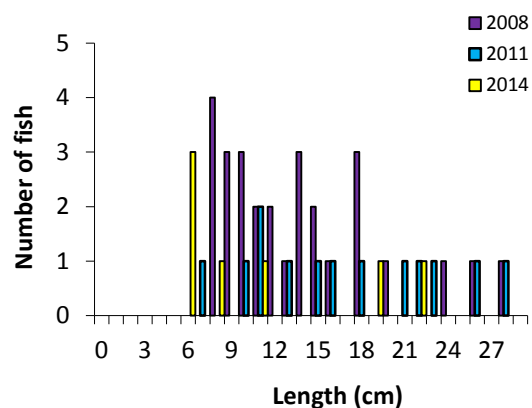


Fig. 4.37. Length frequency distribution of European eel in the Duncormick River ((W) Br. nr Duncormick Rly St_B), July 2008 (n=28), July 2011 (n=13) and August 2014 (n=7)

Mahon, River

Two sites were electric fished on the River Mahon, one near Seafeld House and another at the Bunmahon Pumphouse Weir.

Mahon, River (Pumphouse Weir_A)

The Pumphouse Weir survey site was located downstream of the weir at the waterworks, approximately three kilometres north-east of Bunmahon (Plate 4.20). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 2nd of September 2014, along a 36m length of channel. Glide and pool



dominated the habitat, over a substrate dominated by cobble and gravel.



Plate 4.20. The Mahon River at the pumphouse weir, Bunmahon, Co. Cork

Flounder was the most abundant species captured at this site, a species often encountered in streams close to the sea (Table. 4.20). Salmon fry (0+) were much more abundant than parr (1+ & older) (Fig. 4.38), while the brown trout numbers were more evenly mixed between both 0+ and 1+ & older (Fig. 4.40).

The eel population was mixed across size classes, and juveniles up to 10cm in length made up the majority of those recorded (Fig. 4.39).

Table 4.20. Density of fish (no./m²), Mahon, River (Pumphouse Weir_A)

| Species | Total minimum density 2014 |
|----------------------|-------------------------------|
| Brown trout | 0.024 |
| 0+ Brown trout | 0.012 |
| 1++ Brown trout | 0.012 |
| European eel | 0.030 |
| Flounder | 0.163 |
| Lamprey sp. | 0.012 |
| Salmon | 0.068 |
| 0+ Salmon | 0.059 |
| 1++ Salmon | 0.009 |
| 3-spined stickleback | 0.077 |
| All Fish | 0.374 |

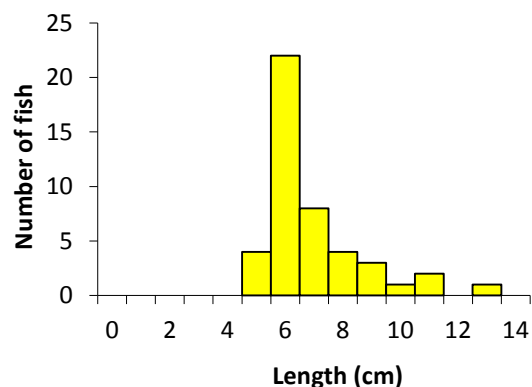


Fig. 4.38. Length frequency distribution of salmon in the Mahon River (Pumphouse Weir_A), September 2014 (n=45)

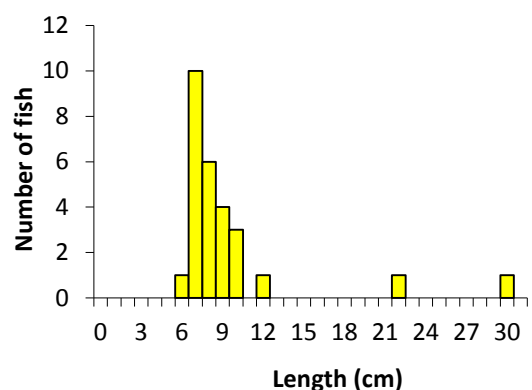


Fig. 4.39. Length frequency distribution of European eel in the Mahon River (Pumphouse Weir_A), September 2014 (n=27)

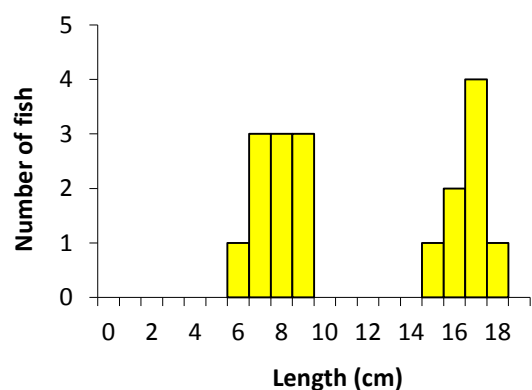


Fig. 4.40. Length frequency distribution of brown trout in the Mahon River (Pumphouse Weir_A), September 2014 (n=18)

Mahon, River (ENE of Seafield House_A)

The Seafield House survey site was located further downstream of the Pumphouse Weir site (Plate 4.21). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 2nd of September 2014, along a 45m length of channel. Glide dominated a mixed habitat, with a substrate composed of mainly cobble and gravel.



Plate 4.21. The Mahon River near Seafield House, Bunmahon, Co. Cork

Flounder was by far the most abundant species caught, followed closely by three-spined stickleback (Table 4.21). Salmon parr (1+ & older) were captured in low numbers when compared to fry (0+) at this site (Fig.4.41). European eel were also present in good numbers, with the majority of those recorded measuring 10cm or less (Fig. 4.42).

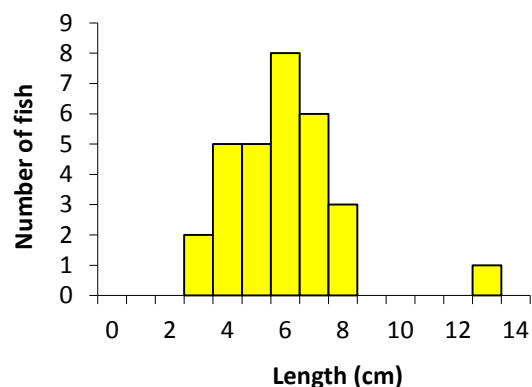


Fig. 4.41. Length frequency distribution of salmon in the Mahon River (ENE of Seafield House_A), September 2014 (n=35)

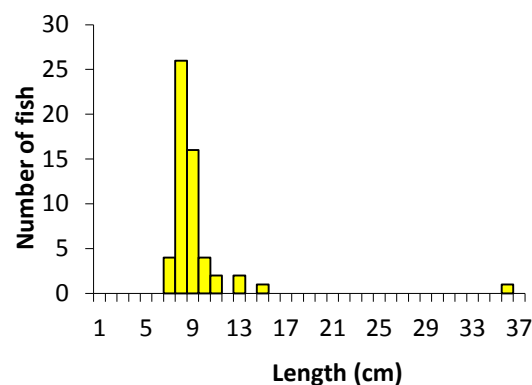


Fig. 4.42. Length frequency distribution of European eel in the Mahon River (ENE of Seafield House_A), September 2014 (n=56)

Table 4.21. Density of fish (no./m²), River Mahon, (ENE of Seafield House_A)

| Species | Total minimum density 2014 |
|------------------------|-------------------------------|
| Brown trout | 0.005 |
| 0+ brown trout | 0.003 |
| 1+ & older brown trout | 0.002 |
| European eel | 0.044 |
| Flounder | 0.066 |
| Lamprey sp. | 0.014 |
| Salmon | 0.021 |
| 0+ salmon | 0.021 |
| 1+ & older salmon | 0.002 |
| Sea trout | - |
| 3-spined stickleback | 0.063 |
| All Fish | 0.213 |

Owenduff River (Rathnageeragh_A)

This survey site was located downstream of Rathnageeragh bridge, approximately 10km northwest of Wellingtonbridge, Co. Wexford (Plate 4.22). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 1st of September 2014, along a 40m length of channel. The habitat was evenly spread out between riffle, glide and pool, over a substrate dominated by cobble.



Plate 4.22. The Owenduff River at Rathnageeragh, Co. Wexford

Brown trout and salmon were the two most abundant species encountered (Table 4.22). Both species had a range of sizes recorded, with fry (0+) and 1+ & older present (Figs. 4.43 and 4.44). European eel was also recorded up to over 40cm in length (Fig. 4.45).

Table 4.22. Density of fish (no./m²), Owenduff River (Rathnageeragh_A)

| Species | Total minimum density 2014 |
|------------------------|----------------------------|
| Brown trout | 0.155 |
| 0+ brown trout | 0.056 |
| 1+ & older brown trout | 0.099 |
| European eel | 0.026 |
| Lamprey sp. | 0.004 |
| Salmon | 0.095 |
| 0+ salmon | 0.039 |
| 1+ & older salmon | 0.056 |
| Stone loach | 0.056 |
| 3-spined stickleback | 0.004 |
| All Fish | 0.337 |

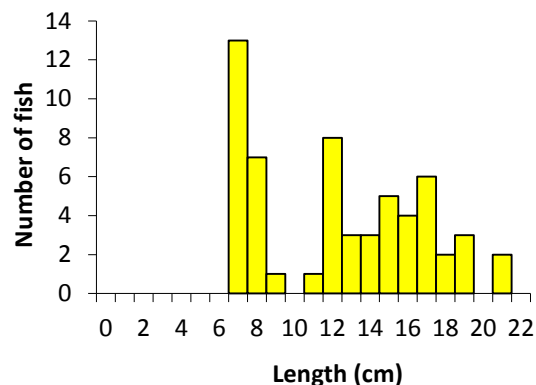


Fig. 4.43. Length frequency distribution of brown trout in the Owenduff River (Rathnageeragh_A), September 2014 (n=58)

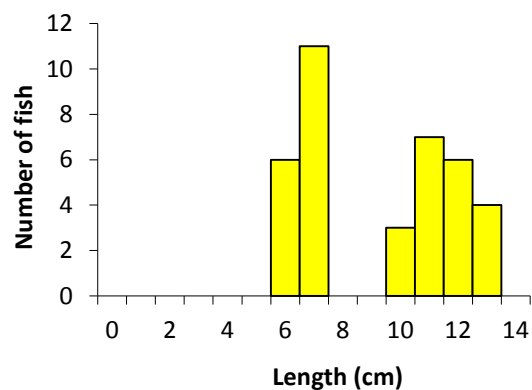


Fig. 4.44. Length frequency distribution of salmon in the Owenduff River (Rathnageeragh_A), September 2014 (n=37)

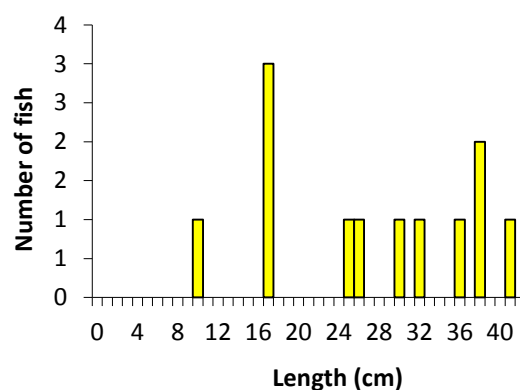


Fig. 4.45. Length frequency distribution of European eel in the Owenduff River (Rathnageeragh_A), September 2014 (n=12)

Urrin River

This survey site was located downstream of Bucks Bridge, approximately 3km southeast of Killealy, Co. Wexford (Plate 4.23). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 21st of August 2014, along a 45m length of channel. The habitat was mixed, with glide the most abundant type, over a substrate of mainly cobble and gravel.



Plate 4.23. The Urrin River at Buck's Br., Co. Wexford

Only native fish species were recorded at this site during both surveys (Table 4.23). Brown trout 1+ and older density was higher in 2008, with 0+ density greater in 2014 (Fig. 4.46). Salmon fry (0+) abundance was markedly higher in 2014 than 2008 (Fig. 4.47).

Table 4.23. Density of fish (no./m²), Urrin River (Buck's Br. B)

| Species | Total minimum density | |
|------------------------|-----------------------|-------|
| | 2008 | 2014 |
| Brown trout | 0.156 | 0.193 |
| 0+ brown trout | 0.052 | 0.109 |
| 1+ & older brown trout | 0.104 | 0.084 |
| European eel | 0.004 | 0.009 |
| Salmon | 0.019 | 0.140 |
| 0+ salmon | 0.004 | 0.103 |
| 1+ & older salmon | 0.015 | 0.037 |
| All Fish | 0.178 | 0.343 |

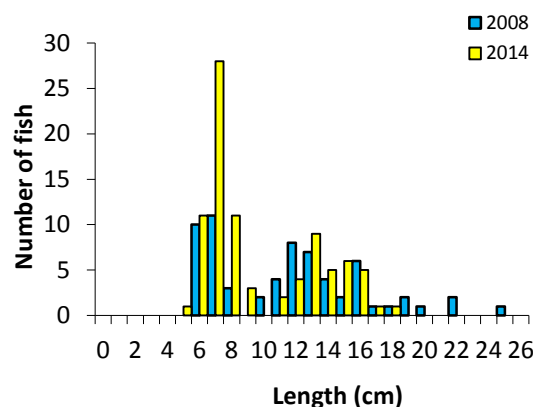


Fig. 4.46. Length frequency distribution of brown trout in the Urrin River (Buck's Br._B), August 2014 (n=65) and October 2008 (n=87)

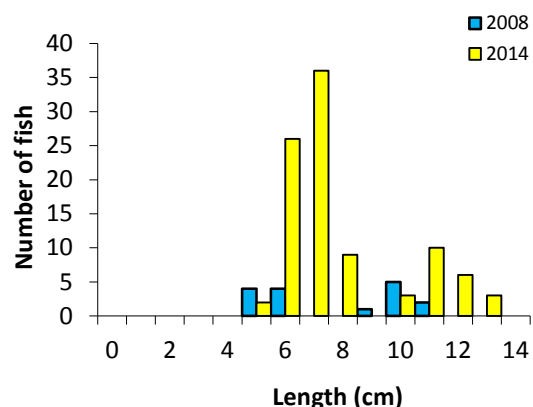


Fig. 4.47. Length frequency distribution of salmon in the Urrin River (Buck's Br._B), August 2014 (n=16) and October 2008 (n=95)



4.1.7. South Eastern River Basin District - non-wadeable sites

Aherlow River

Two sites were electric fished on the Aherlow, one at Killardry Br. and another at Old Cappa Br.

Aherlow River (Killardry Br._A)

The Killardry Bridge survey site was located upstream of Killardry Bridge, approximately 1.5km downstream of the river's confluence with the River Ara (Plate 4.24).



Plate 4.24. The Aherlow River at Killardry Br., Co. Tipperary

One electric-fishing pass was conducted using two boat-based electric fishing units on the 1st of July 2014, along a 245m length of channel. Glide dominated the habitat, over a mixed substrate of cobble, gravel and sand.

Brown trout and salmon were the most abundant species encountered (Table 4.24). The abundance of brown trout was much lower than in the previous survey in 2010 (Fig. 4.48). A similar trend was observed for salmon, with densities much lower for 2014 (Fig. 4.49).

Table 4.24. Density of fish (no./m²), Aherlow River (Killardry Br._A)

| Species | Total minimum density | |
|------------------------|-----------------------|--------|
| | 2010 | 2014 |
| Brown trout | 0.025 | 0.006 |
| 0+ brown trout | 0.001 | 0.000 |
| 1+ & older brown trout | 0.024 | 0.006 |
| Perch | - | 0.001 |
| Roach | 0.001 | 0.003 |
| Salmon | 0.025 | 0.005 |
| 0+ salmon | 0.009 | 0.0003 |
| 1+ & older salmon | 0.017 | 0.005 |
| Stone loach | 0.001 | 0.001 |
| 3-spined stickleback | 0.0003 | - |
| All Fish | 0.052 | 0.016 |

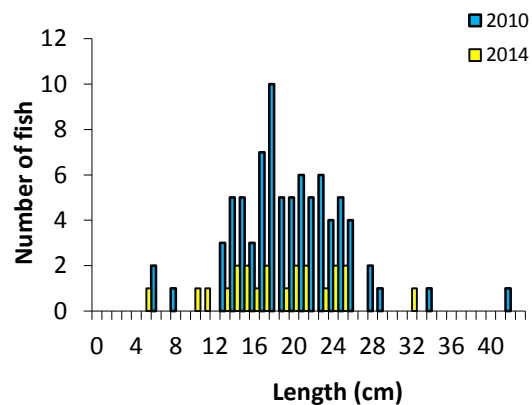


Fig. 4.48. Length frequency distribution of brown trout in the Aherlow River (Killardry Br._A), July 2014 (n=81) and July 2010 (n=22)

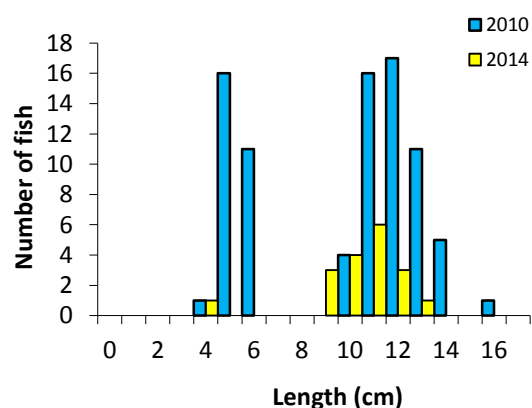


Fig. 4.49. Length frequency distribution of salmon in the Aherlow River (Killardry Br._A), July 2014 (n=82) and July 2010 (n=18)

Aherlow River (Old Cappa Br._A)

The Old Cappa Bridge survey site was located upstream of the Old Cappa Bridge, approximately 1km upstream of the river's confluence with the River Ara (Plate 4.25). Three electric-fishing passes were conducted using one boat-based electric fishing unit on the 1st of July 2014, along a 168m length of channel. Glide dominated the habitat, over a substrate of mainly cobble and gravel.



Plate 4.25. The Aherlow River at Old Cappa Br., Co. Tipperary

Only brown trout and salmon were recorded at this site (Table 4.25). No brown trout fry (0+) were recorded at this site (Fig. 4.50), while in the case of salmon, the majority or those recorded were parr (1+ & older) (Fig. 4.51).

Table 4.25. Density of fish (no./m²), Aherlow River (Old Cappa Br._A)

| Species | Total minimum density 2014 |
|------------------------|----------------------------|
| Brown trout | 0.004 |
| 0+ brown trout | - |
| 1+ & older brown trout | 0.004 |
| Salmon | 0.004 |
| 0+ salmon | 0.0004 |
| 1+ & older salmon | 0.003 |
| All Fish | 0.008 |

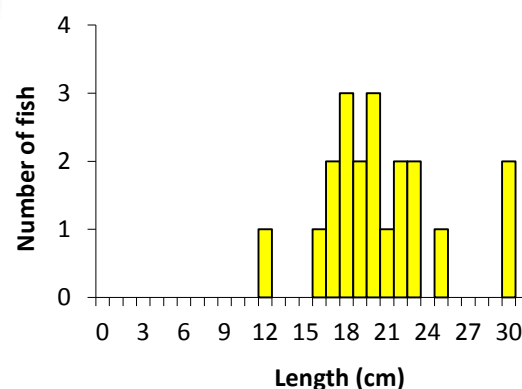


Fig. 4.50. Length frequency distribution of brown trout in the Aherlow River (Old Cappa Br._A), July 2014 (n=20)

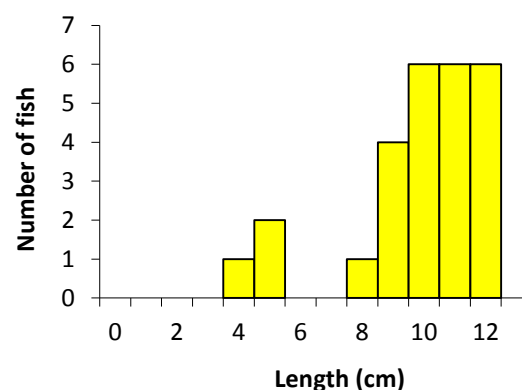


Fig. 4.51. Length frequency distribution of salmon in the Aherlow River (Old Cappa Br._A), July 2014 (n=26)

Anner River

Two sites were electric fished on the Anner River, one at Drummon Br. and another at Killusty.

Anner River (Drummon Br._A)

The Drummon Bridge site was located downstream of Drummon Bridge, about 11km east of Fethard, Co. Tipperary (Plate 4.26). Three electric-fishing passes were conducted using two boat-based electric fishing units on the 3rd of July 2014, along a 197m length of channel. Glide dominated the habitat, over a substrate of mainly cobble and gravel.



Plate 4.26. The Anner River at Drummon Br., Tipperary

Brown trout and salmon were the two most dominant species recorded at this site (Table 4.26). Brown trout abundance was lower across all size classes in 2014 than 2008 (Table 4.25 and Fig. 4.52), while salmon fry abundance was also lower in 2014 (Fig. 4.53). Three-spined stickleback were also present in 2014, but not recorded in 2008.

Table 4.26. Density of fish (no./m²), Anner River (Drummon Br. _A)

| Species | Total minimum density | |
|------------------------|-----------------------|-------|
| | 2008 | 2014 |
| Brown trout | 0.049 | 0.037 |
| 0+ brown trout | 0.006 | 0.002 |
| 1+ & older brown trout | 0.044 | 0.035 |
| European eel | 0.001 | 0.002 |
| Lamprey sp. | 0.001 | 0.001 |
| Salmon | 0.026 | 0.033 |
| 0+ salmon | 0.014 | 0.027 |
| 1+ & older salmon | 0.012 | 0.005 |
| Stone loach | 0.002 | 0.004 |
| 3-spined stickleback | - | 0.001 |
| All Fish | 0.078 | 0.077 |

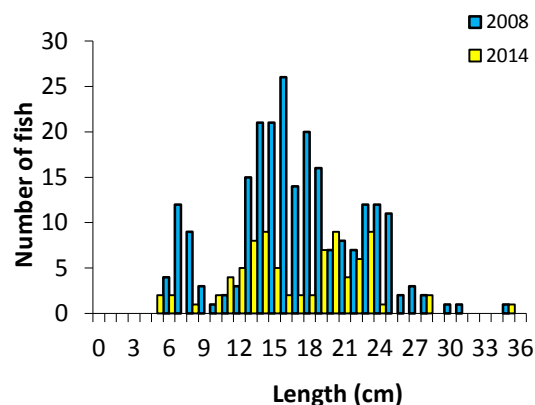


Fig. 4.52. Length frequency distribution of brown trout in the Anner River (Drummon Br. _A), September 2008 (n=234) and July 2014 (n=83)

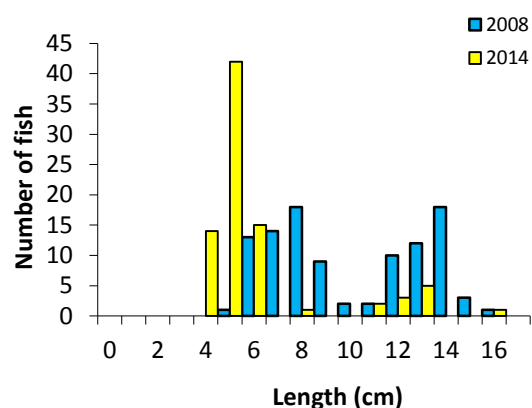


Fig. 4.53. Length frequency distribution of salmon in the Anner River (Drummon Br. _A), September 2008 (n=103) and July 2014 (n=83)

Anner River (Killusty_A)

The Killusty Br. site was located at a ford on the western side of Slievenamon, about 5km southeast of Fethard, Co. Tipperary. Three electric-fishing passes were conducted using one boat-based electric fishing unit on the 3rd of July 2014, along a 105m length of channel. Glide dominated the habitat, over a mixed substrate of cobble, gravel and sand.

Brown trout and salmon were the most commonly encountered species (Table 4.26). A relatively wide range of brown trout lengths were recorded (Fig. 4.54) but only a single individual fry (0+) was recorded. Both salmon fry (0+) and parr (1+ & older) were present (Table 4.27 and Figs 4.54 and 4.55).

Table 4.27. Density of fish (no./m²), Anner River (Killusty_A)

| Species | Total minimum density 2014 |
|------------------------|-------------------------------|
| Brown trout | 0.038 |
| 0+ brown trout | 0.001 |
| 1+ & older brown trout | 0.037 |
| European eel | 0.001 |
| Salmon | 0.005 |
| 0+ salmon | 0.001 |
| 1+ & older salmon | 0.004 |
| Stone loach | 0.004 |
| All Fish | 0.047 |

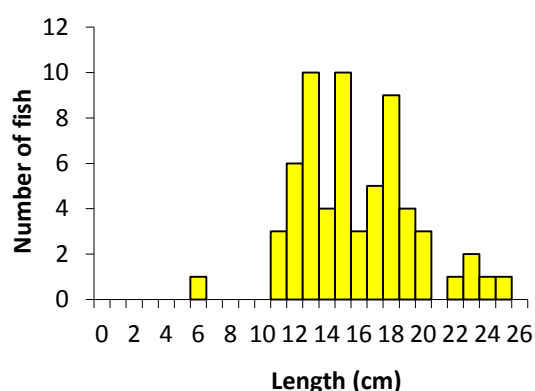


Fig. 4.54. Length frequency distribution of brown trout in the Anner River (Killusty_A), July 2014 (n=63)

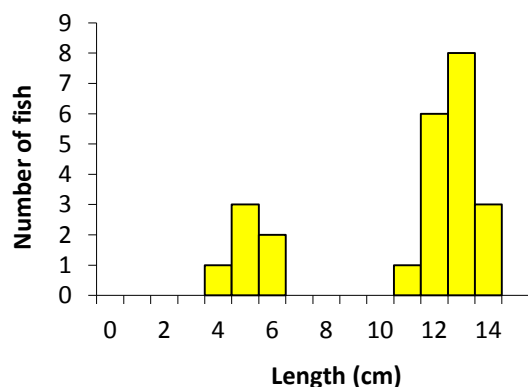


Fig. 4.55. Length frequency distribution of salmon in the Anner River (Killusty_A), July 2014 (n=24)

Ara River

Two sites were electric fished on the Ara River, one at Bansha and another at Lisheen.

Ara River (Bansha_A)

The Bansha site was located downstream of the bridge in Bansha, approximately 6km southeast of Tipperary Town (Plate 4.27). Three electric-fishing passes were conducted using one boat-based electric fishing unit on the 2nd of July 2014, along a 105m length of channel. Glide and pool dominated the habitat, over a substrate of mainly cobble and gravel.



Plate 4.27. The Ara River at Bansha, Co. Tipperary

Brown trout was the most abundant fish species recorded, with 0+ and 1+ & older present (Table 4.28 and Fig. 4.56). Salmon were only present in low numbers and all of those recorded were parr (Table 4.28).

Table 4.28. Density of fish (no./m²), Ara River (Bansha_A)

| Species | Total minimum density 2014 |
|------------------------|-------------------------------|
| Brown trout | 0.025 |
| 0+ brown trout | 0.001 |
| 1+ & older brown trout | 0.025 |
| European eel | 0.001 |
| Salmon | 0.001 |
| 0+ salmon | - |
| 1+ & older salmon | 0.001 |
| Stone loach | 0.001 |
| All Fish | 0.027 |

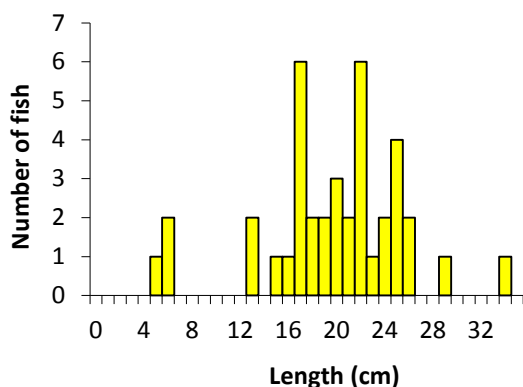


Fig. 4.56. Length frequency distribution of brown trout in the Ara River (Bansha_A), July 2014 (n=39)

Ara River (Lisheen_A)

The Lisheen site was located at approximately 1km upstream of the confluence with the Aherlow River, approximately 8km northwest of Caher, Co. Tipperary (Plate 4.28). Three electric-fishing passes were conducted using one boat-based electric fishing unit on the 2nd of July 2014, along a 126m length of channel. Glide dominated the habitat, over a substrate of mainly gravel and cobble.



Plate 4.28. The Ara River at Lisheen, Co. Tipperary

Brown trout was the most abundant species at this site (Table 4.29). No brown trout fry (0+) were recorded (Fig. 4.57). Both salmon fry (0+) and parr (1+ & older) were encountered but fry were present in low numbers (Table 4.29 and Figs. 4.57 and 4.58).

Table 4.29. Density of fish (no./m²), Ara River (Lisheen_A)

| Species | Total minimum density 2014 |
|------------------------|-------------------------------|
| Brown trout | 0.032 |
| 0+ brown trout | - |
| 1+ & older brown trout | 0.032 |
| European eel | 0.002 |
| Perch | 0.002 |
| Salmon | 0.023 |
| 0+ salmon | 0.005 |
| 1+ & older salmon | 0.023 |
| Stone loach | 0.002 |
| All Fish | 0.058 |

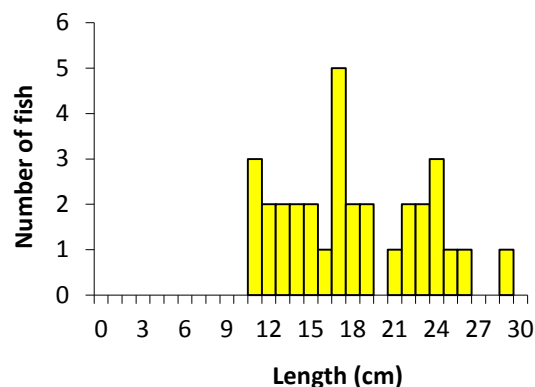


Fig. 4.57. Length frequency distribution of brown trout in the Ara River (Lisheen_A), July 2014 (n=32)

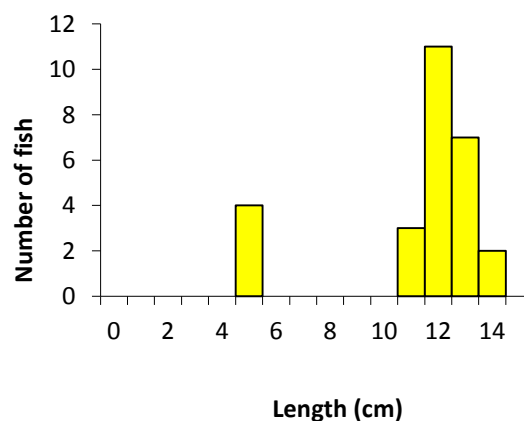


Fig. 4.58. Length frequency distribution of salmon in the Ara River (Lisheen_A), July 2014 (n=27)



Barrow, River (Pass Br._B)

This survey site was located between Pass Bridge and the Grand Canal Bridge, just outside Monasterevin, Co. Kildare (Plate 4.29). One electric-fishing pass was conducted using four boat-based electric fishing units (two boats electric fished parallel to each bank separately) on the 30th of June 2014, along a 363m length of channel. Glide dominated the habitat, over a mixed substrate of gravel, cobble and sand.



Plate 4.29. The River Barrow at Pass Br., Co. Kildare

This was a species rich site, with dace the most frequently encountered species (Table 4.30 and Fig. 4.59). Roach density was lower in 2014 than 2012, with a marked decrease in fry (Table 4.30). Brown trout and salmon showed similar trends, with 0+ dominating in 2012 and 1+ & older dominating in 2014 (Figs. 4.62 to 4.63).

Table 4.30. Density of fish (no./m²), Barrow, River (Pass Br._B)

| Species | Total minimum density | |
|------------------------|-----------------------|--------|
| | 2012 | 2014 |
| Brown trout | 0.002 | 0.002 |
| 0+ brown trout | - | - |
| 1+ & older brown trout | 0.002 | 0.002 |
| Dace | 0.010 | 0.014 |
| European eel | 0.001 | 0.0003 |
| Gudgeon | 0.013 | 0.004 |
| Lamprey sp. | 0.0003 | - |
| Minnow | 0.037 | 0.007 |
| Perch | 0.003 | 0.004 |
| Pike | 0.0002 | 0.002 |
| Roach | 0.016 | 0.009 |
| Roach x bream hybrid | 0.0003 | 0.0001 |
| Salmon | 0.003 | 0.004 |
| 0+ salmon | - | - |
| 1+ & older salmon | 0.003 | 0.004 |
| Stone loach | 0.003 | 0.001 |
| 3-spined stickleback | 0.0005 | - |
| All Fish | 0.088 | 0.046 |

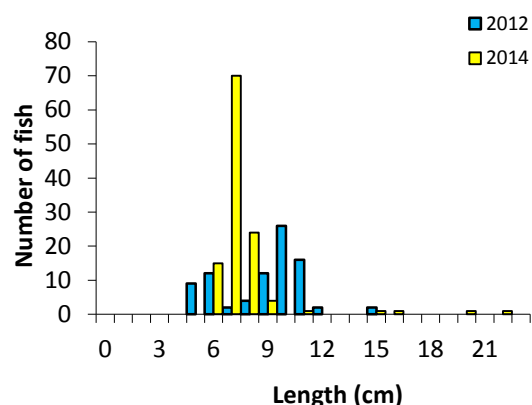


Fig. 4.59. Length frequency distribution of dace in the River Barrow (Pass Br._B), May 2012 (n=85) and June 2014 (n=118)

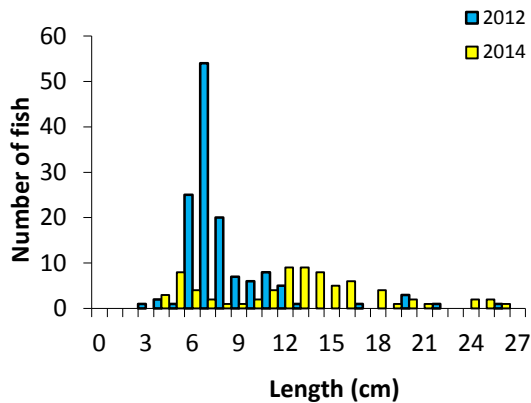


Fig. 4.60. Length frequency distribution of roach in the River Barrow (Pass Br._B), May 2012 (n=136) and June 2014 (n=75)

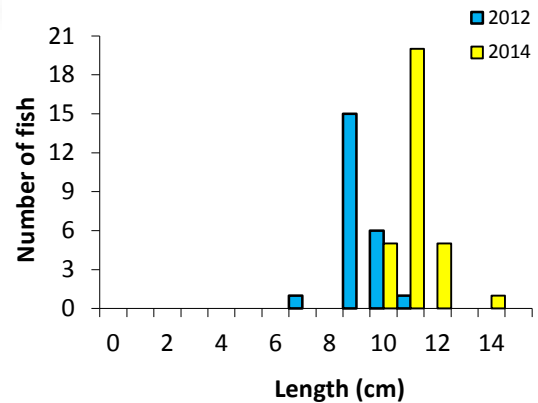


Fig. 4.63. Length frequency distribution of salmon in the River Barrow (Pass Br._B), May 2012 (n=23) and June 2014 (n=31)

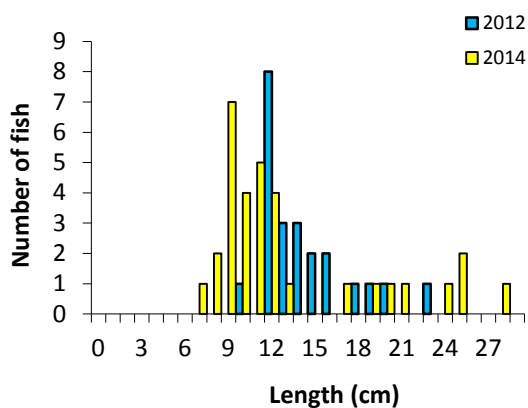


Fig. 4.61. Length frequency distribution of perch in the River Barrow (Pass Br._B), May 2012 (n=23) and June 2014 (n=32)

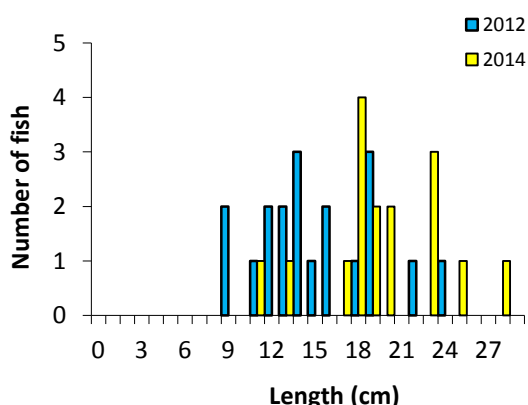


Fig. 4.62. Length frequency distribution of brown trout in the River Barrow (Pass Br._B), May 2012 (n=19) and June 2014 (n=16)

Multeen River (Ballygriffin Br._A)

This survey site was located downstream of Ballygriffin Bridge, approximately 2km north of Golden, Co. Tipperary (Plate 4.30). Three electric-fishing passes were conducted using two boat-based electric fishing units on the 4th of September 2014, along a 173m length of channel. Glide dominated the habitat, over a mixed substrate of gravel, cobble and sand.



Plate 4.30. The Multeen River at Ballygriffin Br., Co. Tipperary

Brown trout and salmon were the most abundant species recorded at this site (Table 4.31). Brown trout density was higher in 2014, with far greater densities of 1+ & older fish caught (Fig. 4.64). Salmon abundance also increased in 2014, with fry (0+) abundance increasing from that recorded in 2008 (Fig. 4.65).

Table 4.31. Density of fish (no./m²), Multeen River (Ballygriffin Br._A)

| Species | Total minimum density | |
|------------------------|-----------------------|--------|
| | 2008 | 2014 |
| Brown trout | 0.014 | 0.029 |
| 0+ brown trout | 0.0005 | 0.0005 |
| 1+ & older brown trout | 0.014 | 0.029 |
| European eel | - | 0.002 |
| Lamprey sp. | 0.0005 | 0.002 |
| Salmon | 0.021 | 0.026 |
| 0+ salmon | 0.005 | 0.012 |
| 1+ & older salmon | 0.016 | 0.014 |
| Stone loach | 0.0005 | 0.004 |
| All Fish | 0.037 | 0.062 |

River Nore

Three sites were electric fished on the River Nore: Brownsbarn, Kilmacshane and Quakers Br.

Nore, River (Brownsbarn Br._A)

Brownsbarn Bridge is located upstream of Brownsbarn Br., north-west of Inistioge in Co. Kilkenny (Plate 4.31). One electric-fishing pass was conducted using four boat-based electric fishing units, with two boats fishing parallel to each bank separately, on the 28th of August 2014, along a 562m length of channel. Glide and pool dominated the habitat, over a substrate of mainly cobble.



Plate 4.31. The River Nore at Brownsbarn Br., Co. Kilkenny

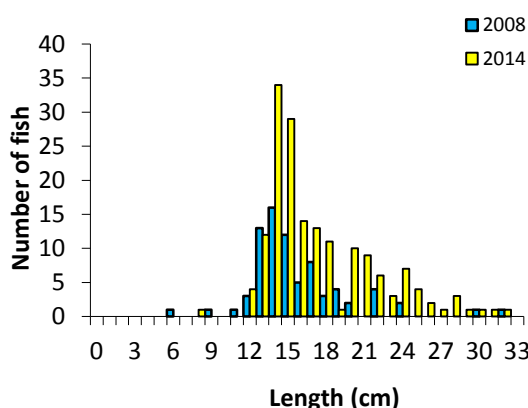


Fig. 4.64. Length frequency distribution of brown trout in the Multeen River (Ballygriffin Br._B), September 2008 (n=77) and September 2014 (n=168)

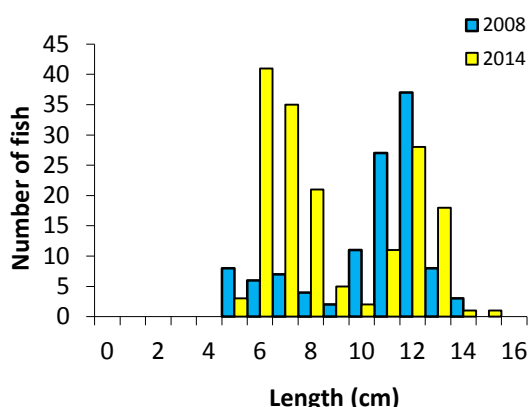


Fig. 4.65. Length frequency distribution of salmon in the Multeen River (Ballygriffin Br._B), September 2008 (n=113) and September 2014 (n=166)

Dace was the most abundant fish species, with an increase in density recorded in 2014 (Table 4.32 and Fig. 4.66). No brown trout fry (0+) were caught either year, but brown trout (1+ & older) distribution was quite similar despite a small increase in 2014 (Fig. 4.67). Salmon density was lower in 2014 than 2010, with parr (1& & older) replacing fry (0+) as the dominant cohort (Table 4.32 and Fig. 4.68).



Table 4.32. Density of fish (no./m²), River Nore, (Brownsbarn Br._A)

| Species | Total minimum density | |
|------------------------|-----------------------|--------|
| | 2010 | 2014 |
| Brown trout | 0.001 | 0.003 |
| 0+ brown trout | - | - |
| 1+ & older brown trout | 0.001 | 0.003 |
| Dace | 0.001 | 0.006 |
| European eel | 0.002 | 0.0004 |
| Flounder | 0.004 | 0.002 |
| Lamprey sp. | - | 0.0001 |
| Minnow | 0.0005 | 0.001 |
| Salmon | 0.002 | 0.002 |
| 0+ salmon | - | 0.0001 |
| 1+ & older salmon | 0.002 | 0.002 |
| Sea trout | - | 0.0001 |
| Stone loach | 0.00004 | 0.0001 |
| All Fish | 0.011 | 0.015 |

Fig. 4.67. Length frequency distribution of brown trout in the River Nore (Brownsbarn Br._A), June 2010 (n=35) and August 2014 (n=42)

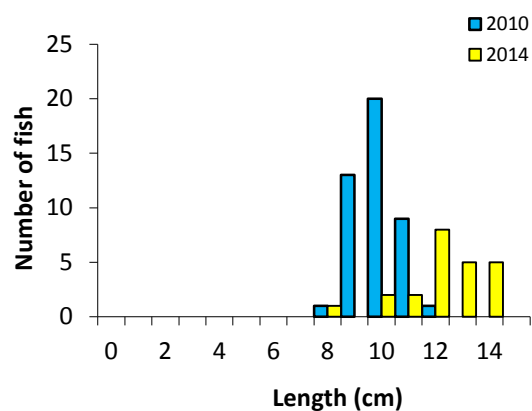


Fig. 4.68. Length frequency distribution of salmon in the River Nore (Brownsbarn Br._A), June 2010 (n=44) and August 2014 (n=23)

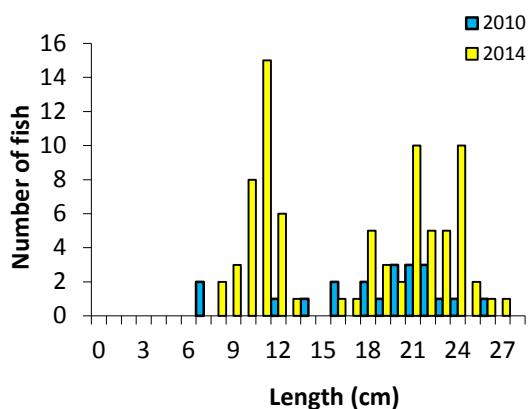
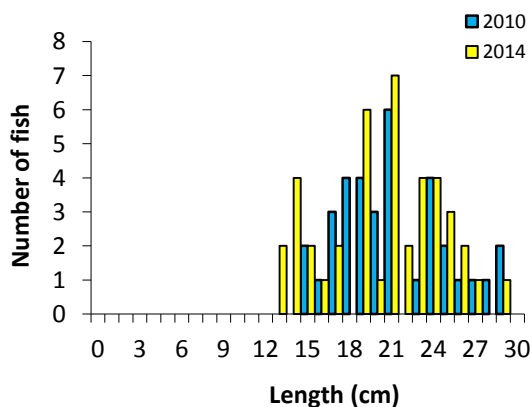


Fig. 4.66. Length frequency distribution of dace in the River Nore (Brownsbarn Br._A), June 2010 (n=21) and August 2014 (n=81)



Nore, River (Kilmacshane_A)

The Kilmacshane site was located approximately 350m downstream of the Brownsbarn Bridge site (Plate 4.32). One electric-fishing pass was conducted using four boat-based electric fishing units (two boats electric fished each bank separately) on the 28th of August 2014, along a 328m length of channel. Glide and pool dominated the habitat, with the substrate composed mainly of cobble and gravel.



Plate 4.32. The River Nore at Kilmacshane, Co. Kilkenny

Dace was also the most abundant species recorded at this site (Table 4.33). Brown trout and salmon (Fig. 4.71) were also recorded but fry (0+) were



absent for both species (Table 4.33 and Figs. 4.70 and 4.71).

Table 4.33. Density of fish (no./m²), River Nore, (Kilmacshane_A)

| Species | Total minimum density 2014 |
|------------------------|-------------------------------|
| Brown trout | 0.003 |
| 0+ brown trout | - |
| 1+ & older brown trout | 0.003 |
| Dace | 0.006 |
| European eel | 0.0001 |
| Flounder | 0.0001 |
| Minnow | 0.001 |
| Roach | 0.0001 |
| Salmon | 0.001 |
| 0+ salmon | - |
| 1+ & older salmon | 0.001 |
| Sea trout | 0.0004 |
| All Fish | 0.012 |

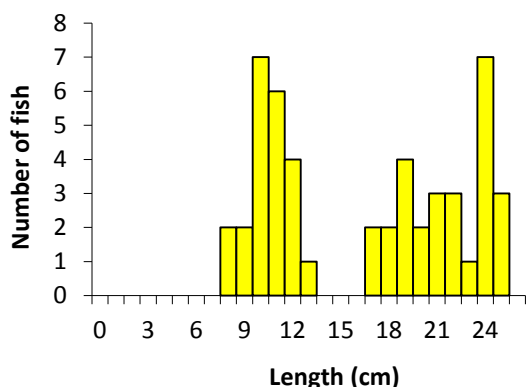


Fig. 4.69. Length frequency distribution of dace in the River Nore (Kilmacshane_A), August 2014 (n=49)

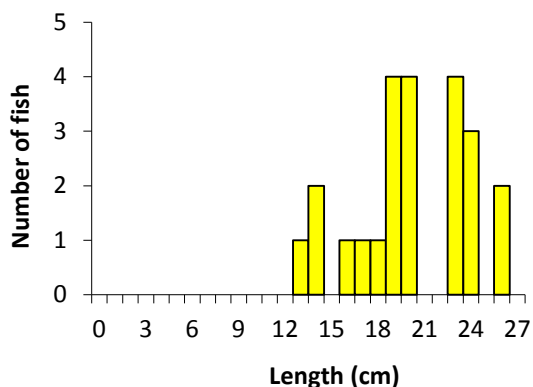


Fig. 4.70. Length frequency distribution of brown

trout in the River Nore (Kilmacshane_A), August 2014 (n=23)

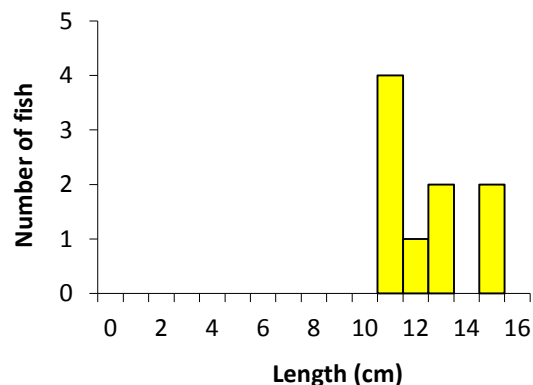


Fig. 4.71. Length frequency distribution of salmon in the River Nore (Kilmacshane_A), August 2014 (n=9)

Nore, River (Quakers Br._A)

The Quakers Bridge site was located just downstream of Quakers Br., on the border between Counties Tipperary and Laois, approximately 8km south-east of Roscrea (Plate 4.33). Three electric-fishing passes were conducted using one boat-based electric fishing unit on the 27th of August 2014, along a 232m length of channel. Glide dominated the habitat, over a substrate comprised mostly of mud and silt.



Plate 4.33. The River Nore at Quakers Br., Laois/Tipperary border

Brown trout was the most abundant species recorded at this site (Table 4.34), and showed a marked increase in density since the previous two surveys. A range of age classes were caught, but no fry (0+) (Fig. 4.72). Despite the good brown trout numbers, European eel, salmon and a



number of other species, previously recorded, were not captured during the survey.

Table 4.34. Density of fish (no./m²), River Nore, (Quakers Br. _A)

| Species | Total minimum density | | |
|------------------------|-----------------------|--------|-------|
| | 2008 | 2010 | 2014 |
| Brown trout | 0.013 | 0.007 | 0.035 |
| 0+ brown trout | 0.000 | - | - |
| 1+ & older brown trout | 0.013 | 0.007 | 0.035 |
| European eel | 0.001 | 0.0005 | - |
| Gudgeon | 0.001 | 0.0005 | - |
| Lamprey sp. | 0.001 | - | 0.001 |
| Minnow | 0.003 | 0.003 | - |
| Perch | - | - | 0.001 |
| Pike | 0.006 | 0.005 | 0.001 |
| Salmon | 0.001 | - | - |
| 0+ salmon | 0.001 | - | - |
| 1+ & older salmon | - | - | - |
| Stone loach | 0.001 | 0.0005 | - |
| 3-spined stickleback | 0.002 | 0.0005 | 0.002 |
| All Fish | 0.027 | 0.017 | 0.036 |



Plate 4.34. The River Slaney at Bunclody, Carlow/Wexford border

One electric-fishing pass was conducted using four boat-based electric fishing units (two boats electric fished parallel to each bank separately) on the 19th of August 2014, along a 234m length of channel. Glide dominated the habitat, over a mixed substrate of cobble, gravel, sand and boulder.

This was a species rich site, with salmon the most abundant species recorded (Table 4.35). The majority of these were parr (1+ & older) (Fig. 4.73). Similarly, the brown community was also composed entirely of 1+ & older (Fig. 4.74). A number of other species were also recorded, including roach and sea trout.

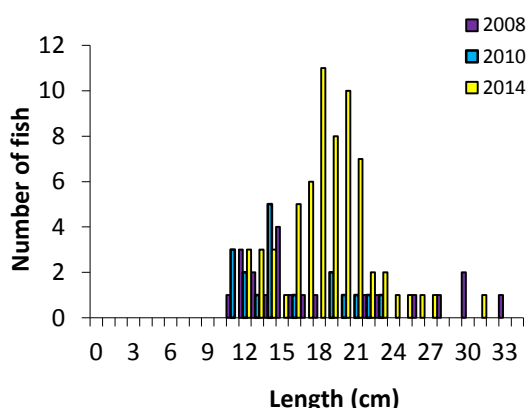


Fig. 4.72. Length frequency distribution of brown trout in the River Nore (Quakers Br. _A), August 2008 (n=21), July 2010 (n=18) and August 2014 (n=66)

River Slaney

Two sites were electric fished on the River Slaney, one at Bunclody and another at Carhill.

Slaney, River (Bunclody_A)

The Bunclody site was located just upstream of Slaney Br. in Bunclody, on the Carlow/Wexford border (Plate 4.34).

Table 4.35. Density of fish (no./m²), River Slaney, (Bunclody_A)

| Species | Total minimum density |
|------------------------|-----------------------|
| | 2014 |
| Brown trout | 0.002 |
| 0+ brown trout | - |
| 1+ & older brown trout | 0.002 |
| European eel | 0.001 |
| Gudgeon | 0.0004 |
| Minnow | 0.001 |
| Roach | 0.0004 |
| Salmon | 0.009 |
| 0+ salmon | 0.0002 |
| 1+ & older salmon | 0.008 |
| Sea trout | 0.0004 |
| Stone loach | 0.0004 |
| 3-spined stickleback | 0.0002 |
| All Fish | 0.014 |

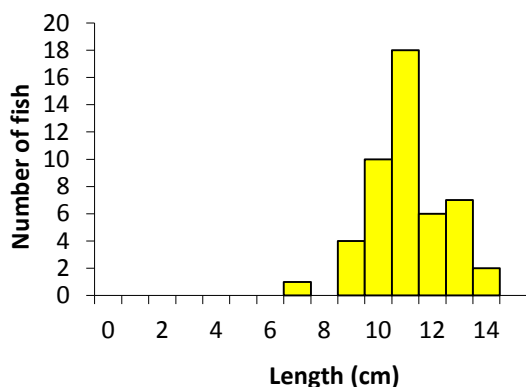


Fig. 4.73. Length frequency distribution of salmon in the River Slaney (Bunclody_A), August 2014 (n=48)

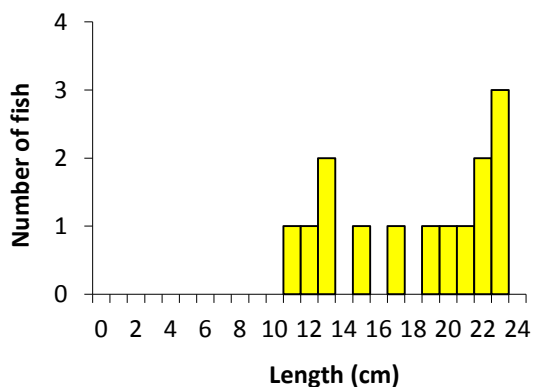


Fig. 4.74. Length frequency distribution of brown trout in the River Slaney (Bunclody_A), August 2014 (n=14)

Slaney, River (Carhill_A)

The Carhill site was located approximately 550m upstream of the Bunclody site (Plate 4.35). One electric-fishing pass was conducted using four boat-based electric fishing units (two boats electric fished parallel to each bank separately) on the 19th of August 2014, along a 234m length of channel. Glide and pool dominated the habitat, over a mixed substrate of cobble, boulder, gravel and sand.



Plate 4.35. The River Slaney at Carhill, Carlow/Wexford border

Minnow was the most abundant fish species recorded at this site (Table 4.36). Overall species densities were relatively low. Sea trout were also recorded at this site.

Table 4.36. Density of fish (no./m²), River Slaney, (Carhill_A)

| Species | Total minimum density 2014 |
|------------------------|-------------------------------|
| Brown trout | 0.001 |
| 0+ brown trout | 0.001 |
| 1+ & older brown trout | 0.001 |
| Gudgeon | 0.002 |
| Minnow | 0.005 |
| Salmon | 0.001 |
| 0+ salmon | 0.0003 |
| 1+ & older salmon | 0.001 |
| Sea trout | 0.0003 |
| Stone loach | 0.0003 |
| All Fish | 0.010 |

River Suir

Three sites were electric fished on the River Suir main channel, Kilsheelan Br., Knocknageragh Br. and Poulakerry.

Suir, River (Kilsheelan Br._A)

The Kilsheelan Br. survey site was located upstream of Kilsheelan Br., approximately 4.5km east of Clonmel on the Tipperary, Waterford border (Plate 4.36). One electric-fishing pass was conducted using four boat-based electric fishing units (two boats electric fished parallel to each bank separately) on the 26th of August 2014, along a 323m length of channel. Glide dominated the

habitat, over a substrate mainly composed of cobble.



Plate 4.36. The River Suir at Kilsheelan, Tipperary/Waterford border

Salmon was the most abundant species recorded at this site, with both fry and parr recorded (Table 4.37). An increase in parr was observed in 2014 when compared with the previous survey of 2010 (Fig. 4.75). Brown trout abundance was also higher in 2014 with a wide range of size classes recorded (Table 4.37 and Fig. 4.76).

Table 4.37. Density of fish (no./m²), River Suir, (Kilsheelan Br._A)

| Species | Total minimum density | |
|------------------------|-----------------------|--------|
| | 2010 | 2014 |
| Brown trout | 0.001 | 0.009 |
| 0+ brown trout | 0.000 | 0.002 |
| 1+ & older brown trout | 0.001 | 0.007 |
| Dace | 0.00003 | - |
| European eel | 0.003 | 0.0004 |
| Flounder | 0.0004 | 0.001 |
| Lamprey sp. | 0.0001 | 0.0003 |
| Minnow | 0.00003 | 0.005 |
| Salmon | 0.003 | 0.013 |
| 0+ salmon | - | 0.007 |
| 1+ & older salmon | 0.003 | 0.006 |
| Stone loach | 0.001 | 0.005 |
| 3-spined stickleback | 0.00003 | - |
| All Fish | 0.007 | 0.035 |

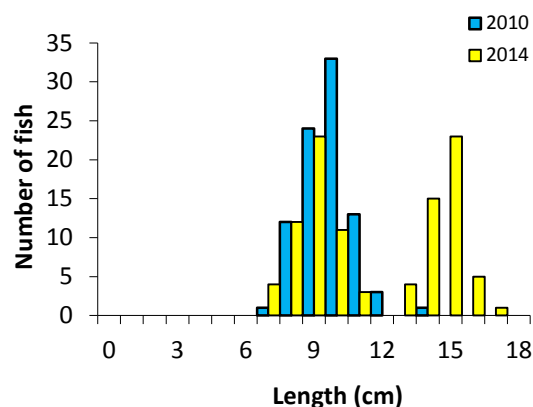


Fig. 4.75. Length frequency distribution of salmon in the River Suir (Kilsheelan Br._A), June 2010 (n=87) and August 2014 (n=101)

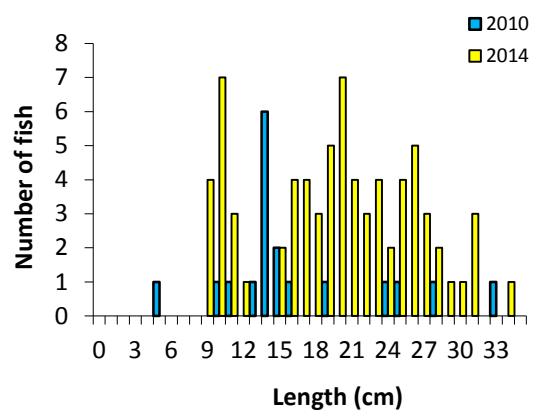


Fig. 4.76. Length frequency distribution of brown trout in the River Suir (Kilsheelan Br._A), June 2010 (n=18) and August 2014 (n=73)

Suir, River (Knocknageragh Br._A)

The Knocknageragh Br. survey site was located approximately 14km from the source of the River Suir, downstream of Knocknageragh Br., just outside Templemore (Plate 4.37). Three electric-fishing passes were conducted using one boat-based electric fishing unit on the 25th of August 2014, along a 100m length of channel. Glide dominated the habitat, over a substrate of cobble, sand, mud and silt.



Plate 4.37. The River Suir at Knocknageragh, Co. Tipperary

Brown trout was the most abundant fish species recorded at this site; however, their density was lower in 2014 when compared with the previous surveys (Table 4.38). Only 1+ and older specimens were recorded. Salmon were absent from this site during 2014, having been recorded on two previous occasions.

Table 4.38. Density of fish (no./m²), River Suir, (Knocknageragh Br. _A)

| Species | Total minimum density | | |
|------------------------|-----------------------|-------|-------|
| | 2008 | 2010 | 2014 |
| Brown trout | 0.153 | 0.127 | 0.051 |
| 0+ brown trout | - | - | - |
| 1+ & older brown trout | 0.153 | 0.127 | 0.051 |
| European eel | - | 0.002 | - |
| Gudgeon | 0.024 | - | - |
| Lamprey sp. | - | 0.002 | 0.002 |
| Pike | - | 0.002 | - |
| Roach | 0.002 | - | - |
| Salmon | 0.002 | 0.003 | - |
| 0+ salmon | - | - | - |
| 1+ & older salmon | 0.002 | 0.003 | - |
| Stone loach | 0.007 | 0.005 | 0.008 |
| 3-spined stickleback | - | 0.002 | - |
| All Fish | 0.187 | 0.141 | 0.061 |

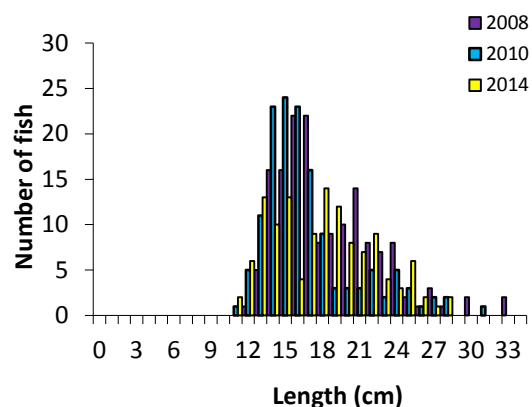


Fig. 4.77. Length frequency distribution of brown trout in the River Suir (Knocknageragh Br. _A), August 2008 (n=157), August 2010 (n=142) and August 2014 (n=125)

Suir, River (Poulakerry _A)

The Poulakerry survey site was located approximately 450m downstream from the Kilsheelan Bridge site. One electric-fishing pass was conducted using four boat-based electric fishing units (two boats electric fished parallel to each bank separately) on the 26th of August 2014, along a 214m length of channel. Glide dominated the habitat, over a substrate of cobble and gravel.

Stoneloach and three-spined stickleback were the two most commonly encountered species at this site (Table 4.39). Brown trout and salmon fry and parr were recorded. Dace were also recorded (Fig. 4.80).

Table 4.39. Density of fish (no./m²), River Suir, (Poulakerry _A)

| Species | Total minimum density | |
|------------------------|-----------------------|--|
| | 2014 | |
| Brown trout | 0.003 | |
| 0+ brown trout | 0.001 | |
| 1+ & older brown trout | 0.001 | |
| Dace | 0.002 | |
| European eel | 0.0004 | |
| Flounder | 0.001 | |
| Lamprey sp. | 0.0004 | |
| Minnnow | 0.011 | |
| Salmon | 0.002 | |
| 0+ salmon | 0.001 | |
| 1+ & older salmon | 0.001 | |
| Stone loach | 0.007 | |
| 3-spined stickleback | 0.007 | |
| All Fish | 0.027 | |

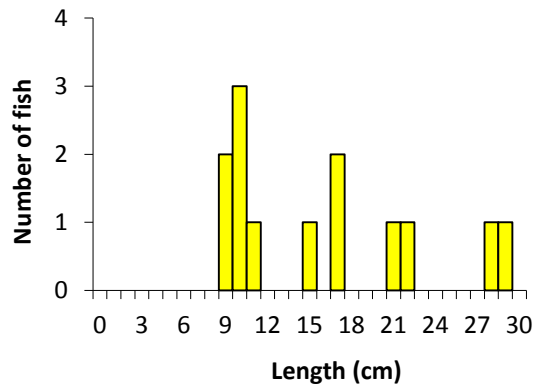


Fig. 4.78. Length frequency distribution of brown trout in the River Suir (Poulakerry_A), August 2014 (n=13)

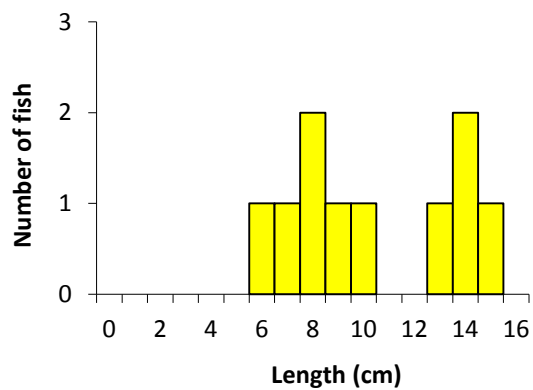


Fig. 4.79. Length frequency distribution of salmon in the River Suir (Poulakerry_A), August 2014 (n=10)

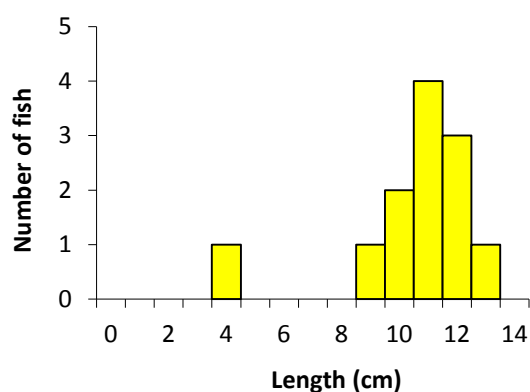


Fig. 4.80. Length frequency distribution of dace in the River Suir (Poulakerry_A), August 2014 (n=12)

4.1.8. Shannon International River Basin District - wadeable sites

Nine river sites were surveyed in four river catchments within the Shannon International River Basin District (ShIRBD) during 2014. The ShIRBD is home to Ireland's longest river and is Ireland's

largest RBD, covering an area of approximately 18,000 km² stretching over a distance from Co. Fermanagh in Northern Ireland, as far south as the Dingle peninsula in County Kerry. Catchments with surveys on them included, the Feale, Inny, Deel and Brosna. Five of these sites were wadeable and four were non-wadeable (Fig. 4.81).



Fig. 4.81. Map of the ShIRBD showing all sites surveyed in 2014



The River Deel (Newcastlewest)

Two sites were electric fished on the River Deel (Newcastlewest), one at Balliniska and another at Ballygulleen.

River Deel (Br. near Balliniska_A)

The Balliniska survey site was located downstream of Bunoke Br. near Balliniska, approximately 6.5km southeast of Newcastlewest, Co. Limerick (Plate 4.3). Three electric-fishing passes were conducted using three bank-based electric fishing units on the 25th of July 2014, along a 45m length of channel. Glide dominated the habitat, over a substrate of mostly cobble and gravel.



Plate 4.38. The River Deel at Balliniska, Co. Limerick

Minnow was the most abundant species recorded at this site (Table 4.40). Brown trout fry were not recorded, while salmon fry (0+) were present (Table 4.40 and Figs. 4.82 and 4.83).

Table 4.40. Density of fish (no./m²), River Deel (Br. near Balliniska_A)

| Species | Total minimum density | |
|--------------------------|-----------------------|-------|
| | 2011 | 2014 |
| Brown trout | 0.026 | 0.025 |
| 0+ brown trout | - | - |
| 1+ & older brown trout | 0.026 | 0.025 |
| Minnow | 1.722 | 0.492 |
| Salmon | 0.005 | 0.008 |
| 0+ salmon | 0.005 | 0.008 |
| 1+ & older salmon | - | - |
| Stone loach | 0.060 | 0.061 |
| Three-spined stickleback | 0.021 | 0.028 |
| All Fish | 1.834 | 0.614 |

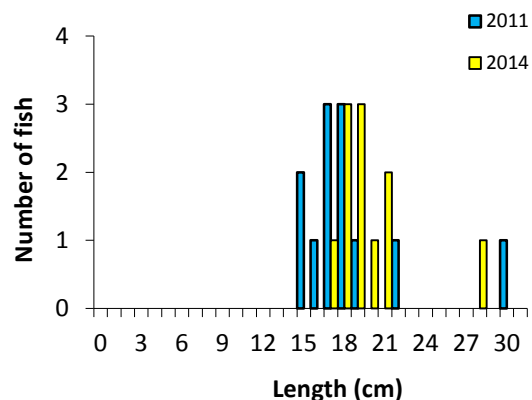


Fig. 4.82. Length frequency distribution of brown trout in the Deel River (Balliniska_A), July 2008 (n=256), August 2011 (n=12) and July 2014 (n=11)

River Deel (Ballygulleen_A)

The Ballygulleen survey site was located a further 2.5km upstream from the Balliniska site (Plate 4.38). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 25th of September 2014, along a 45m length of channel. Glide and riffle dominated the habitat, over a substrate of cobble and gravel.



Plate 4.39. The River Deel at Ballygulleen, Cork/Limerick border

Minnow was the most abundant fish species recorded at this site. Salmon fry (0+) were also recorded but the density was relatively low (Table 4.41).



Table 4.41. Density of fish (no./m²), River Deel (Ballygulleen_A)

| Species | Total minimum density 2014 |
|----------------------|-------------------------------|
| Minnow | 0.877 |
| Salmon | 0.008 |
| 0+ salmon | 0.008 |
| 1+ & older salmon | - |
| Stone loach | 0.066 |
| 3-spined stickleback | 0.058 |
| All Fish | 1.010 |

The River Inny

Two wadeable sites were electric fished on the River Inny, one at Oldcastle and another at Shrul Br.

River Inny (Br. 1 km S of Oldcastle_A)

The Oldcastle survey site was located close to its source, on the downstream side of Tubride Bridge, just south of Oldcastle, Co. Meath (Plate 4.40). Three electric-fishing passes were conducted using one bank-based electric fishing unit on the 9th of September 2014, along a 40m length of channel. Glide and riffle dominated the habitat, over a mixed substrate largely composed of cobble, gravel and boulder.



Plate 4.40. The Inny River at Oldcastle, Co. Meath

Brown trout density fluctuated over the three sampling occasions; the 0+ age class was dominant in 2008 and 2011, while 1+ & older fish dominated in 2014 (Table 4.83 and Fig. 4.83). Juvenile lamprey and three-spined stickleback were also present at the site (Table 4.83).

Table 4.42. Density of fish (no./m²), River Inny (Br. 1 km S of Oldcastle_A)

| Species | Total minimum density | | |
|------------------------|-----------------------|-------|-------|
| | 2008 | 2011 | 2014 |
| Brown trout | 0.492 | 0.346 | 0.468 |
| 0+ brown trout | 0.331 | 0.208 | 0.190 |
| 1+ & older brown trout | 0.161 | 0.138 | 0.278 |
| Lamprey sp. | - | 0.023 | - |
| 3-spined stickleback | 0.018 | 0.154 | 0.008 |
| All Fish | 0.510 | 0.523 | 0.476 |

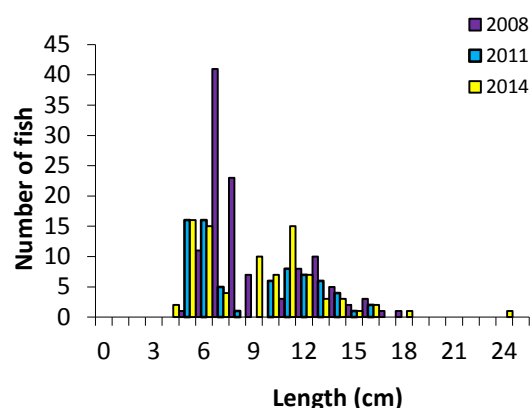


Fig. 4.83. Length frequency distribution of brown trout in the Inny River (Br. 1 km S of Oldcastle_A), September 2008 (n=116), August 2011 (n=72) and September 2014 (n=87)

The Smearlagh River

Two sites were electric fished on the Smearlagh, one at a Ford upstream of the Feale River confluence and another at Rathea.

Smearlagh River (Ford u/s Feale R confl (LHS)_A)

The Ford survey site was located within 300m of the River Feale confluence, less than 3km southeast of Listowel, Co. Kerry (Plate 4.41). Three electric-fishing passes were conducted using three bank-based electric fishing units on the 23rd of September 2014, along a 40m length of channel. Riffle was the most abundant habitat type at this mixed site, over a substrate largely composed of cobble and boulder.



Plate 4.41. The Smearlagh River upstream of the River Feale Confluence, Co. Kerry

Salmon was the most abundant fish species recorded at this site, followed closely by minnow (Table 4.43). Salmon abundance was higher in 2014 than in 2008. Brown trout fry (0+), previously absent in 2008, were recorded in 2014, while the length of brown trout was generally smaller than that recorded in 2008 (Fig. 4.85).

Table 4.43. Density of fish (no./m²), Smearlagh River (Ford u/s Feale R confl (LHS)_A)

| Species | Total minimum density | |
|------------------------|-----------------------|-------|
| | 2008 | 2014 |
| Brown trout | 0.011 | 0.014 |
| 0+ brown trout | - | 0.002 |
| 1+ & older brown trout | 0.011 | 0.014 |
| European eel | 0.001 | 0.040 |
| Lamprey sp. | 0.0003 | 0.002 |
| Minnow | 0.003 | 0.232 |
| Salmon | 0.011 | 0.255 |
| 0+ salmon | 0.001 | 0.131 |
| 1+ & older salmon | 0.010 | 0.124 |
| Sea trout | 0.003 | 0.005 |
| 3-spined stickleback | - | 0.009 |
| All Fish | 0.029 | 0.555 |

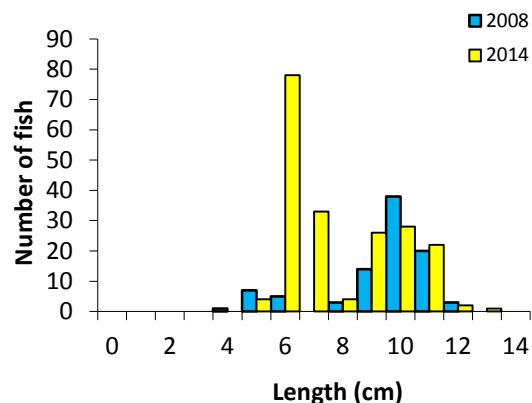


Fig. 4.84. Length frequency distribution of salmon in the Smearlagh River (Feale Confl._A), July 2008 (n=10) and September 2014 (n=16)

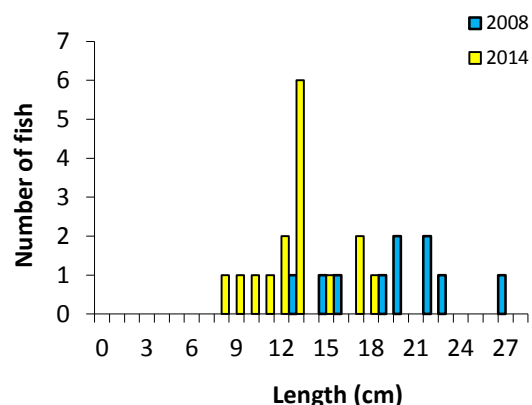


Fig. 4.85. Length frequency distribution of brown trout in the Smearlagh River (Feale Confl._A), July 2008 (n=10) and September 2014 (n=16)

Smearlagh River (Rathea_A)

The Rathea survey site was located downstream of a bridge near Rathea, approximately 10km upstream of the Ford survey site (Plate 4.42). Three electric-fishing passes were conducted using three bank-based electric fishing units on the 23rd of September 2014, along a 40m length of channel. Riffle dominated the habitat, over a substrate of mainly cobble and boulder.



Plate 4.42. The Smearlagh at Rathea, Co. Kerry

Salmon was the most abundant fish species recorded at this site, with good densities of both fry and parr recorded (Table 4.44). 0+ salmon was the dominant age class for that species while in contrast brown trout parr were more abundant.

Table 4.44. Density of fish (no./m²), Smearlagh River (Rathea_A)

| Species | Total minimum density 2014 |
|------------------------|-------------------------------|
| Brown trout | 0.029 |
| 0+ brown trout | 0.005 |
| 1+ & older brown trout | 0.024 |
| European eel | 0.015 |
| Salmon | 0.449 |
| 0+ salmon | 0.302 |
| 1+ & older salmon | 0.146 |
| All Fish | 0.493 |

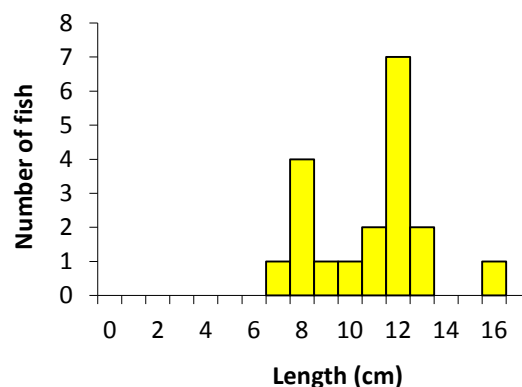


Fig. 4.87. Length frequency distribution of brown trout in the Smearlagh River (Rathea_A), September 2014 (n=19)

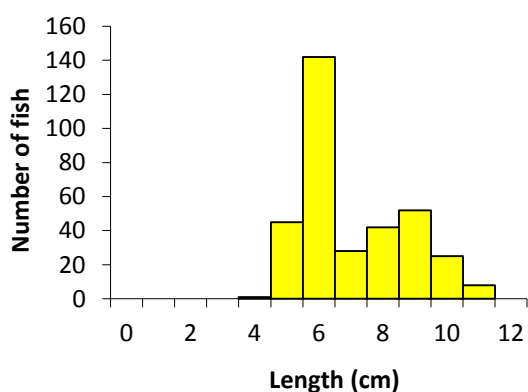


Fig. 4.86. Length frequency distribution of salmon in the Smearlagh River (Rathea_A), September 2014 (sub-sample, n=343)

4.1.9. Shannon International River Basin District - non-wadeable sites

The River Brosna

This survey site was located immediately upstream of a road bridge, approximately 500m northwest of Pollagh village, Co. Offaly (Plate 4.43). One electric-fishing pass was conducted using four boat-based electric fishing units on the 22nd of September 2014, along a 460m length of channel. Glide dominated the habitat, over a substrate of sand, mud and silt.



Plate 4.43. The River Brosna at Pollagh, Co. Offaly

Roach was the most abundant fish species recorded at this site in 2014 and showed a marked increase from the density recorded in 2008 (Table 4.45). This increase was due to an increase in fry (0+) density (Fig. 4.88).

Table 4.45. Density of fish (no./m²), River Brosna (0.5km NW of Pollagh_A)

| Species | Total minimum density | |
|------------------------|-----------------------|--------|
| | 2008 | 2014 |
| Brown trout | - | 0.0001 |
| 0+ brown trout | - | - |
| 1+ & older brown trout | - | 0.0001 |
| European eel | 0.0001 | - |
| Gudgeon | 0.0001 | 0.001 |
| Lamprey sp. | - | 0.0002 |
| Minnow | 0.0002 | 0.0004 |
| Perch | 0.002 | 0.002 |
| Pike | 0.0004 | 0.0001 |
| Roach | 0.007 | 0.028 |
| Stone loach | - | 0.0002 |
| 3-spined stickleback | - | 0.0005 |
| All Fish | 0.010 | 0.033 |

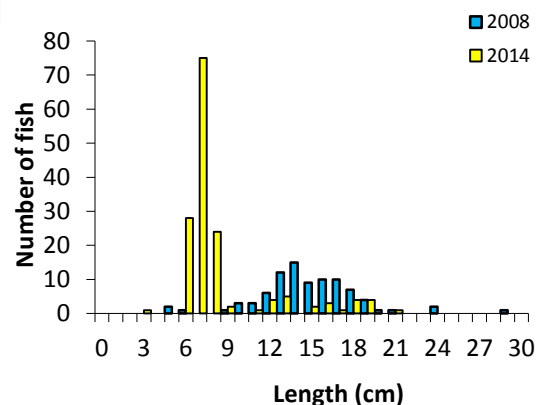


Fig. 4.88. Length frequency distribution of roach in the Brosna River (Pollagh_A), July 2008 (n=88) and September 2014 (sub-sample, n=155)

The River Feale

Two sites were electric fished on the River Feale, one at Duagh House and another at Sluicequarter.

Feale, River (Br. ENE of Duagh Ho_A)

The Duagh House survey site was located downstream of Duagh Br., just west of the Village of Duagh, near Listowel, Co. Kerry (Plate 4.44). One electric-fishing pass was conducted using four boat-based electric fishing units (two boats electric fished parallel to each bank separately) on the 24th of September 2014, along a 256m length of channel. Glide dominated the habitat, over a substrate of mainly cobble.



Plate 4.44. The River Feale near Duagh House, Co. Kerry

Salmon was the most abundant species recorded at this site, with relatively good densities of both fry and parr; both were higher than densities recorded in 2008 (Table 4.46 and Fig. 4.89). Brown



trout abundance was also higher in 2014, with again, only parr present (Fig. 4.90). Sea trout were absent on this occasion.

Table 4.46. Density of fish (no./m²), River Feale River (Br. ENE of Duagh Ho. A)

| Species | Total minimum density | |
|------------------------|-----------------------|--------|
| | 2008 | 2014 |
| Brown trout | 0.001 | 0.003 |
| 0+ brown trout | - | - |
| 1+ & older brown trout | 0.001 | 0.003 |
| European eel | 0.001 | 0.001 |
| Lamprey sp. | 0.0002 | 0.0002 |
| Minnow | 0.002 | 0.012 |
| Salmon | 0.009 | 0.043 |
| 0+ salmon | 0.001 | 0.018 |
| 1+ & older salmon | 0.008 | 0.025 |
| Sea trout | 0.0001 | - |
| All Fish | 0.013 | 0.059 |

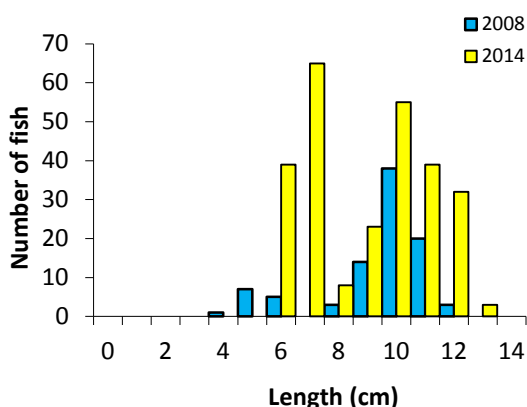


Fig. 4.89. Length frequency distribution of salmon in the Feale River (Br. ENE of Duagh Ho. A), July 2008 (n=10) and September 2014 (n=21)

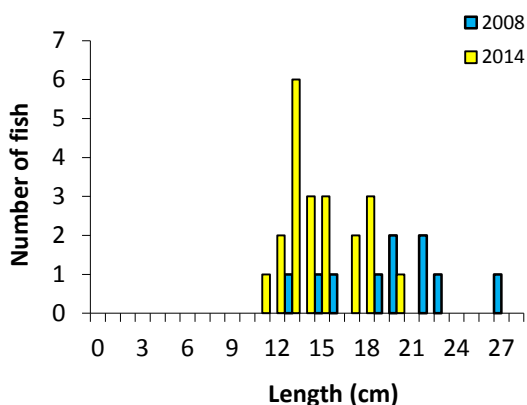


Fig. 4.90. Length frequency distribution of brown trout in the Feale River (Br. ENE of Duagh Ho. A), July 2008 (n=91) and September 2014 (n=264)

Feale, River (Sluicequarter_A)

The Sluicequarter survey site was located approximately 2km further upstream of the Duagh House site (Plate 4.45). One electric-fishing pass was conducted using two boat-based electric fishing units on the 24th of September 2014, along a 126m length of channel. Glide dominated the habitat, over a substrate of cobble and boulder.



Plate 4.45. The River Feale at Sluicequarter, Co. Kerry

Salmon was the most abundant fish species recorded at this site and the vast majority of these were parr (Table 4.47 and Fig. 4.91). This was a relatively good site for European eel, with a wide range of sizes captured (Fig. 4.92).

Table 4.47. Density of fish (no./m²), River Feale, (Sluicequarter_A)

| Species | Total minimum density |
|------------------------|-----------------------|
| | 2014 |
| Brown trout | 0.004 |
| 0+ brown trout | - |
| 1+ & older brown trout | 0.004 |
| European eel | 0.011 |
| Minnow | 0.020 |
| Salmon | 0.048 |
| 0+ salmon | 0.002 |
| 1+ & older salmon | 0.045 |
| All Fish | 0.082 |

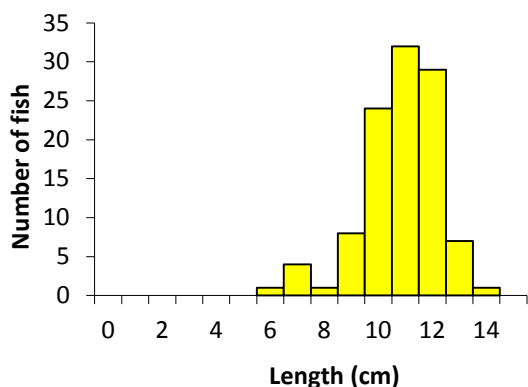


Fig. 4.91. Length frequency distribution of salmon in the Feale River (Br. ENE of Sluicequarter_A), September 2014 (n=107)

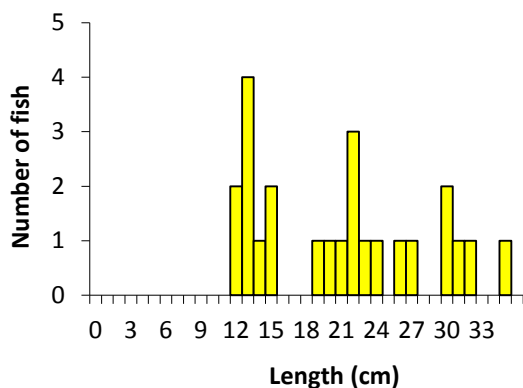


Fig. 4.92. Length frequency distribution of European eel in the Feale River (Br. ENE of Sluicequarter_A), September 2014 (n=24)

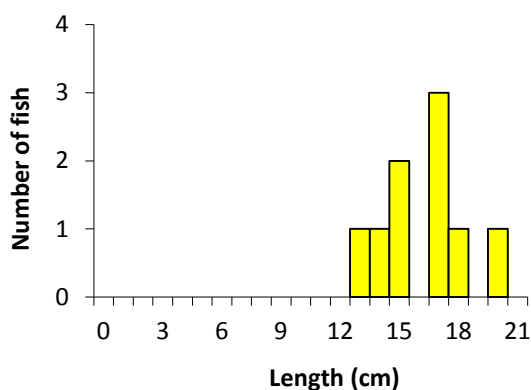


Fig. 4.93. Length frequency distribution of brown trout in the Feale River (Br. ENE of Sluicequarter_A), September 2014 (n=9)

River Inny (Shrule Br._A)

The Shrule Bridge survey site was located downstream of Shrule Br., about 3km upstream of Ballymahon, Co. Longford (Plate 4.46). One electric-fishing pass was conducted using four boat-based electric fishing units (two boats electric fished parallel to each bank separately) on the 8th of September 2014, along a 380m length of channel. Glide dominated the habitat, over a mixed substrate of sand, cobble and gravel.



Plate 4.46. The Inny River at Shrule Br., Co. Longford

Minnow and perch were the two most abundant species encountered (Table 4.48). Perch density was higher in 2014 than in 2008, with a wide range of length classes present (Fig. 4.94). Brown trout were also recorded across a wide range of length classes but their density was lower in 2014 (Fig. 4.95). Roach x bream hybrids and chub were absent from the latest survey.

Table 4.48. Density of fish (no./m²), River Inny (Shrule Br._A)

| Species | Total minimum density | |
|------------------------|-----------------------|--------|
| | 2008 | 2014 |
| Brown trout | 0.014 | 0.006 |
| 0+ brown trout | 0.009 | 0.001 |
| 1+ & older brown trout | 0.006 | 0.005 |
| Chub | 0.0001 | - |
| European eel | 0.001 | - |
| Gudgeon | 0.007 | 0.003 |
| Minnow | 0.011 | 0.007 |
| Perch | 0.002 | 0.007 |
| Pike | 0.001 | 0.001 |
| Roach | 0.004 | 0.004 |
| Roach x bream hybrid | 0.0001 | - |
| Salmon | - | 0.001 |
| 0+ salmon | - | - |
| 1+ & older salmon | - | 0.001 |
| Stone loach | 0.001 | 0.0004 |
| All Fish | 0.041 | 0.029 |

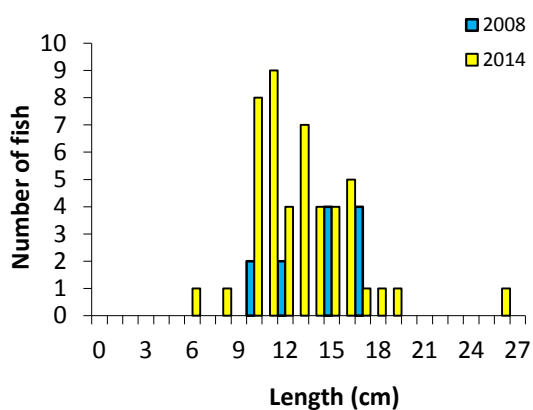


Fig. 4.94. Length frequency distribution of perch in the Inny River (Shrule Br._A), July (2008) (n=12) and September 2014 (n=47)

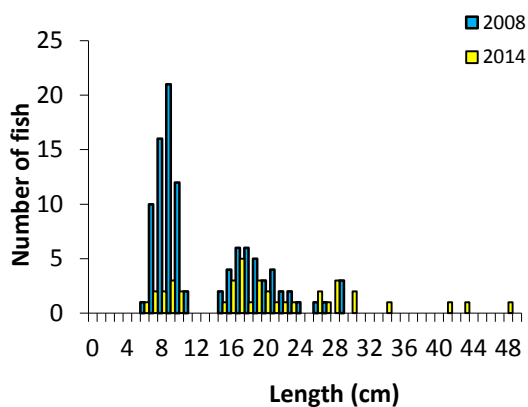


Fig. 4.95. Length frequency distribution of brown trout in the Inny River (Shrule Br._A), July (2008) (n=102) and September 2014 (n=40)

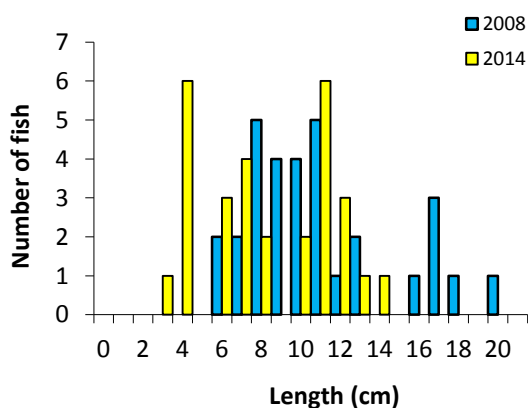


Fig. 4.96. Length frequency distribution of roach in the Inny River (Shrule Br._A), July (2008) (n=31) and September 2014 (n=29)

4.1.10. South Western River Basin District - wadeable sites

Six river sites were surveyed in three river catchments within the South Western River Basin District (SWRBD) during 2014. The SWRBD is the second largest RBD in Ireland, covering a land area

of approximately 13,000km². It also encompasses a further 1,000km² of marine waters off the coast of Counties Wexford and Waterford. Catchments with surveys on them included, the Glashaboy, Lee and Munster Blackwater. All of these sites were wadeable.



Fig. 4.97. Map of the SWRBD showing all sites surveyed in 2014

Finisk River (Modelligo Br._A)

This survey site was located downstream of Modelligo Bridge, approximately 6km east of Cappoquin, Co. Waterford (Plate 4.47). Three electric-fishing passes were conducted using three bank-based electric fishing units on the 15th of September 2014, along a 45m length of channel. Riffle and glide dominated the habitat, over a substrate of mainly cobble and gravel.



Plate 4.47. The Finisk River at Modelligo Br., Co. Waterford

Salmon was the most abundant fish species recorded at this site, although their density was lower than 2010 (Table 4.49 and Fig. 4.98). Brown trout abundance was relatively low, with a comparable spread of size classes between both years (Fig. 4.99). Stone loach and three-spined stickleback were recorded in 2014, having been absent from the 2010 survey.

Table 4.49. Density of fish (no./m²), Finisk River (Modelligo Br._A)

| Species | Total minimum density | |
|--------------------------|-----------------------|-------|
| | 2010 | 2014 |
| Brown trout | 0.013 | 0.011 |
| 0+ brown trout | 0.004 | 0.002 |
| 1+ & older brown trout | 0.009 | 0.009 |
| European eel | 0.004 | 0.011 |
| Lamprey sp. | 0.002 | - |
| Salmon | 0.619 | 0.200 |
| 0+ salmon | 0.439 | 0.173 |
| 1+ & older salmon | 0.180 | 0.027 |
| Stone loach | - | 0.011 |
| Three-spined stickleback | - | 0.005 |
| All Fish | 0.637 | 0.239 |

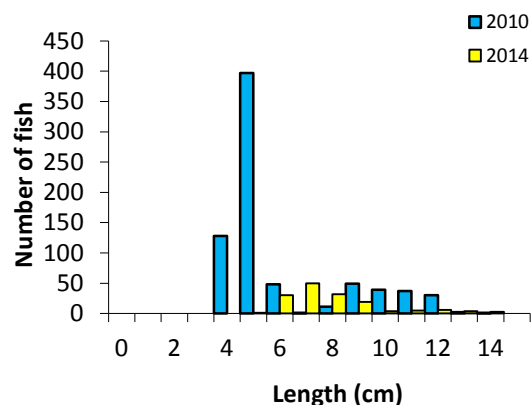


Fig. 4.98. Length frequency distribution of salmon in the Finisk River (Modelligo Br._A), July (2010) (n=743) and September 2014 (n=154)

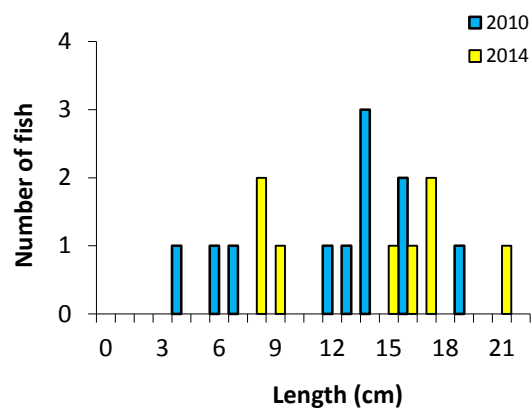


Fig. 4.99. Length frequency distribution of brown trout in the Finisk River (Modelligo Br._A), July (2010) (n=11) and September 2014 (n=8)

The River Funshion

Two sites were electric fished on the River Funshion, one at Brackbaun Br. and another River Funshion at Kilbeheny Br.

River Funshion (Brackbaun Br._A)

The Brackbaun Bridge survey site was located just upstream of Brackbaun Bridge, approximately 10km northeast of Mitchelstown, Co. Cork (Plate 4.48). Three electric-fishing passes were conducted using three bank-based electric fishing units on the 16th of September 2014, along a 45m length of channel. Riffle dominated the habitat, over a substrate of mainly gravel.



Plate 4.48. The River Funshion at Brackbaun Br., Limerick/Tipperary border

Brown trout was the most abundant fish species recorded at this site, while salmon were also relatively abundant (Table 4.50). Brown trout fry (0+) density was noticeably higher in 2014 than in 2009 (Fig. 4.100). The observed increase in salmon density between both years was due to a higher parr (1+ & older) density (Table 4.50 and Fig. 4.101).

Table 4.50. Density of fish (no./m²), River Funshion, (Brackbaun Br._A)

| Species | Total minimum density | |
|------------------------|-----------------------|-------|
| | 2009 | 2014 |
| Brown trout | 0.111 | 0.132 |
| 0+ brown trout | 0.069 | 0.124 |
| 1+ & older brown trout | 0.042 | 0.008 |
| European eel | - | 0.003 |
| Salmon | 0.079 | 0.100 |
| 0+ salmon | 0.020 | 0.019 |
| 1+ & older salmon | 0.059 | 0.081 |
| All Fish | 0.190 | 0.234 |

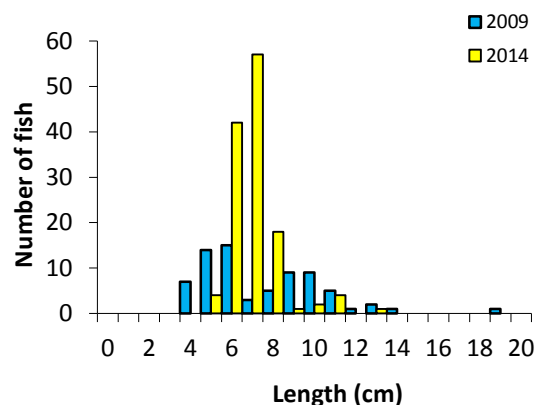


Fig. 4.100. Length frequency distribution of brown trout in the River Funshion (Brackbaun Br._A), July (2009) (n=72) and September 2014 (n=129)

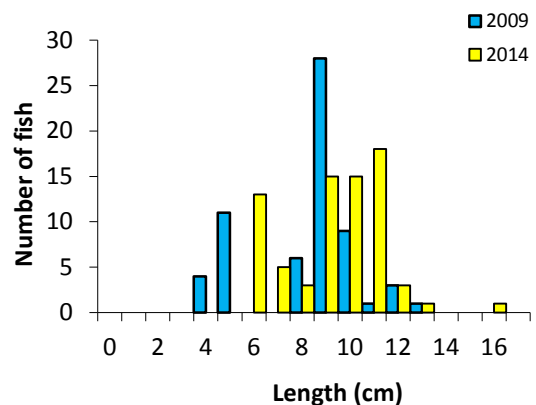


Fig. 4.101. Length frequency distribution of salmon in the River Funshion (Brackbaun Br._A), July (2009) (n=63) and September 2014 (n=74)

River Funshion (Kilbeheny_A)

The Kilbeheny survey site was located just downstream of the confluence with the Behanagh River, approximately 5km downstream of the Brackbaun Br. site (Plate 4.49). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 16th of September 2014, along a 45m length of channel. Riffle dominated the habitat, over a substrate of mainly gravel.



Plate 4.49. The River Funshion at Kilbeheny, Cork/Limerick border

Salmon and brown trout were both abundant at this site (Table 4.51). The majority of salmon recorded were fry (0+) (Fig. 4.102). A wide range of brown trout length classes were recorded, with fry (0+) making up the most abundant age cohort (Fig. 4.103).

Table 4.51. Density of fish (no./m²), River Funshion, (Kilbeheny_A)

| Species | Total minimum density 2014 |
|------------------------|----------------------------|
| Brown trout | 0.108 |
| 0+ brown trout | 0.042 |
| 1+ & older brown trout | 0.066 |
| European eel | 0.003 |
| Salmon | 0.236 |
| 0+ salmon | 0.167 |
| 1+ & older salmon | 0.069 |
| All Fish | 0.347 |

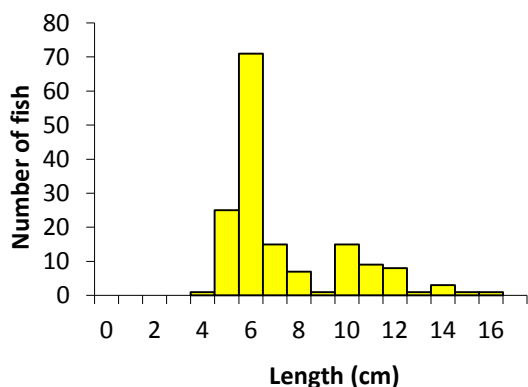


Fig. 4.102. Length frequency distribution of

salmon in the River Funshion (Kilbeheny_A), September 2014 (n=158)

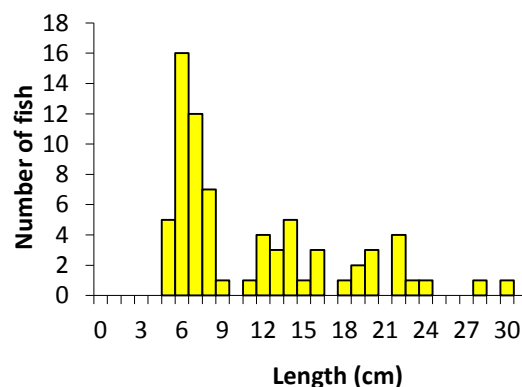


Fig. 4.103. Length frequency distribution of brown trout in the River Funshion (Kilbeheny_A), September 2014 (n=72)

The Glashaboy River

Two sites were electric fished on the Glashaboy River, one at Ballyvorisheen Br. and another at Ardnabricka.

Glashaboy River (Ardnabricka_A)

The Ardnabricka survey site was located just east of Carrignavar village at Ardnabricka Br., approximately 3km south of the Ballyvorisheen site (Plate 4.50). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 17th of September 2014, along a 45m length of channel. Riffle and glide dominated the habitat, over a substrate of cobble, gravel, mud and silt.



Plate 4.50. The Glashaboy River at Ardnabricka, Co. Cork



Brown trout was the most abundant fish species recorded, with relatively good densities of both 0+ and 1+ & older present (Table 4.52 and Fig. 4.104). Lamprey was also abundant at this site (Fig. 4.105).

Table 4.52. Density of fish (no./m²), Glashaboy River (Ardnabricka_A)

| Species | Total minimum density |
|-----------------|-----------------------|
| | 2014 |
| Brown trout | 0.384 |
| 0+ Brown trout | 0.116 |
| 1++ Brown trout | 0.269 |
| European eel | 0.019 |
| Lamprey sp. | 0.060 |
| Salmon | 0.023 |
| 0+ Salmon | - |
| 1++ Salmon | 0.023 |
| Stone loach | 0.009 |
| All Fish | 0.477 |

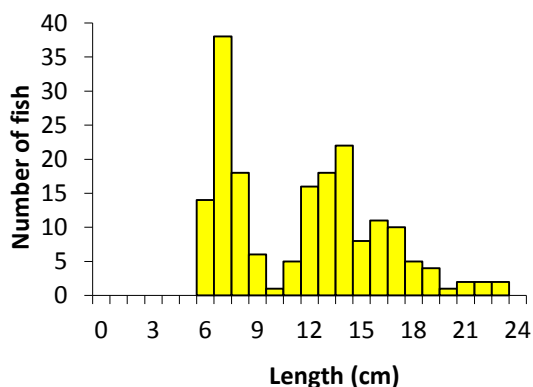


Fig. 4.104. Length frequency distribution of brown trout in the Glashaboy River (Ardnabricka_A), September 2014 (n=183)

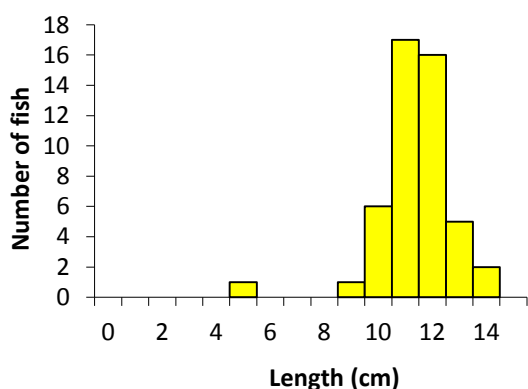


Fig. 4.105. Length frequency distribution of lamprey in the Glashaboy River (Ardnabricka_A), September 2014 (n=48)

Glashaboy River (Ballyvorisheen Br._B)

The Ballyvorisheen Bridge survey site was located just downstream of Ballyvorisheen Bridge, 2km north of Carrignavar village (Plate 4.51). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 17th of September 2014, along a 45m length of channel. Riffle and glide dominated the habitat, over a substrate of gravel, sand and cobble.



Plate 4.51. The Glashaboy River at Ballyvorisheen Br., Co. Cork

Brown trout was the most abundant fish species recorded at this site (Table 4.53 and Fig. 4.106). Although their density was higher than 2011, it was still lower than that originally recorded in 2008 (Table 4.53).

Table 4.53. Density of fish (no./m²), Glashaboy River (Ballyvorisheen Br._B)

| Species | Total minimum density | | |
|------------------------|-----------------------|-------|-------|
| | 2008 | 2011 | 2014 |
| Brown trout | 0.563 | 0.186 | 0.276 |
| 0+ brown trout | 0.222 | 0.084 | 0.167 |
| 1+ & older brown trout | 0.341 | 0.102 | 0.109 |
| European eel | 0.010 | 0.006 | 0.006 |
| Salmon | 0.025 | 0.138 | 0.006 |
| 0+ salmon | - | 0.132 | 0.006 |
| 1+ & older salmon | 0.025 | 0.006 | - |
| Stone loach | 0.015 | 0.012 | 0.006 |
| All Fish | 0.612 | 0.342 | 0.282 |

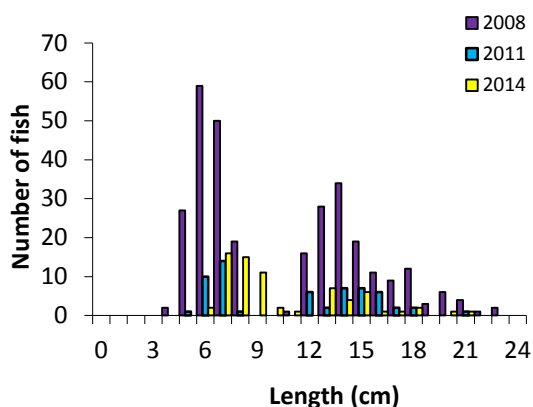


Fig. 4.106. Length frequency distribution of brown trout in the Glashaboy River (Ballyvorisheen Br._B), July 2008 (n=303), July 2011 (n=59) and September 2014 (n=70)

Sullane River (Sullane Br._A)

This survey site was located upstream of Sullane Br., approximately 10km west of Macroom, Co. Cork (Plate 4.52). Three electric-fishing passes were conducted using three bank-based electric fishing units on the 18th of September 2014, along a 45m length of channel. Riffle and glide dominated the habitat, over a substrate of cobble and gravel.



Plate 4.52. The Sullane River at Sullane Br., Co. Cork

Brown trout was the most abundant species recorded at this site with salmon the second most frequently encountered (Table 4.54). A wide range of length classes were recorded for brown trout, which included both 0+ and 1+ & older (Fig. 4.107). Fry and parr were also recorded for salmon, although fry were dominant (Table 4.54 and Fig. 4.108).

Table 4.54. Density of fish (no./m²), Sullane River (Sullane Br._A)

| Species | Total minimum density 2014 |
|------------------------|-------------------------------|
| Brown trout | 0.243 |
| 0+ brown trout | 0.148 |
| 1+ & older brown trout | 0.096 |
| Minnow | 0.007 |
| Salmon | 0.039 |
| 0+ salmon | 0.035 |
| 1+ & older salmon | 0.004 |
| Stone loach | 0.004 |
| 3-spined stickleback | 0.004 |
| All Fish | 0.298 |

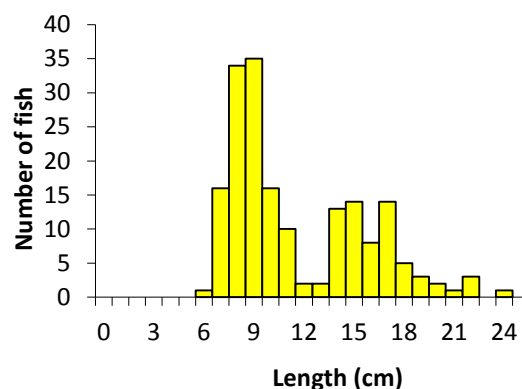


Fig. 4.107. Length frequency distribution of brown trout in the Sullane River (Sullane Br._A), September 2014 (n=180)

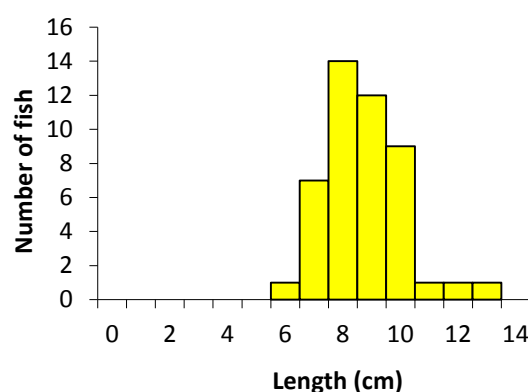


Fig. 4.108. Length frequency distribution of salmon in the Sullane River (Sullane Br._A), September 2014 (n=46)



4.1.11. Western River Basin District - wadeable sites

Sixteen river sites were surveyed in six river catchments within the Western River Basin District (WRBD) during 2014. The WRBD stretches along 2,700km of coastline from County Sligo in the north to Co. Clare in the south. Although it shares

borders with two international river basin districts (NWIRBD and SHIRBD), the WRBD is situated entirely within the Republic of Ireland. Catchments with sites surveyed included, the Ballysadare, Bundorragha, Corrib, Garvogue, Moy and Nanny. Five of these sites were wadeable and 11 were non-wadeable.



Fig. 4.109. Map of the WRBD showing all sites surveyed in 2014

Bundorragha River (Rock Pool_A)

This survey site was located at the rock pool, less than 1km south of Fin Lough, near the Delphi Fishery, Co. Mayo (Plate 4.53). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 31st of July 2014, along a 38m length of channel. Glide dominated the habitat, over a substrate of cobble and boulder.



Plate 4.53. The Bundorragha River at the Rock Pool, near Delphi, Co. Mayo

Salmon was the most abundant fish species recorded at this site, with the majority of these fry (Table 4.55 and Fig. 4.110). Brown trout were also present, both 0+ and 1+ & older (Table 4.55 and Fig. 4.111).

Table 4.55. Density of fish (no./m²), Bundorragha River (Rock Pool_A)

| Species | Total minimum density 2014 |
|------------------------|-------------------------------|
| Brown trout | 0.017 |
| 0+ brown trout | 0.006 |
| 1+ & older brown trout | 0.011 |
| European eel | 0.011 |
| Salmon | 0.088 |
| 0+ salmon | 0.069 |
| 1+ & older salmon | 0.019 |
| All Fish | 0.116 |

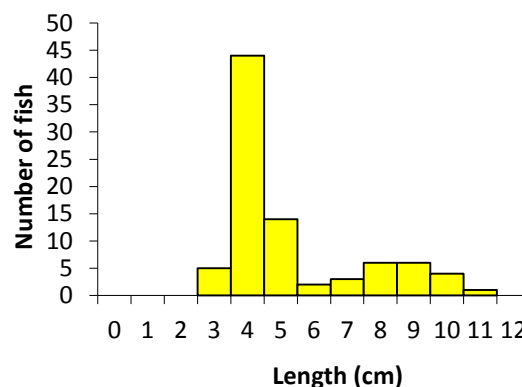


Fig. 4.110. Length frequency distribution of salmon in the Bundorragha River (Rockpool_A), July 2014 (n=85)

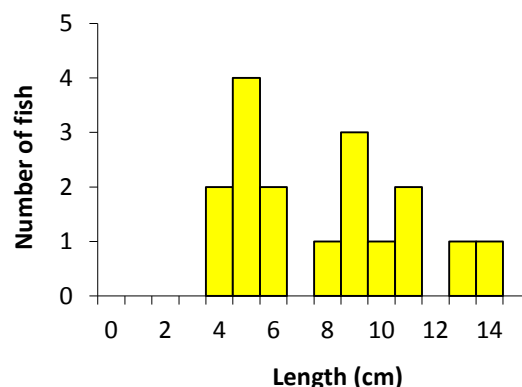


Fig. 4.111. Length frequency distribution of brown trout in the Bundorragha River (Rockpool_A), July 2014 (n=17)

Owennaglogh River (Tawnynoran_A)

This survey site was located upstream of the confluence with the Bundorragha River near the Delphi Fishery, Co. Mayo (Plate 4.55). Three electric-fishing passes were conducted using two bank-based electric fishing units on the 31st of July 2014, along a 40m length of channel. Glide was the most abundant habitat, over a substrate dominated by cobble.



Plate 4.55. The Owenaglogh River, upstream of the Bundorragha confluence, Co. Mayo

Salmon was the most abundant species recorded at this site, with fry making up the majority of those caught (Table 4.56 and Fig. 4.112). Brown trout were evenly spread across a wide range of size classes, representing both fry and parr (Table 4.56 and Fig. 4.113).

Table 4.56. Density of fish (no./m²), Owennaglogh River (Tawnynoran_A)

| Species | Total minimum density 2014 |
|------------------------|-------------------------------|
| Brown trout | 0.054 |
| 0+ brown trout | 0.013 |
| 1+ & older brown trout | 0.041 |
| European eel | 0.003 |
| Salmon | 0.226 |
| 0+ salmon | 0.163 |
| 1+ & older salmon | 0.064 |
| All Fish | 0.284 |

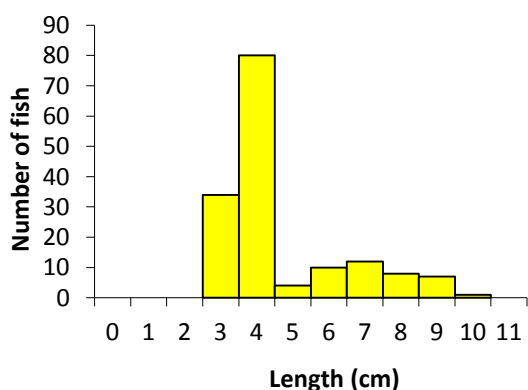


Fig. 4.112. Length frequency distribution of salmon in the Owenaglogh River (Tawnynoran_A), July 2014 (n=156)

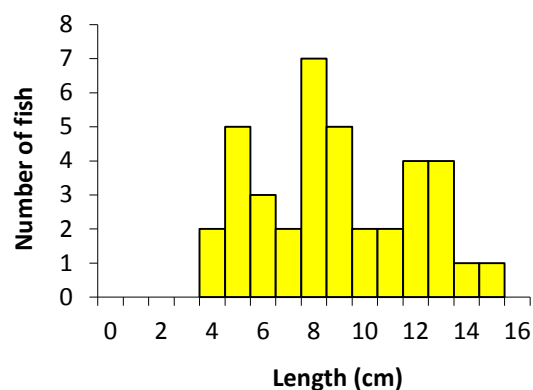


Fig. 4.113. Length frequency distribution of brown trout in the Owenaglogh River (Tawnynoran_A), July 2014 (n=38)

Nanny River

Two sites were surveyed in the Nanny River catchment, one was wadeable (Demesne River) and is described below and the second was unwadeable and is described later in the section.

Demesne River (Curraghreen_A)

The Demesne River survey site was located along a quiet track in Curraghreen, on the western side of Tuam (Plate 4.54). Three electric-fishing passes were conducted using one bank-based electric fishing unit on the 28th of July 2014, along a 40m length of channel. Glide was the most abundant habitat, over a substrate of mainly gravel and cobble.



Plate 4.54. The Demesne River at Curraghreen, Tuam, Co. Galway

Brown trout, three-spined stickleback and lamprey were the only species recorded at this site and were all captured in comparable, but low densities



(Table 4.56). Both brown trout 0+ and 1+ & older were present (Fig. 4.112).

Table 4.57. Density of fish (no./m²), Demesne River, (Curraghreen_A)

| Species | Total minimum density |
|------------------------|-----------------------|
| | 2014 |
| Brown trout | 0.038 |
| 0+ brown trout | 0.029 |
| 1+ & older brown trout | 0.008 |
| Lamprey sp. | 0.033 |
| 3-spined stickleback | 0.038 |
| All Fish | 0.109 |

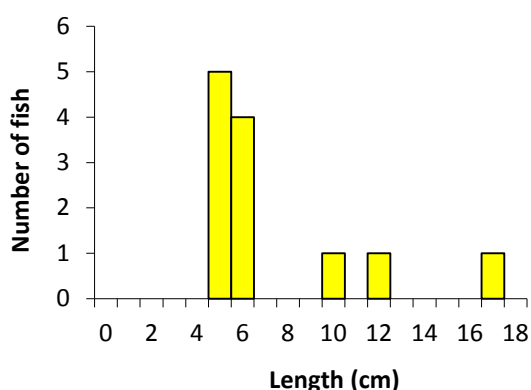


Fig. 4.114. Length frequency distribution of brown trout in the Demesne River (Curraghreen_A), July 2014 (n=12)

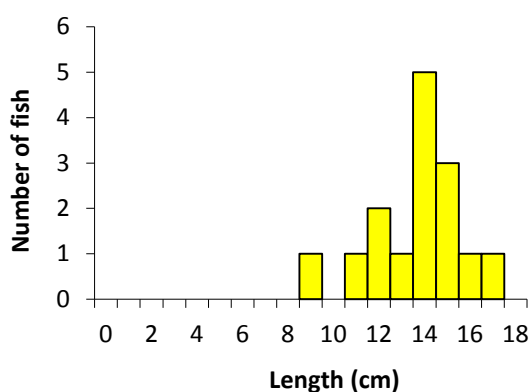


Fig. 4.115. Length frequency distribution of lamprey in the Demesne River (Curraghreen_A), July 2014 (n=15)

The Tobercurry River

Two sites were electric fished on the Tobercurry River, one just upstream of the River Moy confluence and another further upstream at Tullinaglug.

Tobercurry River (Br. just u/s Moy River_C)

The site was located upstream of a small bridge, approximately 100m from the River Moy confluence (Plate 4.56). Three electric-fishing passes were conducted using one bank-based electric fishing unit on the 22nd of July 2014, along a 45m length of channel. Glide dominated the habitat, over a substrate mainly composed of cobble.



Plate 4.56. The Tobercurry River, just upstream of the River Moy confluence, Co. Sligo

Salmon was the most abundant fish species recorded at this site with both fry and parr well represented (Table 4.58 and Fig. 4.116). Brown trout, minnow, stone loach and three-spined stickleback were also recorded at the site (Table 4.58).

Table 4.58. Density of fish (no./m²), Tobercurry River (Br. just u/s Moy River_C)

| Species | Total minimum density | |
|------------------------|-----------------------|-------|
| | 2011 | 2014 |
| Brown trout | 0.008 | 0.018 |
| 0+ brown trout | 0.008 | - |
| 1+ & older brown trout | - | 0.018 |
| Minnow | 0.299 | 0.412 |
| Salmon | 0.573 | 0.421 |
| 0+ salmon | 0.323 | 0.184 |
| 1+ & older salmon | 0.250 | 0.237 |
| Stone loach | 0.016 | - |
| 3-spined stickleback | 0.016 | 0.009 |
| All Fish | 0.912 | 0.860 |

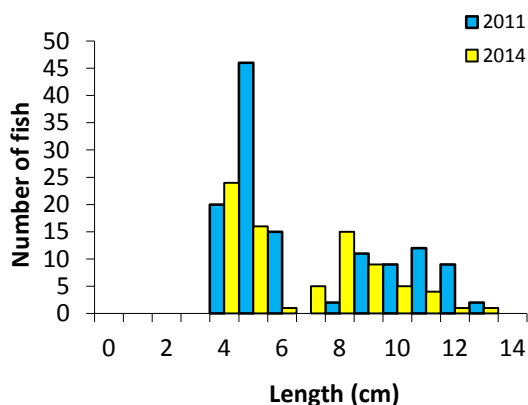


Fig. 4.116. Length frequency distribution of salmon in the Tobercurry River (Moy Confl._C), August 2011 (n=126) and July 2014 (n=81)

Tobercurry River (Tullanaglug_A)

The Tullanaglug survey site was located 1.5 km upstream from the other River Moy confluence site (Plate 4.57). Three electric-fishing passes were conducted using one bank-based electric fishing unit on the 22nd of July 2014, along a 40m length of channel. The habitat was well mixed, with glide the most abundant type, over a substrate of mainly cobble and gravel.



Plate 4.57. The Tobercurry River at Tullanaglug, Co. Sligo

Salmon, brown trout and three-spined stickleback were the only fish species recorded at this site although salmon made up the vast majority of the catch (Table 4.59). Most of the salmon caught were fry (0+) (Fig. 4.117).

Table 4.59. Density of fish (no./m²), Tobercurry River (Tullanaglug_A)

| Species | Total minimum density 2014 |
|------------------------|-------------------------------|
| Brown trout | 0.007 |
| 0+ brown trout | - |
| 1+ & older brown trout | 0.007 |
| Salmon | 0.171 |
| 0+ salmon | 0.112 |
| 1+ & older salmon | 0.060 |
| 3-spined stickleback | 0.030 |
| All Fish | 0.201 |

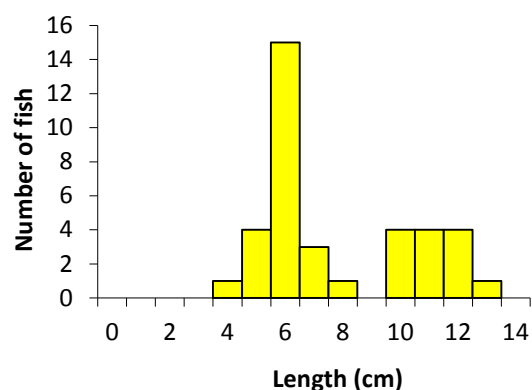


Fig. 4.117. Length frequency distribution of salmon in the Tobercurry River (Tullanaglug_A), July 2014 (n=37)



4.1.12. Western River Basin District - non-wadeable sites

The Ballysadare River

Two sites were electric fished on the Ballysadare River one at Ballysadare Br. and another at Oakwood.

Ballysadare River (Ballysadare Br._A)

The Ballysadare survey site was located just upstream of the main bridge in Ballysadare (Plate 4.58). One electric-fishing pass was conducted using three boat-based electric fishing units on the 23rd of July 2014, along a 320m length of channel. Glide and pool dominated the habitat, over a substrate of cobble, gravel, mud and silt.



Plate 4.58. The Ballysadare River at Ballysadare Br., Co. Sligo

The density of fish captured at this site was relatively low, with roach the most frequently encountered species (Table 4.60 and Fig. 4.118).

Table 4.60. Density of fish (no./m²), Ballysadare River (Ballysadare Br._A)

| Species | Total minimum density | |
|------------------------|-----------------------|--------|
| | 2010 | 2014 |
| Brown trout | 0.002 | 0.0003 |
| 0+ brown trout | - | - |
| 1+ & older brown trout | 0.002 | 0.0003 |
| European eel | 0.003 | 0.001 |
| Lamprey sp. | 0.0001 | - |
| Minnow | 0.001 | - |
| Perch | 0.009 | 0.0003 |
| Pike | 0.0004 | 0.0004 |
| Roach | 0.001 | 0.003 |
| Salmon | 0.018 | 0.001 |
| 0+ salmon | 0.001 | - |
| 1+ & older salmon | 0.017 | 0.001 |
| 3-spined stickleback | 0.0004 | - |
| All Fish | 0.034 | 0.006 |

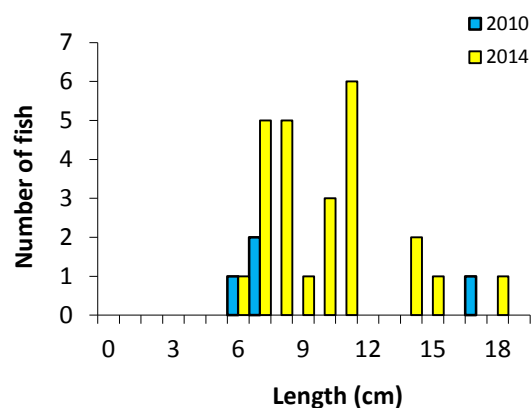


Fig. 4.118. Length frequency distribution of roach in the Ballysadare River (Ballysadare Br._A), June 2010 (n=4) and July 2014 (n=25)

Ballysadare River (Oakwood_A)

The Oakwood survey site was located upstream of the N4 bridge on the eastern side of Ballysadare, approximately 200m upstream of the Ballysadare site (Plate 4.59). One electric-fishing pass was conducted using three boat-based electric fishing units on the 23rd of July 2014, along a 208m length of channel. Glide and pool dominated the habitat, over a substrate of cobble, gravel, mud and silt.



Plate 4.59. The Ballysadare River at Oakwood, Ballysadare, Co. Sligo

No fish were recorded during this survey, however adult salmon were observed. This was a relatively deep site with steep muddy banks, providing poor habitat for juvenile fish.



Bonet River

Two sites were electric fished on the Bonet River, one at Dromahaire Br. and another near Dromahaire Castle.

Bonet River (1.8 km d/s Dromahaire Br._A)

The Dromahaire survey site was located downstream of a bridge on the southern side of Dromahaire, Co. Leitrim (Plate 4.60). One electric-fishing pass was conducted using three boat-based electric fishing units on the 21st of July 2014, along a 302m length of channel. Glide and pool dominated the habitat, over a substrate of sand, mud and silt.

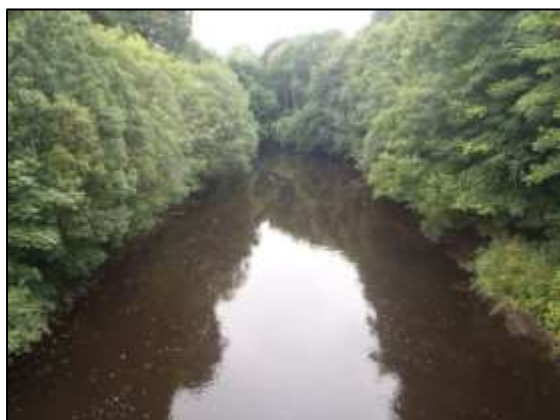


Plate 4.60. The Bonet River near Dromahaire, Co. Leitrim

The density of fish recorded at this site was also relatively low (Table 4.61). Eel, gudgeon, lamprey, minnow and perch were recorded at the site (Table 4.61). Despite being recorded in 2010, no brown trout or salmon were caught during the 2014 survey.

Table 4.61. Density of fish (no./m²), Bonet River (1.8 km d/s Dromahaire Br._A)

| Species | Total minimum density | |
|------------------------|-----------------------|--------|
| | 2010 | 2014 |
| Brown trout | 0.0002 | - |
| 0+ brown trout | - | - |
| 1+ & older brown trout | 0.0002 | - |
| European eel | 0.0002 | 0.0003 |
| Gudgeon | 0.041 | 0.0002 |
| Lamprey sp. | 0.008 | 0.0005 |
| Minnow | 0.113 | 0.0005 |
| Perch | 0.001 | 0.0006 |
| Salmon | 0.0002 | - |
| 0+ salmon | - | - |
| 1+ & older salmon | 0.0002 | - |
| Stone loach | 0.001 | - |
| 3-spined stickleback | 0.020 | - |
| All Fish | 0.184 | 0.002 |

Bonet River (Castle_A)

The Castle site was located at the bridge in Dromahaire, approximately 100m downstream of the Dromahaire survey site. One electric-fishing pass was conducted using three boat-based electric fishing units on the 21st of July 2014, along a 143m length of channel. Glide and pool dominated the habitat, over a substrate of sand, mud, silt and bedrock.

Only three fish species were recorded at this site. Brown trout was the most abundant, followed by salmon and gudgeon (Table 4.62).

Table 4.62. Density of fish (no./m²), Bonet River (Castle_A)

| Species | Total minimum density |
|------------------------|-----------------------|
| | 2014 |
| Brown trout | 0.009 |
| 0+ brown trout | - |
| 1+ & older brown trout | 0.009 |
| Gudgeon | 0.0003 |
| Salmon | 0.003 |
| 0+ salmon | - |
| 1+ & older salmon | 0.003 |
| All Fish | 0.013 |

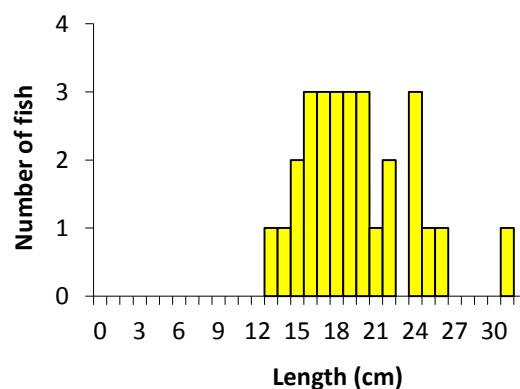


Fig. 4.119. Length frequency distribution of brown trout in the Bonet River (Castle_A), July 2014 (n=28)

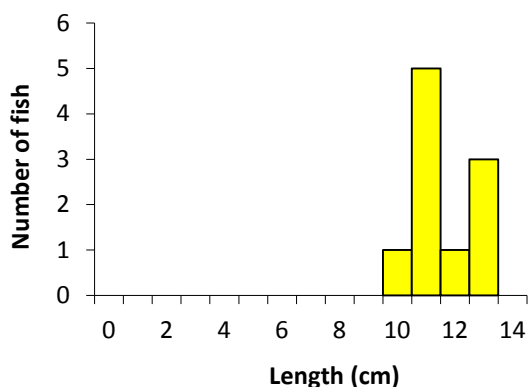


Fig. 4.120. Length frequency distribution of salmon in the Bonet River (Castle_A), July 2014 (n=10)

The River Clare

Two sites were electric fished on the Clare River, one at Corrofin and another at Kiltroe Castle Br.

River Clare (Corrofin Br._A)

The Corrofin site was located just over 1km north of Corrofin, Co. Galway (Plate 4.61). One electric-fishing pass was conducted using three boat-based electric fishing units on the 29th of July 2014, along a 322m length of channel. Glide dominated the habitat, over a substrate mainly composed of sand.



Plate 4.61. The River Clare near Corrofin, Co. Galway

Roach was the most abundant fish species recorded at the site (Table 4.63). The length frequency distribution showed a shift in length class between both years, from mainly smaller sizes in 2010 to larger sizes in 2014 (Fig. 4.121). Perch were also captured at this site, with a wide range of sizes recorded (Fig. 4.122).

Table 4.63. Density of fish (no./m²), River Clare, (Corrofin Br._A)

| Species | Total minimum density | |
|------------------------|-----------------------|--------|
| | 2010 | 2014 |
| Brown trout | 0.0007 | 0.0003 |
| 0+ brown trout | 0.0003 | - |
| 1+ & older brown trout | 0.0003 | 0.0003 |
| 9-spined stickleback | 0.0003 | - |
| Perch | 0.002 | 0.001 |
| Pike | 0.003 | 0.001 |
| Roach | 0.006 | 0.005 |
| Salmon | 0.007 | 0.0003 |
| 0+ salmon | 0.001 | - |
| 1+ & older salmon | 0.006 | 0.0003 |
| Stone loach | 0.002 | 0.0002 |
| 3-spined stickleback | 0.006 | - |
| All Fish | 0.026 | 0.008 |

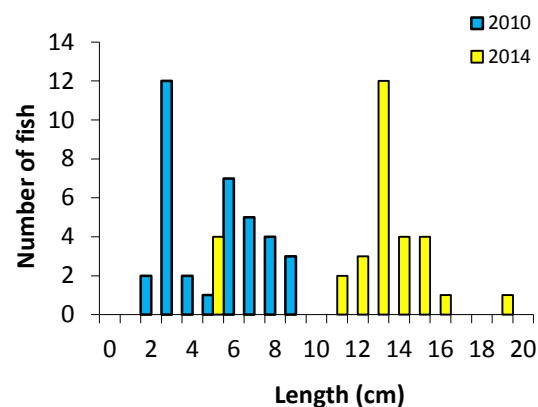


Fig. 4.121. Length frequency distribution of roach in the River Clare (Corrofin Br._A), August 2010 (n=36) and July 2014 (n=31)

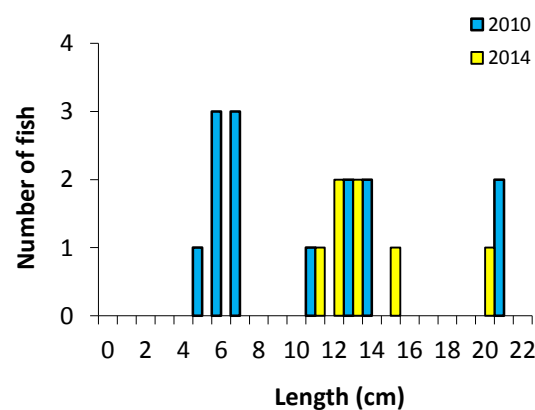


Fig. 4.122. Length frequency distribution of perch in the River Clare (Corrofin Br._A), August 2010 (n=14) and July 2014 (n=7)

River Clare (Kiltroe Castle Br._A)

The Kiltroe Castle Bridge site was located downstream of the bridge beside the castle ruins, 2km east of Claregalway (Plate 4.62). One electric-fishing pass was conducted using two boat-based electric fishing units on the 29th of July 2014, along a 241m length of channel. Glide dominated the habitat, over a substrate of gravel, cobble and sand.



Plate 4.62. The River Clare at Kiltroe Castle, Co. Galway

Roach was the most abundant fish species caught at this site in 2014 (Table 4.64). The density of roach was also higher in 2014 than 2010 with slightly older cohorts responsible for the increase (Fig. 4.123). Salmon fry (0+) and parr (1+ & older) abundance was lower in 2014 than 2010 (Fig. 4.124). Brown trout density was also lower in 2014, although the spread of sizes remained somewhat similar to the previous survey (Fig. 4.125).

Table 4.64. Density of fish (no./m²), River Clare, (Kiltroe Castle Br._A)

| Species | Total minimum density | |
|------------------------|-----------------------|--------|
| | 2010 | 2014 |
| Brown trout | 0.007 | 0.003 |
| 0+ brown trout | 0.003 | 0.001 |
| 1+ & older brown trout | 0.004 | 0.003 |
| European eel | 0.0003 | 0.0003 |
| Lamprey sp. | 0.0003 | - |
| Perch | 0.012 | 0.001 |
| Pike | 0.001 | 0.0003 |
| Roach | 0.013 | 0.017 |
| Salmon | 0.030 | 0.004 |
| 0+ salmon | 0.012 | - |
| 1+ & older salmon | 0.019 | 0.004 |
| 3-spined stickleback | 0.007 | - |
| All Fish | 0.071 | 0.026 |

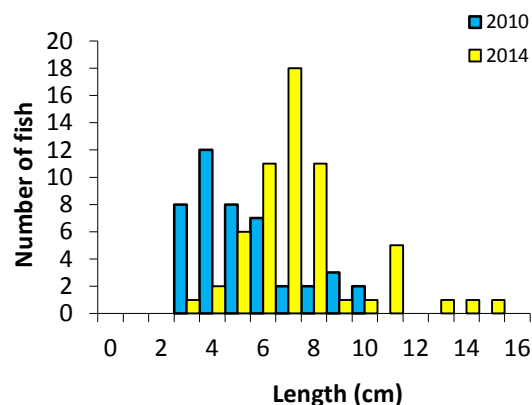


Fig. 4.123. Length frequency distribution of roach in the River Clare (Kiltroe Castle Br._A), August 2010 (n=44) and July 2014 (n=59)

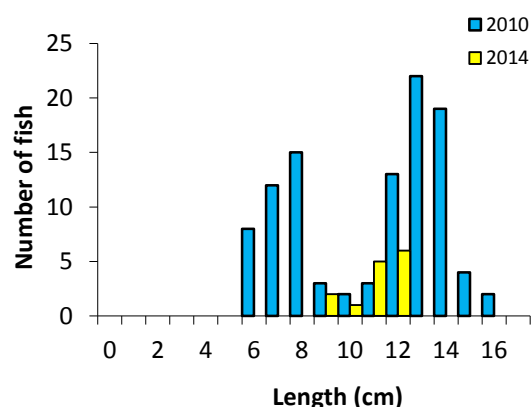


Fig. 4.124. Length frequency distribution of salmon in the River Clare (Kiltroe Castle Br._A), August 2010 (n=103) and July 2014 (n=14)

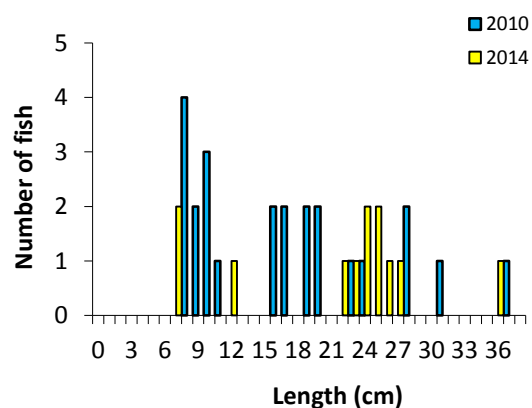


Fig. 4.125. Length frequency distribution of brown trout in the River Clare (Kiltroe Castle Br._A), August 2010 (n=24) and July 2014 (n=12)

River Nanny (u/s Weir Br._A)

This site was located upstream of Weir Bridge, just upstream from the River Clare confluence (Plate 4.63). One electric-fishing pass was conducted using one boat-based electric fishing unit on the 28th of July 2014, along a 115m length of channel. Glide dominated the habitat, over a substrate of mud and silt.



Plate 4.63. The River Nanny just upstream of the River Clare confluence, Co. Galway

The density of fish was low at this site (Table 4.65).

Table 4.65. Density of fish (no./m²), Nanny (Tuam), River (u/s Weir Br._A)

| Species | Total minimum density | |
|------------------------|-----------------------|-------|
| | 2009 | 2014 |
| Brown trout | 0.066 | 0.003 |
| 0+ brown trout | 0.001 | - |
| 1+ & older brown trout | 0.065 | 0.003 |
| Perch | 0.004 | - |
| Pike | 0.003 | - |
| Roach | - | 0.001 |
| Salmon | 0.001 | - |
| 0+ salmon | - | - |
| 1+ & older salmon | 0.001 | - |
| Stone loach | 0.001 | - |
| All Fish | 0.076 | 0.004 |

Owenmore River

Two sites were electric fished on the Owenmore River, one near the Unshin River Confluence and another at the waterfall in Collooney.

Owenmore River (Sligo) (300 m u/s Unshin River confl_A)

The Owenmore, Unshin River Confluence survey site was located approximately 0.5km upstream of the confluence with the Unshin River, just outside Collooney (Plate 4.64). One electric-fishing pass was conducted using three boat-based electric fishing units on the 24th of July 2014, along a 144m length of channel. Glide was the most abundant habitat, over a substrate mixed between cobble, boulder and gravel.



Plate 4.64. The Owenmore River just downstream of the Unshin River Confluence, Co. Sligo

Salmon was the most abundant fish species recorded at this site (Table 4.66 and Fig. 4.126). Roach were not captured in 2010 but were recorded in abundance in 2014, across a range of sizes (Fig. 4.127).

Table 4.66. Density of fish (no./m²), Owenmore River (Sligo) (300 m u/s Unshin River confl_A)

| Species | Total minimum density | |
|------------------------|-----------------------|--------|
| | 2010 | 2014 |
| Brown trout | 0.007 | 0.002 |
| 0+ brown trout | - | - |
| 1+ & older brown trout | 0.007 | 0.002 |
| European eel | 0.004 | - |
| Lamprey sp. | 0.001 | - |
| Minnow | 0.003 | 0.0003 |
| Perch | 0.001 | 0.0003 |
| Pike | - | 0.0003 |
| Roach | - | 0.005 |
| Salmon | 0.104 | 0.030 |
| 0+ salmon | 0.046 | 0.014 |
| 1+ & older salmon | 0.058 | 0.016 |
| All Fish | 0.119 | 0.038 |

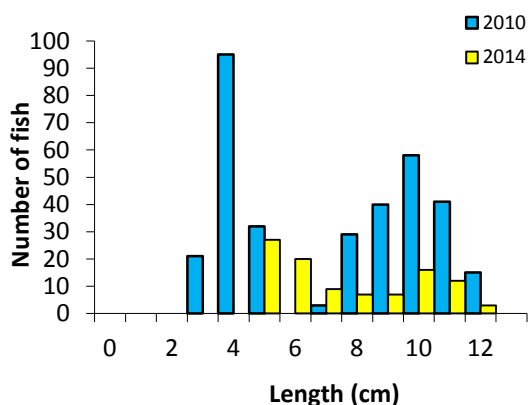


Fig. 4.126. Length frequency distribution of salmon in the Owenmore River (300 m u/s Unshin River confl_A), June 2010 (n=334) and July 2014 (n=101)

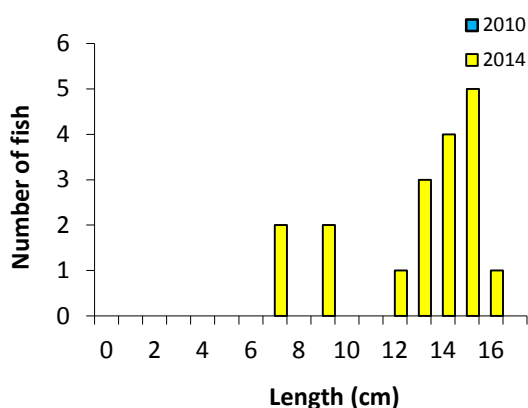


Fig. 4.127. Length frequency distribution of roach in the Owenmore River (300 m u/s Unshin River confl_A), June 2010 (no roach) and July 2014 (n=18)

Owenmore River (Sligo) (Waterfall_A)

The Owenmore (Waterfall) survey site was located approximately 400m further upstream from the Unshin River Confluence site, just below the waterfall in Collooney (Plate 4.65). One electric-fishing pass were conducted using three boat-based electric fishing units on the 24th of July 2014, along a 179m length of channel. Riffle and glide dominated the habitat, over a substrate of mostly boulder and cobble.



Plate 4.65. The Owenmore River just downstream of the waterfall in Collooney, Co. Sligo

Salmon was the most abundant fish species recorded at this site, with the majority of these, parr (1+ & older) (Table 4.67 and Fig. 4.128). A range of brown trout sizes were also recorded (Fig. 4.129).

Table 4.67. Density of fish (no./m²), Owenmore River (Sligo) (Waterfall_A)

| Species | Total minimum density 2014 |
|------------------------|-------------------------------|
| Brown trout | 0.005 |
| 0+ brown trout | - |
| 1+ & older brown trout | 0.005 |
| European eel | 0.0005 |
| Perch | 0.001 |
| Pike | 0.0002 |
| Roach | 0.0005 |
| Salmon | 0.022 |
| 0+ salmon | 0.001 |
| 1+ & older salmon | 0.021 |
| All Fish | 0.028 |

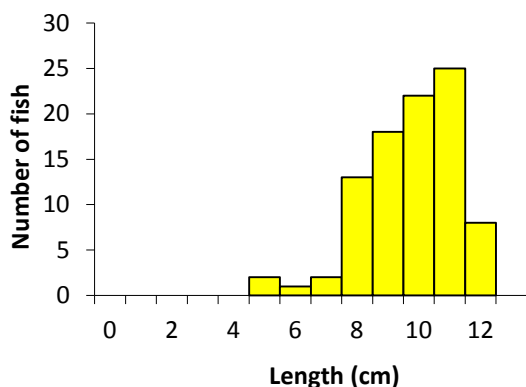


Fig. 4.128. Length frequency distribution of salmon in the Owenmore River (Waterfall_A), July 2014 (n=91)

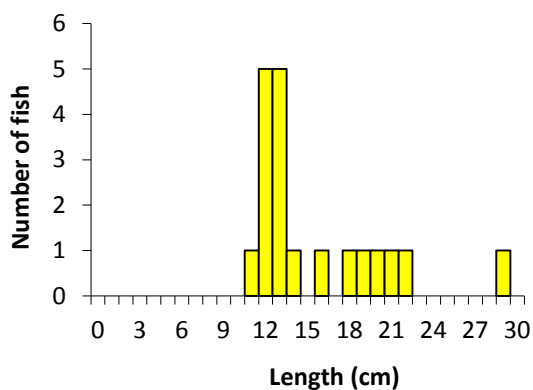


Fig. 4.129. Length frequency distribution of brown trout in the Owenmore River (Waterfall_A), July 2014 (n=19)



Plate 4.66. The Robe River at Akit Br., Co. Mayo

Minnow was the most abundant species recorded at this site (Table 4.68). Brown trout were caught in low numbers, and both 0+ and 1+ & older were represented (Fig. 4.130).

Table 4.68. Density of fish (no./m²), Robe River (Akit Br._A)

| Species | Total minimum density | |
|------------------------|-----------------------|--------|
| | 2010 | 2014 |
| Brown trout | 0.001 | 0.001 |
| 0+ brown trout | - | 0.001 |
| 1+ & older brown trout | 0.001 | 0.001 |
| European eel | 0.0001 | 0.0001 |
| Minnow | 0.008 | 0.017 |
| Perch | 0.0003 | 0.001 |
| Pike | - | 0.0004 |
| Roach | - | 0.0003 |
| Stone loach | - | 0.0003 |
| 3-spined stickleback | - | 0.0001 |
| All Fish | 0.009 | 0.020 |

The Robe River

Two sites were electric fished on the Robe River, one at Akit Br. and another at Friarsquarter.

Robe River (Akit Br._A)

The Akit Bridge survey site was located upstream of Akit Bridge, on the north end of Ballinrobe (Plate 4.66). One electric-fishing pass was conducted using two boat-based electric fishing units on the 30th of July 2014, along a 447m length of channel. Glide dominated the habitat, over a substrate of mainly mud and silt.

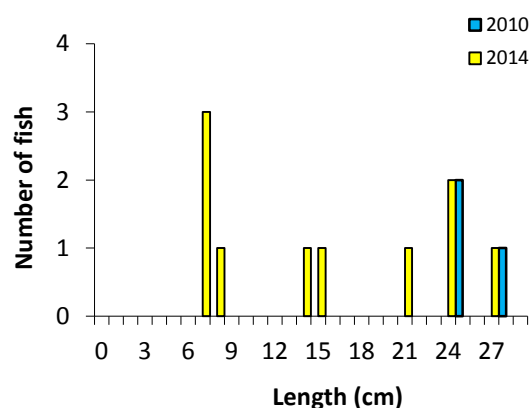


Fig. 4.130. Length frequency distribution of brown trout in the Robe River (Akit Br._A), July 2010 (n=4) and July 2014 (n=10)

Robe River (Friarsquarter_A)

This site was located a little further upstream from the Akit Bridge site (Plate 4.67). One electric-fishing pass was conducted using two boat-based electric fishing units on the 30th of July 2014, along a 140m length of channel. Glide dominated the habitat, over a substrate of gravel, sand, mud and silt.



Plate 4.67. The Robe River at Friarsquarter, Co. Mayo

Only three fish species were recorded at this site, with minnow the most abundant (Fig. 4.69). No brown trout fry (0+) were encountered.

Table 4.69. Density of fish (no./m²), Robe River (Friarsquarter_A)

| Species | Total minimum density 2014 |
|------------------------|-------------------------------|
| Brown trout | 0.003 |
| 0+ brown trout | - |
| 1+ & older brown trout | 0.003 |
| Minnow | 0.011 |
| Roach | 0.002 |
| All Fish | 0.015 |



4.2 Community Structure

A total of 14 fish species (sea trout are included as a separate 'variety' of brown trout) and one hybrid were recorded within the 70 sites surveyed during 2014 (Fig. 4.131). Brown trout was the most common fish species recorded, occurring in 67 sites, followed by salmon (54), European eel (39),

stone loach (35), minnow (27), three-spined stickleback (27), lamprey (24), roach (16), perch (13), pike (10), gudgeon (9), sea trout (8), flounder (7) and dace (4). Roach x bream hybrids were only recorded at one site.

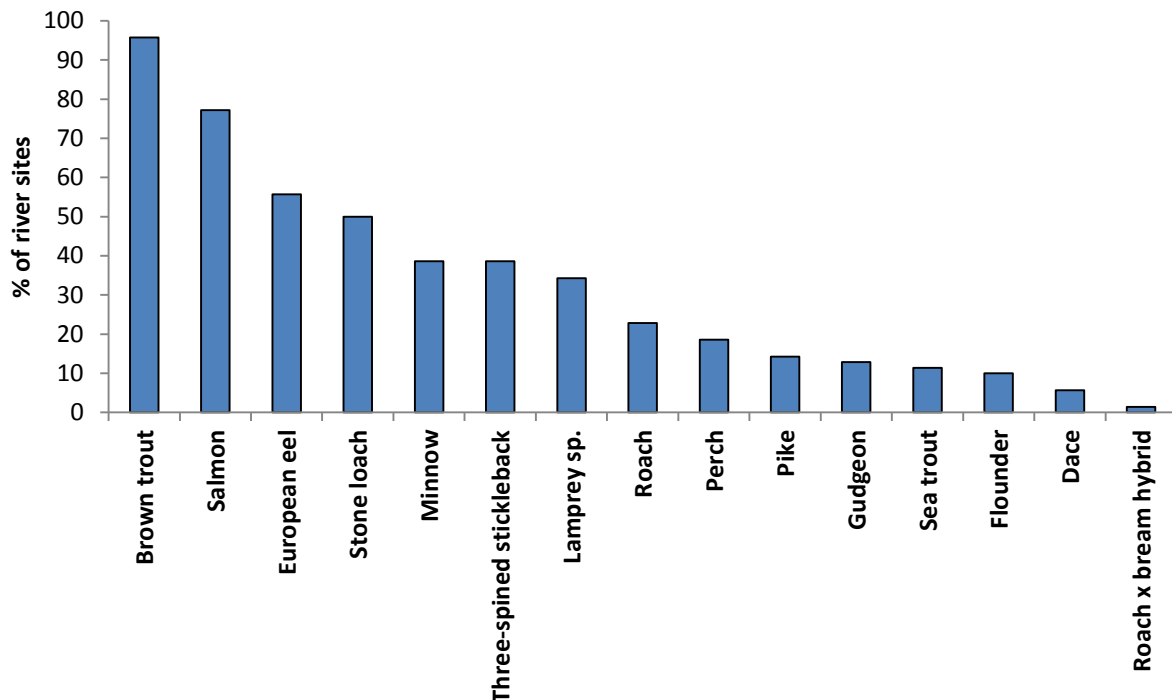


Fig. 4.131. Percentage of sites where each fish species was recorded across Ireland for WFD SM monitoring 2014



4.3 Age and growth

Brown trout were recorded at 67 sites. 1+ and older brown trout were present at all these sites, but 0+ (fry) were only present at 44 sites. Ages ranged from 0+ to 5+, with fish aged 0+ and 1+ comprising the most abundant age classes. Older brown trout cohorts were encountered much less frequently, with 4+ and 5+ individuals recorded in only fourteen and two sites respectively. The largest brown trout recorded in 2014 was caught in the Inny River at Shrle Br., which measured 48.4cm in length, weighed 1.35kg and was 4+. 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 4.132. Slower growth was observed in some of the more upland and acidic sites, such as the Cronaniv Burn, Bundorragha and Dargle Rivers (Fig. 4.132). The fastest growth rate at L1 was observed on the Mahon River (Pumphouse Weir_A) at L2 was on the the Deel River (Br. near Balliniska_A), at L3 was on the River Clare (Kiltroge Castle Br._A) and L4 was on the River Inny at Shrle Br._A). There were insufficient L5 brown trout captured to compare them reliably.

Salmon were recorded in 54 sites and 48 of these had parr (1+ & older) present. Salmon ages ranged from 0+ to 3+, with those within the 0+ and 1+ the most common age classes present. Eleven sites recorded salmon aged 2+, while 3+ were only present at one site. Adult salmon were intentionally avoided during these surveys to avoid damaging them, but were observed at a number of sites. The mean back-calculated length-at-age data for salmon, where individuals aged 1+ and older were recorded are shown in Figure 4.133 and Appendix 5. Length at age data is not shown for the Owenmore River (300 m u/s Unshin confl_A) as no salmon scales were collected. The fastest growth rate at L1 was observed on the River Clare (Corrofin Br._A) and L2 was on the Finisk River (Modelligo Br._A).

Eight age classes were recorded for dace (0+ to 7+). The 1+ cohort was the most abundant age class present, followed by 4+. The mean back-calculated length-at-age data for dace, where individuals aged 1+ and older were recorded are shown in Figure 4.134 and Appendix 6. The River Barrow (Pass Br._B) had the highest length at age mean values, indicating a faster growth rate than any of the other sites where dace were caught.

Six age classes of pike were recorded (0+ to 5+). The River Barrow recorded the widest range of age classes, with a total of five present and was the only site where individuals aged 5+ were

encountered. The mean back-calculated length-at-age data for pike, where individuals aged 1+ and older were recorded are shown in Figure 4.135 and Appendix 7. Length at age data for the River Barrow also indicates faster growth rates for pike than at any of the other sites where they were recorded.

Eleven age classes were recorded for roach (0+ to 11+). The River Barrow (Pass Br._B) recorded the widest range of age classes for any site during 2014. The mean back-calculated length-at-age data for roach, where individuals aged 1+ and older were recorded, are shown in Figure 4.136 and Appendix 8. The River Barrow displayed a relatively fast rate of growth. The Robe River (Friarsquarter_A), however, had the fastest rate of growth rate, indicated by greater length-at-age data. The Aherlow River (Killardry Br._A) contained the oldest individuals that were recorded (10+).

Four age classes were recorded for sea trout (1.2+, 2.0+, 2.1+ and 2.1.1+). Sea trout were recorded in relatively low numbers in four age categories 1.2+ (two sea winter maiden with one previous year in freshwater), 2.0+ (finnock), 2.1+ (two sea winter maiden with 2 previous years in freshwater) and 2.1.1+ (2 year old smolt). The mean back-calculated length-at-age data for sea trout are shown in Appendix 9. The River Slaney (Carhill_A) and River Nore (Brownsbarn Br._A) both showed relatively fast rates of growth.

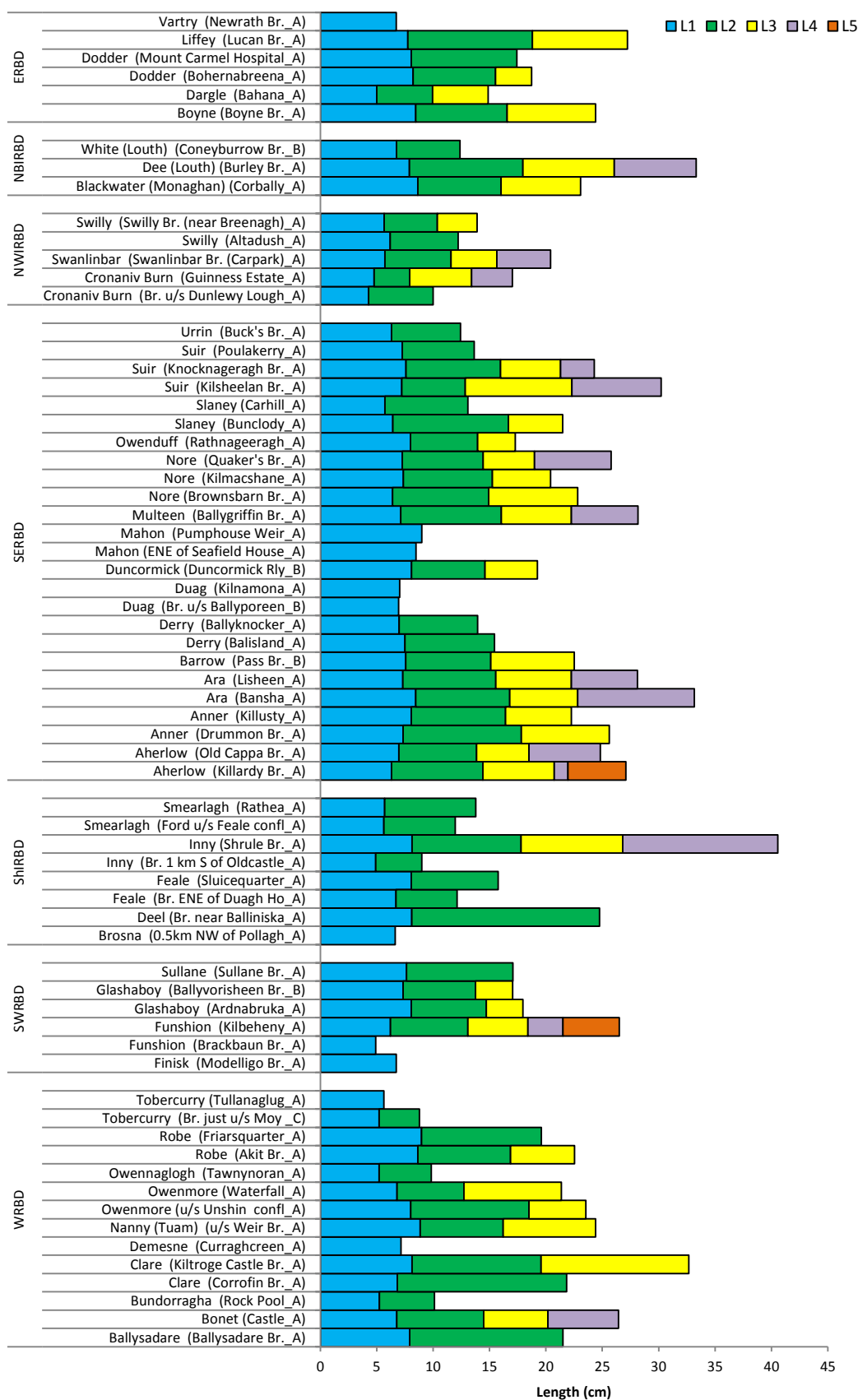


Fig. 4.132. Mean length at age values (L1, L2, L3 etc.) for brown trout across all sites surveyed in 2014

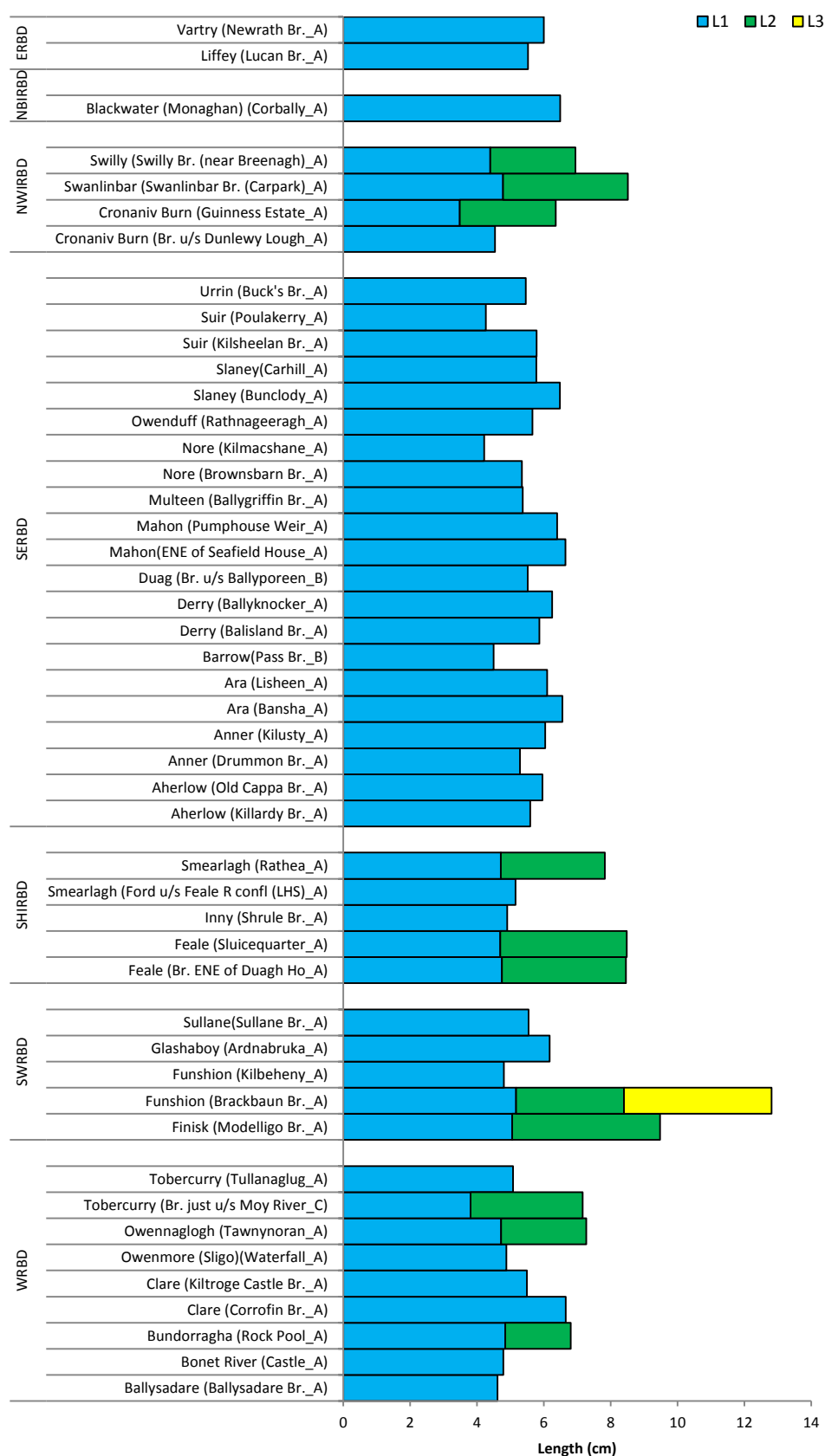


Fig. 4.133. Mean length at age values (L1, L2, L3 etc.) for salmon across all sites surveyed in 2014

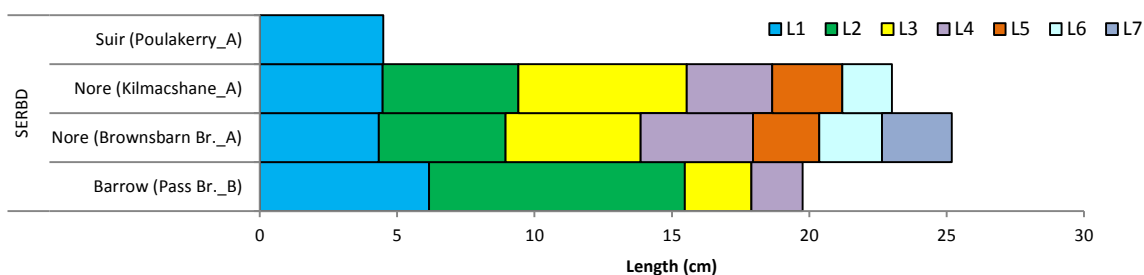


Fig. 4.134. Mean length at age values (L1, L2, L3 etc.) for dace across all sites surveyed in 2014

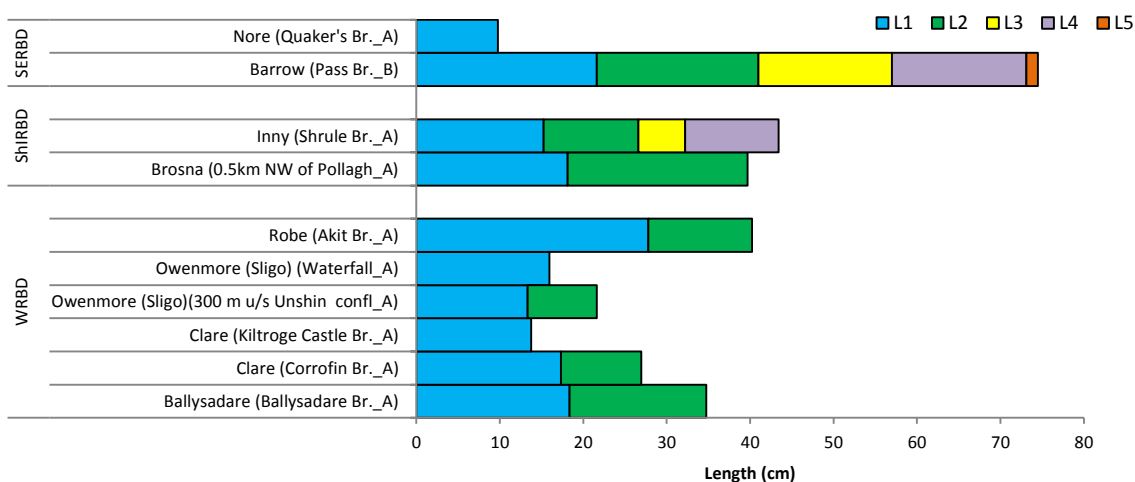


Fig. 4.135. Mean length at age values (L1, L2, L3 etc.) for pike across all sites surveyed in 2014

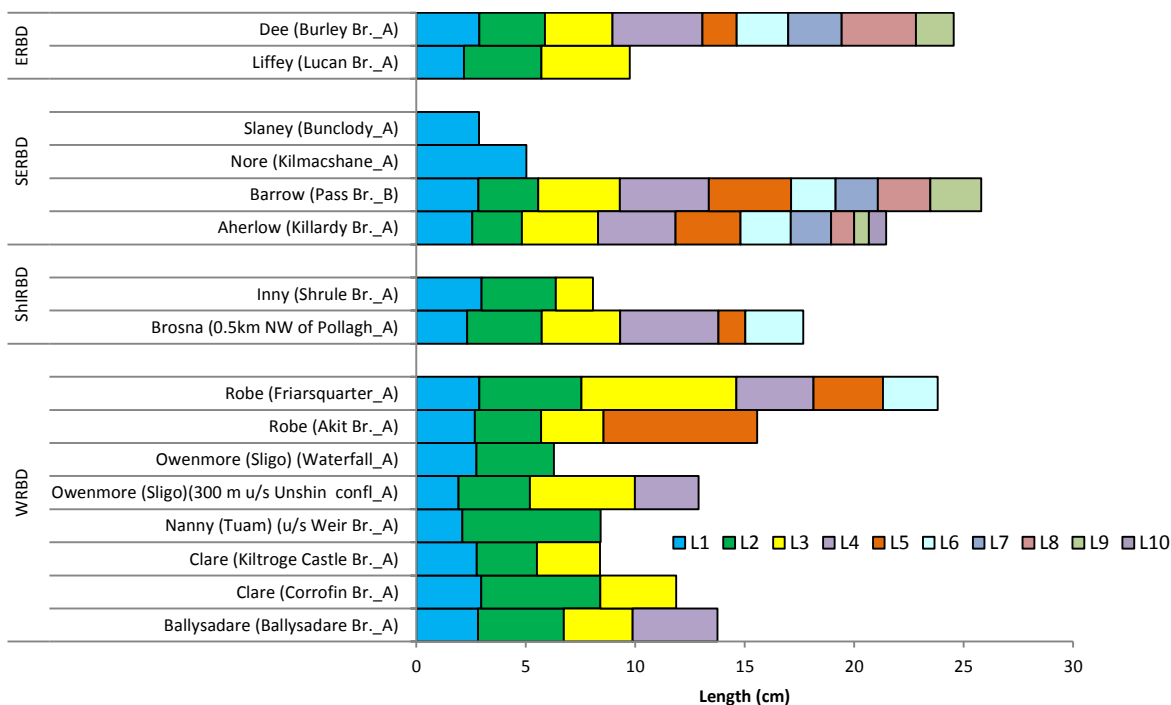


Fig. 4.136. Mean length at age values (L1, L2, L3 etc.) for roach across all sites surveyed in 2014



River sites where 1+ and older brown trout were present were divided into three categories based on their alkalinity; these were low = $<35 \text{ mgCaCO}_3 \text{ l}^{-1}$, moderate = $35 - 100 \text{ mgCaCO}_3 \text{ l}^{-1}$, and high $> 100 \text{ mgCaCO}_3 \text{ l}^{-1}$. The mean back-calculated lengths for each alkalinity type are shown in Figure 4.138. Eighteen river sites were characterised as low alkalinity, 12 as moderate alkalinity and 37 as high alkalinity. The mean length at age data for each alkalinity category is shown in Fig. 4.137. Statistical analysis revealed that there was a significant difference across alkalinity groups for L1 (Kruskal-Wallis, $H=9.168$, $df=2$, $p<0.05$), with a

significant difference between the Low and High categories (Mann-Whitney Pairwise, $P<0.01$). For L2, there was also a difference across the alkalinity groups (ANOVA, $F=87.2$, $df=2$, $p<0.001$, with a significant difference between the Low and High categories (Tukey's Pairwise, $p<0.001$). For L3 there was also a difference across the alkalinity groups (Kruskal-Wallis, $H=20.04$, $p<0.001$). Mann-Whitney Pairwise tests revealed the differences to be between the Low and High ($p<0.001$) and Moderate and High groups ($p<0.001$). For L4, there was no significant difference found across the three alkalinity groups.

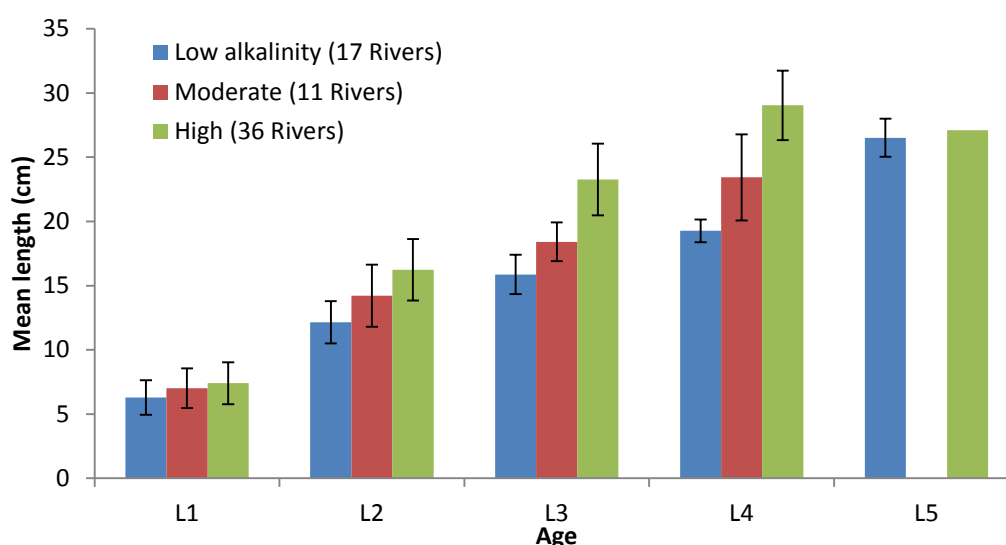


Fig. 4.137. Mean (\pm S.D.) back calculated lengths at age for brown trout in rivers within each alkalinity class

The brown trout at each river site were assigned growth categories based on a new classification scheme developed using length at age data (L1, L2, L3 and L4) (Matson and Kelly, in prep). Length at age data for each site was compared with Table 4.70 below to ascertain which growth category it fit into most appropriately. Some sites couldn't be determined due to insufficient data. Where there

was overlap between two categories, a mixed category was used (Table 4.71).

Four sites were categorised as very slow, two sites as very slow/slow, one site as slow, two sites as slow/moderate, 49 sites as moderate and four sites as moderate/fast. Four sites had insufficient data to determine a growth category reliably.

Table 4.70. 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 4.71. Categories of brown trout growth in the WFD river sites surveyed in 2014



| River | Growth category | River | Growth category |
|---|-----------------|---|-----------------|
| Ballysadare (Ballysadare Br._A) | N/A | Duncormick ((W) Br. nr Duncormick Rly St_B) | Moderate |
| Clare (Corrofin Br._A) | N/A | Feale (Br. ENE of Duagh Ho_A) | Moderate |
| Robe (Friarsquarter_A) | N/A | Feale (Sluicequarter_A) | Moderate |
| Tobercurry (Br. just u/s Moy_C) | N/A | Finisk (Modelligo Br._A) | Moderate |
| Tobercurry (Tullanaglug_A) | N/A | Funshion (Kilbeheny_A) | Moderate |
| Cronaniv Burn (Br. u/s Dunlewy Lough_A) | Very Slow | Glashaboy (Ardnabricka_A) | Moderate |
| Cronaniv Burn (Dunlewy_A) | Very Slow | Glashaboy (Ballyvorisheen Br._B) | Moderate |
| Funshion (Brackbaun Br._A) | Very Slow | Mahon (ENE of Seafield House_A) | Moderate |
| Inny (Br. 1 km S of Oldcastle_A) | Very Slow | Mahon (Pumphouse Weir_A) | Moderate |
| Dargle (Bahana_A) | Very Slow/Slow | Multeen (Ballygriffin Br._A) | Moderate |
| Owennaglogh (Tawnynoran_A) | Very Slow/Slow | Nanny (Tuam) (u/s Weir Br._A) | Moderate |
| Bundorragha (Rock Pool_A) | Slow | Nore (Brownsbarn Br._A) | Moderate |
| Swanlinbar (Swanlinbar Br. (Carpark)_A) | Slow/Moderate | Nore (Kilmacshane_A) | Moderate |
| Swilly (Swilly Br. (near Breenagh)_A) | Slow/Moderate | Nore (Quakers Br._A) | Moderate |
| Aherlow (Killardy Br._A) | Moderate | Owenduff (Rathnageeragh_A) | Moderate |
| Aherlow (Old Cappa Br._A) | Moderate | Owenmore (Sligo) (Waterfall_A) | Moderate |
| Anner (Drummon Br._A) | Moderate | Robe (Akit Br._A) | Moderate |
| Anner (Killusty_A) | Moderate | Slaney (Bunclody_A) | Moderate |
| Ara (Bansha_A) | Moderate | Slaney (Carhill_A) | Moderate |
| Ara (Lisheen_A) | Moderate | Smearlagh (Ford u/s Feale R confl (LHS)_A) | Moderate |
| Barrow (Pass Br._B) | Moderate | Smearlagh (Ratheia_A) | Moderate |
| Blackwater (Monaghan)(Corvally_A) | Moderate | Suir (Kilsheelan Br._A) | Moderate |
| Bonet (Castle_A) | Moderate | Suir (Knocknageragh Br._A) | Moderate |
| Boyne (Boyne Br._A) | Moderate | Suir (Poulakerry_A) | Moderate |
| Brosna (0.5km NW of Pollagh_A) | Moderate | Sullane (Sullane Br._A) | Moderate |
| Dee (Louth)(Burley Br._A) | Moderate | Swilly (Altadush_A) | Moderate |
| Deel (Newcastlewest)(Br. near Balliniska_A) | Moderate | Urrin (Buck's Br._B) | Moderate |
| Demesne (Curraghreen_A) | Moderate | Vartry (Newrath Br._A) | Moderate |
| Derry (Balisland_A) | Moderate | White (Louth) (Coneyburrow Br._B) | Moderate |
| Derry (Ballyknocker_A) | Moderate | Clare (Kiltroge Castle Br._A) | Moderate/Fast |
| Dodder (Bohernabreena_A) | Moderate | Inny (Shrule Br._A) | Moderate/Fast |
| Dodder (Mount Carmel Hospital_A) | Moderate | Liffey (Lucan Br._A) | Moderate/Fast |
| Duag (Br. u/s Ballyporeen_B) | Moderate | Owenmore (Sligo)(Unshin confl_A) | Moderate/Fast |
| Duag (Kilnamona_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. Following an approach similar to that developed by the Environment Agency in England and Wales, the Fisheries Classification Scheme 2 (FCS2-Ireland) 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. The tool has been intercalibrated in a cross-Europe exercise (EC, 2013).

Using this tool and expert opinion, each site surveyed in 2014 was assigned a draft fish classification status (Table 4.72. & Fig. 4.138). Where applicable, the status is also given for previous surveys.



The ecological status of three sites were classed as High, 38 as Good, 25 as Moderate and two as Poor. Two sites were not classified. When comparing the status this year with that from previous years, there was an improvement in ecological status at the River Nore (Quakers Br._A) and the River Vartry (Newrath Br._A); however, there was a deterioration in ecological status at four sites: the Aherlow River (Killardy Br._A), the River Feale (Br. ENE of Duagh Ho_A, the Owenmore River (300 m u/s Unshin River confl_A) and the River Suir (Knocknageragh Br._A). All other sites that were previously surveyed remained unchanged.



Table 4.72. Ecological status for 2014 WFD surveillance monitoring sites, including previous status where applicable

| RBD | River (Site) | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|--------|---|------|------|------|------|------|------|------|
| ERBD | Boyne (Boyne Br._A) | | G | M | | | | M |
| | Dargle (Bahana_A) | | | | | G | | G |
| | Dodder (Bohernabreena_A) | | | | G | | M | M |
| | Dodder (Mount Carmel Hospital_A) | | | | M | | M | M |
| | Liffey (Lucan Br._A) | | G | | | | | G |
| | Vartry (Newrath Br._A) | G | | | | | G | H |
| NBIRBD | Blackwater (Monaghan)(Corvally_A) | | | | | | | M |
| | Dee (Burley Br._A) | | M | | | | | M |
| | White (Coneyburrow Br._B) | | | | | M | P | P |
| NWIRBD | Cronaniv Burn (Br. u/s Dunlewy Lough_A) | H | | | H | | | H |
| | Cronaniv Burn (Dunlewy_A) | | | | | | | G |
| | Swanlinbar (Swanlinbar Br. (Carpark)_A) | | | | G | | | G |
| | Swilly (Altadush_A) | | | | | | | G |
| | Swilly (Swilly Br. (near Breenagh)_A) | G | | | G | | | G |
| SERBD | Aherlow (Killardy Br._A) | | | G | | | | M |
| | Aherlow (Old Cappa Br._A) | | | | | | | M |
| | Anner (Drummon Br._A) | G | | | | | | G |
| | Anner (Killusty_A) | | | | | | | G |
| | Ara (Bansha_A) | | | | | | | G |
| | Ara (Lisheen_A) | | | | | | | G |
| | Barrow (Pass Br._B) | | | | | G | | G |
| | Derry (Balisland Br._A) | | | | | | | M |
| | Derry (Ballyknocker_A) | | | | | | | H |
| | Duag (Br. u/s Ballyporeen_B) | G | | | M | | | M |
| | Duag (Kilnamona_A) | | | | | | | M |
| | Duncormick (Duncormick Rly St_B) | M | | | M | | | M |
| | Mahon (ENE of Seafeld House_A) | G | | | | | | G |
| | Mahon (Pumphouse Weir_A) | | | | | | | G |
| | Multeen (Ballygriffin Br._A) | | | | | G | | G |
| | Nore (Brownsbarn Br._A) | | | | | G | | G |
| | Nore (Kilmacshane_A) | | | | | | | G |
| | Nore (Quakers Br._A) | M | | M | | | | G |
| | Owenduff (Rathnageeragh_A) | | | | | | | G |
| | Slaney (Bunclody_A) | | | | | | | M |
| | Slaney (Carhill_A) | | | | | | | M |



Table 4.72 continued. Ecological status for 2014 WFD surveillance monitoring sites, including previous status where applicable

| RBD | River (Site) | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|--------|--|------|------|------|------|------|------|------|
| SERBD | Suir (Kilsheelan Br._A) | | | G | | | | G |
| | Suir (Knocknageragh Br._A) | M | | G | | | | M |
| | Suir (Poulakerry_A) | | | | | | | G |
| | Urrin (Buck's Br._A) | G | | | | | | G |
| SHIRBD | Brosna (0.5km NW of Pollagh_A) | M | | | | | | M |
| | Deel (Ballygulleen_A) | | | | | | | P |
| | Deel (Br. near Balliniska_A) | M | | | M | | | M |
| | Feale (Br. ENE of Duagh Ho_A) | H | | | | | | G |
| | Feale (Sluicequarter_A) | | | | | | | G |
| | Inny (Br. 1 km S of Oldcastle_A) | G | | G | | | | G |
| | Inny (Shrule Br._A) | M | | | | | | M |
| | Smearlagh (Ford u/s Feale R confl (LHS)_A) | G | | | | | | G |
| | Smearlagh (Rathea_A) | | | | | | | G |
| SWRBD | Finisk (Modelligo Br._A) | | | G | | | | G |
| | Funshion (Brackbaun Br._A) | | G | | | | | G |
| | Funshion (Kilbeheny_A) | | | | | | | G |
| | Glashaboy (Ardnabricka_A) | | | | | | | G |
| | Glashaboy (Ballyvorisheen Br._B) | G | | | G | | | G |
| | Sullane (Sullane Br._A) | | | | | | | G |
| WRBD | Ballysadare (Ballysadare Br._A) | | | G | | | | N/A |
| | Ballysadare (Oakwood_A) | | | | | | | N/A |
| | Bonet (1.8 km d/s Dromahaire Br._A) | | | M | | | | M |
| | Bonet (Castle_A) | | | | | | | M |
| | Bundorragha (Rock Pool_A) | | | | | | | G |
| | Clare (Corrofin Br._A) | | | M | | | | M |
| | Clare (Kiltroge Castle Br._A) | | | M | | | | M |
| | Demesne (Curraghcreen_A) | | | | | | | M |
| | Nanny (u/s Weir Br._A) | | M | | | | | M |
| | Owenmore (Sligo) (Unshin River confl_A) | | | H | | | | G |
| | Owenmore (Sligo)(Waterfall_A) | | | | | | | G |
| | Owennaglogh (Tawnynoran_A) | | | | | | | G |
| | Robe (Akit Br._A) | | | M | | | | M |
| | Robe (Friarsquarter_A) | | | | | | | M |
| | Tobercurry (Br. just u/s Moy River_C) | | | | G | | | G |
| | Tobercurry (Tullanaglug_A) | | | | | | | G |

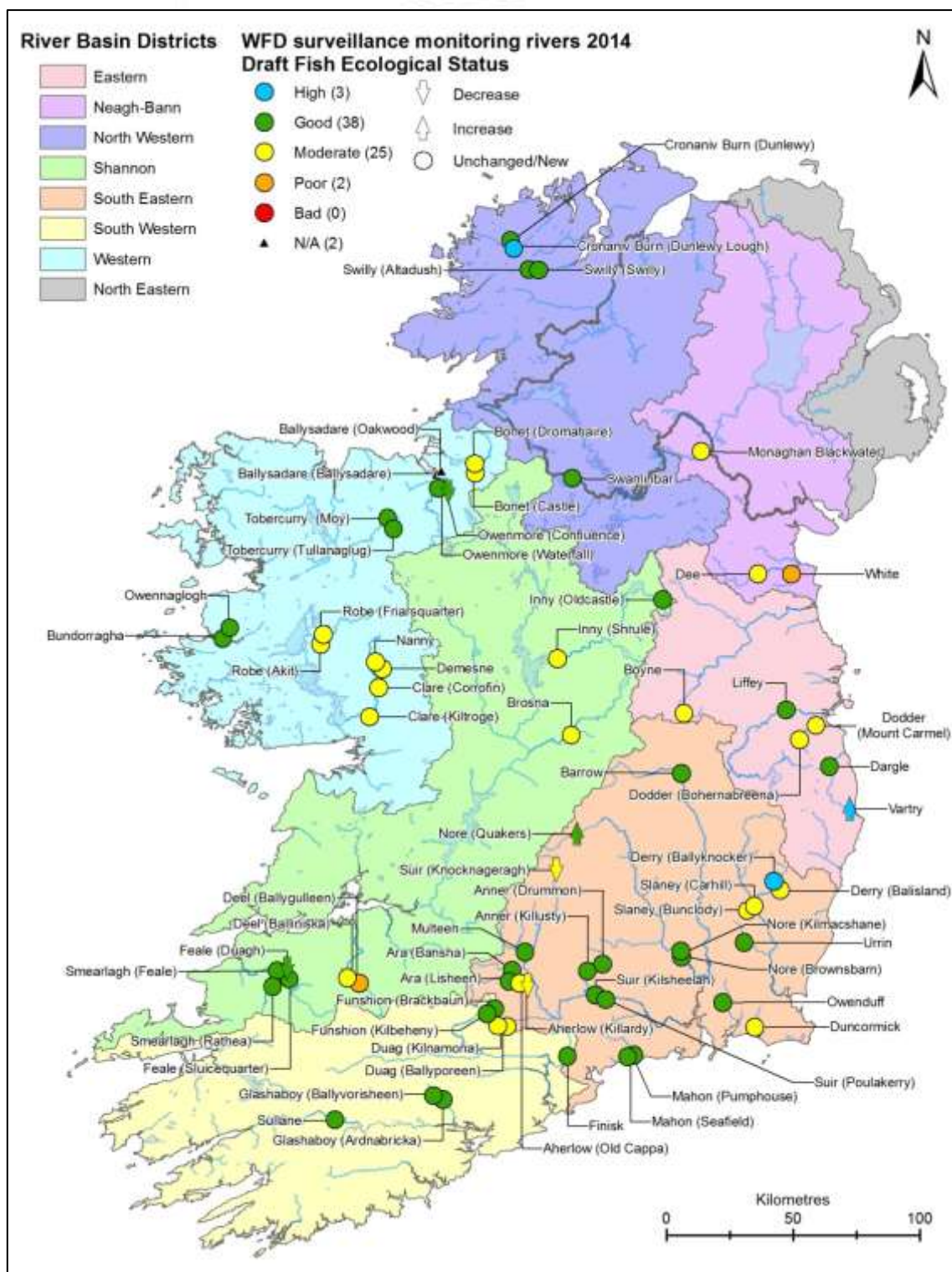


Fig. 4.138. Map of ecological status for 2014 WFD surveillance monitoring sites, with indication of changes in status where applicable.



5. DISCUSSION

A total of 14 fish species (including sea trout) and one hybrid were recorded during the 2014 WFD surveillance monitoring programme across Ireland. Brown trout was the most commonly encountered species, recorded in all but three sites. The River Barrow (Pass Br._B) was the most diverse site surveyed, recording a total of 10 species (sea trout are included as a separate 'variety' of trout) and one hybrid. The lowest diversity (only a single species) was recorded in two sites, the Dargle River (Bahana_A) and Swilly River (Altadush_A). The greatest abundances of brown trout and salmon were recorded in the Inny River (Br. 1km S of Oldcastle_A) and Smearlagh River (Rathea_A) sites respectively.

The growth of brown trout was done 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 class as having moderate growth. Among those with the slowest rates of growth included streams in upland areas such as the sites on the Cronaniv Burn.

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 2014 was assigned a draft fish classification status. Three sites were classed as High, 38 as Good and 25 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.
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- Kennedy, M. and Fitzmaurice, P. (1971) Growth and food of Brown Trout *Salmo Trutta* (L.) in Irish Waters. *Proceedings of the Royal Irish Academy*, **71 (B) (18)**, 269-352.
- Matson R. P. and Kelly, F.L. (*in prep*) Brown trout growth in rivers of varying alkalinity.
- 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, 2014

| River name | Site name | Easting | Northing |
|------------------------------------|--|---------|----------|
| ERBD (Wadeable sites) | | | |
| Dargle River | Bahana_A | 320682 | 213379 |
| Dodder, River | D/s Piperstown Stream, Bohernabreena_A | 308860 | 224074 |
| Dodder, River | Mount Carmel Hospital_A | 315381 | 229554 |
| Vartry River | Newrath Br._A | 328823 | 196717 |
| ERBD (Non-wadeable sites) | | | |
| Boyne, River | Boyne Br._A | 263479 | 234485 |
| Liffey, River | Lucan Br._A | 303722 | 235610 |
| NBIRBD (Wadeable sites) | | | |
| Blackwater (Monaghan), River | Corvally_A | 270106 | 337628 |
| White River (Louth) | Coneyburrow Br._B | 305715 | 289279 |
| NBIRBD (Non-wadeable sites) | | | |
| Dee, River | Burley Br._A | 292527 | 289494 |
| NWIRBD (Wadeable sites) | | | |
| Cronaniv Burn | Br. u/s Dunlewy Lough_A | 193078 | 418692 |
| Cronaniv Burn | Dunlewy_A | 192893 | 418962 |
| Swanlinbar River | Swanlinbar Br. (Carpark)_A | 219417 | 327146 |
| Swilly, River | Altadush_A | 204448 | 409342 |
| Swilly, River | Swilly Br. (near Breenagh)_A | 206003 | 409202 |
| SERBD (Wadeable sites) | | | |
| Derry River | Balisland Br._A | 297751 | 164307 |
| Derry River | Ballyknocker_A | 298845 | 166811 |
| Duag, River | Br. u/s Ballyporeen_B | 192020 | 112666 |
| Duag, River | Kilnamona_A | 191339 | 112470 |
| Duncormick River | (W) Br. nr Duncormick Rly St_B | 291307 | 110688 |
| Mahon, River | ENE of Seafield House_A | 242275 | 101086 |
| Mahon, River | Pumphouse Weir_A | 242268 | 101190 |
| Owenduff River | Rathnageeragh_A | 278599 | 120402 |
| Urrin River | Buck's Br._B | 287048 | 144021 |
| SERBD (Non-wadeable sites) | | | |
| Aherlow River | Killardy Br._A | 201476 | 129560 |
| Aherlow River | Old Cappa Br._A | 199357 | 129337 |
| Anner River | Drummon Br._A | 231300 | 135345 |
| Anner River | Killusty_A | 225290 | 132567 |
| Ara River | Bansha_A | 195709 | 133050 |
| Ara River | Lisheen_A | 199395 | 130088 |
| Barrow, River | Pass Br._B | 262344 | 210648 |
| Multeen River | Ballygriffin Br._A | 200708 | 140186 |
| Nore, River | Brownsbarn Br._A | 261648 | 138930 |
| Nore, River | Kilmacshane_A | 262107 | 139320 |
| Nore, River | Quakers Br._A | 221296 | 186972 |



APPENDIX 1 continued

Site location information for WFD surveillance monitoring, 2014

| River name | Site name | Easting | Northing |
|------------------------------------|--------------------------------|---------|----------|
| Slaney, River | Bunclody_A | 291319 | 156964 |
| Slaney, River | Carhill_A | 291184 | 157667 |
| Suir, River | Kilsheelan Br._A | 228449 | 123279 |
| Suir, River | Knocknageragh Br._A | 213095 | 172414 |
| Suir, River | Poulakerry_A | 229055 | 123071 |
| SHIRBD (Wadeable sites) | | | |
| Deel (Newcastlewest), River | Ballygulleen_A | 134400 | 127979 |
| Deel (Newcastlewest), River | Br. near Balliniska_A | 132448 | 128629 |
| Inny River | Br. 1 km S of Oldcastle_A | 254920 | 279258 |
| Smearlagh River | Ford u/s Feale R confl (LHS)_A | 103050 | 132840 |
| Smearlagh River | Rathea_A | 101243 | 126610 |
| SHIRBD (Non-wadeable sites) | | | |
| Brosna, River | 0.5km NW of Pollagh_A | 219024 | 225711 |
| Feale, River | Br. ENE of Duagh Ho_A | 106925 | 130920 |
| Feale, River | Sluicequarter_A | 107938 | 129485 |
| Inny River | Shrule Br._A | 213497 | 255885 |
| SWRBD (Wadeable sites) | | | |
| Finisk River | Modelligo Br._A | 217573 | 099243 |
| Funshion, River | Brackbaun Br._A | 188962 | 116813 |
| Funshion, River | Kilbeheny_A | 185659 | 115810 |
| Glashaboy River | Ardnabricka_A | 168374 | 081929 |
| Glashaboy River | Ballyvorisheen Br._B | 166995 | 084270 |
| Sullane River | Sullane Br._A | 125926 | 074028 |
| WRBD (Wadeable sites) | | | |
| Bundorragha River | Rock Pool_A | 084119 | 264600 |
| Demesne River | Curraghcreen_A | 144382 | 251918 |
| Owennaglogh | Tawnynoran_A | 084004 | 265225 |
| Tobercurry River | Br. just u/s Moy River_C | 147612 | 311439 |
| Tobercurry River | Tullanaglug_A | 148671 | 311520 |
| WRBD (Non-wadeable sites) | | | |
| Ballysadare River | Ballysadare Br._A | 166910 | 328970 |
| Ballysadare River | Oakwood_A | 167372 | 329048 |
| Bonet River | 1.8 km d/s Dromahaire Br._A | 180645 | 330599 |
| Bonet River | Castle_A | 180440 | 330966 |
| Clare, River | Corrofin Br._A | 142950 | 244520 |
| Clare, River | Kiltroge Castle Br._A | 139405 | 233016 |
| Nanny (Tuam), River | u/s Weir Br._A | 141744 | 252970 |
| Owenmore River (Sligo) | 300 m u/s Unshin River confl_A | 168448 | 326621 |
| Owenmore River (Sligo) | Waterfall_A | 167940 | 326541 |
| Robe River | Akit Br._A | 119684 | 264937 |
| Robe River | Friarsquarter_A | 120033 | 265245 |



| River | Site name | Catchment | Site code | Waterbody code |
|------------------------------------|-----------------------|------------|------------|------------------|
| ERBD (Wadeable sites) | | | | |
| Dargle River | Bahana_A | Dargle | 10D010005A | EA_10_1148 |
| Dodder, River | Bohernabreena_A | Liffey | 09D010100A | EA_09_1656 |
| Dodder, River | Mount Carmel_A | Liffey | 09D010680A | EA_09_587 |
| Vartry River | Newrath Br._A | Vartry | 10V010300A | EA_10_1601 |
| ERBD (Non-wadeable sites) | | | | |
| Boyne, River | Boyne Br._A | Boyne | 07B040200A | EA_07_990 |
| Liffey, River | Lucan Br._A | Liffey | 09L012100A | EA_09_1870_5 |
| NBIRBD (Wadeable sites) | | | | |
| Blackwater (Monaghan), River | Corvally_A | Blackwater | 03B010680A | GBNI1NB030307099 |
| White River (Louth) | Coneyburrow Br._B | Dee | 06W010500B | NB_06_550 |
| NBIRBD (Non-wadeable sites) | | | | |
| Dee, River | Burley Br._A | Dee | 06D010600A | NB_06_50 |
| NWIRBD (Wadeable sites) | | | | |
| Cronaniv Burn | Dunlewy Lough_A | Clady | 38C060100A | NW_38_800 |
| Cronaniv Burn | Dunlewy_A | Clady | 38C060120A | NW_38_800 |
| Swanlinbar River | Carpark_A | Erne | 36S010290A | NW_36_18 |
| Swilly, River | Altadush_A | Swilly | 39S020030A | NW_39_2208 |
| Swilly, River | Swilly Br._A | Swilly | 39S020050A | NW_39_1508 |
| SERBD (Wadeable sites) | | | | |
| Derry River | Balisland Br._A | Slaney | 12D020710A | SE_12_2095 |
| Derry River | Ballyknocker_A | Slaney | 12D020570A | SE_12_2095 |
| Duag, River | Br. u/s Ballyporeen_B | Suir | 16D030100B | SE_16_639 |
| Duag, River | Kilnamona_A | Suir | 16D030080A | SE_16_639 |
| Duncormick River | Railway_B | Duncormick | 13D010350B | SE_13_745 |
| Mahon, River | Seafield House_A | Mahon | 17M010350A | SE_17_825 |
| Mahon, River | Pumphouse Weir_A | Mahon | 17M010340A | SE_17_825 |
| Owenduff River | Rathnageeragh_A | Owenduff | 13O010060A | SE_13_754 |
| Urrin River | Buck's Br._B | Slaney | 12U010200B | SE_12_2605 |
| SERBD (Non-wadeable sites) | | | | |
| Aherlow River | Killardy Br._A | Suir | 16A010900A | SE_16_540 |
| Aherlow River | Old Cappa Br._A | Suir | 16A010800A | SE_16_540 |
| Anner River | Drummon Br._A | Suir | 16A020600A | SE_16_2342 |
| Anner River | Killusty_A | Suir | 16A020770A | SE_16_2342 |
| Ara River | Bansha_A | Suir | 16A030520A | SE_16_2303 |
| Ara River | Lisheen_A | Suir | 16A030720A | SE_16_2303 |
| Barrow, River | Pass Br._B | Barrow | 14B011000B | SE_14_196_1 |
| Multeen River | Ballygriffin Br._A | Suir | 16M021100A | SE_16_3825 |
| Nore, River | Brownsbarn Br._A | Nore | 15N012400A | SE_15_1994_7 |
| Nore, River | Kilmacshane_A | Nore | 15N012410A | SE_15_1994_7 |
| Nore, River | Quakers Br._A | Nore | 15N010300A | SE_15_1018 |



APPENDIX 2 continued

Site coding information for WFD surveillance monitoring, 2014

| River | Site name | Catchment | Site code | Waterbody code |
|------------------------------------|-----------------------|-----------------|------------|----------------|
| Slaney, River | Bunclody_A | Slaney | 12S021800A | SE_12_924_2 |
| Slaney, River | Carhill_A | Slaney | 12S021700A | SE_12_924_2 |
| Suir, River | Kilsheelan Br._A | Suir | 16S022700A | SE_16_4181_5 |
| Suir, River | Knocknageragh Br._A | Suir | 16S020200A | SE_16_3997 |
| Suir, River | Poulakerry_A | Suir | 16S022710A | SE_16_4181_5 |
| SHIRBD (Wadeable sites) | | | | |
| Deel (Newcastlewest), River | Ballygulleen_A | Shannon Est Sth | 24D020340A | SH_24_863 |
| Deel (Newcastlewest), River | Balliniska_A | Shannon Est Sth | 24D020400A | SH_24_863 |
| Inny River | Oldcastle_A | Inny | 26I010100A | SH_26_2060 |
| Smearlagh River | Feale R. confl_A | Feale | 23S020700A | SH_23_373 |
| Smearlagh River | Rathea_A | Feale | 23S020500A | SH_23_373 |
| SHIRBD (Non-wadeable sites) | | | | |
| Brosna, River | Pollagh_A | Shannon Lwr | 25B090760A | SH_25_681 |
| Feale, River | Duagh Ho_A | Feale | 23F010500A | SH_23_2941 |
| Feale, River | Sluicequarter_A | Feale | 23F010450A | SH_23_2941 |
| Inny River | Shrute Br._A | Inny | 26I011350A | SH_26_883 |
| SWRBD (Wadeable sites) | | | | |
| Finisk River | Modelligo Br._A | Blackwater | 18F020300A | SW_18_2774 |
| Funshion, River | Brackbaun Br._A | Blackwater | 18F050030A | SW_18_11 |
| Funshion, River | Kilbeheny_A | Blackwater | 18F050065A | SW_18_11 |
| Glashaboy River | Ardnabricka_A | Glashaboy | 19G010270A | SW_19_755 |
| Glashaboy River | Ballyvorisheen Br._B | Glashaboy | 19G010200B | SW_19_755 |
| Sullane River | Sullane Br._A | Lee | 19S020300A | SW_19_915 |
| WRBD (Wadeable sites) | | | | |
| Bundorragha River | Rock Pool_A | Bundorragha | 32B010160A | WE_32_1767 |
| Demesne River | Curraghcreen_A | Nanny | 30N010080A | WE_30_1128 |
| Owennaglogh | Tawnynoran_A | Bundorragha | 32B010130A | WE_32_378 |
| Tobercurry River | Moy River_C | Moy | 34T020200C | WE_34_2633 |
| Tobercurry River | Tullanaglug_A | Moy | 34T020150A | WE_34_2633 |
| WRBD (Non-wadeable sites) | | | | |
| Ballysadare River | Ballysadare Br._A | Ballysadare | 35B050100A | WE_35_2107 |
| Ballysadare River | Oakwood_A | Ballysadare | 35B050070A | WE_35_2107 |
| Bonet River | Dromahaire Br._A | Garvogue | 35B060600A | WE_35_3842 |
| Bonet River | Castle_A | Garvogue | 35B060600B | WE_35_3842 |
| Clare, River | Corrofin Br._A | Corrib | 30C010800A | WE_30_258_3 |
| Clare, River | Kiltroge Castle Br._A | Corrib | 30C011150A | WE_30_258_5 |
| Nanny (Tuam), River | Weir Br._A | Corrib | 30N010300A | WE_30_1128 |
| Owenmore River (Sligo) | Unshin R. confl_A | Ballysadare | 35O060900A | WE_35_2107 |
| Owenmore River (Sligo) | Waterfall_A | Ballysadare | 35O060830A | WE_35_2107 |
| Robe River | Akit Br._A | Corrib | 30R010600A | WE_30_3370_3 |
| Robe River | Friarsquarter_A | Corrib | 30R010590A | WE_30_3370_3 |



APPENDIX 3

Details of river sites surveyed for WFD surveillance monitoring, 2014

| River | Site name | Catchment area (km ²) | Width (m) | Surface area (m ²) | Mean depth (m) | Max depth (m) |
|------------------------------------|-----------------------|-----------------------------------|-----------|--------------------------------|----------------|---------------|
| ERBD (Wadeable sites) | | | | | | |
| Dargle River | Bahana_A | 12.92 | 7.98 | 295 | 0.12 | 0.32 |
| Dodder, River | Bohernabreena_A | 31.82 | 7.32 | 315 | 0.19 | 0.59 |
| Dodder, River | Mount Carmel_A | 93.22 | 9.68 | 358 | 0.19 | 0.45 |
| Vartry River | Newrath Br._A | 102.98 | 7.72 | 324 | 0.22 | 0.48 |
| ERBD (Non-wadeable sites) | | | | | | |
| Boyne, River | Boyne Br._A | 60.31 | 3.85 | 516 | 0.49 | 0.79 |
| Liffey, River | Lucan Br._A | 1102.06 | 20.80 | 5179 | 0.65 | 1.50 |
| NBIRBD (Wadeable sites) | | | | | | |
| Blackwater (Monaghan), River | Corvally_A | 143.28 | 10.33 | 413 | 0.37 | 0.90 |
| White River (Louth) | Coneyburrow Br._B | 55.13 | 7.95 | 358 | 0.34 | 0.58 |
| NBIRBD (Non-wadeable sites) | | | | | | |
| Dee, River | Burley Br._A | 175.52 | 7.00 | 1050 | 0.95 | 1.40 |
| NWIRBD (Wadeable sites) | | | | | | |
| Cronaniv Burn | Dunlewy Lough_A | 6.88 | 4.66 | 210 | 0.19 | 0.36 |
| Cronaniv Burn | Dunlewy_A | 15.08 | 8.48 | 356 | 0.20 | 0.48 |
| Swanlinbar River | Carpark_A | 21.55 | 8.55 | 393 | 0.23 | 0.59 |
| Swilly, River | Altadush_A | 11.83 | 4.88 | 224 | 0.19 | 0.55 |
| Swilly, River | Swilly Br._A | 18.93 | 5.78 | 260 | 0.15 | 0.34 |
| SERBD (Wadeable sites) | | | | | | |
| Derry River | Balisland Br._A | 136.25 | 10.92 | 469 | 0.21 | 0.36 |
| Derry River | Ballyknocker_A | 124.98 | 12.45 | 498 | 0.25 | 0.59 |
| Duag, River | Br. u/s Ballyporeen_B | 16.44 | 3.33 | 150 | 0.18 | 0.29 |
| Duag, River | Kilnamona_A | 13.72 | 4.86 | 204 | 0.12 | 0.36 |
| Duncormick River | Railway_B | 36.40 | 4.43 | 199 | 0.24 | 0.56 |
| Mahon, River | Seafeld House_A | 90.79 | 12.72 | 572 | 0.24 | 0.76 |
| Mahon, River | Pumphouse Weir_A | 90.78 | 9.37 | 337 | 0.28 | 0.64 |
| Owenduff River | Rathnageeragh_A | 51.07 | 5.79 | 232 | 0.31 | 0.76 |
| Urrin River | Buck's Br._B | 42.22 | 7.13 | 321 | 0.18 | 0.53 |
| SERBD (Non-wadeable sites) | | | | | | |
| Aherlow River | Killardy Br._A | 272.55 | 14.33 | 3512 | 0.71 | 1.20 |
| Aherlow River | Old Cappa Br._A | 174.09 | 13.75 | 2310 | 0.81 | 1.46 |
| Anner River | Drummon Br._A | 81.05 | 6.50 | 1281 | 0.52 | 1.20 |
| Anner River | Killusty_A | 136.23 | 7.92 | 831 | 0.45 | 0.73 |
| Ara River | Bansha_A | 74.63 | 7.50 | 788 | 0.48 | 0.73 |
| Ara River | Lisheen_A | 86.12 | 4.75 | 599 | 0.52 | 0.80 |
| Barrow, River | Pass Br._B | 1125.58 | 32.17 | 11677 | 0.53 | 0.75 |
| Multeen River | Ballygriffin Br._A | 174.82 | 12.67 | 2191 | 0.28 | 1.12 |
| Nore, River | Brownsbarn Br._A | 2419.32 | 34.60 | 19445 | 1.31 | 2.60 |
| Nore, River | Kilmacshane_A | 2420.09 | 34.63 | 11357 | 1.07 | 2.24 |
| Nore, River | Quakers Br._A | 84.27 | 6.50 | 1508 | 0.64 | 1.40 |



APPENDIX 3 continued

Details of river sites surveyed for WFD surveillance monitoring, 2014

| River | Site name | Catchment area (km ²) | Width (m) | Surface area (m ²) | Mean depth (m) | Max depth (m) |
|------------------------------------|-----------------------|-----------------------------------|-----------|--------------------------------|----------------|---------------|
| Slaney, River | Buncloody_A | 848.10 | 25.92 | 6065 | 0.85 | 1.49 |
| Slaney, River | Carhill_A | 847.38 | 26.50 | 3763 | 0.92 | 2.00 |
| Suir, River | Kilsheelan Br._A | 2636.56 | 48.50 | 15666 | 0.82 | 1.31 |
| Suir, River | Knocknageragh Br._A | 94.13 | 6.07 | 607 | 0.37 | 0.63 |
| Suir, River | Poulakerry_A | 2637.04 | 42.20 | 9031 | 0.74 | 1.25 |
| SHIRBD (Wadeable sites) | | | | | | |
| Deel (Newcastlewest), River | Ballygulleen_A | | 8.03 | 362 | 0.14 | 0.32 |
| Deel (Newcastlewest), River | Balliniska_A | 152.66 | 8.03 | 362 | 0.29 | 0.60 |
| Inny River | Oldcastle_A | 13.18 | 3.15 | 126 | 0.30 | 0.58 |
| Smearlagh River | Feale R. confl_A | 128.66 | 10.67 | 427 | 0.21 | 0.86 |
| Smearlagh River | Rathea_A | 92.95 | 10.25 | 410 | 0.11 | 0.28 |
| SHIRBD (Non-wadeable sites) | | | | | | |
| Brosna, River | Pollagh_A | 845.00 | 25.83 | 11883 | 0.97 | 1.50 |
| Feale, River | Duagh Ho_A | 477.51 | 24.67 | 6315 | 0.32 | 0.81 |
| Feale, River | Sluicequarter_A | 472.07 | 17.83 | 2247 | 0.25 | 0.54 |
| Inny River | Shrule Br._A | 1128.26 | 18.67 | 7093 | 0.59 | 1.10 |
| SWRBD (Wadeable sites) | | | | | | |
| Finisk River | Modelligo Br._A | 65.48 | 9.87 | 444 | 0.12 | 0.39 |
| Funshion, River | Brackbaun Br._A | 16.19 | 8.25 | 371 | 0.15 | 0.27 |
| Funshion, River | Kilbeheny_A | 49.22 | 7.43 | 335 | 0.17 | 0.35 |
| Glashaboy River | Ardnabricka_A | 22.16 | 4.80 | 216 | 0.18 | 0.46 |
| Glashaboy River | Ballyvorisheen Br._B | 15.43 | 3.47 | 156 | 0.13 | 0.32 |
| Sullane River | Sullane Br._A | 109.85 | 10.23 | 461 | 0.29 | 0.59 |
| WRBD (Wadeable sites) | | | | | | |
| Bundorragha River | Rock Pool_A | 44.99 | 12.26 | 466 | 0.38 | 0.63 |
| Demesne River | Curraghcreen_A | 4.54 | 5.98 | 239 | 0.23 | 0.67 |
| Owennaglogh | Tawnynoran_A | 11.59 | 7.84 | 314 | 0.16 | 0.40 |
| Tobercurry River | Moy River_C | 24.73 | 2.53 | 114 | 0.12 | 0.24 |
| Tobercurry River | Tullanaglug_A | 21.98 | 3.36 | 134 | 0.13 | 0.30 |
| WRBD (Non-wadeable sites) | | | | | | |
| Ballysadare River | Ballysadare Br._A | 641.88 | 24.50 | 7840 | 2.25 | 2.50 |
| Ballysadare River | Oakwood_A | 635.45 | 28.00 | 5824 | 2.17 | 2.50 |
| Bonet River | Dromahaire Br._A | 292.20 | 21.30 | 6433 | 1.50 | 2.00 |
| Bonet River | Castle_A | 289.95 | 21.30 | 3046 | 1.50 | 2.00 |
| Clare, River | Corrofin Br._A | 704.28 | 19.00 | 6118 | 1.27 | 1.70 |
| Clare, River | Kiltroge Castle Br._A | 1072.68 | 14.60 | 3519 | 0.75 | 1.00 |
| Nanny (Tuam), River | Weir Br._A | 36.74 | 6.25 | 719 | 0.98 | 1.20 |
| Owenmore River (Sligo) | Unshin R. confl_A | 416.25 | 23.33 | 3360 | 0.92 | 2.00 |
| Owenmore River (Sligo) | Waterfall_A | 410.17 | 23.50 | 4207 | 1.24 | 1.40 |
| Robe River | Akit Br._A | 253.75 | 17.00 | 7599 | 2.20 | 2.50 |
| Robe River | Friarsquarter_A | 253.72 | 7.40 | 1036 | 1.33 | 1.50 |



APPENDIX 4

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

| River | | L1 | L2 | L3 | L4 | L5 | Growth category |
|---|------|-------|-------|-------|-------|-------|-----------------|
| Aherlow (Killardy Br._A) | Mean | 6.32 | 14.41 | 20.73 | 21.96 | 27.10 | Moderate |
| | S.D. | 1.31 | 2.70 | 3.38 | N/A | N/A | |
| | n | 19 | 15 | 5 | 1 | 1 | |
| | Min | 3.83 | 9.98 | 16.26 | 21.96 | 27.10 | |
| | Max | 9.18 | 18.80 | 24.93 | 21.96 | 27.10 | |
| Aherlow (Old Cappa Br._A) | Mean | 6.96 | 13.86 | 18.50 | 24.82 | | Moderate |
| | S.D. | 1.65 | 2.24 | 2.35 | 3.13 | | |
| | n | 17 | 16 | 10 | 2 | | |
| | Min | 4.24 | 9.09 | 15.01 | 22.61 | | |
| | Max | 9.97 | 18.16 | 22.23 | 27.03 | | |
| Anner (Drummon Br._A) | Mean | 7.35 | 17.81 | 25.61 | | | Moderate |
| | S.D. | 1.79 | 2.26 | 1.30 | | | |
| | n | 42 | 22 | 2 | | | |
| | Min | 4.39 | 13.41 | 24.70 | | | |
| | Max | 11.04 | 22.16 | 26.53 | | | |
| Anner (Killusty_A) | Mean | 8.06 | 16.43 | 22.26 | | | Moderate |
| | S.D. | 1.37 | 2.09 | 0.66 | | | |
| | n | 35 | 17 | 2 | | | |
| | Min | 5.58 | 13.25 | 21.79 | | | |
| | Max | 10.63 | 19.95 | 22.73 | | | |
| Ara (Bansha_A) | Mean | 8.47 | 16.80 | 22.83 | 33.17 | | Moderate |
| | S.D. | 1.82 | 3.08 | 4.60 | N/A | | |
| | n | 28 | 20 | 5 | 1 | | |
| | Min | 5.52 | 10.13 | 18.42 | 33.17 | | |
| | Max | 12.36 | 21.24 | 30.10 | 33.17 | | |
| Ara (Lisheen_A) | Mean | 7.31 | 15.57 | 22.26 | 28.13 | | Moderate |
| | S.D. | 1.51 | 2.28 | 1.50 | N/A | | |
| | n | 26 | 15 | 8 | 1 | | |
| | Min | 4.02 | 11.95 | 20.23 | 28.13 | | |
| | Max | 9.78 | 19.17 | 24.39 | 28.13 | | |
| Ballysadare (Ballysadare Br._A) | Mean | 7.92 | 21.52 | | | | N/A |
| | S.D. | 1.76 | N/A | | | | |
| | n | 2 | 1 | | | | |
| | Min | 6.68 | 21.52 | | | | |
| | Max | 9.16 | 21.52 | | | | |
| Barrow (Pass Br._B) | Mean | 7.56 | 15.11 | 22.51 | | | Moderate |
| | S.D. | 2.20 | 2.42 | 2.51 | | | |
| | n | 12 | 9 | 2 | | | |
| | Min | 3.64 | 11.27 | 20.74 | | | |
| | Max | 10.86 | 17.81 | 24.28 | | | |
| Blackwater (Monaghan) (Corvally_A) | Mean | 8.65 | 16.02 | 23.09 | | | Moderate |
| | S.D. | 2.15 | 2.31 | 1.46 | | | |
| | n | 22 | 15 | 6 | | | |
| | Min | 5.24 | 12.63 | 21.33 | | | |
| | Max | 12.40 | 19.60 | 25.20 | | | |



APPENDIX 4 continued

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

| River | | L1 | L2 | L3 | L4 | L5 | Growth category |
|--|------|-------|-------|-------|-------|----|-----------------|
| Bonet (Castle_A) | Mean | 6.78 | 14.48 | 20.17 | 26.43 | | Moderate |
| | S.D. | 1.57 | 2.02 | 2.38 | 3.35 | | |
| | n | 28 | 25 | 13 | 2 | | |
| | Min | 4.34 | 10.05 | 15.56 | 24.07 | | |
| | Max | 10.40 | 18.21 | 24.05 | 28.80 | | |
| Boyne (Boyne Br._A) | Mean | 8.45 | 16.56 | 24.41 | | | Moderate |
| | S.D. | 2.12 | 2.69 | 3.15 | | | |
| | n | 68 | 43 | 3 | | | |
| | Min | 4.59 | 6.67 | 21.80 | | | |
| | Max | 15.75 | 22.50 | 27.91 | | | |
| Brosna (0.5km NW of Pollagh_A) | Mean | 6.64 | | | | | Moderate |
| | S.D. | | | | | | |
| | n | 1 | | | | | |
| | Min | 6.64 | | | | | |
| | Max | 6.64 | | | | | |
| Bundorragha (Rock Pool_A) | Mean | 5.23 | 10.12 | | | | Slow |
| | S.D. | 1.26 | 1.88 | | | | |
| | n | 9 | 2 | | | | |
| | Min | 3.63 | 8.79 | | | | |
| | Max | 6.87 | 11.45 | | | | |
| Clare (Corrofin Br._A) | Mean | 6.83 | 21.84 | | | | N/A |
| | S.D. | N/A | N/A | | | | |
| | n | 1 | 1 | | | | |
| | Min | 6.83 | 21.84 | | | | |
| | Max | 6.83 | 21.84 | | | | |
| Clare (Kiltroge Castle Br._A) | Mean | 8.14 | 19.56 | 32.67 | | | Moderate/Fast |
| | S.D. | 1.75 | 1.99 | N/A | | | |
| | n | 10 | 9 | 1 | | | |
| | Min | 5.45 | 17.02 | 32.67 | | | |
| | Max | 10.89 | 22.09 | 32.67 | | | |
| Cronaniv Burn (Br. u/s Dunlewy Lough_A) | Mean | 4.27 | 10.00 | | | | Very Slow |
| | S.D. | 1.57 | 0.09 | | | | |
| | n | 6 | 2 | | | | |
| | Min | 3.15 | 9.93 | | | | |
| | Max | 7.13 | 10.06 | | | | |
| Cronaniv Burn (Dunlewy_A) | Mean | 4.77 | 7.93 | 13.42 | 17.02 | | Very Slow |
| | S.D. | 1.58 | 0.82 | N/A | N/A | | |
| | n | 6 | 2 | 1 | 1 | | |
| | Min | 3.27 | 7.35 | 13.42 | 17.02 | | |
| | Max | 6.72 | 8.51 | 13.42 | 17.02 | | |
| Dargle (Bahana_A) | Mean | 5.00 | 9.96 | 14.89 | | | Very Slow/Slow |
| | S.D. | 1.09 | 1.86 | 2.96 | | | |
| | n | 32 | 18 | 3 | | | |
| | Min | 3.29 | 8.39 | 13.15 | | | |
| | Max | 7.97 | 14.59 | 18.30 | | | |



APPENDIX 4 continued

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

| River | | L1 | L2 | L3 | L4 | L5 | Growth category |
|--|------|-------|-------|-------|-------|----|-----------------|
| Dee (Louth) (Burley Br._A) | Mean | 7.90 | 17.97 | 26.07 | 33.32 | | Moderate |
| | S.D. | 1.10 | 1.49 | N/A | N/A | | |
| | n | 18 | 7 | 1 | 1 | | |
| | Min | 5.95 | 15.72 | 26.07 | 33.32 | | |
| | Max | 9.56 | 19.88 | 26.07 | 33.32 | | |
| Deel (Newcastlewest) (Br. near Balliniska_A) | Mean | 8.12 | 24.75 | | | | Moderate |
| | S.D. | 1.06 | N/A | | | | |
| | n | 11 | 1 | | | | |
| | Min | 7.15 | 24.75 | | | | |
| | Max | 10.55 | 24.75 | | | | |
| Demesne (Curraghreen_A) | Mean | 7.15 | | | | | Moderate |
| | S.D. | 2.05 | | | | | |
| | n | 3 | | | | | |
| | Min | 5.76 | | | | | |
| | Max | 9.50 | | | | | |
| Derry (Balisland_A) | Mean | 7.51 | 15.45 | | | | Moderate |
| | S.D. | 1.91 | 4.60 | | | | |
| | n | 14 | 4 | | | | |
| | Min | 4.74 | 10.50 | | | | |
| | Max | 11.68 | 20.03 | | | | |
| Derry (Ballyknocker_A) | Mean | 7.00 | 13.94 | | | | Moderate |
| | S.D. | 1.42 | 3.54 | | | | |
| | n | 16 | 4 | | | | |
| | Min | 4.36 | 10.53 | | | | |
| | Max | 9.68 | 18.89 | | | | |
| Dodder (D/s Piperstown Stream, Bohernabreena_A) | Mean | 8.23 | 15.54 | 18.74 | | | Moderate |
| | S.D. | 1.16 | 1.95 | N/A | | | |
| | n | 17 | 7 | 1 | | | |
| | Min | 6.19 | 12.95 | 18.74 | | | |
| | Max | 10.23 | 18.41 | 18.74 | | | |
| Dodder (Mount Carmel Hospital_A) | Mean | 8.06 | 17.42 | | | | Moderate |
| | S.D. | 1.98 | 2.59 | | | | |
| | n | 21 | 4 | | | | |
| | Min | 4.96 | 14.22 | | | | |
| | Max | 14.67 | 20.52 | | | | |
| Duag (Br. u/s Ballyporeen_B) | Mean | 6.95 | | | | | Moderate |
| | S.D. | 2.31 | | | | | |
| | n | 7 | | | | | |
| | Min | 3.60 | | | | | |
| | Max | 9.33 | | | | | |
| Duag (Kilnamona_A) | Mean | 7.03 | | | | | Moderate |
| | S.D. | 0.44 | | | | | |
| | n | 2 | | | | | |
| | Min | 6.72 | | | | | |
| | Max | 7.35 | | | | | |



APPENDIX 4 continued

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

| River | | L1 | L2 | L3 | L4 | L5 | Growth category |
|--|------|-------|-------|-------|-------|-------|-----------------|
| Duncormick ((W) Br. nr Duncormick Rly St_B) | Mean | 8.08 | 14.61 | 19.25 | | | Moderate |
| | S.D. | 1.66 | 1.80 | 0.52 | | | |
| | n | 28 | 8 | 2 | | | |
| | Min | 5.36 | 12.58 | 18.88 | | | |
| | Max | 12.27 | 18.41 | 19.61 | | | |
| Feale (Br. ENE of Duagh Ho_A) | Mean | 6.72 | 12.12 | | | | Moderate |
| | S.D. | 1.62 | 0.22 | | | | |
| | n | 16 | 2 | | | | |
| | Min | 4.01 | 11.97 | | | | |
| | Max | 10.10 | 12.28 | | | | |
| Feale (Sluicequarter_A) | Mean | 8.06 | 15.77 | | | | Moderate |
| | S.D. | 1.37 | N/A | | | | |
| | n | 9 | 1 | | | | |
| | Min | 6.54 | 15.77 | | | | |
| | Max | 10.81 | 15.77 | | | | |
| Finisk (Modelligo Br._A) | Mean | 6.74 | | | | | Moderate |
| | S.D. | 1.05 | | | | | |
| | n | 4 | | | | | |
| | Min | 5.23 | | | | | |
| | Max | 7.67 | | | | | |
| Funshion (Brackbaun Br._A) | Mean | 4.90 | | | | | Very Slow |
| | S.D. | 0.92 | | | | | |
| | n | 7 | | | | | |
| | Min | 3.41 | | | | | |
| | Max | 6.28 | | | | | |
| Funshion (Kilbeheny_A) | Mean | 6.21 | 13.09 | 18.41 | 21.52 | 26.51 | Moderate |
| | S.D. | 1.08 | 1.96 | 1.21 | 0.88 | 1.48 | |
| | n | 27 | 15 | 10 | 5 | 2 | |
| | Min | 4.34 | 9.40 | 16.26 | 20.73 | 25.47 | |
| | Max | 8.61 | 16.30 | 20.65 | 22.67 | 27.56 | |
| Glashaboy (Ardnabricka_A) | Mean | 8.06 | 14.72 | 17.97 | | | Moderate |
| | S.D. | 1.81 | 2.50 | 2.42 | | | |
| | n | 34 | 16 | 6 | | | |
| | Min | 4.95 | 10.34 | 15.36 | | | |
| | Max | 11.10 | 19.85 | 22.00 | | | |
| Glashaboy (Ballyvorisheen Br._B) | Mean | 7.34 | 13.76 | 17.05 | | | Moderate |
| | S.D. | 2.17 | 2.71 | N/A | | | |
| | n | 20 | 5 | 1 | | | |
| | Min | 3.71 | 9.27 | 17.05 | | | |
| | Max | 10.67 | 16.45 | 17.05 | | | |
| Inny (Br. 1 km S of Oldcastle_A) | Mean | 4.92 | 9.01 | | | | Very Slow |
| | S.D. | 0.99 | 1.42 | | | | |
| | n | 29 | 6 | | | | |
| | Min | 2.98 | 7.21 | | | | |
| | Max | 6.87 | 10.84 | | | | |



APPENDIX 4 continued

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

| River | | L1 | L2 | L3 | L4 | L5 | Growth category |
|--|------|-------|-------|-------|-------|----|-----------------|
| Inny (Shrule Br._A) | Mean | 8.13 | 17.79 | 26.82 | 40.57 | | Moderate/Fast |
| | S.D. | 1.78 | 5.54 | 8.28 | 4.27 | | |
| | n | 29 | 15 | 7 | 3 | | |
| | Min | 4.70 | 10.22 | 18.15 | 37.16 | | |
| | Max | 11.76 | 28.69 | 41.70 | 45.36 | | |
| Liffey (Lucan Br._A) | Mean | 7.75 | 18.81 | 27.23 | | | Moderate/Fast |
| | S.D. | 1.35 | 3.11 | 1.37 | | | |
| | n | 13 | 8 | 2 | | | |
| | Min | 5.04 | 14.63 | 26.27 | | | |
| | Max | 9.68 | 23.85 | 28.20 | | | |
| Mahon (ENE of Seafield House_A) | Mean | 8.48 | | | | | Moderate |
| | S.D. | N/A | | | | | |
| | n | 1 | | | | | |
| | Min | 8.48 | | | | | |
| | Max | 8.48 | | | | | |
| Mahon (Pumphouse Weir_A) | Mean | 8.99 | | | | | Moderate |
| | S.D. | 2.07 | | | | | |
| | n | 6 | | | | | |
| | Min | 6.96 | | | | | |
| | Max | 12.21 | | | | | |
| Multeen (Ballygriffin Br._A) | Mean | 7.13 | 16.06 | 22.26 | 28.17 | | Moderate |
| | S.D. | 1.43 | 2.97 | 2.31 | 1.87 | | |
| | n | 42 | 28 | 16 | 3 | | |
| | Min | 4.09 | 9.28 | 19.11 | 26.37 | | |
| | Max | 10.50 | 20.97 | 27.06 | 30.11 | | |
| Nanny (Tuam) (u/s Weir Br._A) | Mean | 8.85 | 16.21 | 24.41 | | | Moderate |
| | S.D. | 1.65 | 0.35 | N/A | | | |
| | n | 2 | 2 | 1 | | | |
| | Min | 7.68 | 15.96 | 24.41 | | | |
| | Max | 10.01 | 16.46 | 24.41 | | | |
| Nore (Brownsbarn Br._A) | Mean | 6.41 | 14.92 | 22.82 | | | Moderate |
| | S.D. | 2.01 | 3.36 | 2.49 | | | |
| | n | 31 | 24 | 9 | | | |
| | Min | 2.81 | 10.06 | 20.00 | | | |
| | Max | 9.91 | 21.94 | 27.59 | | | |
| Nore (Kilmacshane_A) | Mean | 7.37 | 15.25 | 20.41 | | | Moderate |
| | S.D. | 1.92 | 2.75 | 0.74 | | | |
| | n | 22 | 19 | 4 | | | |
| | Min | 3.74 | 10.85 | 19.93 | | | |
| | Max | 11.70 | 20.71 | 21.49 | | | |
| Nore (Quakers Br._A) | Mean | 7.26 | 14.43 | 18.99 | 25.78 | | Moderate |
| | S.D. | 1.98 | 2.18 | 2.54 | N/A | | |
| | n | 55 | 45 | 16 | 1 | | |
| | Min | 3.67 | 10.08 | 15.05 | 25.78 | | |
| | Max | 11.63 | 19.77 | 23.92 | 25.78 | | |



APPENDIX 4 continued

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

| River | | L1 | L2 | L3 | L4 | L5 | Growth category |
|--|------|-------|-------|-------|----|----|-----------------|
| Owenduff (Rathnageeragh_A) | Mean | 7.98 | 13.95 | 17.29 | | | Moderate |
| | S.D. | 1.60 | 0.89 | 0.54 | | | |
| | n | 18 | 5 | 2 | | | |
| | Min | 4.40 | 12.51 | 16.91 | | | |
| | Max | 10.66 | 14.95 | 17.68 | | | |
| Owenmore (Sligo) (300 m u/s Unshin confl_A) | Mean | 8.01 | 18.51 | 23.54 | | | Moderate/Fast |
| | S.D. | 1.57 | 1.27 | N/A | | | |
| | n | 6 | 6 | 1 | | | |
| | Min | 6.15 | 17.35 | 23.54 | | | |
| | Max | 10.38 | 20.33 | 23.54 | | | |
| Owenmore (Sligo) (Waterfall_A) | Mean | 6.81 | 12.74 | 21.37 | | | Moderate |
| | S.D. | 1.93 | 2.28 | 6.82 | | | |
| | n | 14 | 7 | 2 | | | |
| | Min | 3.79 | 10.41 | 16.55 | | | |
| | Max | 10.29 | 17.46 | 26.19 | | | |
| Owennaglogh (Tawnynoran_A) | Mean | 5.22 | 9.84 | | | | Very Slow/Slow |
| | S.D. | 1.69 | 1.69 | | | | |
| | n | 21 | 11 | | | | |
| | Min | 2.90 | 7.89 | | | | |
| | Max | 8.78 | 12.95 | | | | |
| Robe (Akit Br._A) | Mean | 8.65 | 16.86 | 22.53 | | | Moderate |
| | S.D. | 1.73 | 2.20 | 1.84 | | | |
| | n | 6 | 4 | 2 | | | |
| | Min | 6.33 | 14.37 | 21.23 | | | |
| | Max | 10.80 | 19.56 | 23.83 | | | |
| Robe (Friarsquarter_A) | Mean | 8.97 | 19.60 | | | | N/A |
| | S.D. | 1.57 | 1.69 | | | | |
| | n | 3 | 2 | | | | |
| | Min | 7.66 | 18.41 | | | | |
| | Max | 10.71 | 20.80 | | | | |
| Slaney (Bunclody_A) | Mean | 6.43 | 16.67 | 21.49 | | | Moderate |
| | S.D. | 1.32 | 2.30 | N/A | | | |
| | n | 10 | 5 | 1 | | | |
| | Min | 4.37 | 13.38 | 21.49 | | | |
| | Max | 8.67 | 19.82 | 21.49 | | | |
| Slaney (Carhill_A) | Mean | 5.73 | 13.09 | | | | Moderate |
| | S.D. | 1.64 | | | | | |
| | n | 2 | 1 | | | | |
| | Min | 4.57 | 13.09 | | | | |
| | Max | 6.89 | 13.09 | | | | |
| Smearlagh (Ford u/s Feale R confl (LHS)_A) | Mean | 5.65 | 11.97 | | | | Moderate |
| | S.D. | 0.81 | 4.11 | | | | |
| | n | 12 | 2 | | | | |
| | Min | 3.97 | 9.07 | | | | |
| | Max | 6.74 | 14.88 | | | | |



APPENDIX 4 continued

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

| River | | L1 | L2 | L3 | L4 | L5 | Growth category |
|--|------|-------|-------|-------|-------|----|-----------------|
| Smearlagh (Rathea_A) | Mean | 5.72 | 13.79 | | | | Moderate |
| | S.D. | 0.89 | N/A | | | | |
| | n | 13 | 1 | | | | |
| | Min | 4.00 | 13.79 | | | | |
| | Max | 6.89 | 13.79 | | | | |
| Suir (Kilsheelan Br._A) | Mean | 7.22 | 12.84 | 22.30 | 30.22 | | Moderate |
| | S.D. | 2.08 | 2.92 | 2.56 | 1.56 | | |
| | n | 54 | 39 | 24 | 4 | | |
| | Min | 3.11 | 7.25 | 17.25 | 28.39 | | |
| | Max | 12.12 | 20.71 | 26.31 | 32.18 | | |
| Suir (Knocknageragh Br._A) | Mean | 7.59 | 15.98 | 21.30 | 24.29 | | Moderate |
| | S.D. | 2.55 | 3.75 | 3.22 | N/A | | |
| | n | 70 | 49 | 17 | 1 | | |
| | Min | 3.39 | 8.77 | 15.35 | 24.29 | | |
| | Max | 12.79 | 23.48 | 27.09 | 24.29 | | |
| Suir (Poulakerry_A) | Mean | 7.26 | 13.64 | | | | Moderate |
| | S.D. | 0.20 | 0.39 | | | | |
| | n | 5 | 2 | | | | |
| | Min | 7.03 | 13.36 | | | | |
| | Max | 7.56 | 13.91 | | | | |
| Sullane (Sullane Br._A) | Mean | 7.65 | 17.08 | | | | Moderate |
| | S.D. | 1.98 | 2.69 | | | | |
| | n | 34 | 8 | | | | |
| | Min | 3.44 | 13.31 | | | | |
| | Max | 11.47 | 20.46 | | | | |
| Swanlinbar (Swanlinbar Br. (Carpark)_A) | Mean | 5.72 | 11.59 | 15.65 | 20.42 | | Slow/Moderate |
| | S.D. | 1.08 | 1.40 | 1.65 | N/A | | |
| | n | 27 | 19 | 5 | 1 | | |
| | Min | 3.36 | 8.40 | 13.83 | 20.42 | | |
| | Max | 7.80 | 14.00 | 18.31 | 20.42 | | |
| Swilly (Altadush_A) | Mean | 6.20 | 12.22 | | | | Moderate |
| | S.D. | 1.12 | 2.43 | | | | |
| | n | 16 | 3 | | | | |
| | Min | 4.25 | 9.55 | | | | |
| | Max | 7.95 | 14.32 | | | | |
| Swilly (Swilly Br. (near Breenagh)_A) | Mean | 5.65 | 10.37 | 13.90 | | | Slow/Moderate |
| | S.D. | 0.86 | 0.44 | 0.41 | | | |
| | n | 11 | 4 | 2 | | | |
| | Min | 4.29 | 9.72 | 13.61 | | | |
| | Max | 7.33 | 10.71 | 14.20 | | | |
| Tobercurry (Br. just u/s Moy _C) | Mean | 5.20 | 8.78 | | | | N/A |
| | S.D. | 0.76 | N/A | | | | |
| | n | 2 | 1 | | | | |
| | Min | 4.66 | 8.78 | | | | |
| | Max | 5.74 | 8.78 | | | | |



APPENDIX 4 continued

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

| River | | L1 | L2 | L3 | L4 | L5 | Growth category |
|--|------|------|-------|----|----|----|-----------------|
| Tobercurry (Tullanaglug_A) | Mean | 5.64 | | | | | N/A |
| | S.D. | N/A | | | | | |
| | n | 1 | | | | | |
| | Min | 5.64 | | | | | |
| | Max | 5.64 | | | | | |
| Vartry (Newrath Br._A) | Mean | 6.74 | | | | | Moderate |
| | S.D. | 1.41 | | | | | |
| | n | 18 | | | | | |
| | Min | 3.47 | | | | | |
| | Max | 8.62 | | | | | |
| White (Louth) (Coneyburrow Br._B) | Mean | 6.77 | 12.38 | | | | Moderate |
| | S.D. | 1.50 | N/A | | | | |
| | n | 4 | 1 | | | | |
| | Min | 4.60 | 12.38 | | | | |
| | Max | 8.03 | 12.38 | | | | |
| Urrin (Buck's Br._B) | Mean | 6.31 | 12.43 | | | | Moderate |
| | S.D. | 1.78 | 1.24 | | | | |
| | n | 22 | 8 | | | | |
| | Min | 3.42 | 10.80 | | | | |
| | Max | 9.62 | 14.26 | | | | |



APPENDIX 5

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

| River | | L1 | L2 | L3 |
|---|------|------|----|----|
| Aherlow (Killardy Br._A) | Mean | 5.60 | | |
| | S.D. | 1.27 | | |
| | n | 12 | | |
| | Min | 4.16 | | |
| | Max | 8.91 | | |
| Aherlow (Old Cappa Br._A) | Mean | 5.96 | | |
| | S.D. | 0.91 | | |
| | n | 13 | | |
| | Min | 4.87 | | |
| | Max | 7.84 | | |
| Anner (Drummon Br._A) | Mean | 5.28 | | |
| | S.D. | 0.65 | | |
| | n | 11 | | |
| | Min | 4.09 | | |
| | Max | 6.64 | | |
| Anner (Kilusty_A) | Mean | 6.04 | | |
| | S.D. | 1.14 | | |
| | n | 10 | | |
| | Min | 4.96 | | |
| | Max | 8.28 | | |
| Ara (Bansha_A) | Mean | 6.56 | | |
| | S.D. | 0.63 | | |
| | n | 3 | | |
| | Min | 6.18 | | |
| | Max | 7.29 | | |
| Ara (Lisheen_A) | Mean | 6.10 | | |
| | S.D. | 0.82 | | |
| | n | 11 | | |
| | Min | 5.27 | | |
| | Max | 8.19 | | |
| Ballysadare (Ballysadare Br._A) | Mean | 4.61 | | |
| | S.D. | 1.29 | | |
| | n | 7 | | |
| | Min | 2.56 | | |
| | Max | 6.36 | | |
| Barrow (Pass Br._B) | Mean | 4.50 | | |
| | S.D. | 0.97 | | |
| | n | 8 | | |
| | Min | 3.46 | | |
| | Max | 6.02 | | |
| Blackwater (Monaghan) (Corvally_A) | Mean | 6.49 | | |
| | S.D. | 0.63 | | |
| | n | 2 | | |
| | Min | 6.04 | | |
| | Max | 6.93 | | |



APPENDIX 5 continued

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

| River | | L1 | L2 | L3 |
|--|------|------|------|----|
| Bonet River (Castle_A) | Mean | 4.79 | | |
| | S.D. | 1.41 | | |
| | n | 10 | | |
| | Min | 3.14 | | |
| | Max | 6.65 | | |
| Bundorragha (Rock Pool_A) | Mean | 4.85 | 6.80 | |
| | S.D. | 1.70 | 0.38 | |
| | n | 17 | 2 | |
| | Min | 2.83 | 6.54 | |
| | Max | 9.41 | 7.07 | |
| Clare (Corrofin Br._A) | Mean | 6.66 | | |
| | S.D. | 1.29 | | |
| | n | 2 | | |
| | Min | 5.75 | | |
| | Max | 7.57 | | |
| Clare (Kiltroge Castle Br._A) | Mean | 5.49 | | |
| | S.D. | 0.45 | | |
| | n | 9 | | |
| | Min | 4.80 | | |
| | Max | 6.19 | | |
| Cronaniv Burn (Br. u/s Dunlewy Lough_A) | Mean | 4.54 | | |
| | S.D. | 0.83 | | |
| | n | 8 | | |
| | Min | 3.52 | | |
| | Max | 5.93 | | |
| Cronaniv Burn (Dunlewy_A) | Mean | 3.49 | 6.36 | |
| | S.D. | 0.63 | 0.44 | |
| | n | 10 | 6 | |
| | Min | 2.42 | 5.81 | |
| | Max | 4.60 | 7.15 | |
| Derry (Balisland Br._A) | Mean | 5.87 | | |
| | S.D. | N/A | | |
| | n | 1 | | |
| | Min | 5.87 | | |
| | Max | 5.87 | | |
| Derry (Ballyknocker_A) | Mean | 6.25 | | |
| | S.D. | 0.81 | | |
| | n | 8 | | |
| | Min | 5.16 | | |
| | Max | 7.24 | | |
| Duag (Br. u/s Ballyporeen_B) | Mean | 5.52 | | |
| | S.D. | 0.71 | | |
| | n | 3 | | |
| | Min | 4.70 | | |
| | Max | 5.96 | | |



APPENDIX 5 continued

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

| River | | L1 | L2 | L3 |
|---|------|------|------|-------|
| Feale (Br. ENE of Duagh Ho_A) | Mean | 4.75 | 8.45 | |
| | S.D. | 1.25 | 0.89 | |
| | n | 22 | 5 | |
| | Min | 3.18 | 7.35 | |
| | Max | 7.89 | 9.24 | |
| Feale (Sluicequarter_A) | Mean | 4.70 | 8.48 | |
| | S.D. | 0.86 | 0.12 | |
| | n | 23 | 2 | |
| | Min | 3.36 | 8.40 | |
| | Max | 6.31 | 8.57 | |
| Finisk (Modelligo Br._A) | Mean | 5.06 | 9.48 | |
| | S.D. | 1.34 | N/A | |
| | n | 14 | 1 | |
| | Min | 2.71 | 9.48 | |
| | Max | 7.46 | 9.48 | |
| Funshion (Brackbaun Br._A) | Mean | 5.17 | 8.40 | 12.81 |
| | S.D. | 1.08 | 0.64 | N/A |
| | n | 16 | 3 | 1 |
| | Min | 3.38 | 7.67 | 12.81 |
| | Max | 6.71 | 8.87 | 12.81 |
| Funshion (Kilbeheny_A) | Mean | 4.81 | | |
| | S.D. | 1.00 | | |
| | n | 17 | | |
| | Min | 3.22 | | |
| | Max | 6.59 | | |
| Glashaboy (Ardnabricka_A) | Mean | 6.17 | | |
| | S.D. | 1.49 | | |
| | n | 9 | | |
| | Min | 4.40 | | |
| | Max | 9.13 | | |
| Inny (Shrule Br._A) | Mean | 4.91 | | |
| | S.D. | 1.65 | | |
| | n | 5 | | |
| | Min | 2.72 | | |
| | Max | 6.93 | | |
| Liffey (Lucan Br._A) | Mean | 5.52 | | |
| | S.D. | 1.14 | | |
| | n | 22 | | |
| | Min | 3.74 | | |
| | Max | 8.58 | | |
| Mahon (ENE of Seafeld House_A) | Mean | 6.65 | | |
| | S.D. | N/A | | |
| | n | 1 | | |
| | Min | 6.65 | | |
| | Max | 6.65 | | |



APPENDIX 5 continued

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

| River | | L1 | L2 | L3 |
|---|------|------|------|----|
| Mahon (Pumphouse Weir_A) | Mean | 6.40 | | |
| | S.D. | 0.61 | | |
| | n | 3 | | |
| | Min | 5.72 | | |
| | Max | 6.91 | | |
| Multeen (Ballygriffin Br._A) | Mean | 5.37 | | |
| | S.D. | 1.46 | | |
| | n | 14 | | |
| | Min | 3.51 | | |
| | Max | 9.34 | | |
| Nore (Brownsbarn Br._A) | Mean | 5.35 | | |
| | S.D. | 1.51 | | |
| | n | 13 | | |
| | Min | 3.35 | | |
| | Max | 8.73 | | |
| Nore (Kilmacshane_A) | Mean | 4.21 | | |
| | S.D. | 1.02 | | |
| | n | 9 | | |
| | Min | 2.95 | | |
| | Max | 5.82 | | |
| Owenduff (Rathnageeragh_A) | Mean | 5.66 | | |
| | S.D. | 1.13 | | |
| | n | 13 | | |
| | Min | 4.09 | | |
| | Max | 7.53 | | |
| Owenmore (Sligo) (Waterfall_A) | Mean | 4.88 | | |
| | S.D. | 1.08 | | |
| | n | 17 | | |
| | Min | 3.04 | | |
| | Max | 6.69 | | |
| Owennaglogh (Tawnynoran_A) | Mean | 4.72 | 7.27 | |
| | S.D. | 1.11 | 0.83 | |
| | n | 14 | 6 | |
| | Min | 2.98 | 6.00 | |
| | Max | 6.67 | 8.33 | |
| Slaney (Bunclody_A) | Mean | 6.48 | | |
| | S.D. | 0.80 | | |
| | n | 8 | | |
| | Min | 5.37 | | |
| | Max | 7.54 | | |
| Slaney (Carhill_A) | Mean | 5.77 | | |
| | S.D. | 0.64 | | |
| | n | 3 | | |
| | Min | 5.04 | | |
| | Max | 6.19 | | |



APPENDIX 5 continued

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

| River | | L1 | L2 | L3 |
|---|------|------|-------|----|
| Smearlagh (Ford u/s Feale R confl (LHS)_A) | Mean | 5.15 | | |
| | S.D. | 0.87 | | |
| | n | 15 | | |
| | Min | 3.61 | | |
| | Max | 6.52 | | |
| Smearlagh (Rathea_A) | Mean | 4.71 | 7.83 | |
| | S.D. | 0.75 | 0.82 | |
| | n | 14 | 2 | |
| | Min | 2.74 | 7.25 | |
| | Max | 5.80 | 8.41 | |
| Suir (Kilsheelan Br._A) | Mean | 5.78 | | |
| | S.D. | 1.64 | | |
| | n | 15 | | |
| | Min | 3.89 | | |
| | Max | 9.16 | | |
| Suir (Poulakerry_A) | Mean | 4.27 | | |
| | S.D. | 0.46 | | |
| | n | 4 | | |
| | Min | 3.65 | | |
| | Max | 4.64 | | |
| Urrin (Buck's Br._A) | Mean | 5.46 | | |
| | S.D. | 1.04 | | |
| | n | 12 | | |
| | Min | 4.19 | | |
| | Max | 7.95 | | |
| Sullane (Sullane Br._A) | Mean | 5.54 | | |
| | S.D. | 0.04 | | |
| | n | 2 | | |
| | Min | 5.51 | | |
| | Max | 5.57 | | |
| Swanlinbar (Swanlinbar Br. (Carpark)_A) | Mean | 4.78 | 8.51 | |
| | S.D. | 1.04 | 1.05 | |
| | n | 8 | 7 | |
| | Min | 3.48 | 6.96 | |
| | Max | 6.65 | 10.32 | |
| Swilly (Swilly Br. (near Breenagh)_A) | Mean | 4.39 | 6.94 | |
| | S.D. | 0.98 | N/A | |
| | n | 9 | 1 | |
| | Min | 3.11 | 6.94 | |
| | Max | 6.54 | 6.94 | |
| Tobercurry (Br. just u/s Moy River_C) | Mean | 3.81 | 7.16 | |
| | S.D. | 0.64 | 1.11 | |
| | n | 17 | 5 | |
| | Min | 2.22 | 5.85 | |
| | Max | 4.94 | 8.59 | |



APPENDIX 5 continued

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

| River | | L1 | L2 | L3 |
|-------------------------------|------|------|----|----|
| Tobercurry (Tullanaglug_A) | Mean | 5.08 | | |
| | S.D. | 0.77 | | |
| | n | 11 | | |
| | Min | 3.68 | | |
| | Max | 6.33 | | |
| Vartry (Newrath Br._A) | Mean | 6.00 | | |
| | S.D. | 1.00 | | |
| | n | 6 | | |
| | Min | 4.20 | | |
| | Max | 6.86 | | |

APPENDIX 6

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

| River | | L1 | L2 | L3 | L4 | L5 | L6 | L7 |
|----------------------------|------|------|-------|-------|-------|-------|-------|-------|
| Barrow (Pass Br._B) | Mean | 6.16 | 15.47 | 17.90 | 19.76 | | | |
| | S.D. | 1.08 | 3.37 | 3.33 | N/A | | | |
| | n | 17 | 4 | 2 | 1 | | | |
| | Min | 4.25 | 12.21 | 15.54 | 19.76 | | | |
| | Max | 7.98 | 20.09 | 20.25 | 19.76 | | | |
| Nore (Brownsbarn Br._A) | Mean | 4.33 | 8.94 | 13.86 | 17.96 | 20.37 | 22.65 | 25.20 |
| | S.D. | 1.53 | 1.71 | 1.65 | 1.30 | 1.09 | 1.08 | 0.44 |
| | n | 48 | 33 | 33 | 27 | 18 | 12 | 3 |
| | Min | 1.94 | 5.83 | 10.25 | 15.40 | 18.45 | 20.83 | 24.83 |
| | Max | 8.16 | 11.83 | 17.25 | 20.40 | 22.56 | 24.06 | 25.68 |
| Nore (Kilmacshane_A) | Mean | 4.46 | 9.42 | 15.54 | 18.65 | 21.21 | 23.01 | |
| | S.D. | 1.28 | 2.65 | 1.32 | 1.33 | 0.43 | 0.83 | |
| | n | 25 | 14 | 13 | 5 | 4 | 3 | |
| | Min | 2.13 | 5.86 | 13.31 | 17.26 | 20.71 | 22.09 | |
| | Max | 6.72 | 16.62 | 17.08 | 20.83 | 21.69 | 23.70 | |
| Suir (Poulakerry_A) | Mean | 4.50 | | | | | | |
| | S.D. | 0.77 | | | | | | |
| | n | 11 | | | | | | |
| | Min | 2.80 | | | | | | |
| | Max | 5.37 | | | | | | |



APPENDIX 7

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

| River | | L1 | L2 | L3 | L4 | L5 |
|--|------|-------|-------|-------|-------|-------|
| Ballysadare (Ballysadare Br._A) | Mean | 18.35 | 34.76 | | | |
| | S.D. | 7.13 | N/A | | | |
| | n | 3 | 1 | | | |
| | Min | 11.28 | 34.76 | | | |
| | Max | 25.54 | 34.76 | | | |
| Barrow (Pass Br._B) | Mean | 21.61 | 41.01 | 57.00 | 73.12 | 74.49 |
| | S.D. | 5.78 | 12.83 | 12.18 | 7.65 | N/A |
| | n | 12 | 4 | 3 | 2 | 1 |
| | Min | 12.72 | 28.76 | 46.18 | 67.71 | 74.49 |
| | Max | 31.60 | 56.44 | 70.18 | 78.53 | 74.49 |
| Brosna (0.5km NW of Pollagh_A) | Mean | 18.13 | 39.71 | | | |
| | S.D. | N/A | N/A | | | |
| | n | 1 | 1 | | | |
| | Min | 18.13 | 39.71 | | | |
| | Max | 18.13 | 39.71 | | | |
| Clare (Corrofin Br._A) | Mean | 17.33 | 26.96 | | | |
| | S.D. | 0.76 | 0.69 | | | |
| | n | 3 | 2 | | | |
| | Min | 16.54 | 26.47 | | | |
| | Max | 18.06 | 27.44 | | | |
| Clare (Kiltroge Castle Br._A) | Mean | 13.77 | | | | |
| | S.D. | N/A | | | | |
| | n | 1 | | | | |
| | Min | 13.77 | | | | |
| | Max | 13.77 | | | | |
| Inny (Shrule Br._A) | Mean | 15.26 | 26.60 | 32.23 | 43.42 | |
| | S.D. | 3.45 | 4.46 | 5.77 | N/A | |
| | n | 9 | 9 | 5 | 1 | |
| | Min | 9.45 | 20.25 | 24.98 | 43.42 | |
| | Max | 20.28 | 33.12 | 40.28 | 43.42 | |
| Nore (Quakers Br._A) | Mean | 9.76 | | | | |
| | S.D. | N/A | | | | |
| | n | 1 | | | | |
| | Min | 9.76 | | | | |
| | Max | 9.76 | | | | |
| Owenmore (Sligo) (300 m u/s Unshin confl_A) | Mean | 13.33 | 21.63 | | | |
| | S.D. | N/A | N/A | | | |
| | n | 1 | 1 | | | |
| | Min | 13.33 | 21.63 | | | |
| | Max | 13.33 | 21.63 | | | |
| Owenmore (Sligo) (Waterfall_A) | Mean | 15.93 | | | | |
| | S.D. | N/A | | | | |
| | n | 1 | | | | |
| | Min | 15.93 | | | | |
| | Max | 15.93 | | | | |



APPENDIX 7 continued

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

| River | | L1 | L2 | L3 | L4 | L5 |
|----------------------|------|-------|-------|----|----|----|
| Robe (Akit Br._A) | Mean | 27.79 | 40.22 | | | |
| | S.D. | N/A | N/A | | | |
| | n | 1 | 1 | | | |
| | Min | 27.79 | 40.22 | | | |
| | Max | 27.79 | 40.22 | | | |



APPENDIX 8

Summary of roach growth 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 |
|--|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Aherlow (Killardy Br._A) | Mean | 2.55 | 4.82 | 8.31 | 11.84 | 14.81 | 17.11 | 18.94 | 20.00 | 20.68 | 21.46 |
| | S.D. | 0.53 | 0.84 | 1.87 | 2.68 | 2.77 | 2.40 | 2.26 | 1.42 | 0.91 | 0.33 |
| | n | 9 | 7 | 7 | 7 | 7 | 7 | 7 | 6 | 4 | 2 |
| | Min | 2.06 | 3.61 | 6.56 | 8.33 | 11.59 | 13.88 | 15.96 | 18.22 | 19.96 | 21.23 |
| | Max | 3.85 | 6.20 | 11.58 | 15.49 | 18.26 | 20.09 | 22.37 | 22.17 | 21.97 | 21.69 |
| Ballysadare (Ballysadare Br._A) | Mean | 2.82 | 6.74 | 9.88 | 13.75 | | | | | | |
| | S.D. | 1.02 | 1.60 | 1.58 | N/A | | | | | | |
| | n | 17 | 10 | 3 | 1 | | | | | | |
| | Min | 1.40 | 4.77 | 8.25 | 13.75 | | | | | | |
| | Max | 4.54 | 10.14 | 11.40 | 13.75 | | | | | | |
| Barrow (Pass Br._B) | Mean | 2.84 | 5.57 | 9.29 | 13.36 | 17.12 | 19.15 | 21.08 | 23.48 | 25.81 | |
| | S.D. | 0.81 | 1.25 | 1.79 | 1.81 | 2.38 | 2.23 | 2.29 | 2.48 | N/A | |
| | n | 41 | 34 | 29 | 23 | 11 | 6 | 6 | 4 | 1 | |
| | Min | 1.73 | 4.03 | 5.80 | 10.51 | 12.55 | 16.81 | 17.92 | 19.83 | 25.81 | |
| | Max | 4.74 | 8.05 | 12.74 | 16.49 | 20.80 | 21.73 | 23.54 | 25.37 | 25.81 | |
| Brosna (0.5km NW of | Mean | 2.32 | 5.73 | 9.31 | 13.80 | 15.03 | 17.67 | | | | |
| | S.D. | 0.78 | 1.58 | 2.91 | 1.51 | N/A | N/A | | | | |
| | n | 35 | 24 | 14 | 10 | 1 | 1 | | | | |
| | Min | 1.28 | 3.75 | 6.98 | 10.36 | 15.03 | 17.67 | | | | |
| | Max | 3.65 | 9.71 | 14.80 | 16.23 | 15.03 | 17.67 | | | | |
| Clare (Corrofin Br._A) | Mean | 2.97 | 8.40 | 11.87 | | | | | | | |
| | S.D. | 0.55 | 1.76 | 1.96 | | | | | | | |
| | n | 17 | 17 | 5 | | | | | | | |
| | Min | 2.00 | 4.80 | 10.00 | | | | | | | |
| | Max | 4.18 | 11.16 | 14.51 | | | | | | | |
| Clare (Kiltroe Castle Br._A) | Mean | 2.75 | 5.51 | 8.39 | | | | | | | |
| | S.D. | 0.47 | 1.44 | 1.55 | | | | | | | |
| | n | 18 | 13 | 6 | | | | | | | |
| | Min | 1.93 | 3.77 | 6.76 | | | | | | | |
| | Max | 3.88 | 9.18 | 10.52 | | | | | | | |
| Dee (Burley Br._A) | Mean | 2.87 | 5.87 | 8.96 | 13.08 | 14.63 | 16.99 | 19.44 | 22.82 | 24.54 | |
| | S.D. | 0.94 | 1.33 | 1.28 | 1.71 | 1.01 | 1.13 | 1.57 | 0.14 | N/A | |
| | n | 16 | 12 | 10 | 10 | 5 | 5 | 3 | 2 | 1 | |
| | Min | 1.79 | 3.59 | 7.66 | 9.98 | 13.81 | 15.78 | 17.76 | 22.72 | 24.54 | |
| | Max | 4.81 | 8.35 | 11.70 | 15.32 | 16.21 | 18.29 | 20.88 | 22.92 | 24.54 | |
| Inny (Shrule Br._A) | Mean | 2.98 | 6.37 | 8.07 | | | | | | | |
| | S.D. | 1.01 | 1.66 | 1.51 | | | | | | | |
| | n | 26 | 12 | 5 | | | | | | | |
| | Min | 1.58 | 3.44 | 6.61 | | | | | | | |
| | Max | 6.27 | 8.65 | 10.29 | | | | | | | |
| Liffey (Lucan Br._A) | Mean | 2.18 | 5.72 | 9.76 | | | | | | | |
| | S.D. | 0.16 | 1.30 | 1.42 | | | | | | | |
| | n | 2 | 2 | 2 | | | | | | | |
| | Min | 2.06 | 4.79 | 8.75 | | | | | | | |
| | Max | 2.29 | 6.64 | 10.76 | | | | | | | |



APPENDIX 8 continued

Summary of roach growth 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 |
|---|------|------|------|-------|-------|-------|-------|----|----|----|-----|
| Nanny (Tuam) (u/s Weir Br._A) | Mean | 2.10 | 8.41 | | | | | | | | |
| | S.D. | N/A | N/A | | | | | | | | |
| | n | 1 | 1 | | | | | | | | |
| | Min | 2.10 | 8.41 | | | | | | | | |
| | Max | 2.10 | 8.41 | | | | | | | | |
| Nore (Kilmacshane_A) | Mean | 5.03 | | | | | | | | | |
| | S.D. | N/A | | | | | | | | | |
| | n | 1 | | | | | | | | | |
| | Min | 5.03 | | | | | | | | | |
| | Max | 5.03 | | | | | | | | | |
| Owenmore (Sligo) (300 m u/s) | Mean | 1.93 | 5.19 | 9.98 | 12.90 | | | | | | |
| | S.D. | 0.65 | 1.52 | 1.16 | 1.25 | | | | | | |
| | n | 18 | 16 | 13 | 4 | | | | | | |
| | Min | 1.04 | 3.64 | 7.72 | 11.58 | | | | | | |
| | Max | 3.26 | 9.53 | 12.19 | 14.00 | | | | | | |
| Owenmore (Sligo) (Waterfall_A) | Mean | 2.74 | 6.29 | | | | | | | | |
| | S.D. | 1.21 | N/A | | | | | | | | |
| | n | 2 | 1 | | | | | | | | |
| | Min | 1.89 | 6.29 | | | | | | | | |
| | Max | 3.60 | 6.29 | | | | | | | | |
| Robe (Akit Br._A) | Mean | 2.67 | 5.70 | 8.55 | 8.55 | 15.57 | | | | | |
| | S.D. | 1.09 | N/A | N/A | N/A | N/A | | | | | |
| | n | 2 | 1 | 1 | 1 | 1 | | | | | |
| | Min | 1.90 | 5.70 | 8.55 | 8.55 | 15.57 | | | | | |
| | Max | 3.44 | 5.70 | 8.55 | 8.55 | 15.57 | | | | | |
| Robe (Friarsquarter_A) | Mean | 2.87 | 7.54 | 14.62 | 18.15 | 21.32 | 23.82 | | | | |
| | S.D. | 1.18 | 1.03 | 1.10 | N/A | N/A | N/A | | | | |
| | n | 2 | 2 | 2 | 1 | 1 | 1 | | | | |
| | Min | 2.04 | 6.81 | 13.84 | 18.15 | 21.32 | 23.82 | | | | |
| | Max | 3.71 | 8.27 | 15.39 | 18.15 | 21.32 | 23.82 | | | | |
| Slaney (Bunclody_A) | Mean | 2.86 | | | | | | | | | |
| | S.D. | 0.18 | | | | | | | | | |
| | n | 2 | | | | | | | | | |
| | Min | 2.73 | | | | | | | | | |
| | Max | 2.99 | | | | | | | | | |



APPENDIX 9

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

| River | | L1 | L2 | L3 | L4 |
|--|------|-------|-------|-------|-------|
| Duncormick ((W) Br. nr Duncormick Rly St_B) | Mean | 7.80 | 17.24 | | |
| | S.D. | N/A | N/A | | |
| | n | 1 | 1 | | |
| | Min | 7.80 | 17.24 | | |
| | Max | 7.80 | 17.24 | | |
| Nore (Brownsbarn Br._A) | Mean | 9.69 | 22.36 | 30.56 | |
| | S.D. | N/A | N/A | N/A | |
| | n | 1 | 1 | 1 | |
| | Min | 9.69 | 22.36 | 30.56 | |
| | Max | 9.69 | 22.36 | 30.56 | |
| Nore (Kilmacshane_A) | Mean | 7.53 | 22.01 | | |
| | S.D. | 2.41 | 2.80 | | |
| | n | 3 | 3 | | |
| | Min | 4.80 | 20.38 | | |
| | Max | 9.37 | 25.24 | | |
| Slaney (Carhill_A) | Mean | 11.82 | 18.72 | | |
| | S.D. | N/A | N/A | | |
| | n | 1 | 1 | | |
| | Min | 11.82 | 18.72 | | |
| | Max | 11.82 | 18.72 | | |
| Smearlagh (Ford u/s Feale R confl (LHS)_A) | Mean | 8.99 | 18.82 | 26.81 | 37.23 |
| | S.D. | 0.74 | 0.29 | 1.58 | N/A |
| | n | 2 | 2 | 2 | 1 |
| | Min | 8.46 | 18.62 | 25.69 | 37.23 |
| | Max | 9.51 | 19.03 | 27.92 | 37.23 |
| Vartry (Ashford Br._A) | Mean | 8.71 | 17.26 | 31.56 | |
| | S.D. | 1.54 | 2.58 | 0.56 | |
| | n | 21 | 21 | 2 | |
| | Min | 6.82 | 12.77 | 31.17 | |
| | Max | 12.30 | 22.16 | 31.96 | |
| Vartry (Newrath Br._A) | Mean | 7.12 | 14.87 | | |
| | S.D. | 1.78 | 3.43 | | |
| | n | 6 | 6 | | |
| | Min | 5.51 | 10.29 | | |
| | Max | 10.37 | 19.83 | | |
| Vartry (Nun's Cross Br._A) | Mean | 7.53 | 16.99 | | |
| | S.D. | 2.18 | 3.58 | | |
| | n | 4 | 4 | | |
| | Min | 5.23 | 13.06 | | |
| | Max | 10.47 | 21.32 | | |



A large, dark blue geometric shape, resembling a stylized wave or a folded piece of paper, occupies the lower half of the page. It has a white border and is decorated with several thin, white, wavy lines that sweep across its surface.

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