LOUGHS AGENCY OF THE FOYLE CARLINGFORD AND IRISH LIGHTS COMMISSION

Loughs Agency Water Framework Directive Fish in Rivers Classification Report 2014

Water Framework Directive Fish Population Assessment

Loughs Agency of the Foyle Carlingford and Irish Lights Commission
Art Niven, Mark McCauley & Rachel Scott, April 2015

This report outlines results and classifications from Water Framework Directive fish surveillance and routine monitoring programmes within rivers of the Foyle and Carlingford areas during 2014

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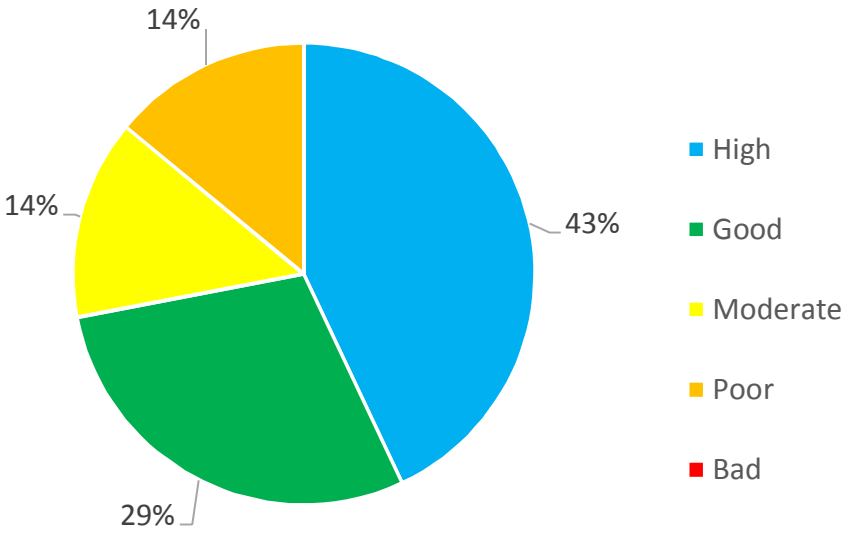
EXECUTIVE SUMMARY

Seven Water Framework Directive fish surveillance monitoring stations were surveyed within the Loughs Agency jurisdiction in 2014. All seven were within Northern Ireland. 43% of sites surveyed were classified as high status, 29% as good status, 14% as moderate status and 14% as poor status. 0% of sites were classified as bad status.



Classification in 2014 was completed using the WFD compliant classification tool, Fish Classification Scheme 2 Ireland (FCS2 Ireland) with the option of a professional judgement over ride. No results were over ridden using professional judgement in 2014. An overview of the classification system is provided and a synopsis of the survey data presented.

Additional data and information has been presented in a series of excel spreadsheets and ESRI Arc GIS shape files. All data reported is stored within the Loughs Agency Geographical Information System (GIS) and is available upon request. Photographs of each site have been included and outline recommendations made for consideration as part of any programme of measures.

Additional indicative classifications have been derived for water bodies within the Foyle and Carlingford areas where certain criteria have been applied to semi quantitative Salmon Management Plan electrofishing data. These criteria have

been developed by the Northern Ireland Water Framework Directive Fish Group and are outlined within this report.

A number of recommendations are made to ensure the continued success of Water Framework Directive river fish monitoring.

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1.0 INTRODUCTION

This report has been prepared to disseminate results for Water Framework Directive fish monitoring within the Foyle and Carlingford areas as managed by the Loughs Agency. The Loughs Agency reports this information to the Northern Ireland Environment Agency. The report provides classifications for water bodies with surveillance monitoring stations, waterbodies where additional data of a suitable standard for deriving WFD fish classifications is available and for water bodies covered by routine semi quantitative Salmon Management Plan monitoring within the Loughs Agency jurisdictions of the Foyle and Carlingford areas for 2014. Additional information has been provided in electronic format.

WFD compliant fish surveys at surveillance stations are required under national and European law. Annex V of the WFD outlines that rivers are included within monitoring programmes and that the composition abundance and age structure of fish fauna are examined (Council of the European Communities, 2000).

A synopsis of targeted Water Framework Directive river fish sampling within the Foyle and Carlingford areas has been provided below for fieldwork conducted in 2014.

Other sites outside the Foyle and Carlingford areas have been monitored by the Agri Food and Biosciences Institute (AFBI) under contract to NIEA. Loughs Agency and AFBI have previously collaborated on a number of surveys to ensure continuity of sampling methods, no collaborative surveys were conducted in 2014.

2.0 BASIS FOR WATER FRAMEWORK DIRECTIVE FISH CLASSIFICATION

The Fish Classification Scheme 2 tool for Ireland (FCS2 Ireland) has been developed to classify fish fauna from high status to bad status to comply with Water Framework Directive requirements. FCS2 Ireland is a statistical model based on the Environment Agency (England) Fisheries Classification Scheme 2 (FCS2). FCS2 Ireland compares the observed abundance of fish of each species with a site specific prediction of the expected fish community under near undisturbed “reference conditions”. The predicted reference conditions are

estimated using models created for each part of the UK and Ireland (UKTAG, 2013).

FCS2 Ireland was used for the first time within the Loughs Agency jurisdiction in 2012 to classify fish in rivers. This methodology is WFD compliant and has replaced professional opinion as the main method of classification. A professional opinion over ride can still be employed if deemed appropriate. Fish classifications will be incorporated into final surface water classifications.

Data collection was conducted in the field during July and August 2014 and involved the use of a quantitative electrofishing methodology and a multi method survey technique. Electrofishing is the preferred method for WFD surveillance monitoring of fish in rivers to obtain a representative sample of fish from each monitoring station. This method is compliant with the European Committee for Standardisation (CEN) standards for assessing fish stocks in wadeable rivers (CEN, 2003).

Quantitative electrofishing requires the netting off of a section of river using stop nets. Removal sampling is then conducted utilising electrofishing equipment with the numbers, age class and species of each fish being recorded for each pass. After an appropriate depletion has been achieved, which facilitates a density estimation to be made, all fish were returned alive to the river.

At a number of larger river sites where quantitative electrofishing was not possible due to width and or depth a multi method sampling approach was adopted which included single pass electrofishing, the deployment of 1m ”D” ring fyke nets overnight and seine netting.

Additional habitat variables were recorded and the exact sampling locations were recorded using a Trimble Juno hand held GPS unit.

Professional judgement over ride can be utilised where classifications are deemed to be inaccurate due to the presence of barriers to migration downstream of the sampling stations. Consideration of this issue has not been incorporated into the FCS2 (Ireland) model at this time. Other scenarios for professional judgement over ride include significant deviation from expected classification and high water levels during survey.

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NURSERY AREA	
Grade 1	• 50 -80mm water depth • 0.5 – 8% gradient • Stable cobble/boulder substrate > or = 70% bed cover • Providing adequate cover
Grade 2	Marginally outside grade 1 on one count only
Grade 3	Well outside grade 1 on one or more counts
Grade 4	Absent, deep, channelized, silty etc.
SPAWNING AREA	
Grade 1	• Flow 300 – 600mm/sec • Water depth 150 – 700mm • 70% substrate 30-80mm diameter • Gravel depth: Trout = 50-150mm Salmon = 200-500mm
Grades 2-4	Failing as for nursery habitat above
HOLDING AREA	
Grade 1	• Depth minimum m ideally > or = 2m • Suitable cover • Bankside/substrate stability
Grades 2-4	Failing as for nursery habitat above

Table 1. Habitat classification based on Department of Agriculture for Northern Ireland (Fisheries Division) advisory leaflet on the evaluation of habitat for salmon and trout

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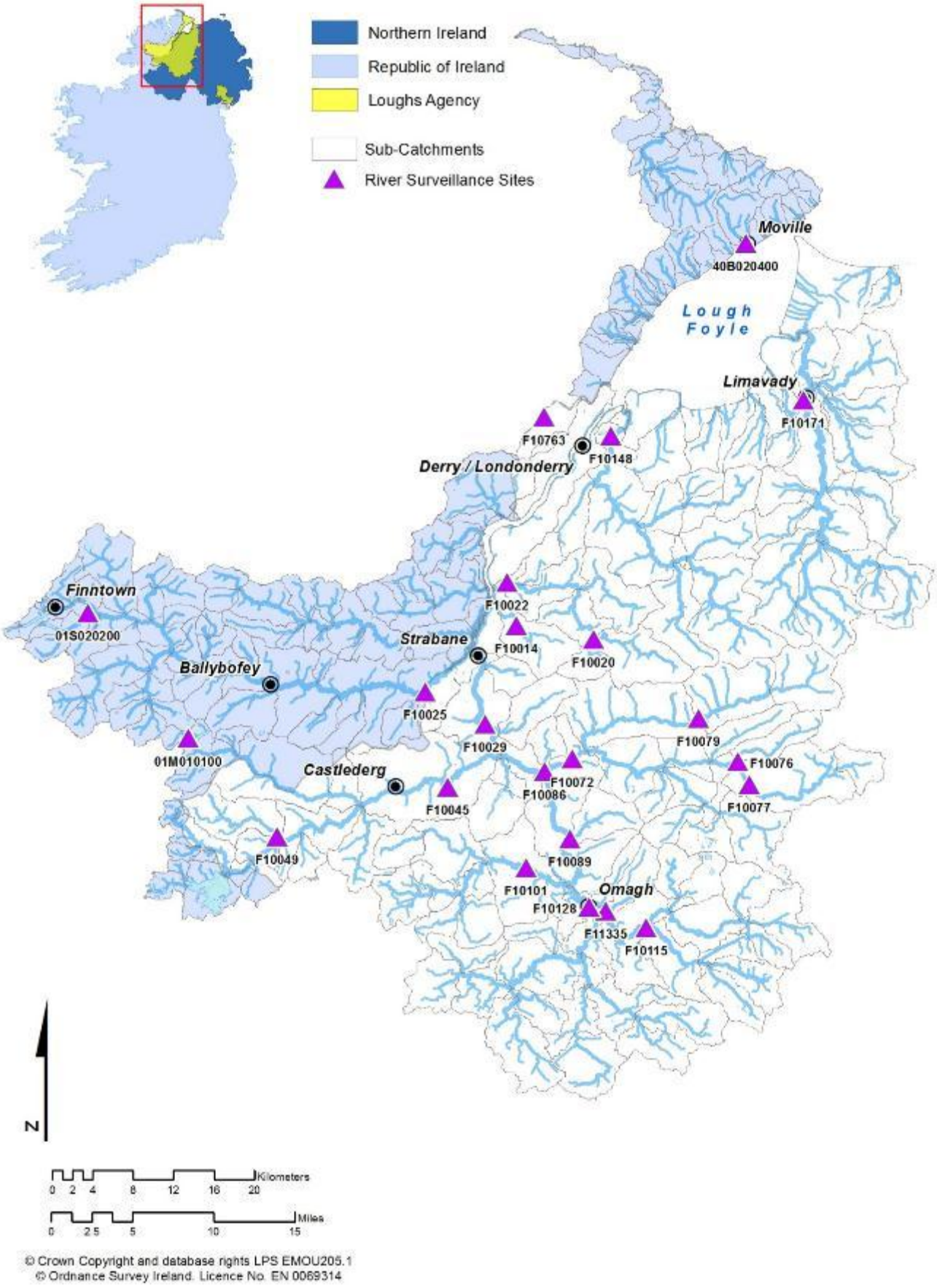

Figure 1. WFD Fish surveillance river sites within the Foyle area, Northern Ireland and Ireland

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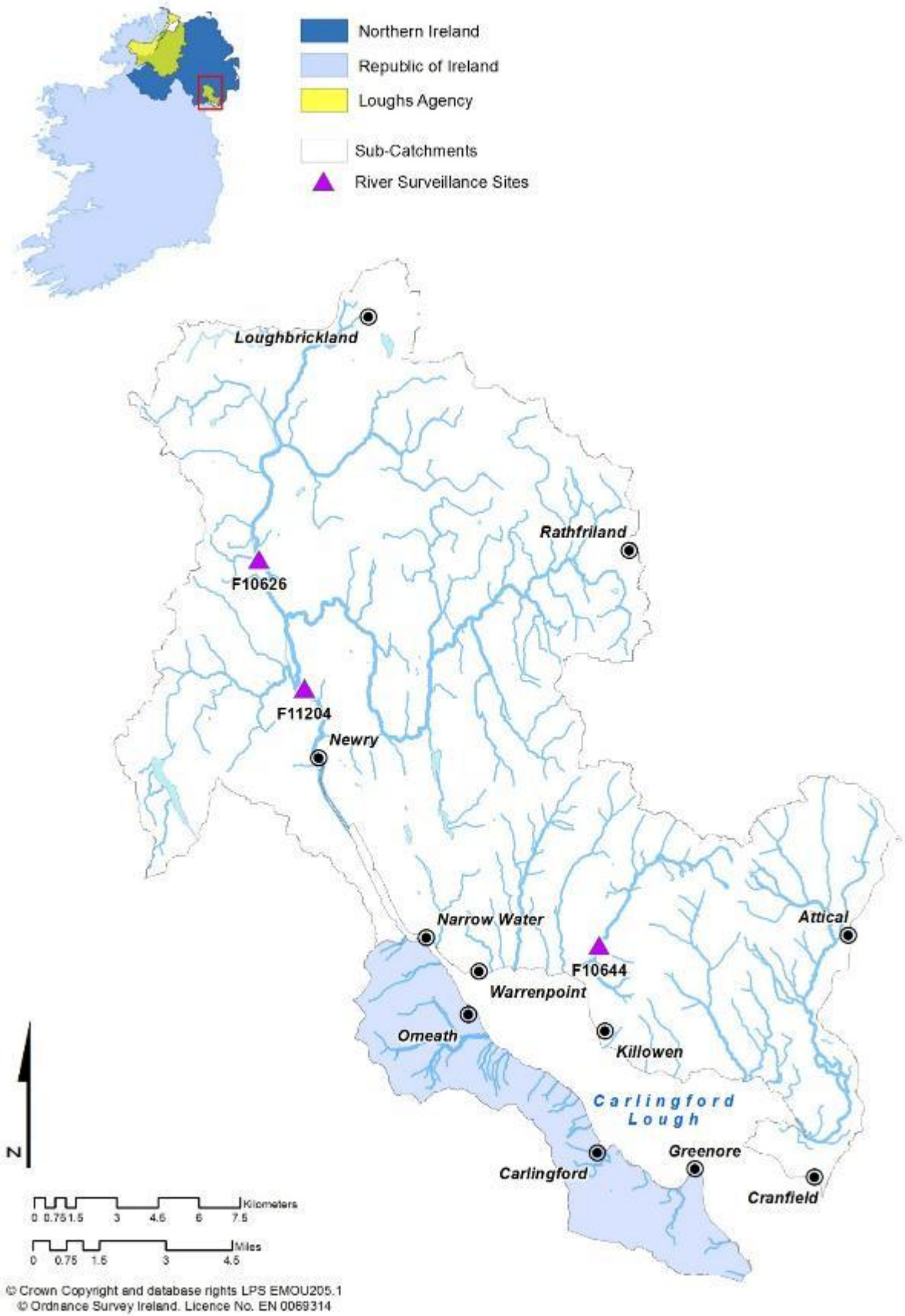

Fig 2. WFD fish surveillance river sites within the Carlingford area, Northern Ireland. There are no sites within Ireland in the Carlingford area.

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3.0 CLASSIFICATIONS

3.1 F11335 Camowen River at Donnellys Bridge GBNI1NW010102033
Camowen WFD Fish Classification 2014

GOOD

METHOD	Sal 0+	Sal 1+	Tro 0+	Tro 1+	Eel	Minnow	Stone Loach	Total
Electrofishing Single Pass	53	7	14	2	0	0	32	108
Seine Netting	0	2	0	22	0	2	0	26
Fyke Net 1	0	2	0	3	3	0	0	8
Fyke Net 2	0	1	0	6	6	0	0	13
TOTAL	**53**	**12**	**14**	**33**	**9**	**2**	**32**	**155**

Table 2. Multi method sampling results

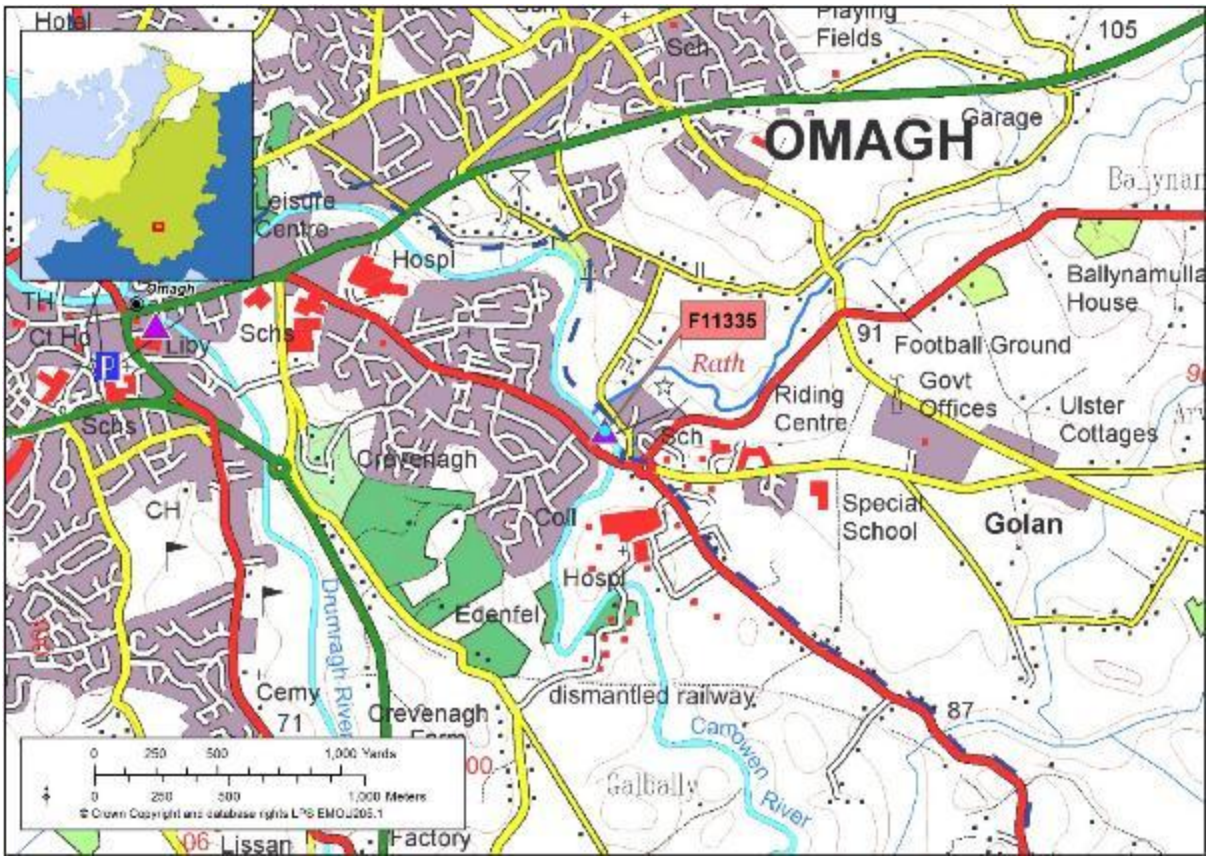

Fig 3. Site F11335

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Due to the width and depth of the Camowen River at site F11335 it was surveyed using a multi method approach which incorporated a single pass electrofishing method, seine netting and fyke netting. Only the single pass electrofishing data has been used for final classification purposes. The combined multi method catch data was also entered into the model as single pass catch data from which a high classification was derived. It was decided to apply the precautionary approach and base the final fish classification on the lowest classification resulting in a classification for this site of good. Minimum density estimates have been calculated for all species present based on the single pass electrofishing data.

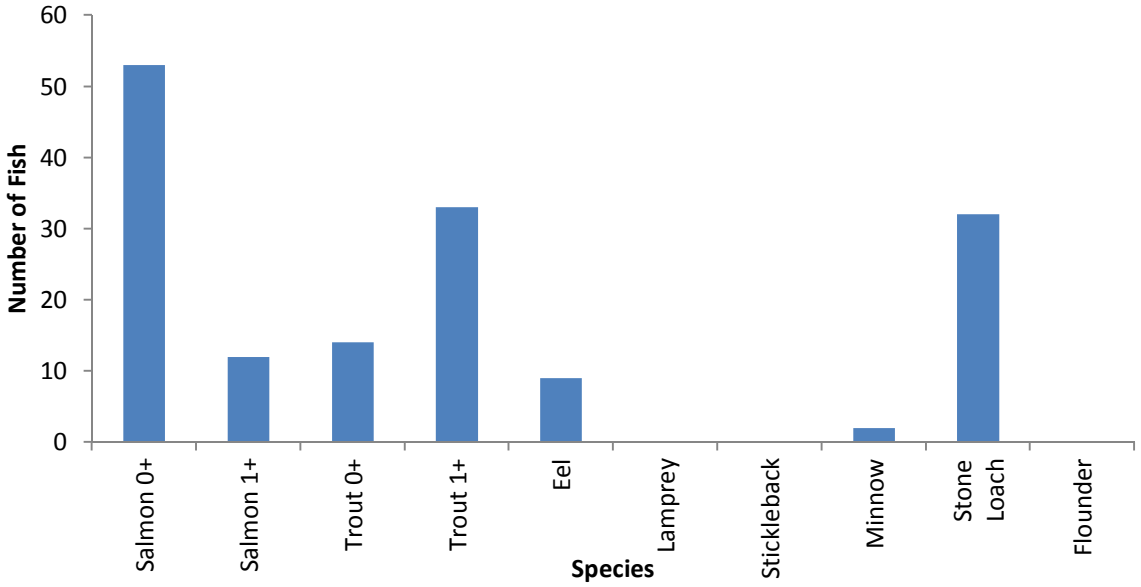

Fig 4. Total catch

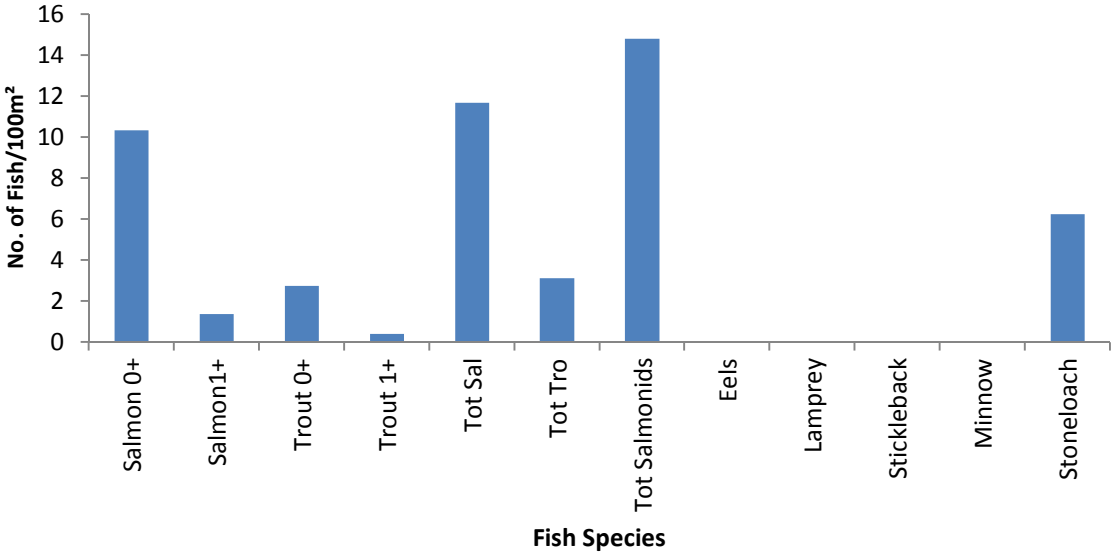

Fig 5. Density/100m²

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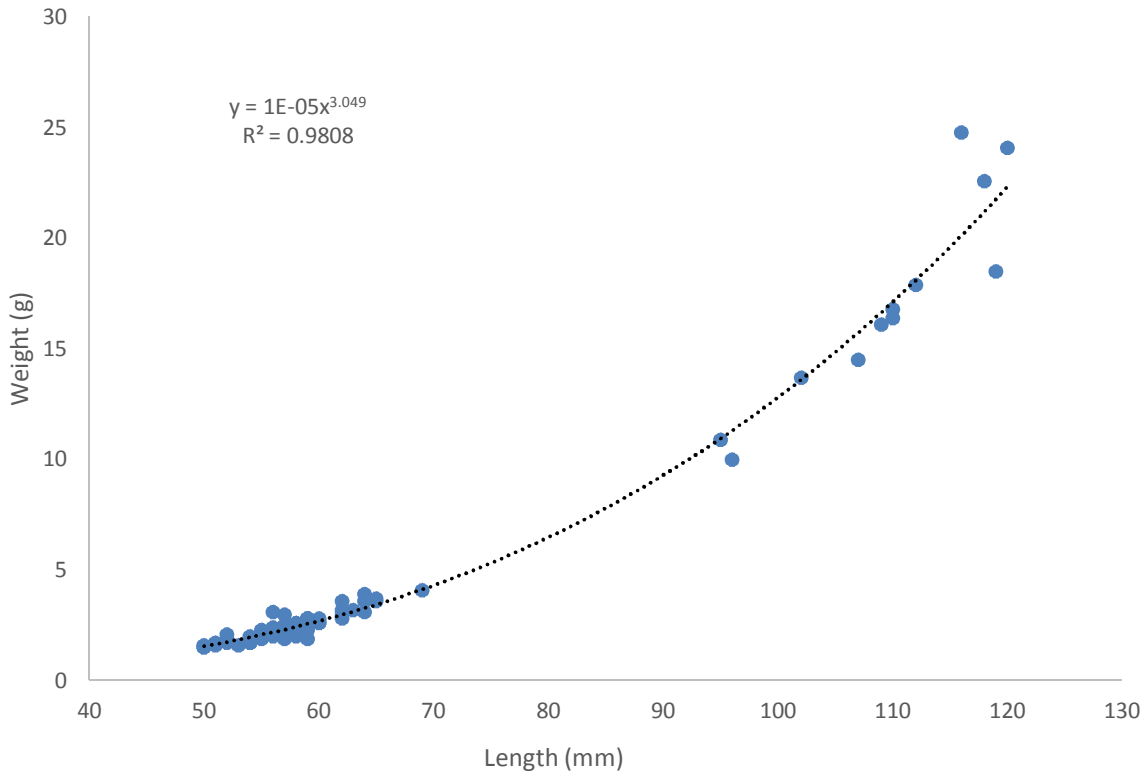

Fig 6. Length weight relationship of salmon n = 65

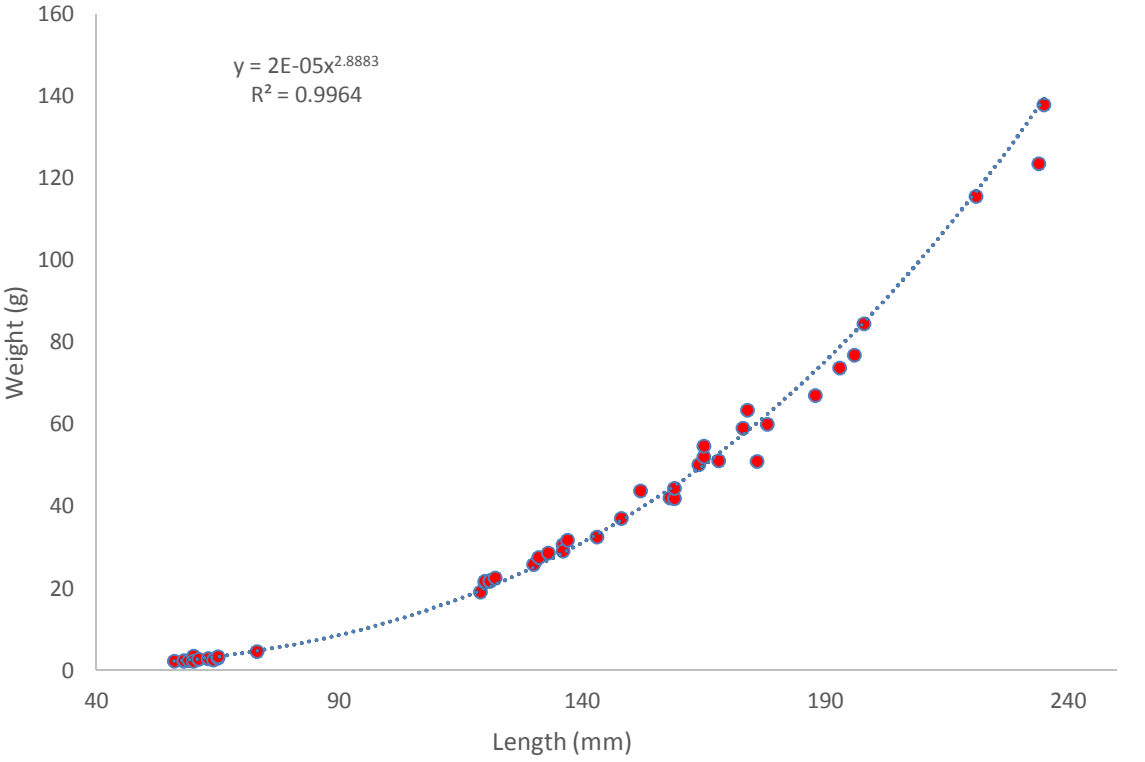

Fig 7. Length weight relationship of all trout caught n = 47

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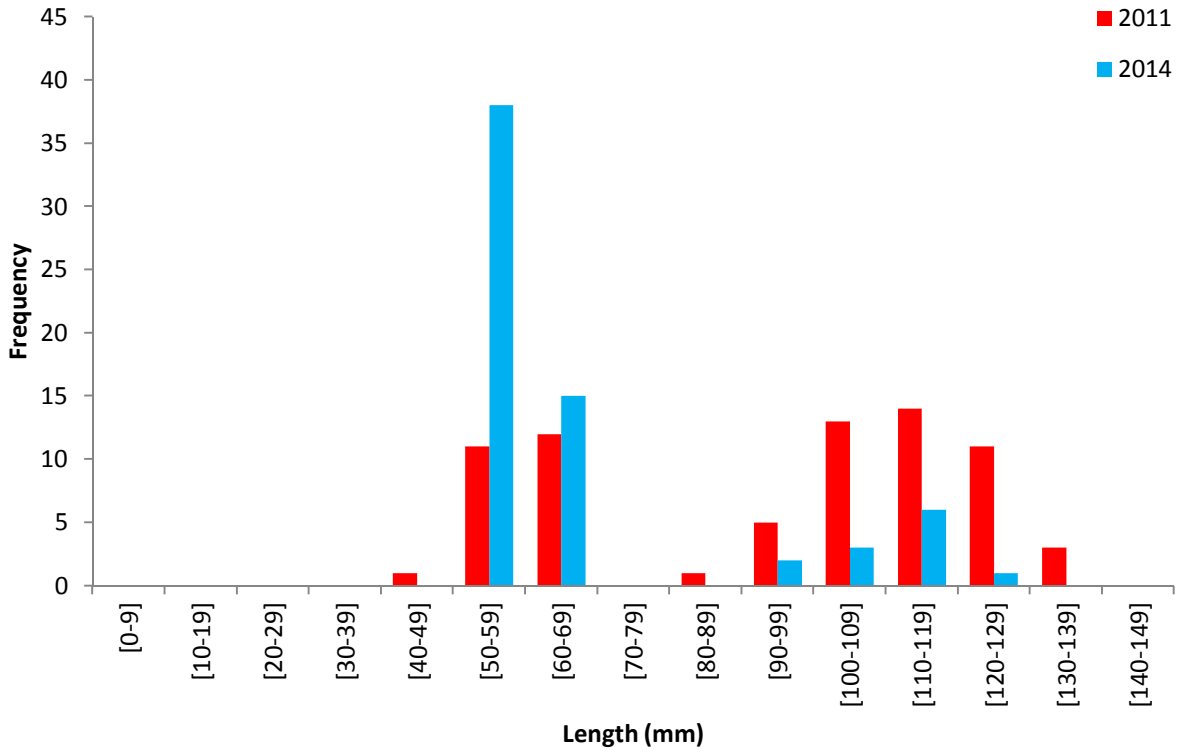

Fig 8. Length frequency distribution for juvenile salmon caught (this can be used to assess the presence of different age classes/cohorts). 2011 n= 71, 2014 n = 65.

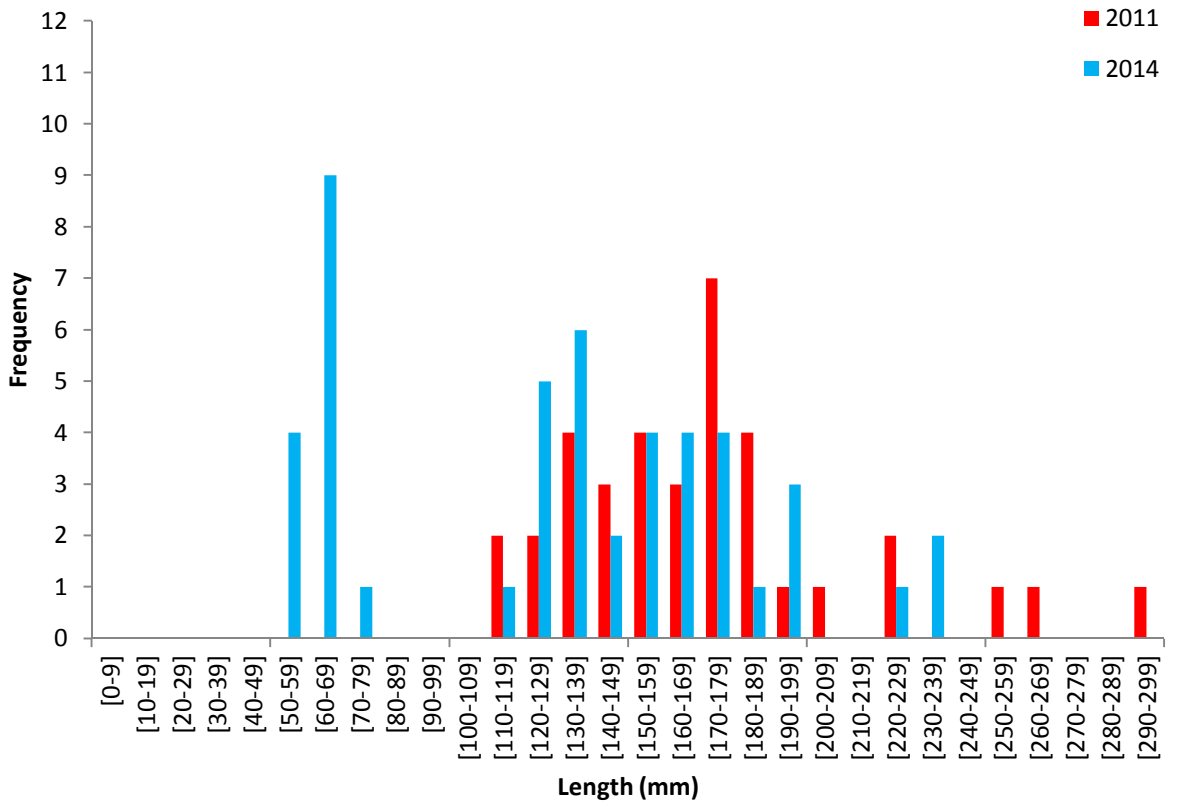

Fig 9. Length frequency distribution for trout. 2011 n = 36, 2014 n = 47.

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This site electrofished is composed predominantly of grade 1 spawning habitat (50%) with grade 2 nursery habitat (50%) and no holding habitat. Additional biological information is available in the spreadsheets provided. Stretches within this water body show evidence of being heavily drained with flood banks constructed beside the river. Significant bank erosion is occurring in places with Japanese knotweed and Himalayan balsam present along the bank. A number of weirs are located within this water body which impact upon fish migration.

Potential programmes of measures could include removal and treatment of invasive species and introduction of large woody debris. Reconnection of the river to the flood plain would also be beneficial from a hydro geomorphological perspective. The removal of weirs should also be given careful consideration.

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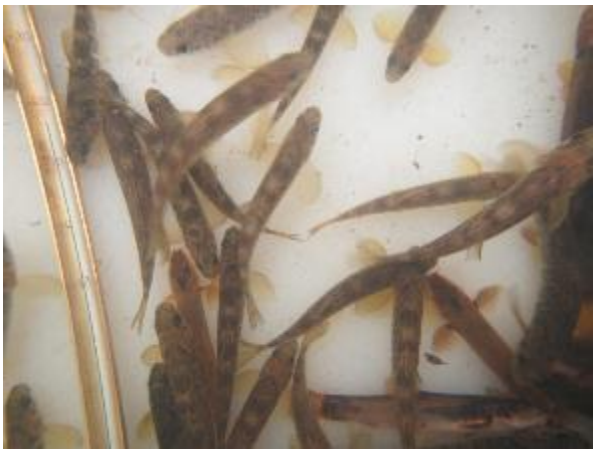

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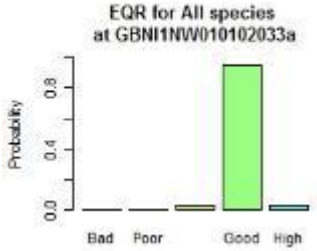

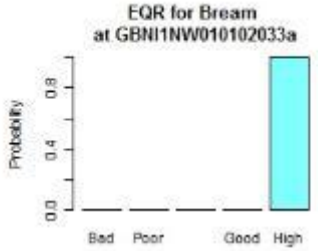

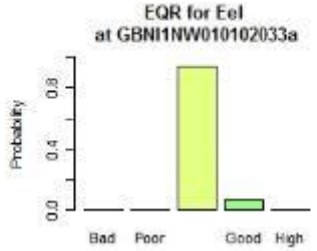

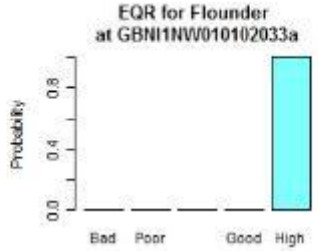

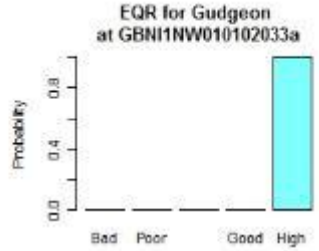

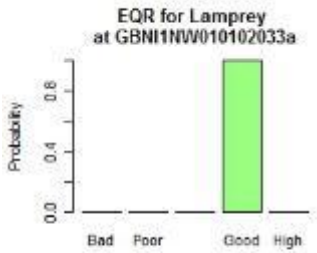

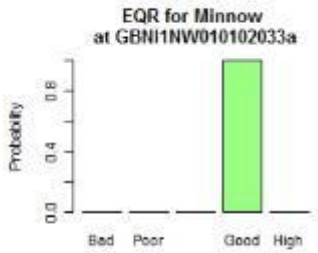

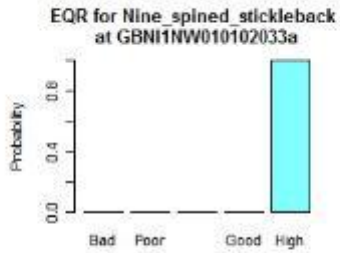

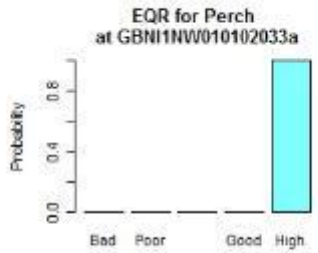

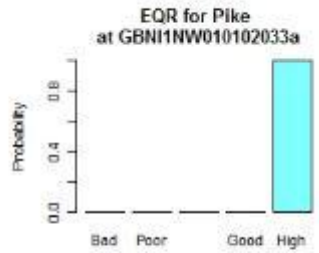

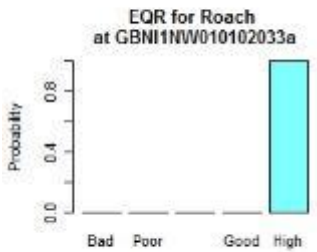

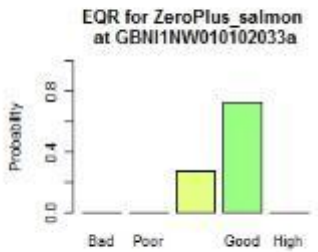

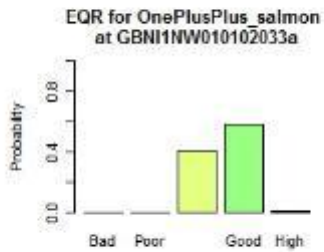

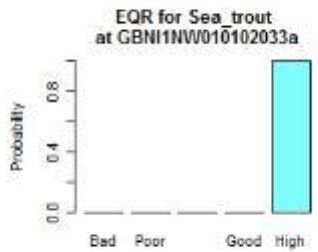

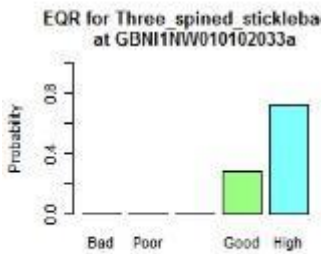

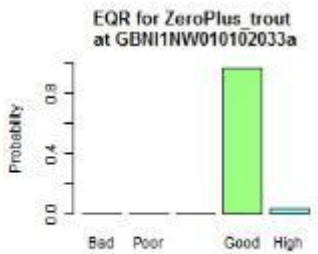

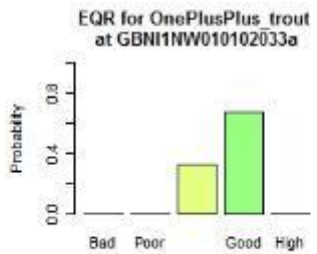

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3.2 F10045 Derg River at Crew Bridge GBNI1NW010102095
Derg WFD Fish Classification 2014

HIGH

Method	Sal 0+	Sal 1+	Tro 0+	Tro 1+	Eel	Lam	Min	SB	Gud	Roa	SL	Total
Electrofishing	84	20	1	1	1	0	0	0	1	1	7	**116**
Seine 1	0	6	0	1	0	0	12	17	0	228	0	**264**
Fyke 1	0	3	0	5	11	0	0	0	0	0	10	**20**
Fyke 2	0	1	0	2	21	0	0	0	0	0	0	**24**
TOTAL	**84**	**30**	**1**	**9**	**33**	**0**	**12**	**17**	**1**	**230**	**7**	**424**

Table 3. Removal sampling results *Note Sal 0+ = salmon 0+, Sal 1+ = salmon1+, Tro 0+ = Trout 0+, Tro 1+ = Trout 1+, Lam = Lamprey, Min = Minnow, SB = 3 Spined Stickleback, Gud = Gudgeon, Roa = Roach and SL = Stone Loach

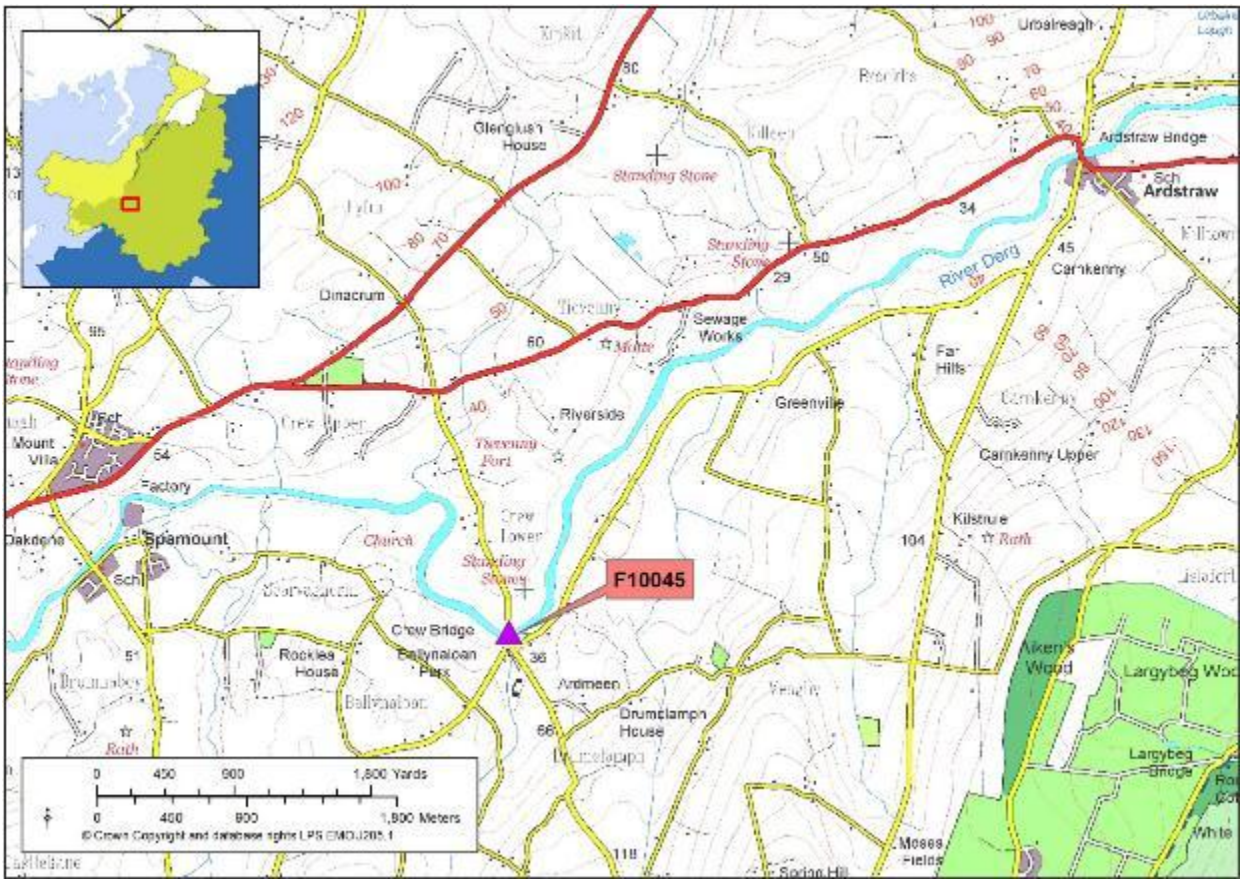

Fig 10. Site F10045

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Site F10045 was surveyed using a multi method approach which incorporated a single pass quantitative electrofishing method, seine netting and fyke netting. Only the single pass electrofishing data has been used for final classification purposes. The combined multi method catch data was also entered into the model as single pass catch data from which a high classification was derived. Both data sets resulted in an agreed classification of high status. Minimum density estimates have been calculated for all species present based on the single pass electrofishing data.

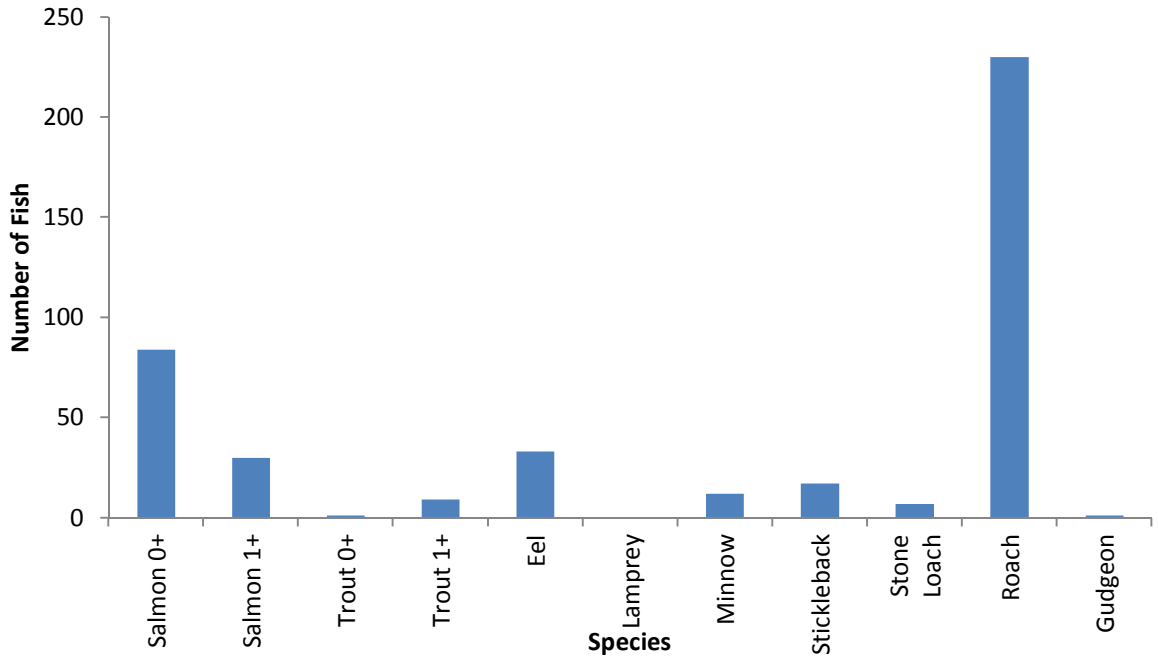

Fig 11. Total catch

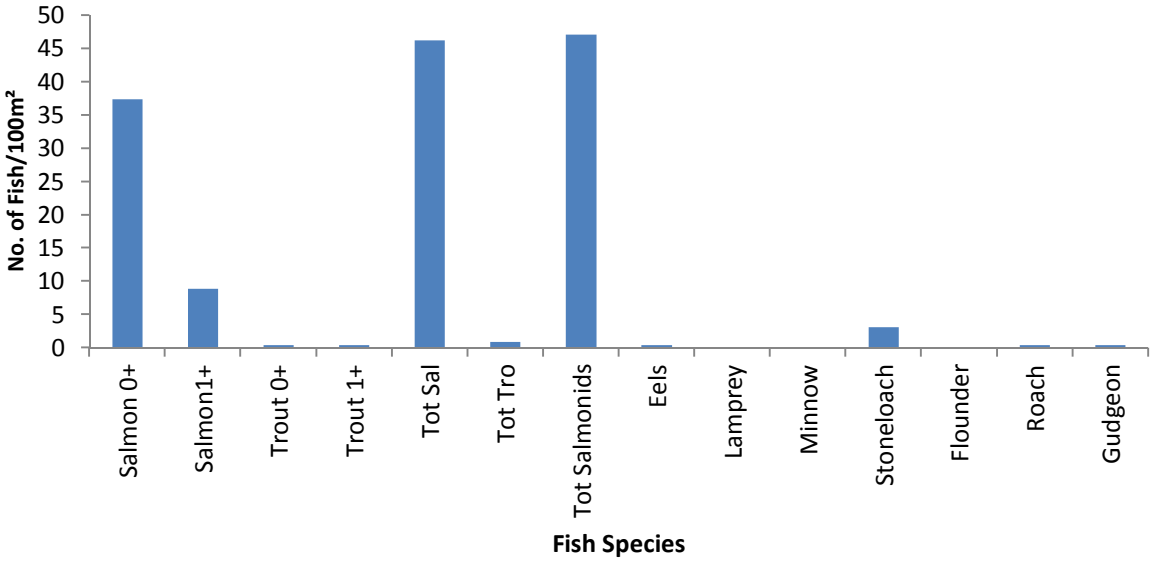

Fig 12. Density/100m^2

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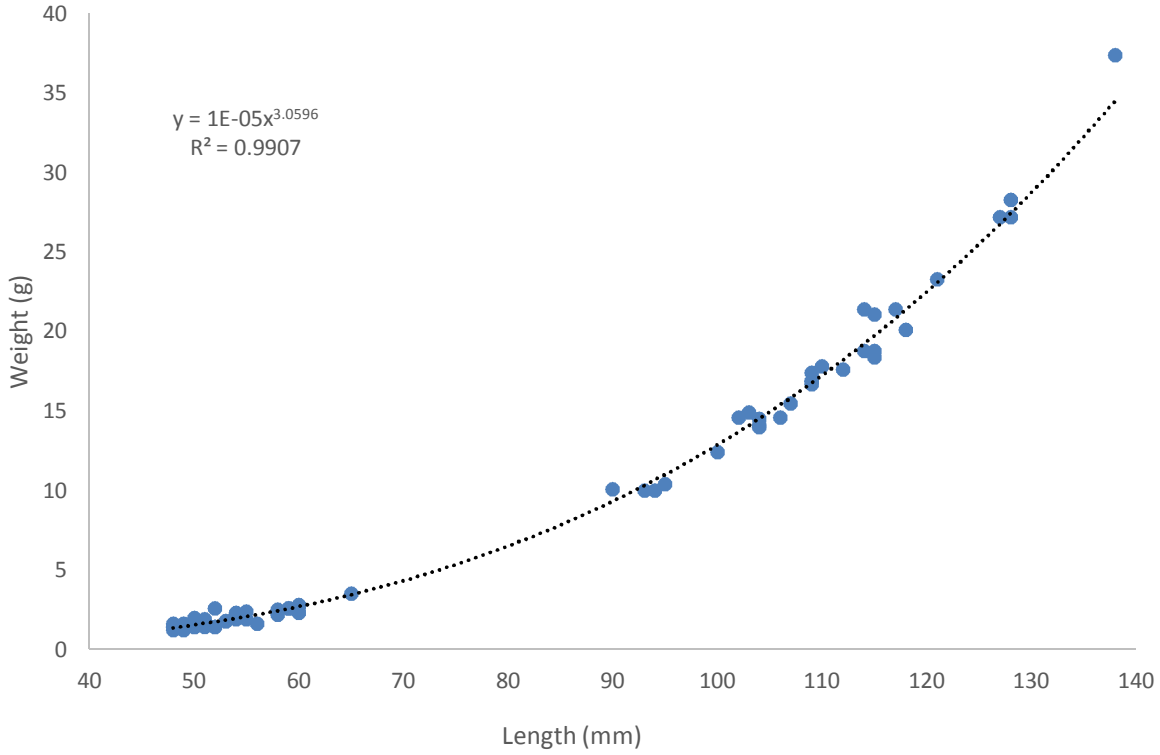

Fig 13. Length weight relationship of of salmon caught n = 66.

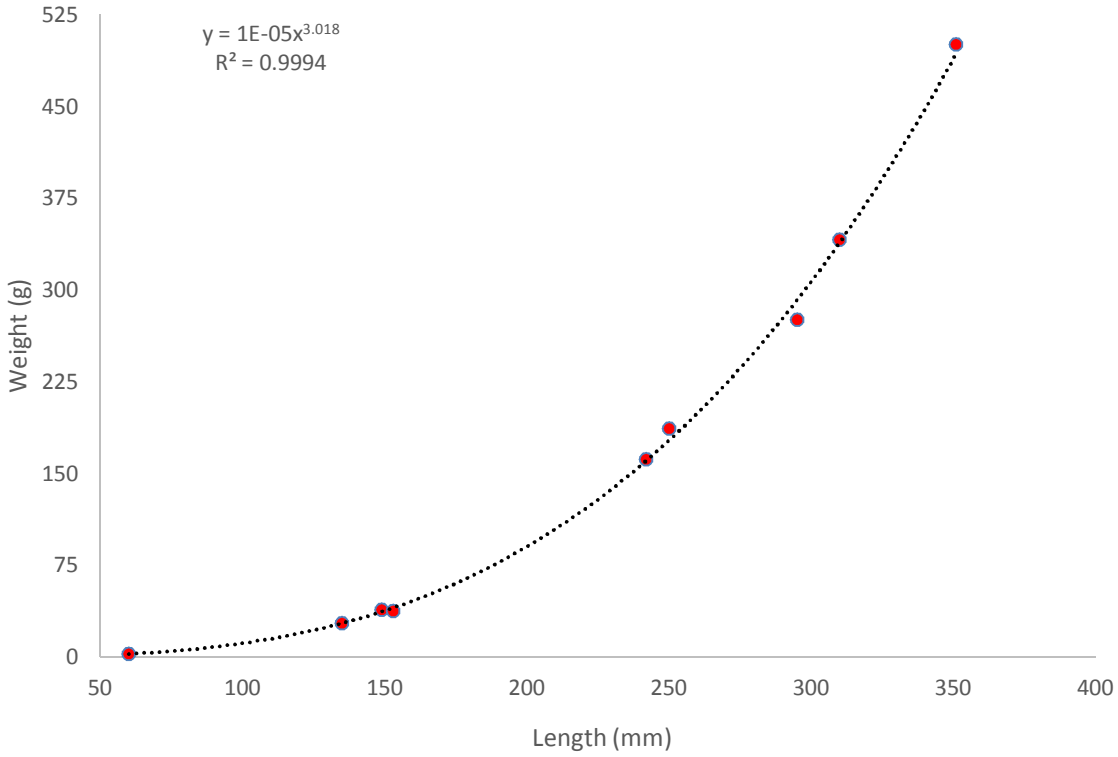

Fig 14. Length weight relationship of of trout caught n = 9.

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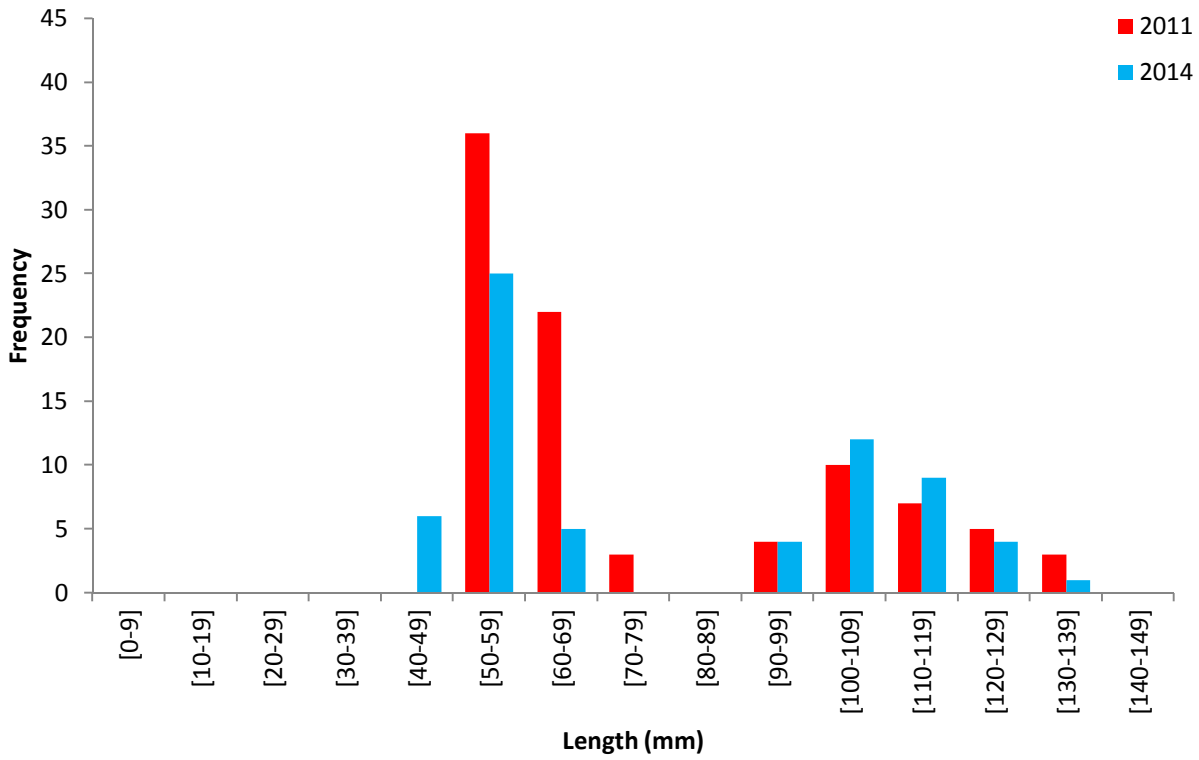

Fig. 15. Length frequency distribution for salmon caught. 2011 n = 90, 2014 n = 65.

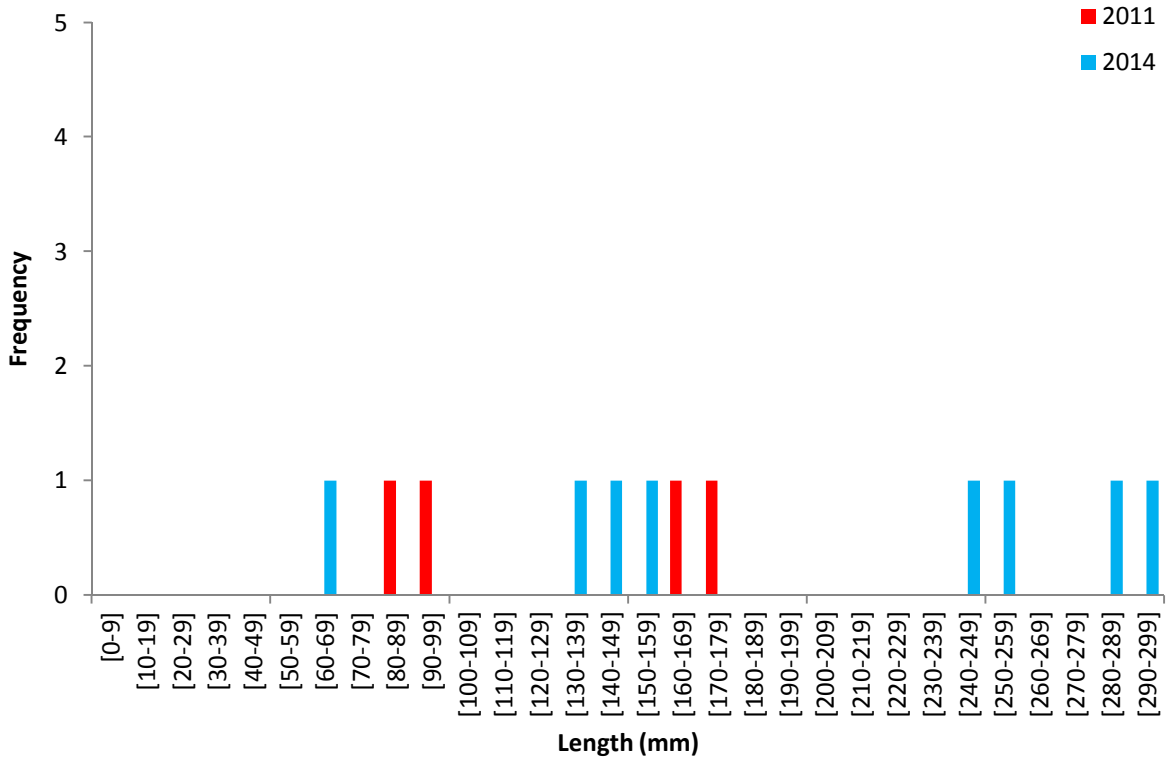

Fig. 16. Length frequency distribution for trout caught. 2011 n = 4, 2014 n = 10.

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This site is composed predominantly of grade 2 spawning habitat (50%) with grade 2 nursery habitat (40%) and grade 3 holding habitat (10%). This site demonstrated natural channel structure with good in channel habitat diversity including the presence of *Ranunculus* sp. Himalayan balsam was present on both banks of the river and Japanese knotweed was present on the left hand bank downstream of the bridge. Giant hogweed was present upstream of the bridge. Some bank erosion was evident upstream of Crew Bridge on the right hand bank.

Potential programmes of measures could include removal and treatment of invasive species and introduction of large woody debris. Reconnection of the river to the flood plain would also be beneficial from a hydro geomorphological perspective. The bank erosion could be halted through riparian fencing incorporating a gate to facilitate limited access grazing and a pasture pump.

Additional biological information is available in the spreadsheets provided.

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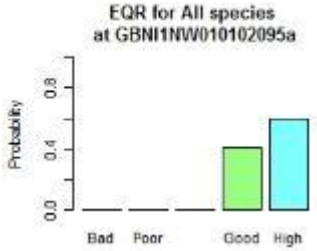

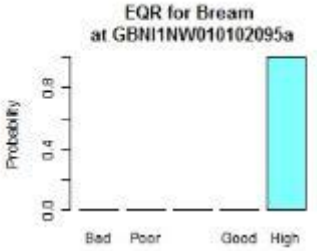

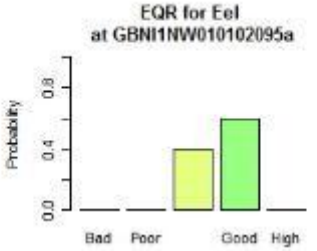

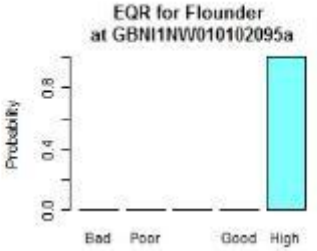

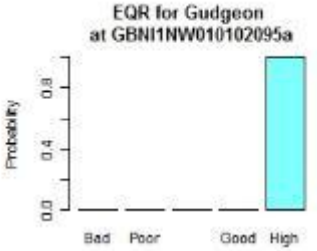

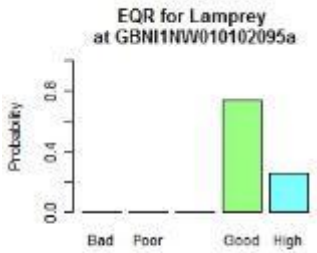

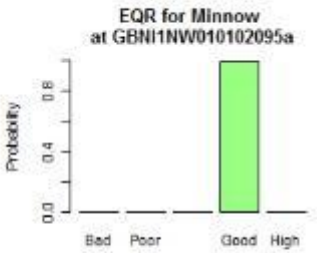

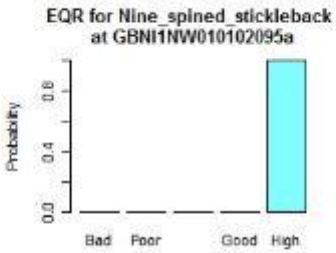

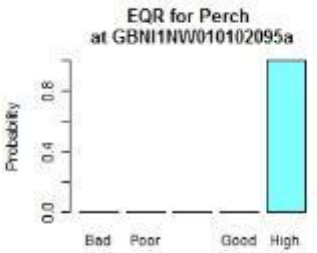

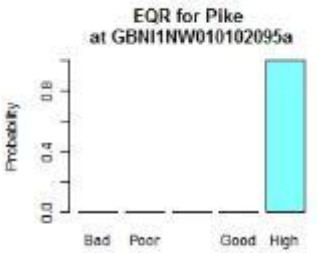

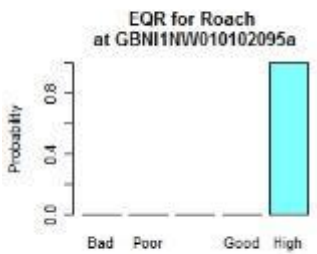

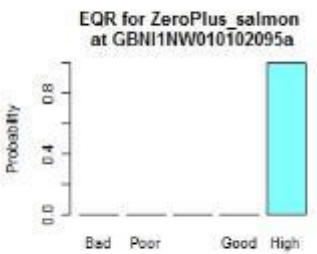

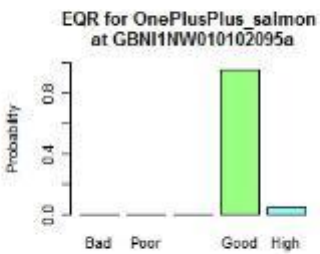

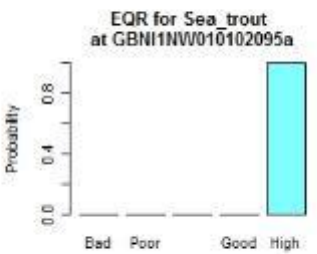

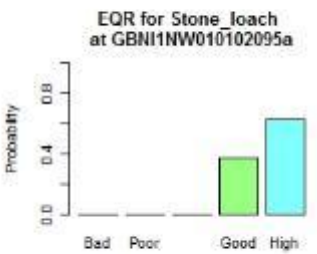

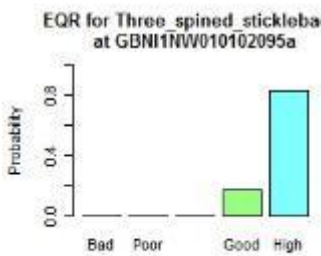

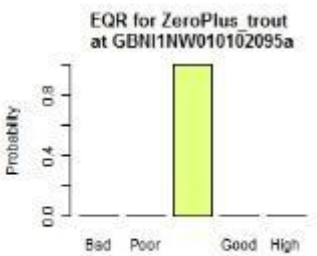

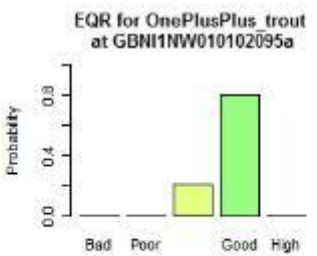

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3.3 F10128 Drumragh River U/S of Campsie Br GBNI1NW010102006 Drumragh WFD Fish Classification 2014

HIGH

FISHING	Salmon 0+	Salmon 1+	Trout 0+	Trout 1+	Eel	La	Mi	SB	SL	Roach	Total
1st Pass	23	36	1	5	2	4	3	1	53	1	**129**
TOTAL	**23**	**36**	**1**	**5**	**2**	**4**	**3**	**1**	**53**	**1**	**129**

Table 4. Sampling results *Note La = Lamprey , Mi = Minnow, SB = 3 Spined Stickleback and SL = Stone loach

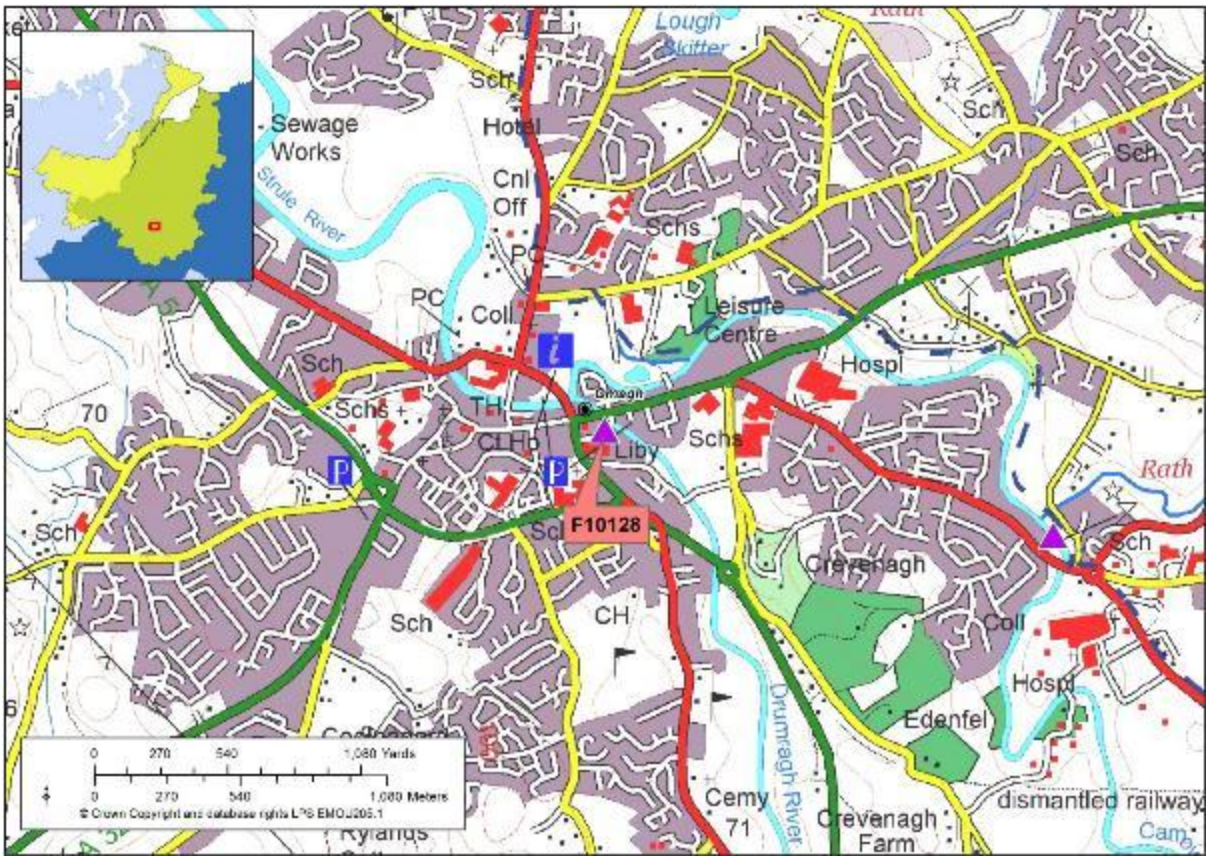

Fig 17. Site F10128

Site F10128 has been classified as a large river site where quantitative electrofishing is not possible except in the lowest of water conditions. A single pass electrofishing survey without stop nets was conducted as the river lacked suitable depths to safely deploy seine and fyke netting methods. From this data minimum density estimates have been calculated for all species present.

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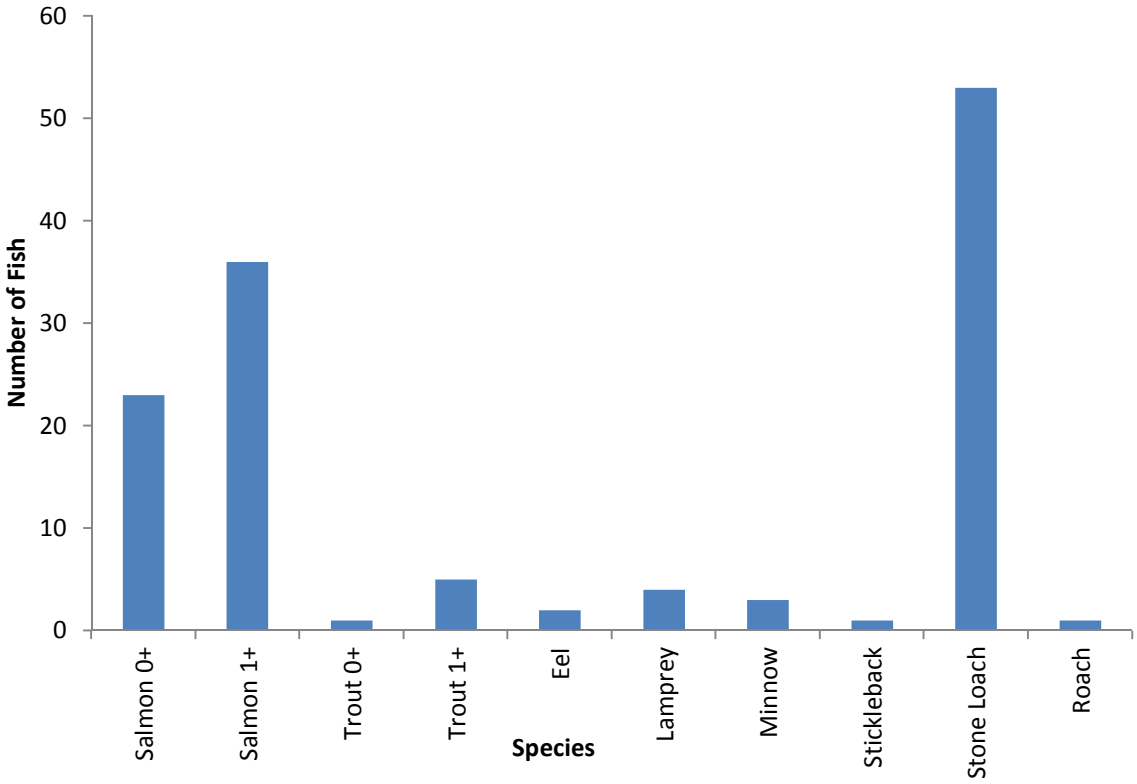

Fig 18. Total catch

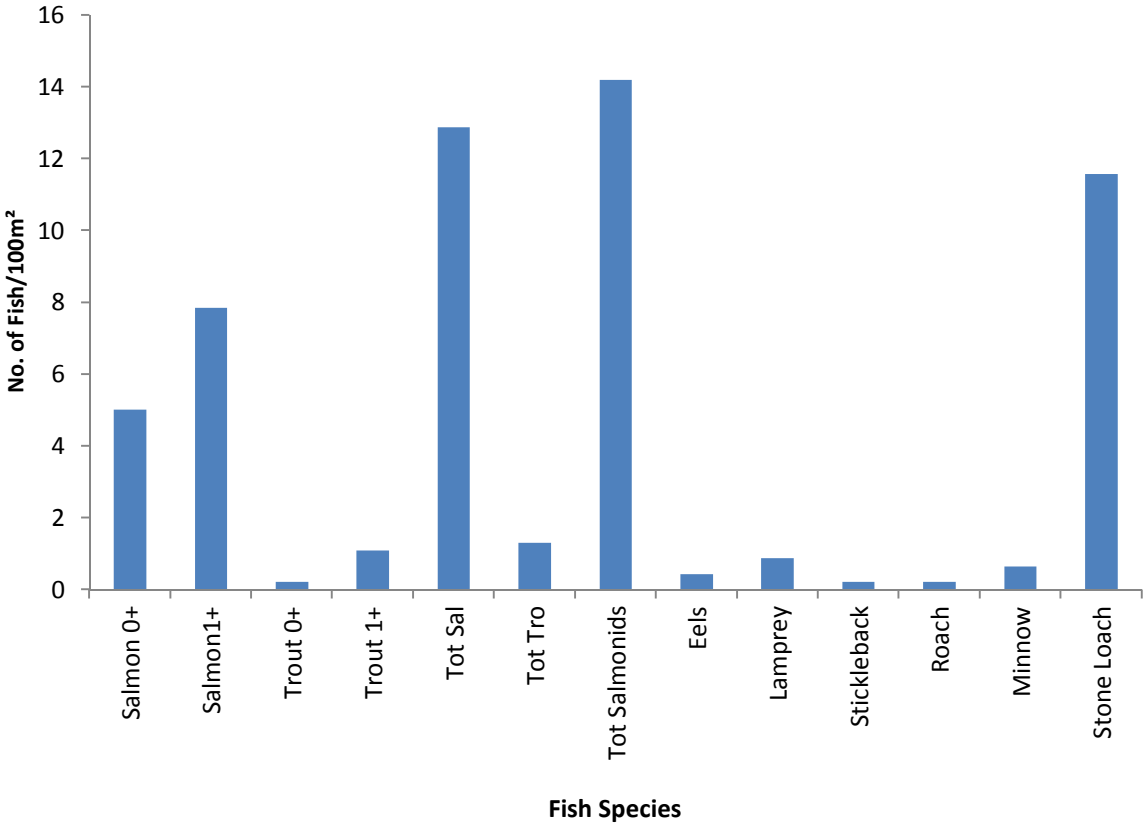

Fig 19. Density estimate in 100m²

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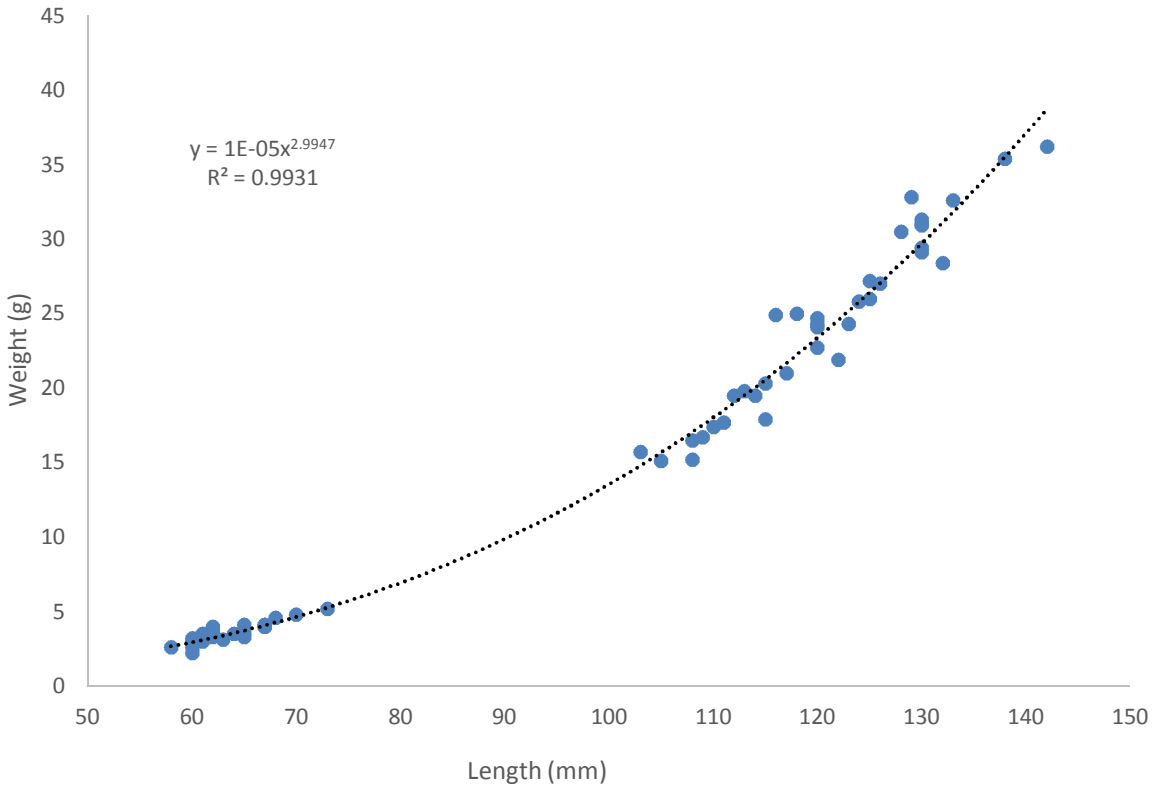

Fig 20. Length weight relationship of salmon n = 59

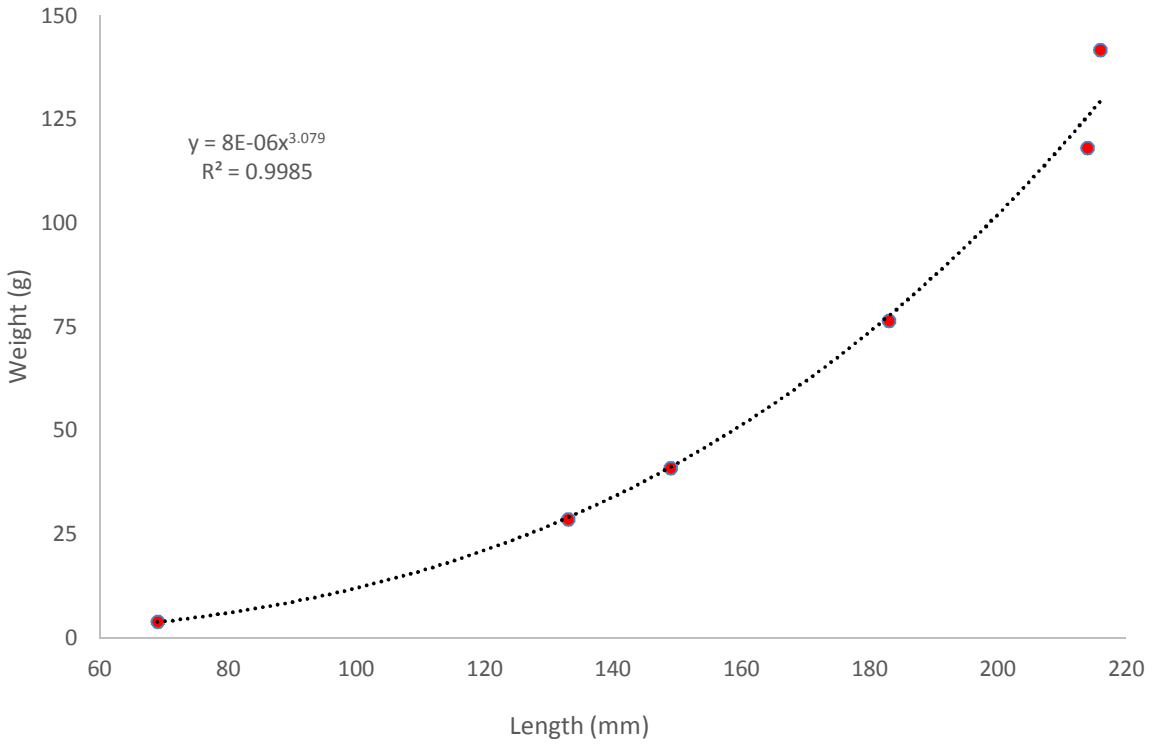

Fig 21. Length weight relationship of trout n = 6

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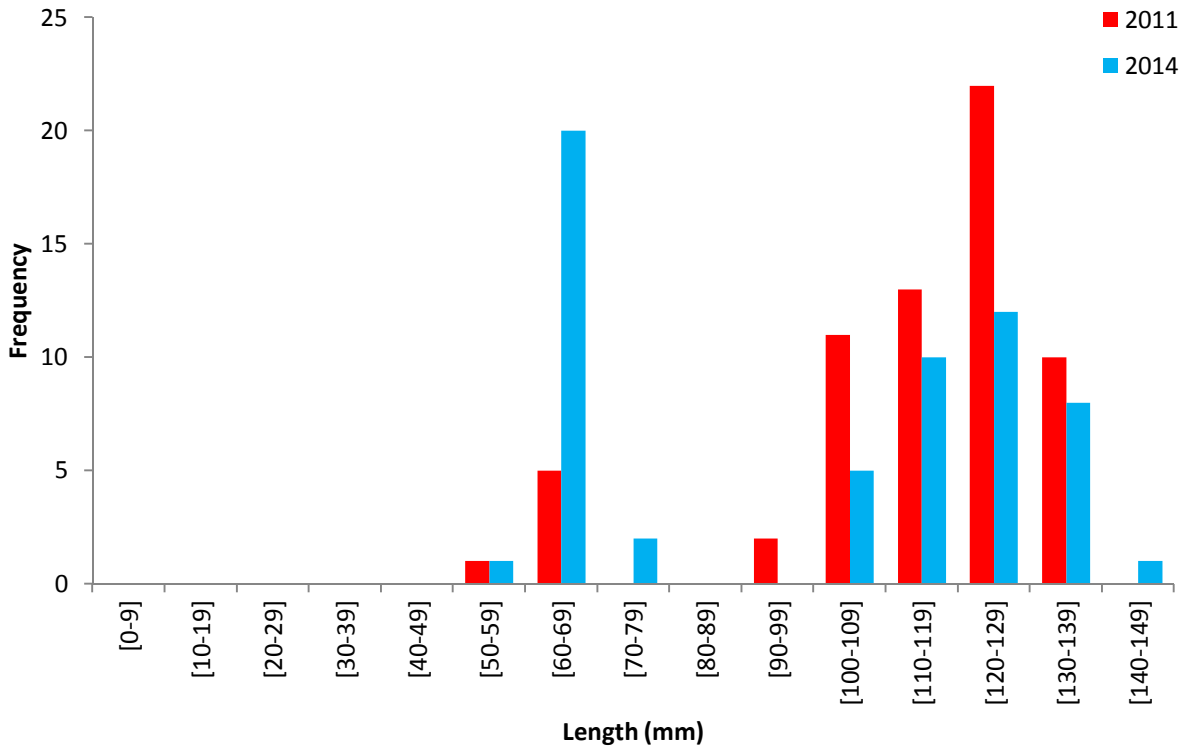

Fig 22. Length frequency distribution for salmon. 2011 n = 64, 2014 n = 59.

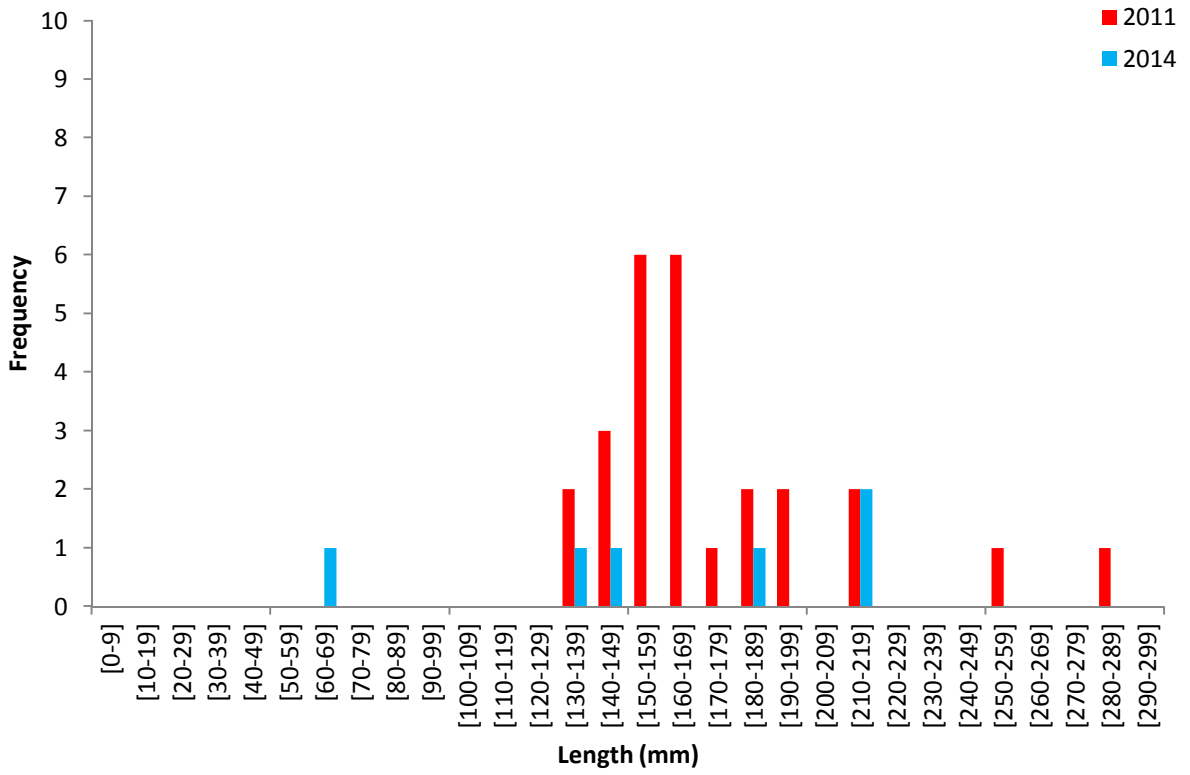

Fig 23. Length frequency distribution for trout. 2011 n = 26, 2014 n = 6.

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This site is composed predominantly of grade 2 nursery habitat (65%) with grade 3 spawning habitat (25%) and grade 3 holding habitat (10%).

This waterbody is impacted by large scale flood defences. Himalayan balsam is present on both banks.

Additional biological information is available in the spreadsheets provided.

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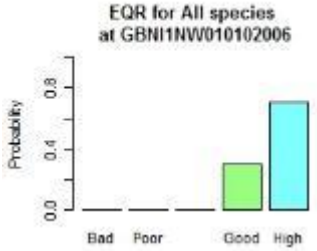

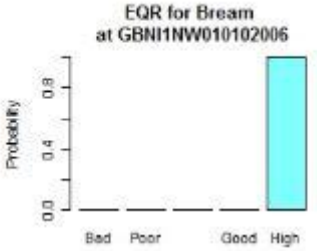

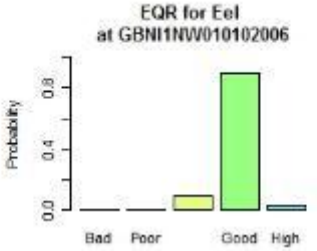

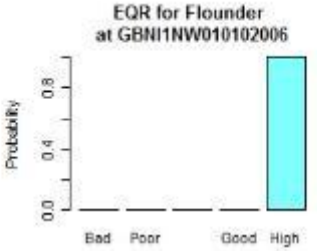

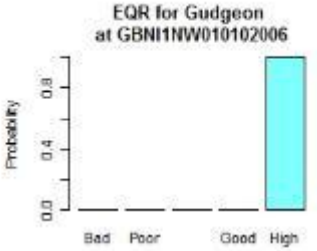

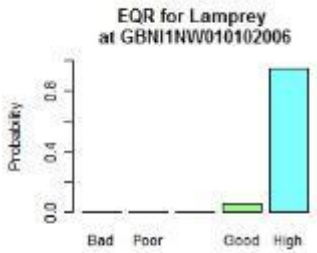

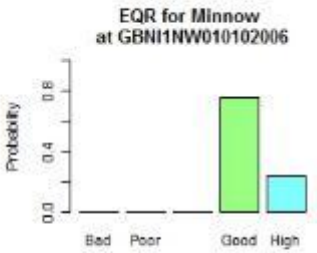

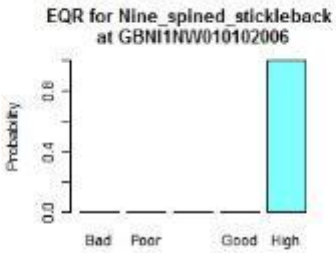

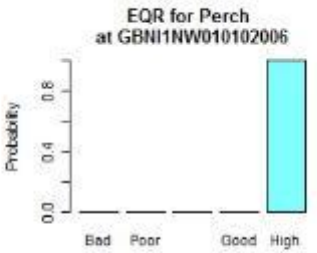

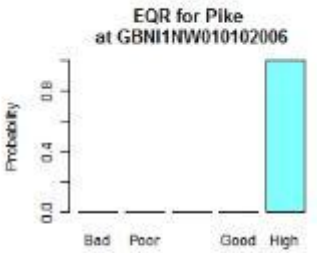

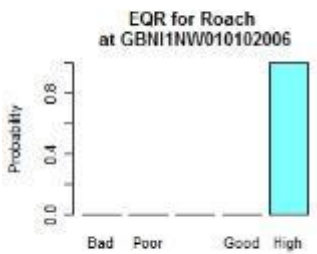

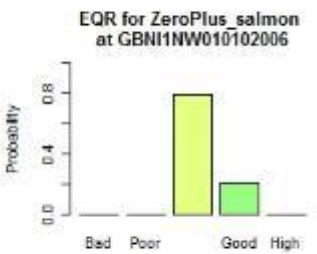

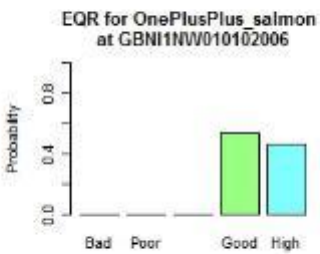

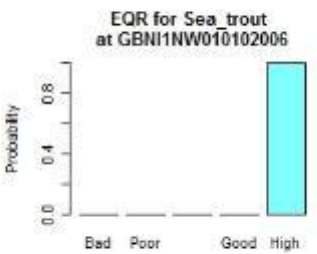

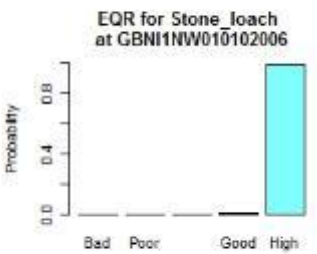

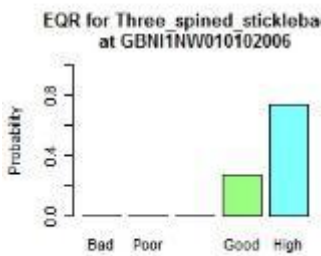

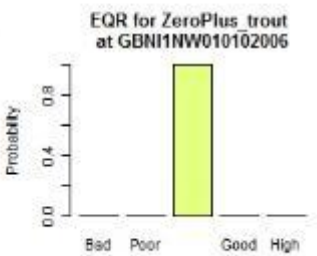

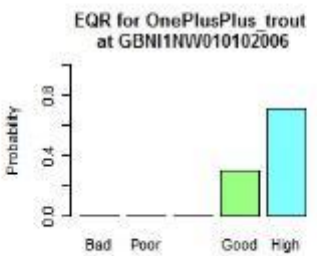

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3.4 F10101 Fairywater River GBNI1NW010102041
Fairywater WFD Fish Classification 2014

MODERATE

FISHING	Salmon 0+	Salmon 1+	Trout 0+	Trout 1+	Eel	*La	*Mi	*SL	*SB	Total
1st	1	3	0	2	3	6	3	100	1	**119**
TOTAL	**1**	**3**	**0**	**2**	**3**	**6**	**3**	**100**	**1**	**119**

Table 5. Removal sampling results*Note La = Lamprey, Mi = Minnow, SL = Stone Loach & SB = Stickleback

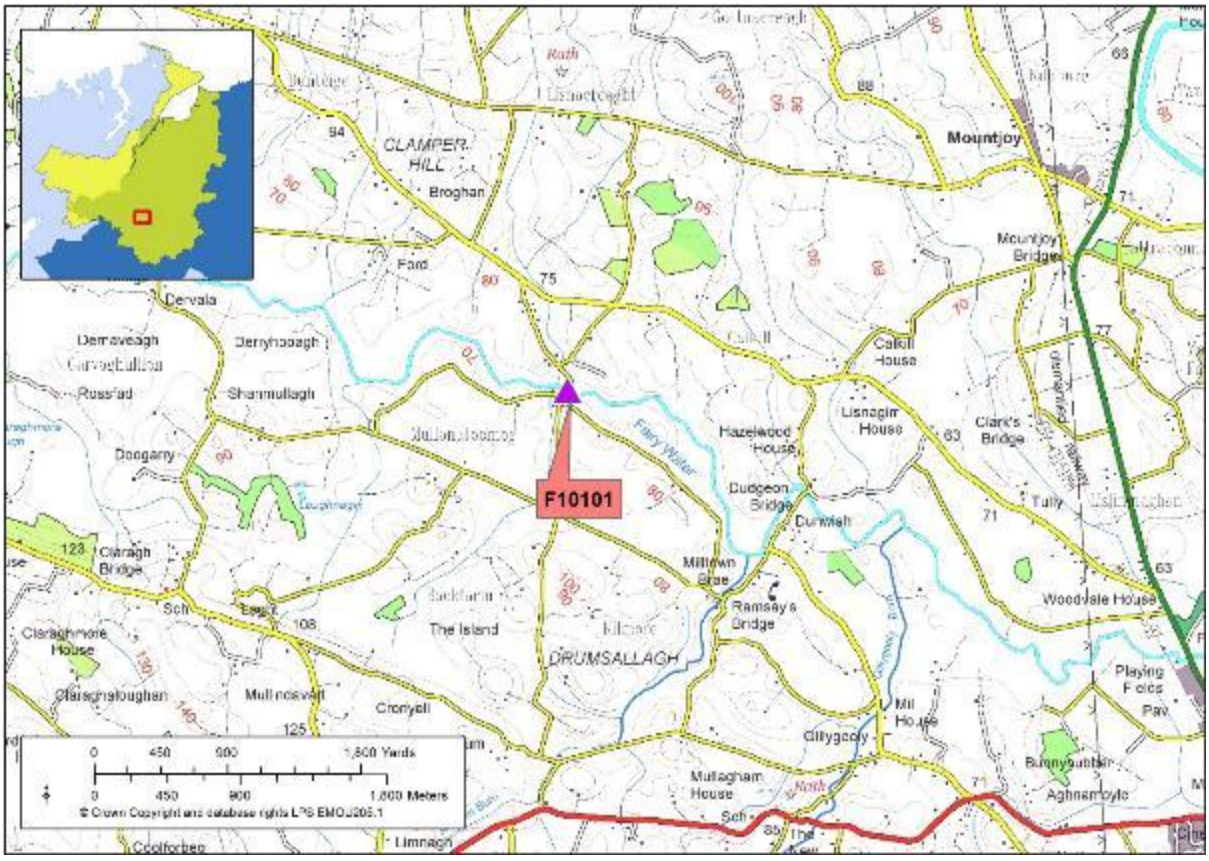

Fig 24. Site F10101

Site F10101 was surveyed using a single pass quantitative electrofishing method due to the very low numbers of fish caught. This involved stop netting the river at both upstream and downstream limits of the selected site. From this data minimum density estimates have been calculated for all species present.

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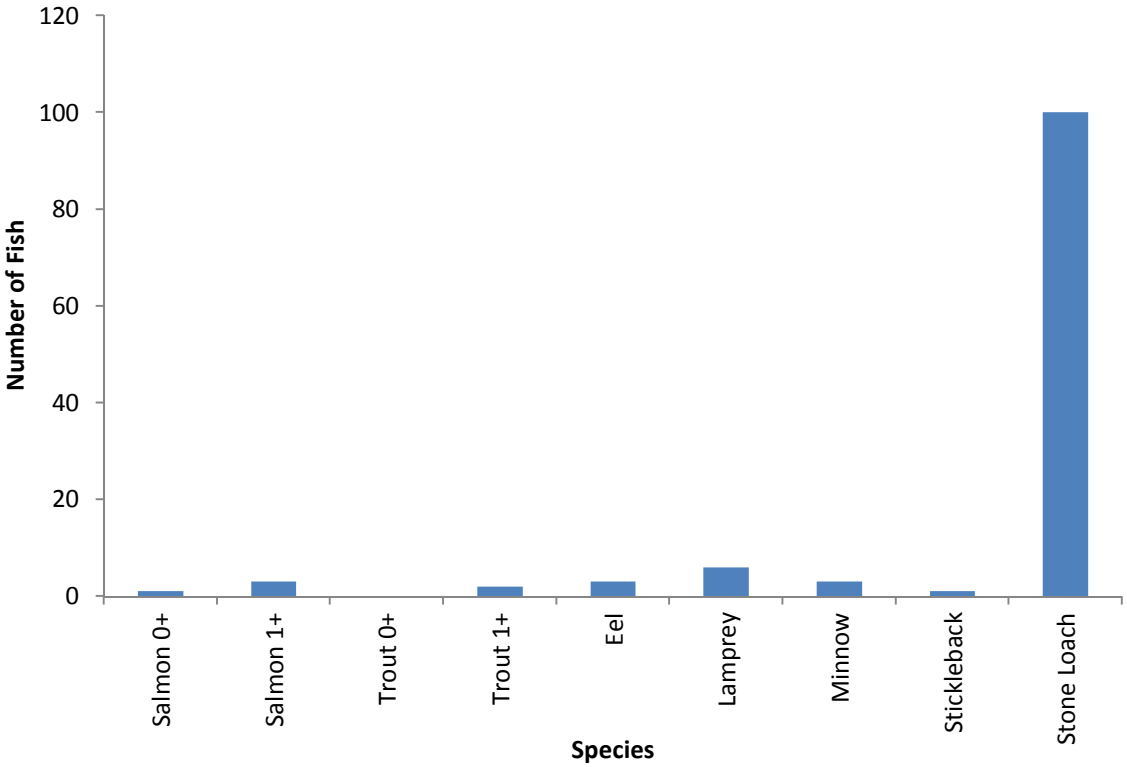

Fig 25. Total catch

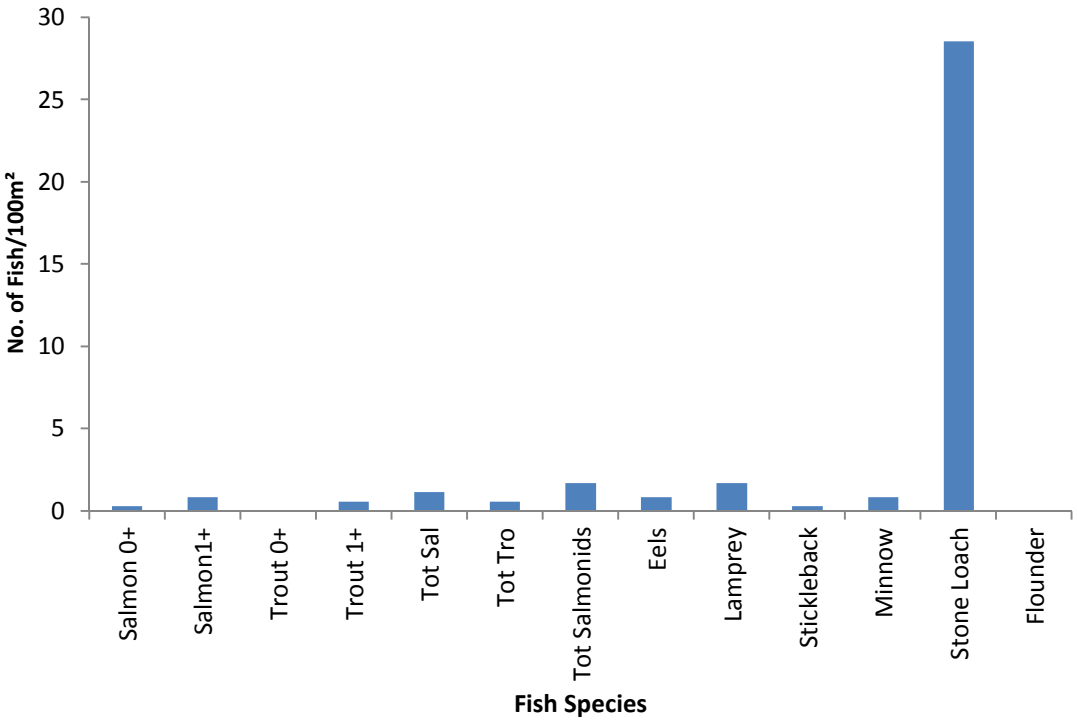

Fig 26. Density/100m²

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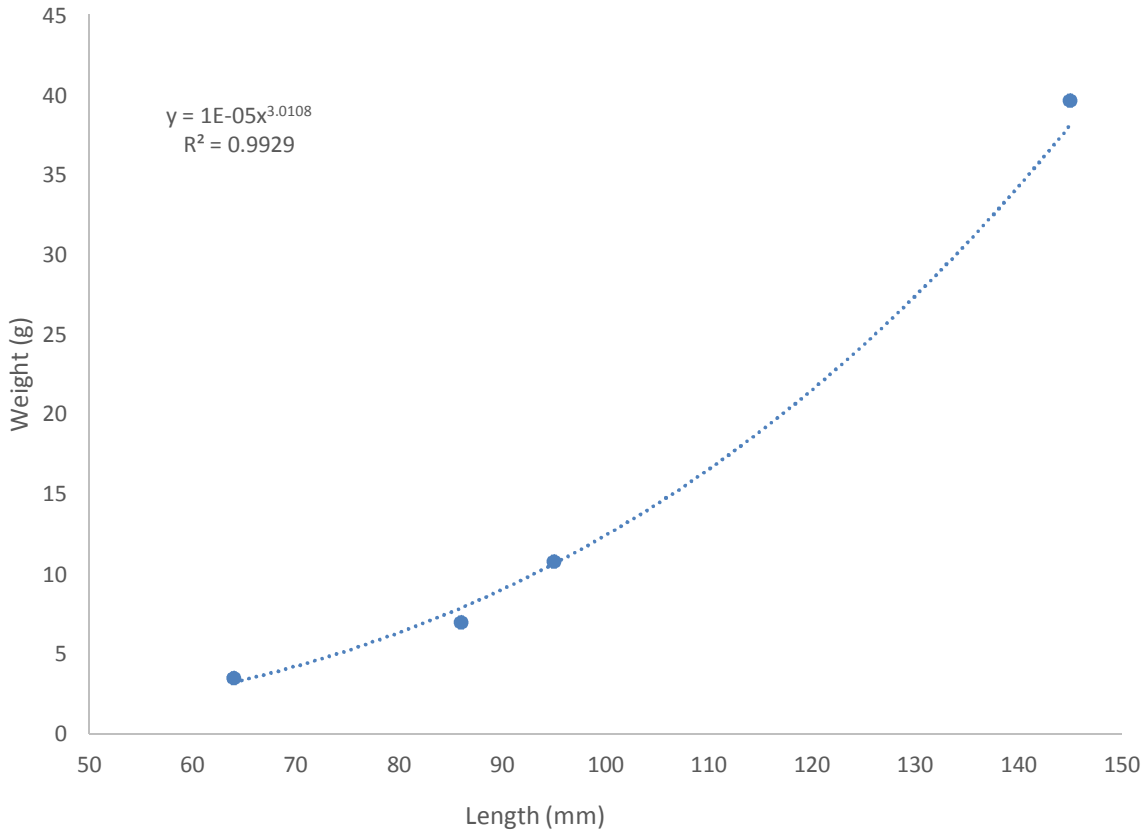

Fig 27. Length weight relationship of salmon caught n = 4

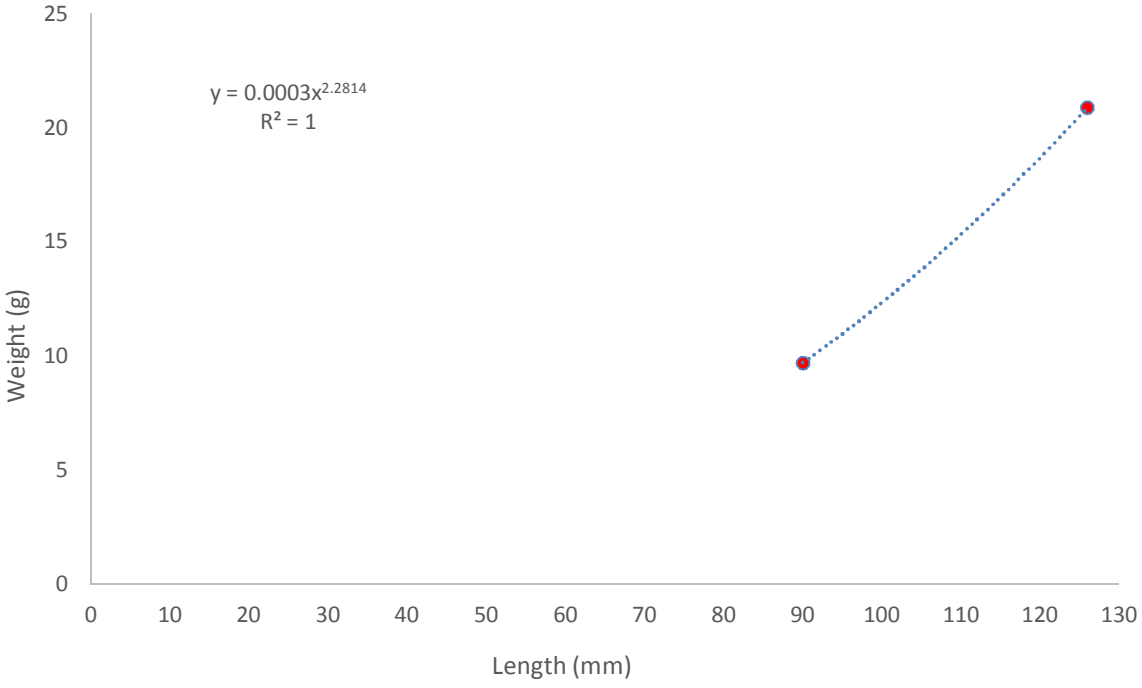

Fig 28. Length weight relationship of trout caught n = 2

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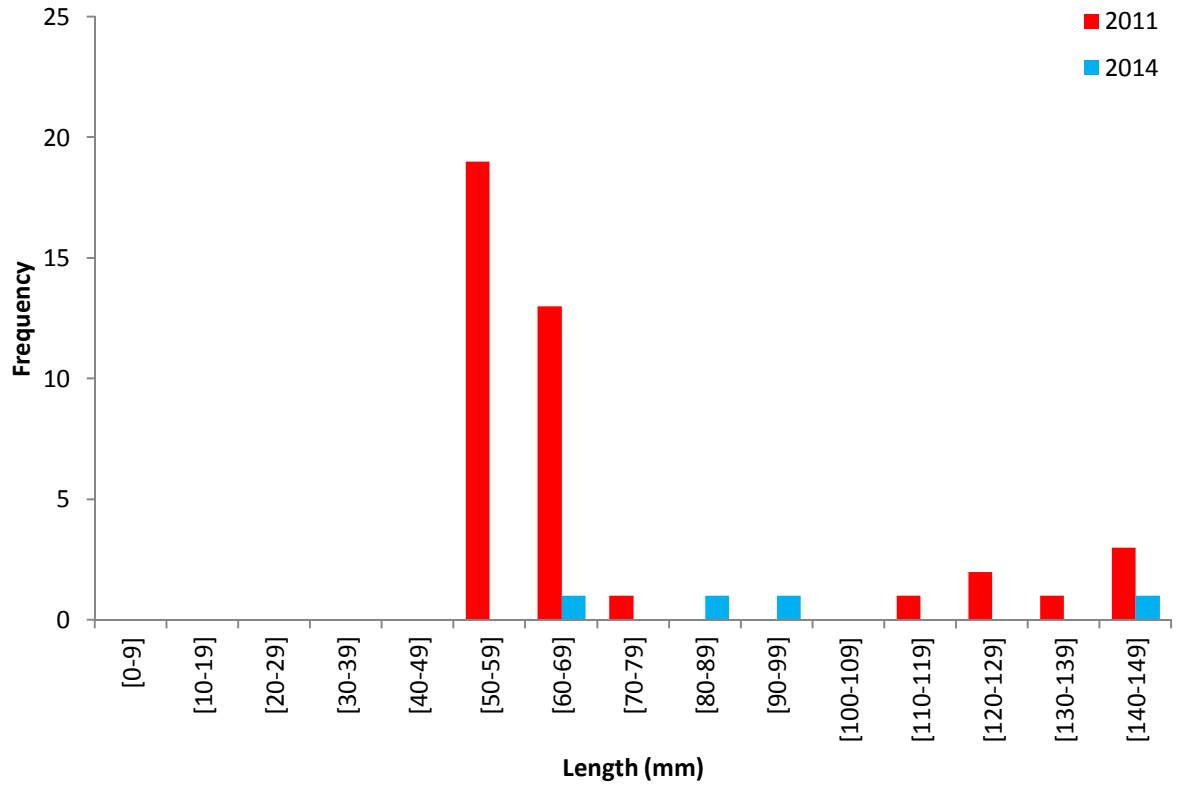

Fig 29. Length frequency distribution for salmon caught. 2011 n = 40, 2014 n = 4.

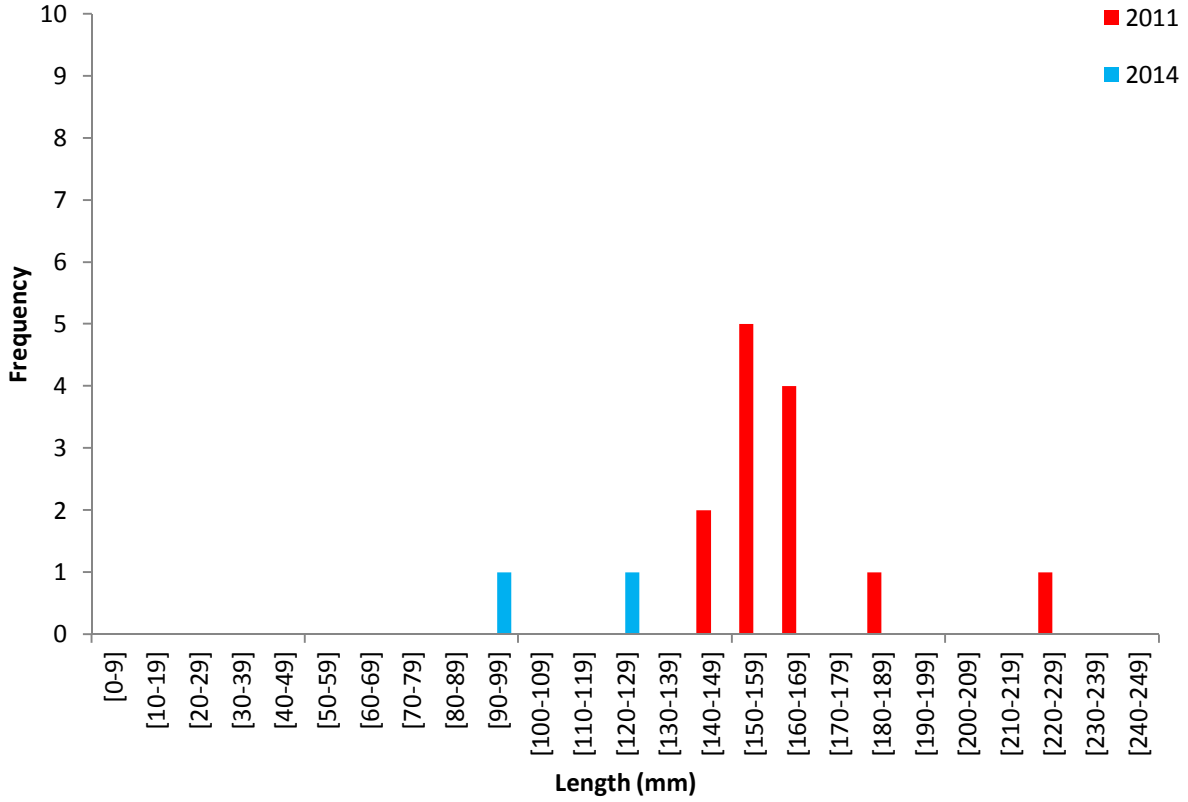

Fig 30. Length frequency distribution for trout caught. 2011 n = 13, 2014 n = 3.

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This site is composed predominantly of grade 3 nursery habitat (80%) with grade 3 holding habitat (15%) and grade 4 spawning habitat (5%).

There was heavy filamentous green algae growth possibly *Cladophera spp* at this site. This watercourse is slow flowing in nature which may be as a result of former drainage programmes which have over widened and deepened the river channel. The riparian area is heavily trampled by cattle on the right hand bank which is introducing fine sediment into the watercourse.

Potential programmes of measures could include reinstatement of a diverse in-channel habitat including the creation of low level deflectors, and the introduction of spawning gravel and nursery stone to create repeated units of spawning holding and nursery habitat. The introduction of large woody debris could also be beneficial throughout this waterbody. Riparian fencing incorporating gates to facilitate limited access for grazing and pasture pumps are also recommended.

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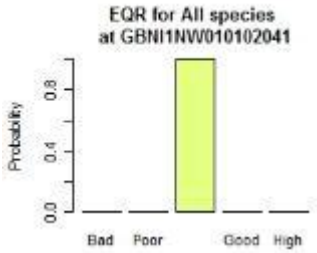

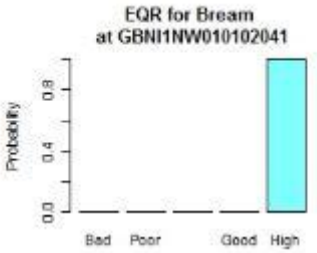

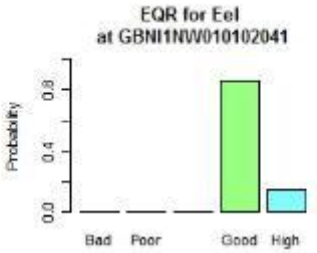

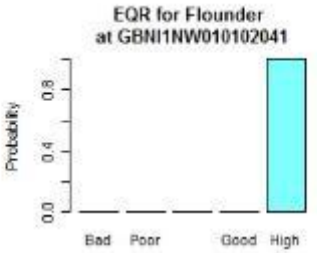

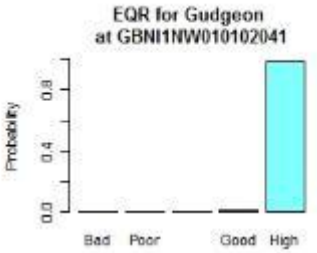

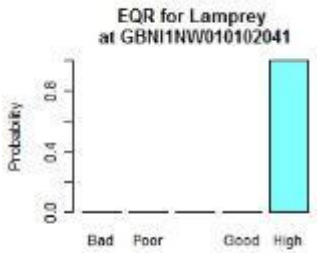

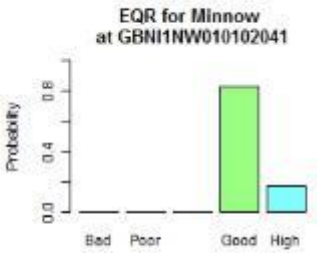

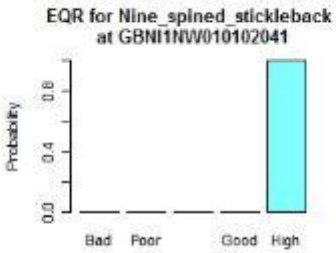

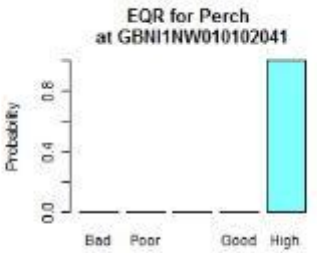

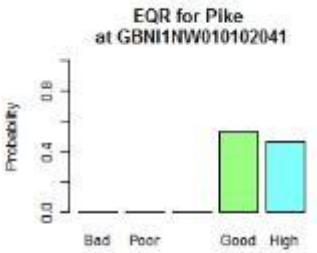

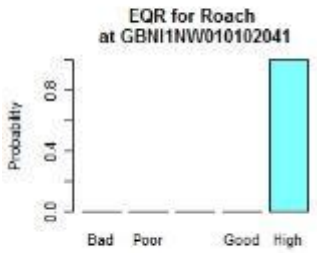

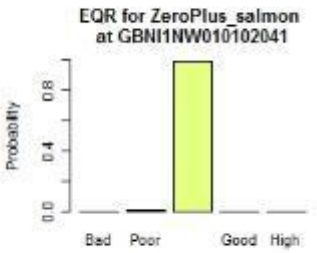

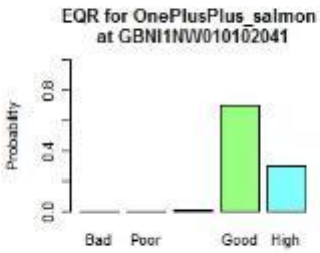

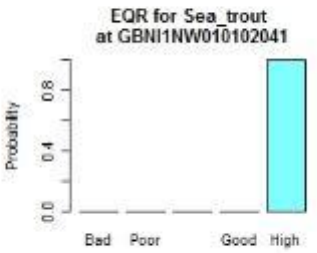

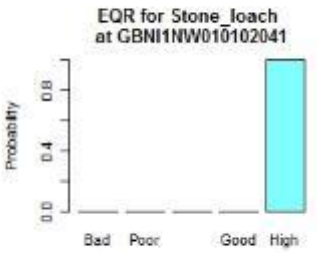

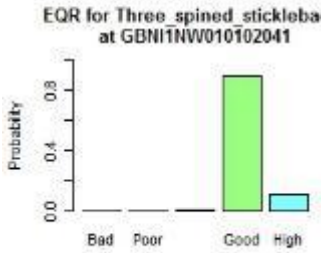

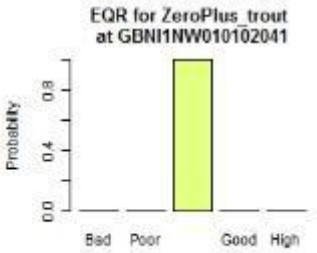

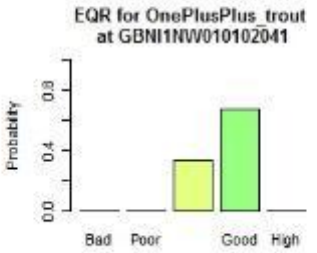

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3.5 F10148 Faughan River at Mobuoy Bridge GBNI1NW020204031 Faughan WFD Fish Classification 2014

POOR

METHOD	Sal 0+	Sal 1+	Tro 0+	Tro 1+	Eel	Lam	Min	SB	SL	Total
Seine 1	0	3	0	1	0	0	17	3	0	**24**
Seine 2	0	4	0	0	0	0	9	4	0	**17**
Fyke 1	0	11	0	4	0	0	3	2	0	**20**
Fyke 2	0	7	0	1	0	0	1	13	0	**22**
Electrofishing	9	8	0	1	0	3	5	8	3	**37**
TOTAL	**9**	**33**	**0**	**7**	**0**	**3**	**35**	**30**	**3**	**120**

Table 6. Removal sampling results

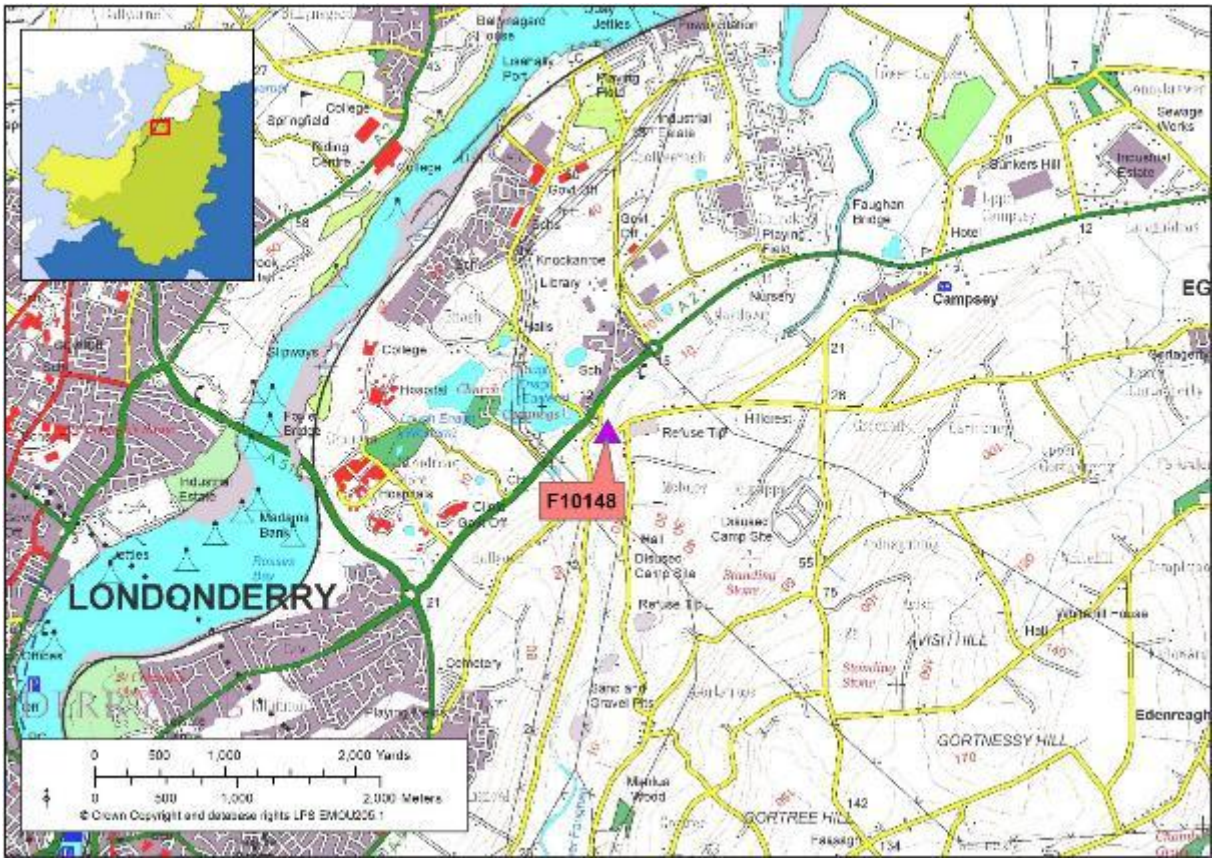

Fig 31. Site F10148

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Site F10148 has been classified as a large river site where quantitative electrofishing is not possible. This site was surveyed using a multi method approach. The multi method approach is conducted across a range of habitats and combines electrofishing at a suitable riffle habitat, seine netting and fyke netting.

Only the single pass electrofishing data has been used for final classification purposes. The combined multi method catch data was also entered into the model as single pass catch data from which a poor classification was derived. Both data sets resulted in an agreed classification of poor status. Minimum density estimates have been calculated for all species present based on the single pass electrofishing data.

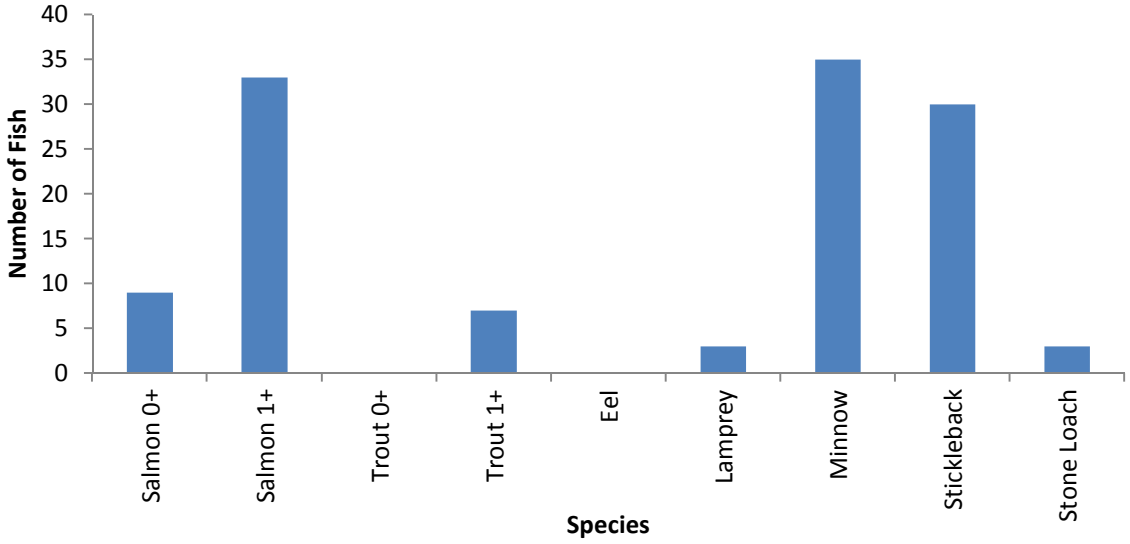

Fig 32. Total catch

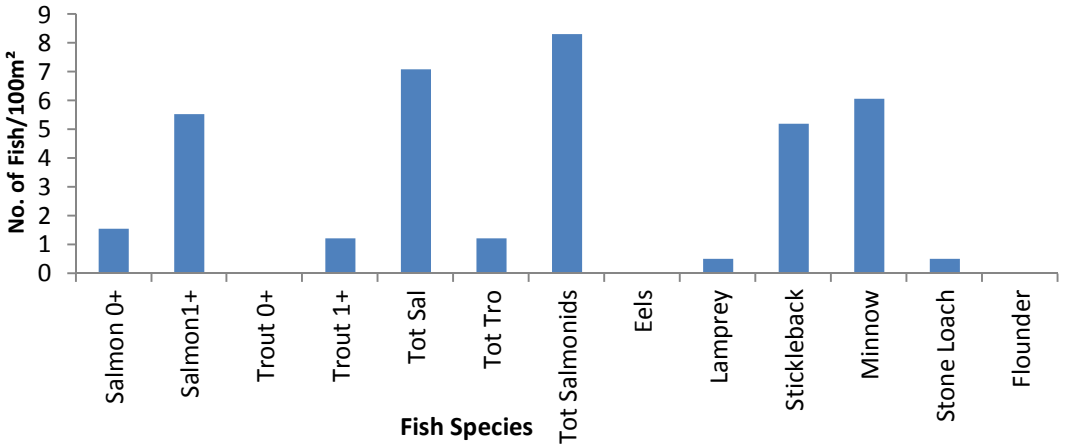

Fig 33. Density/100m²

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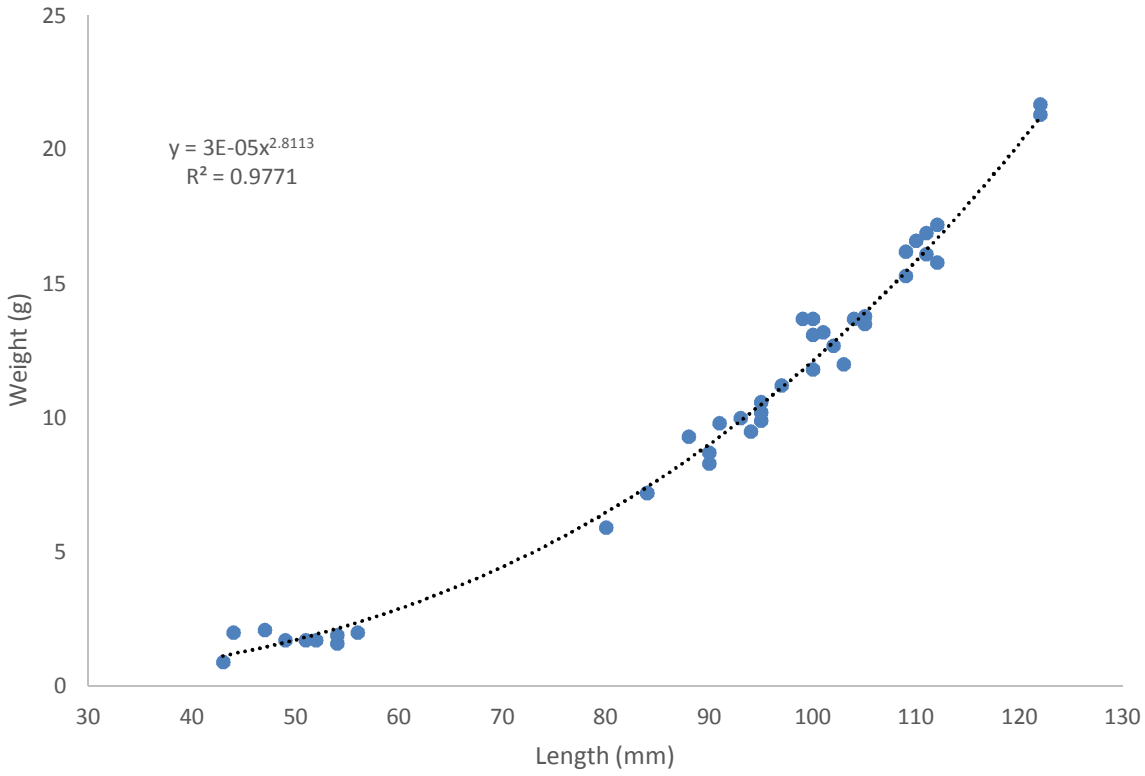

Fig 34. Length weight relationship of all salmon caught n = 41

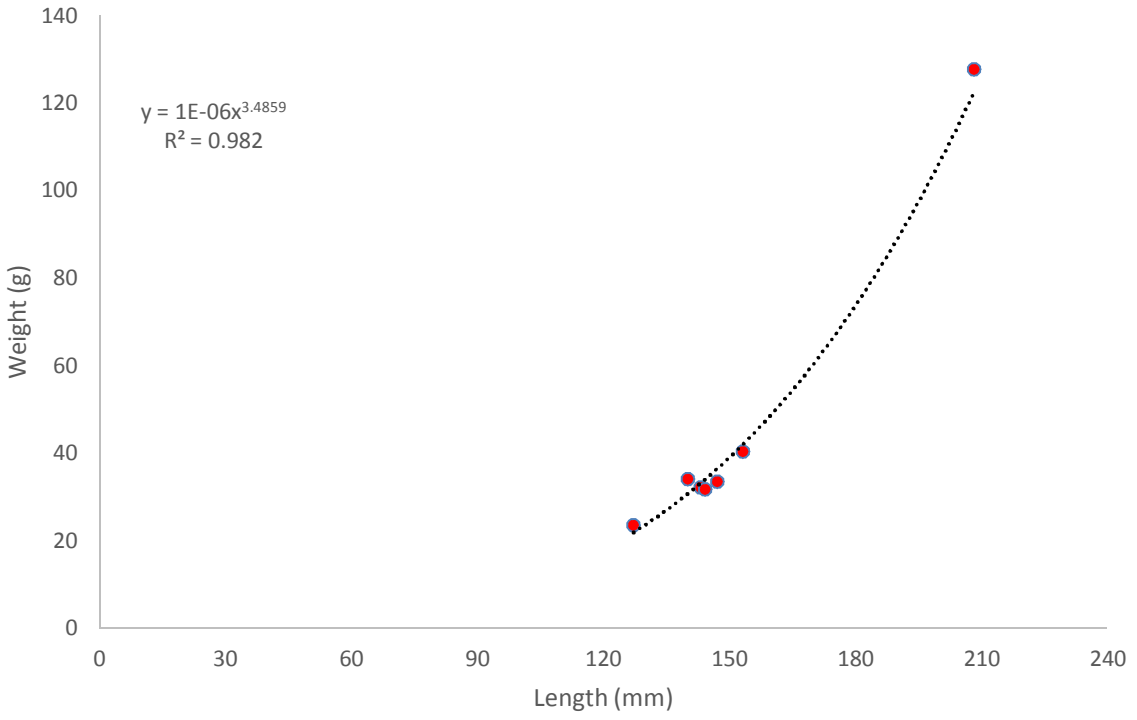

Fig 35. Length weight relationship of all trout caught n = 7

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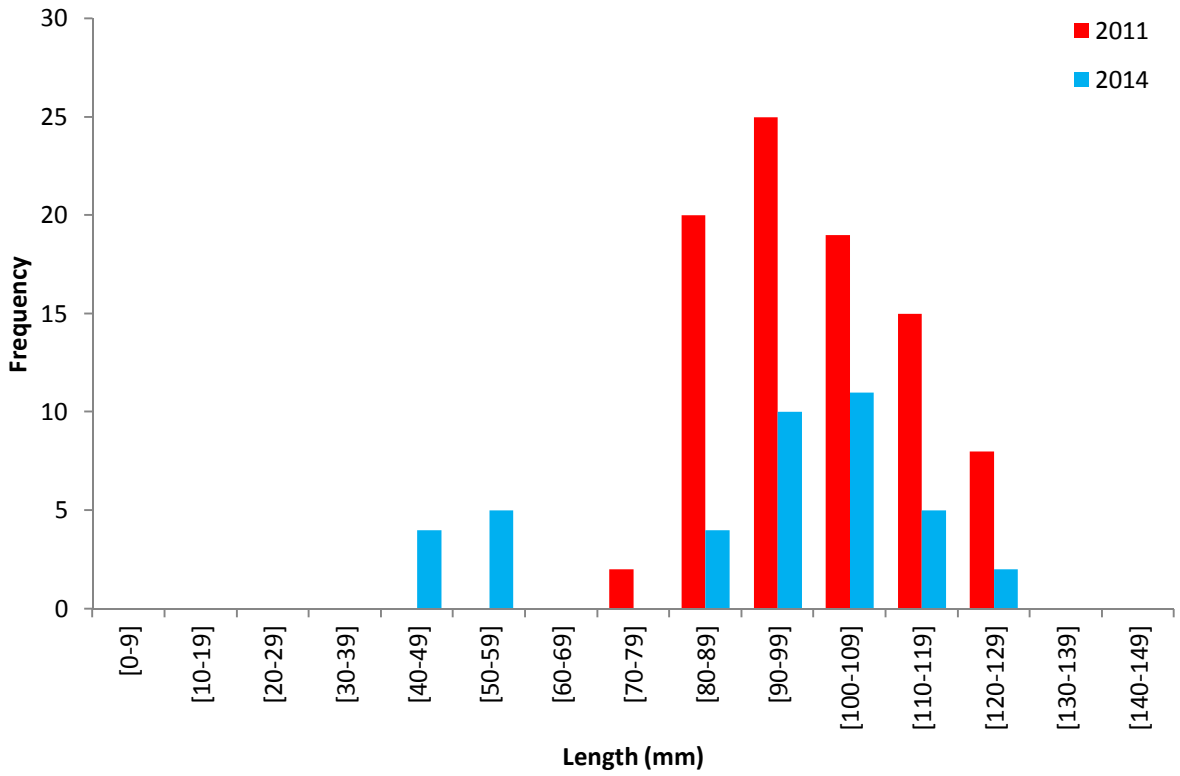

Fig 36. Length frequency distribution for all salmon caught. 2011 n = 89, 2014 n = 41.

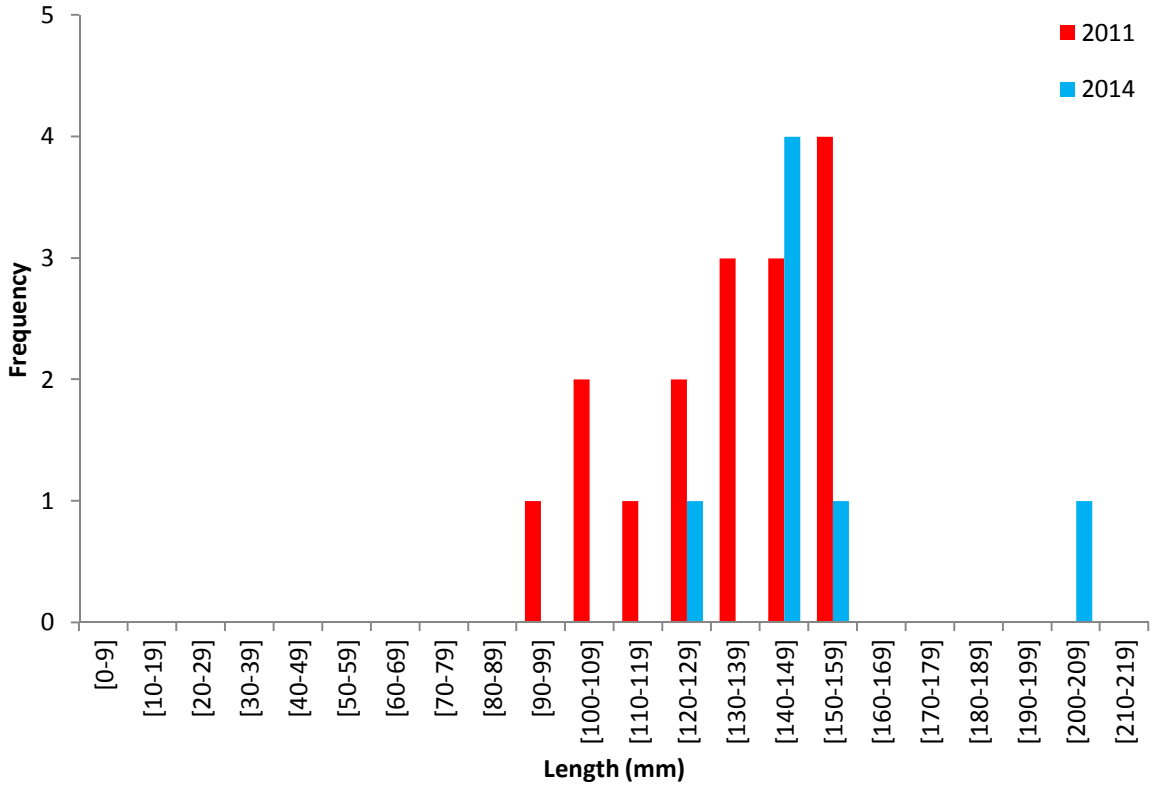

Fig 37. Length frequency distribution for all trout caught. 2011 n = 16, 2014 n = 7.

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This site is composed predominantly of grade 3 spawning habitat (55%) with grade 3 nursery habitat (25%) and grade 3 holding habitat (20%). This site lies within a heavily modified waterbody with the channel constrained by large flood embankments. The riparian area has been colonised by Himalayan balsam and Japanese knotweed.

Potential programmes of measures could include removal and treatment of invasive species, introduction of large woody debris and low level deflector construction. Reconnection of the river to the flood plain would also be beneficial from a hydro geomorphological perspective. Fish passage issues downstream may be having an impact on upstream fish migration particularly for European eel, Sea lamprey and River lamprey migration.

Additional biological information is available in the spreadsheets provided.

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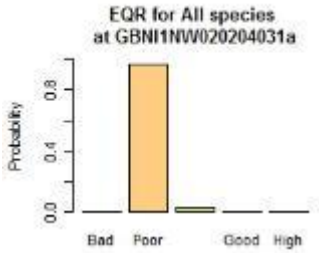

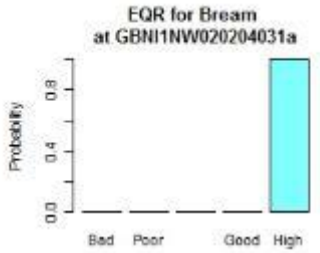

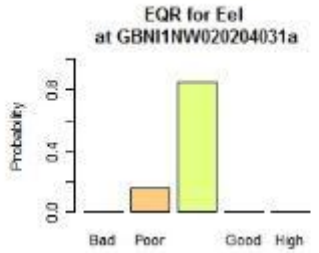

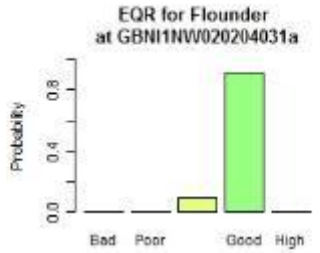

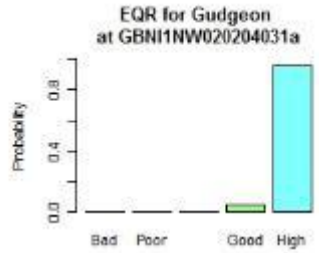

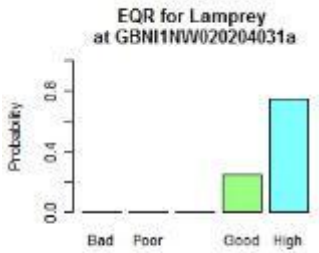

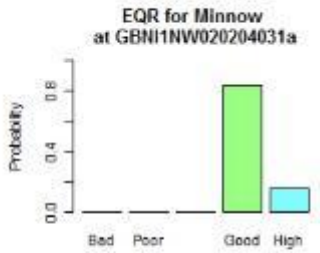

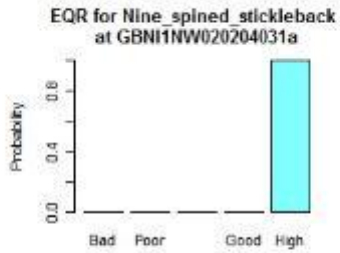

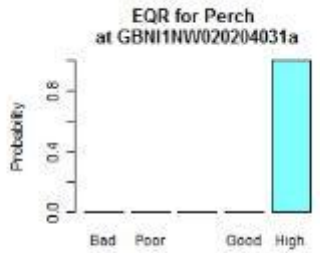

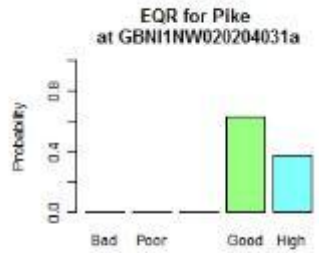

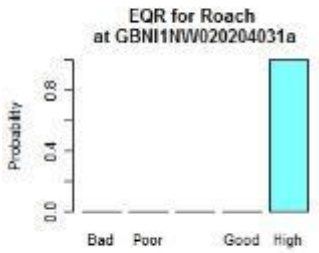

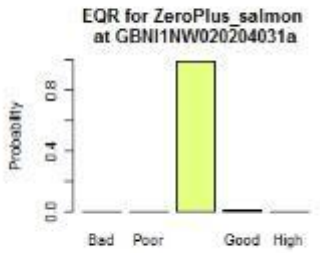

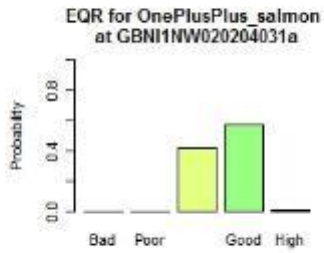

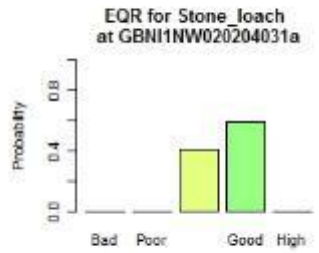

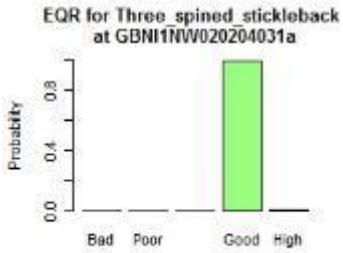

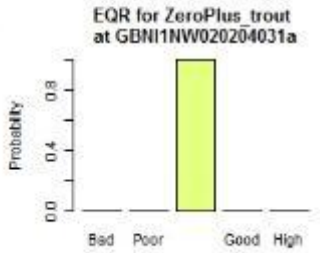

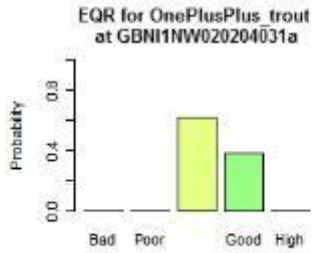

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3.6 F10072 Owenkillew River, Killymore Br GBNI1NW010102028 Owenkillew WFD Fish Classification 2014

HIGH

METHOD	Sal 0+	Sal 1+	Sea Trout	Tro 0+	Tro 1+	Eel	Lam	SB	SL	Total
Seine 1	0	12	0	0	63	0	0	0	0	**75**
Fyke 1	0	3	0	0	5	0	0	0	0	**8**
Fyke 2	0	2	1	0	0	0	0	0	0	**3**
Electrofishing	20	21	0	1	0	6	1	0	1	**50**
TOTAL	**20**	**38**	**1**	**1**	**68**	**6**	**1**	**0**	**1**	**136**

Table 7. Removal sampling results

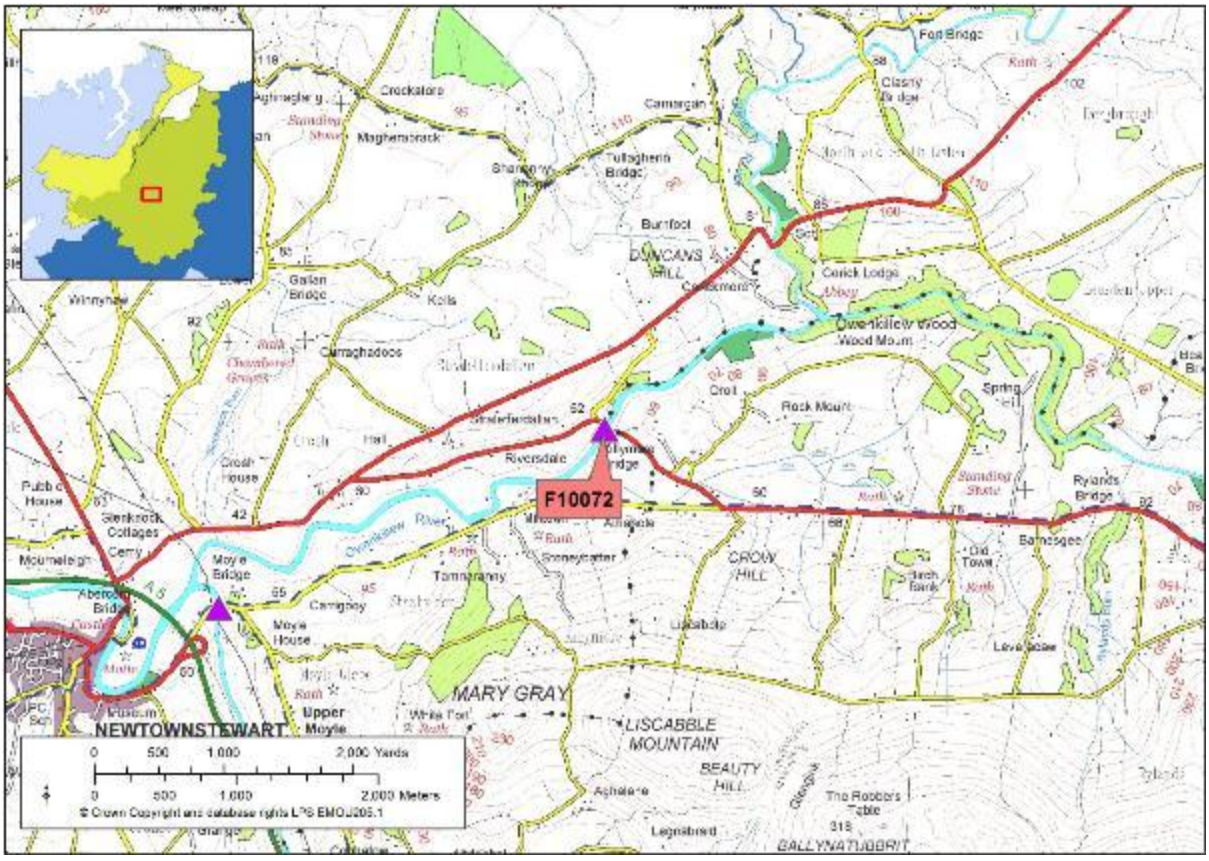

Fig 38. Site F10072

Site F10072 has been classified as a large river site where quantitative electrofishing is not possible. This site was surveyed using a multi method approach. The multi method approach is conducted across a range of habitats

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and combines electrofishing at a suitable riffle habitat, seine netting and fyke netting.

Only the single pass electrofishing data has been used for final classification purposes. The combined multi method catch data was also entered into the model as single pass catch data from which a good classification was derived. The two data sets resulted in different classifications. The single pass electrofishing resulted in a high classification and the combined multi method data resulted in a good classification. It was decided using professional judgement that the high classification derived from single pass electrofishing was justified. Minimum density estimates have been calculated for all species present based on the single pass electrofishing data.

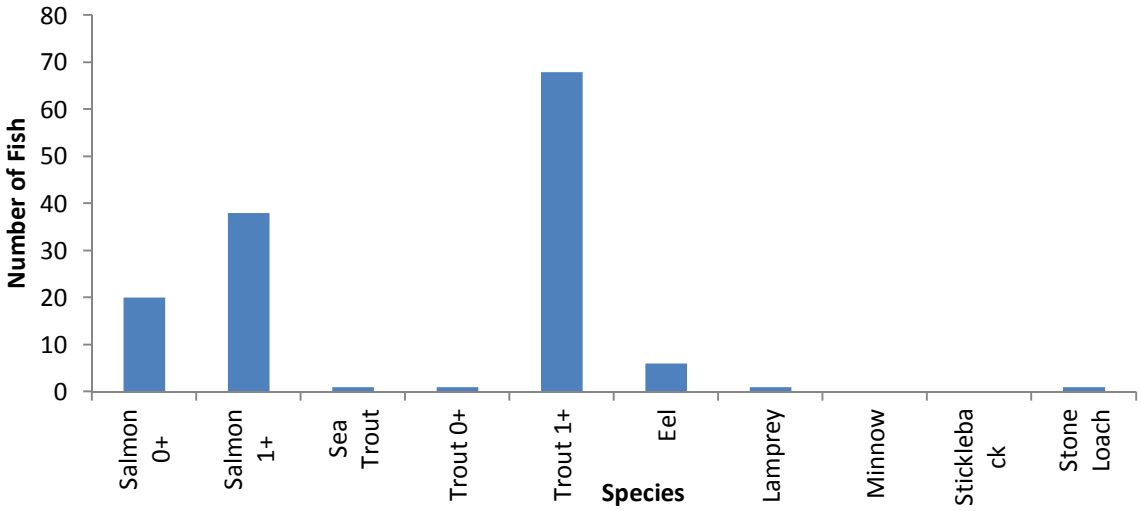

Fig 39. Total catch

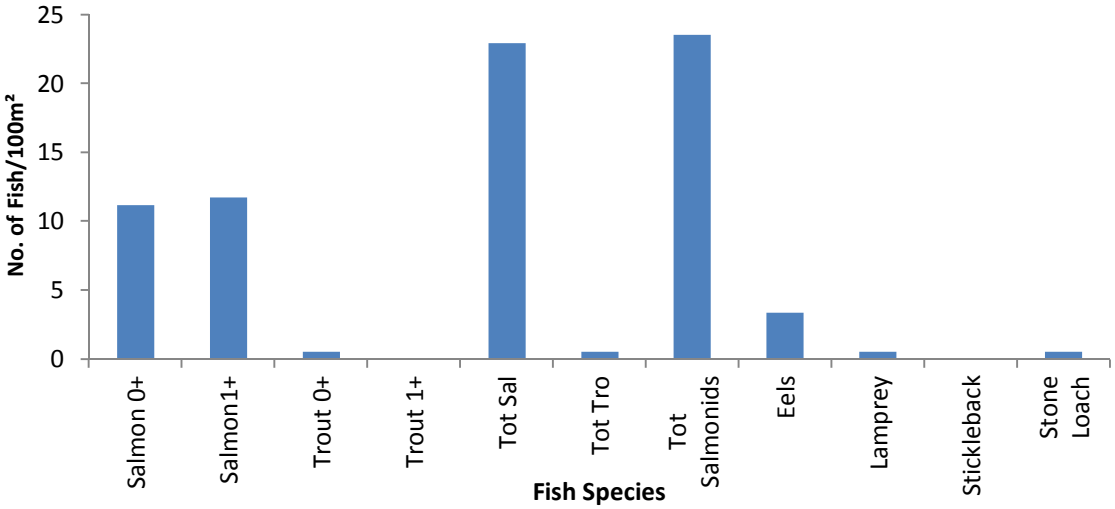

Fig 40. Density estimate/100m^2

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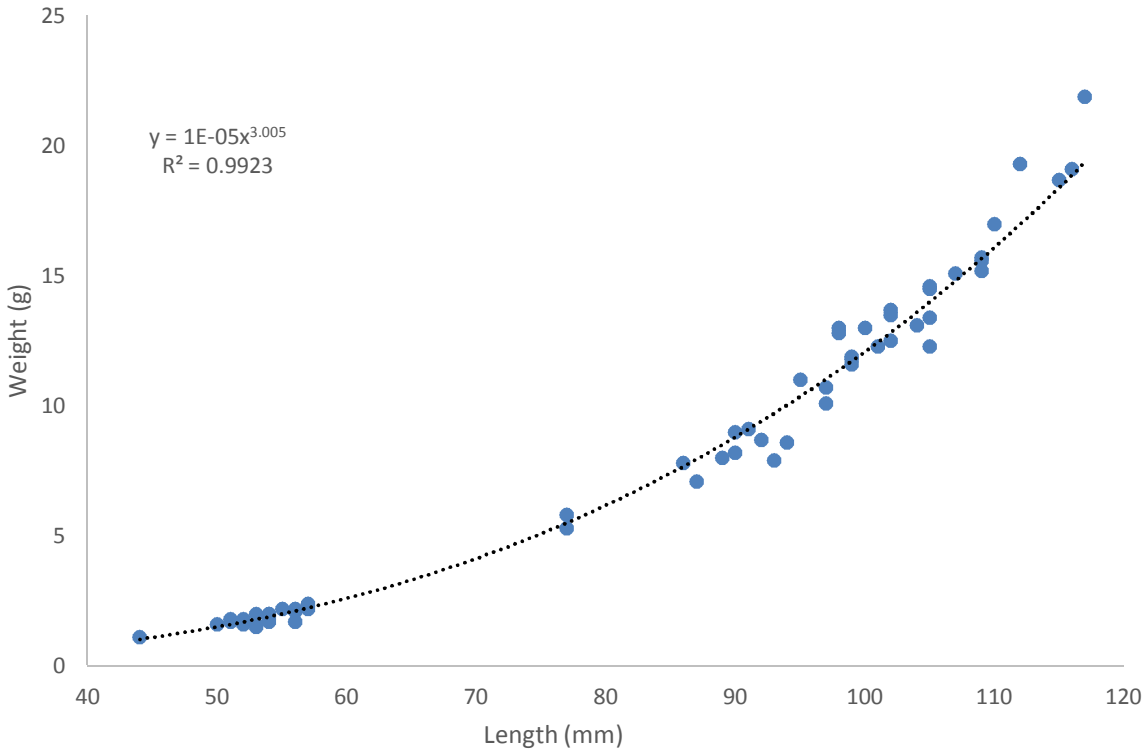

Fig 41. Length weight relationship of salmon caught.

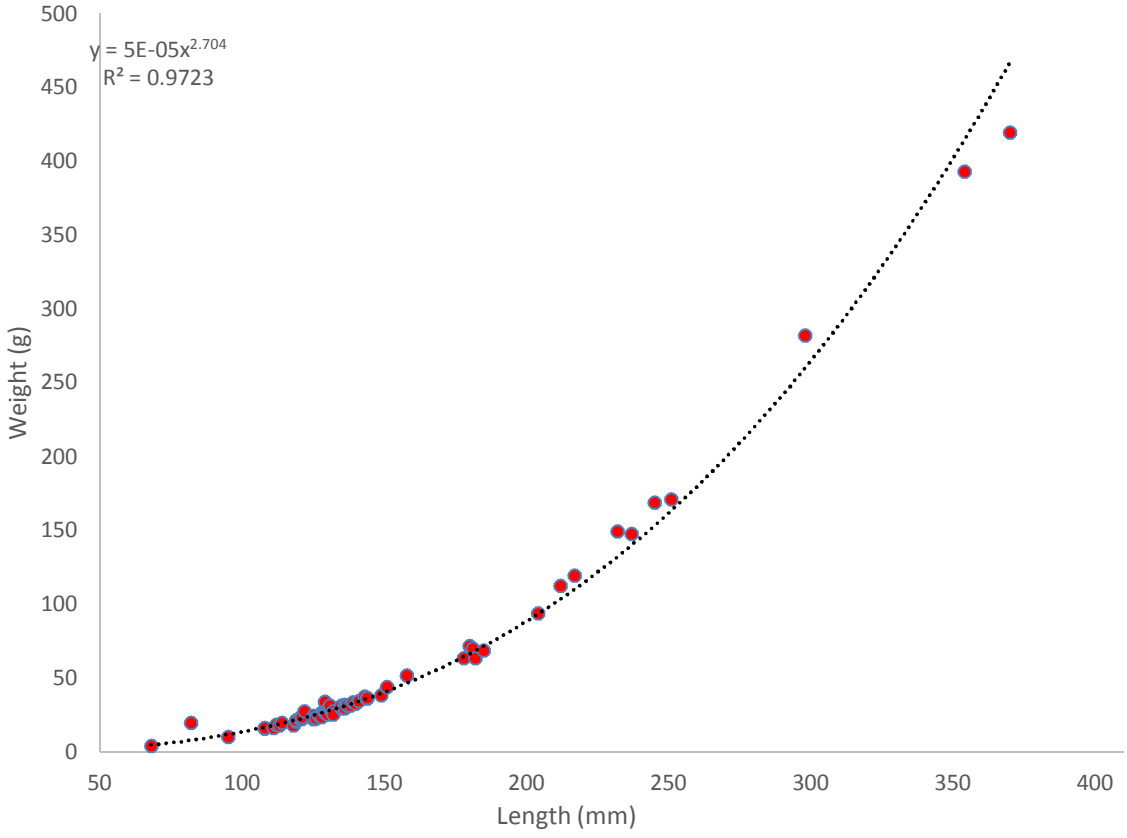

Fig 42. Length weight relationship of salmon caught.

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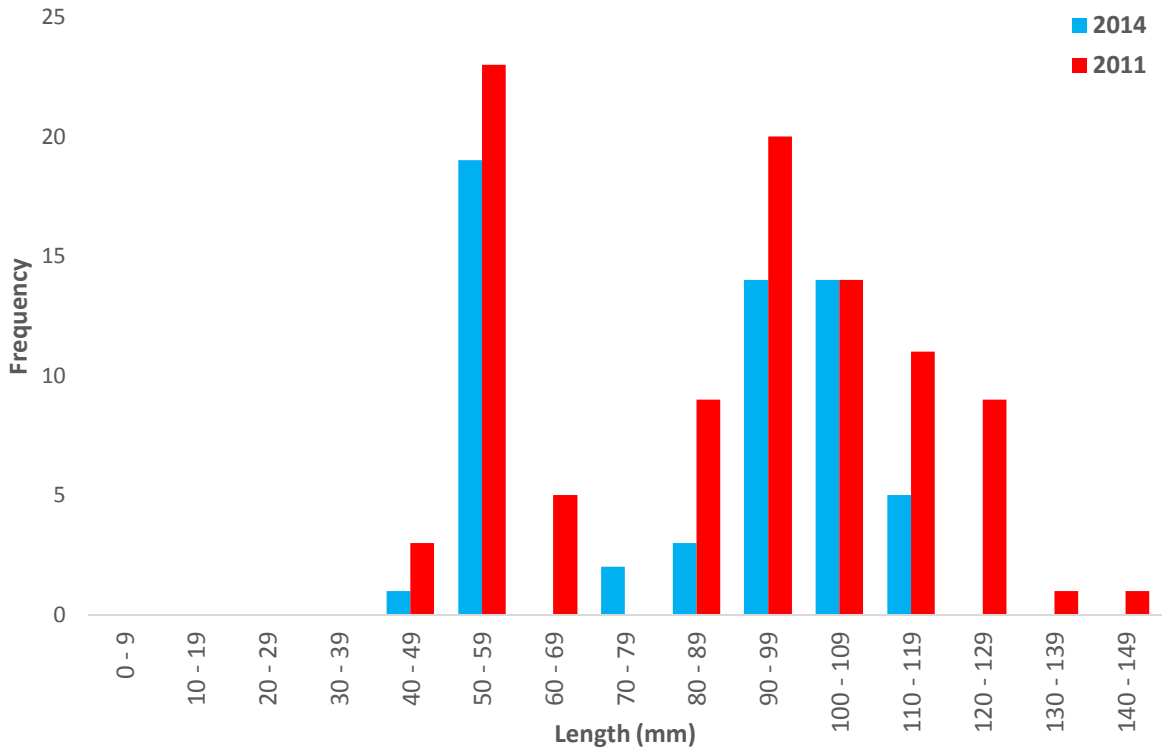

Fig 43. Length weight frequency distribution of salmon caught in 2011 n = 96 and 2014 n = 58

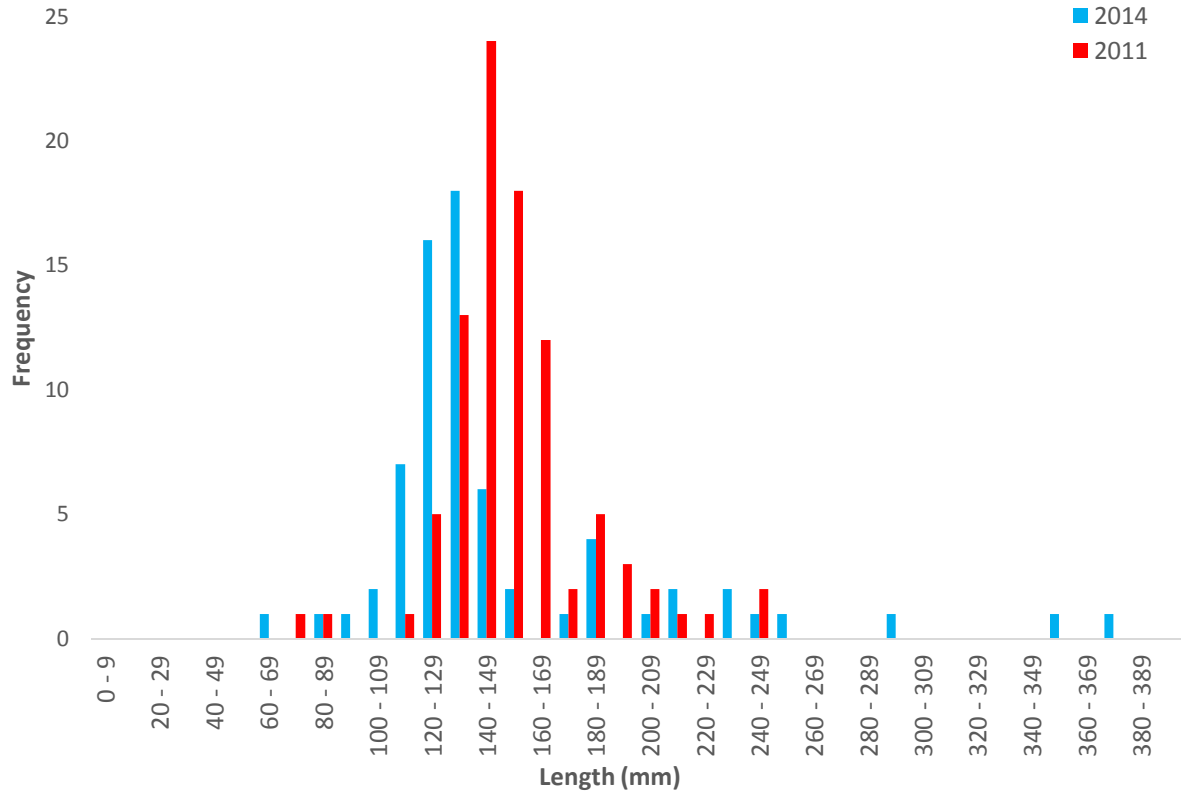

Fig 44. Length frequency distribution of trout caught in 2011 n = 91 and 2014 n = 69.

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This site is composed of grade 2 nursery habitat (80%) and grade 3 spawning habitat (20%).

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The site has unrestricted access to the watercourse by cattle in places. Himalayan balsam is also present within the site. Both banks show evidence of arterial drainage with a large flood bank and reinforced bank toe evident. This site demonstrates features associated with a high energy gravel river with large mobile cobble banks and bars formed in places. Potential programmes of measures could include stock proof fencing, treatment of invasive species and consideration of flood management measures. This site was used for demonstration purposes with a video available at https://www.youtube.com/watch?v=4TVotpI1bKY .

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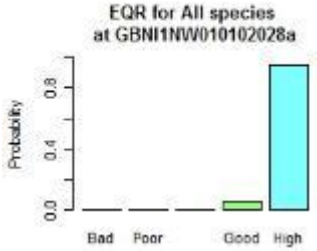

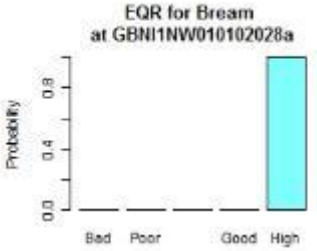

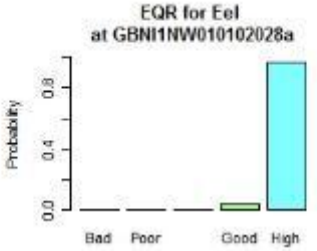

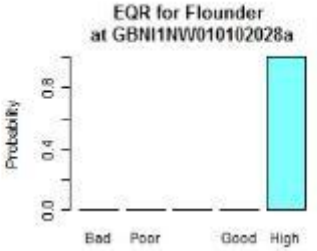

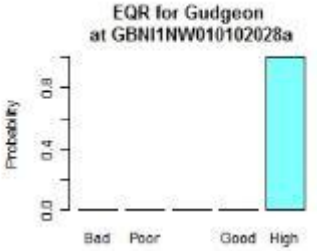

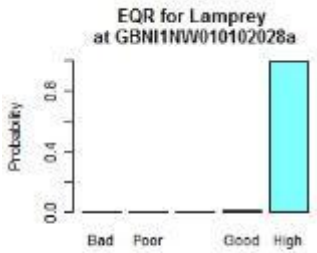

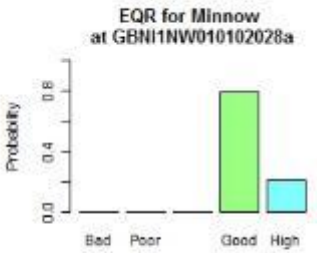

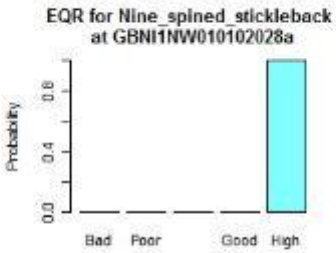

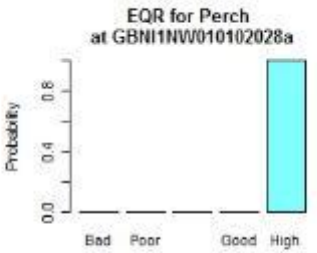

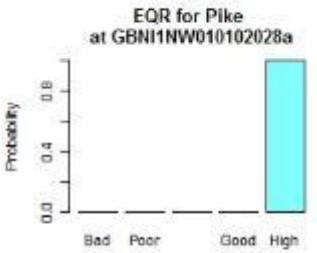

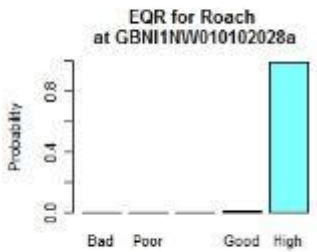

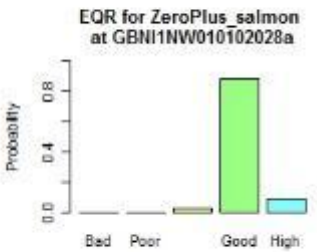

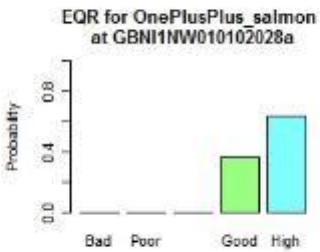

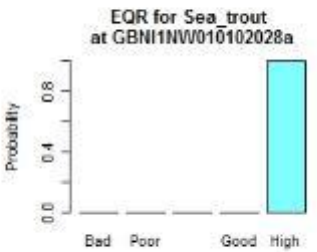

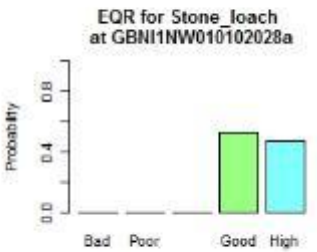

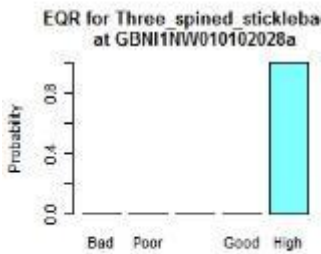

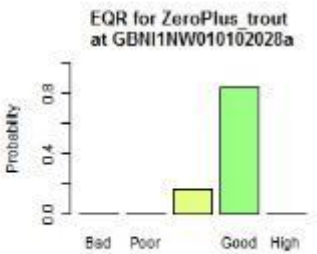

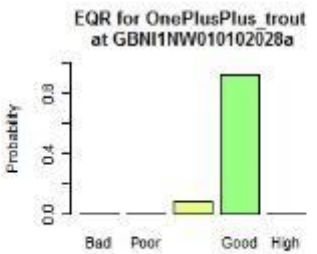

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3.7 F10171 River Roe at Limavady GBNI1NW020202018 Roe WFD Fish Classification 2014

GOOD

METHOD	Sal 0+	Sal 1+	Tro 0+	Tro 1+	Eel	Lam	Min	SB	Fl	Total
Electrofishing Single Pass	35	6	0	3	3	7	8	5	1	**68**
TOTAL	**35**	**6**	**0**	**3**	**3**	**7**	**8**	**5**	**1**	**38**

Table 8. Removal sampling results

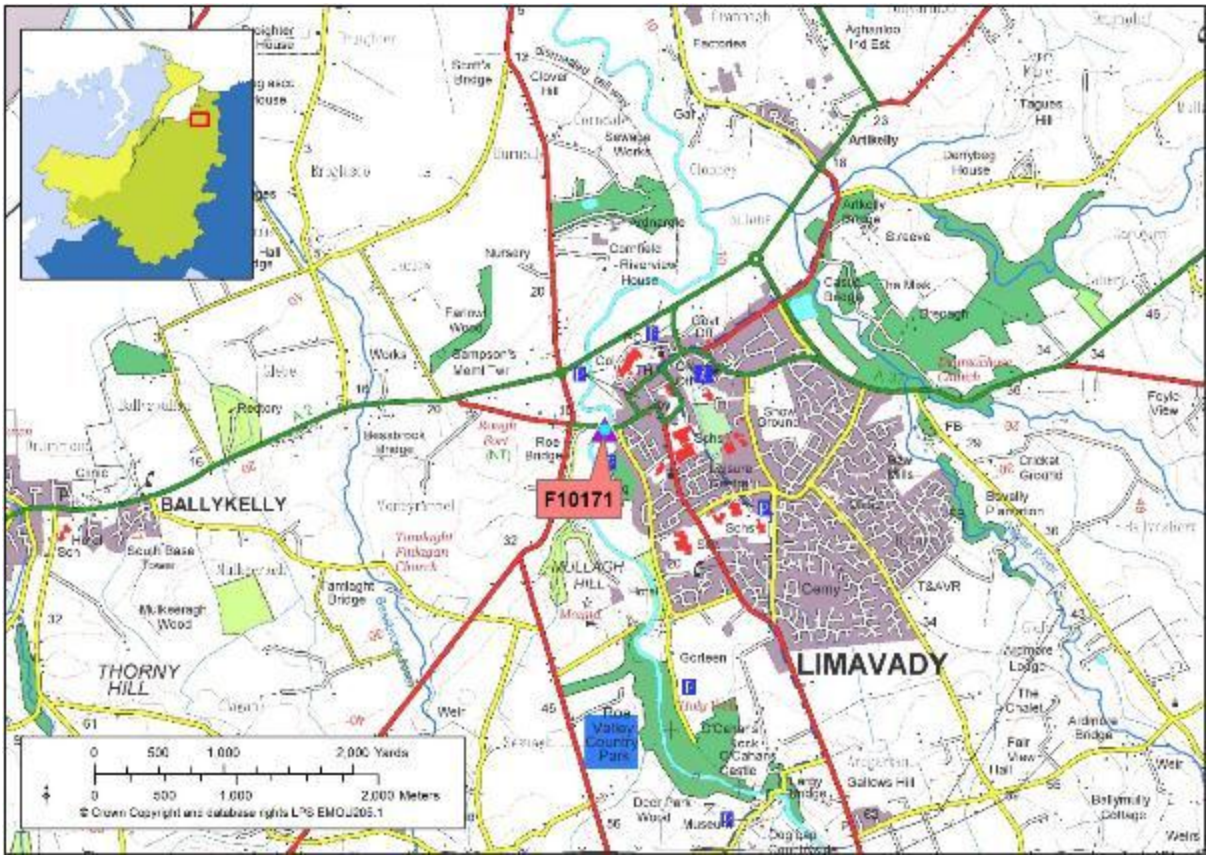

Fig 45. Site F10171

Site F10171 has been classified as a large river site where quantitative electrofishing is not possible. A single pass electrofishing survey was conducted within a defined area. From this data minimum density estimates have been calculated for all species present.

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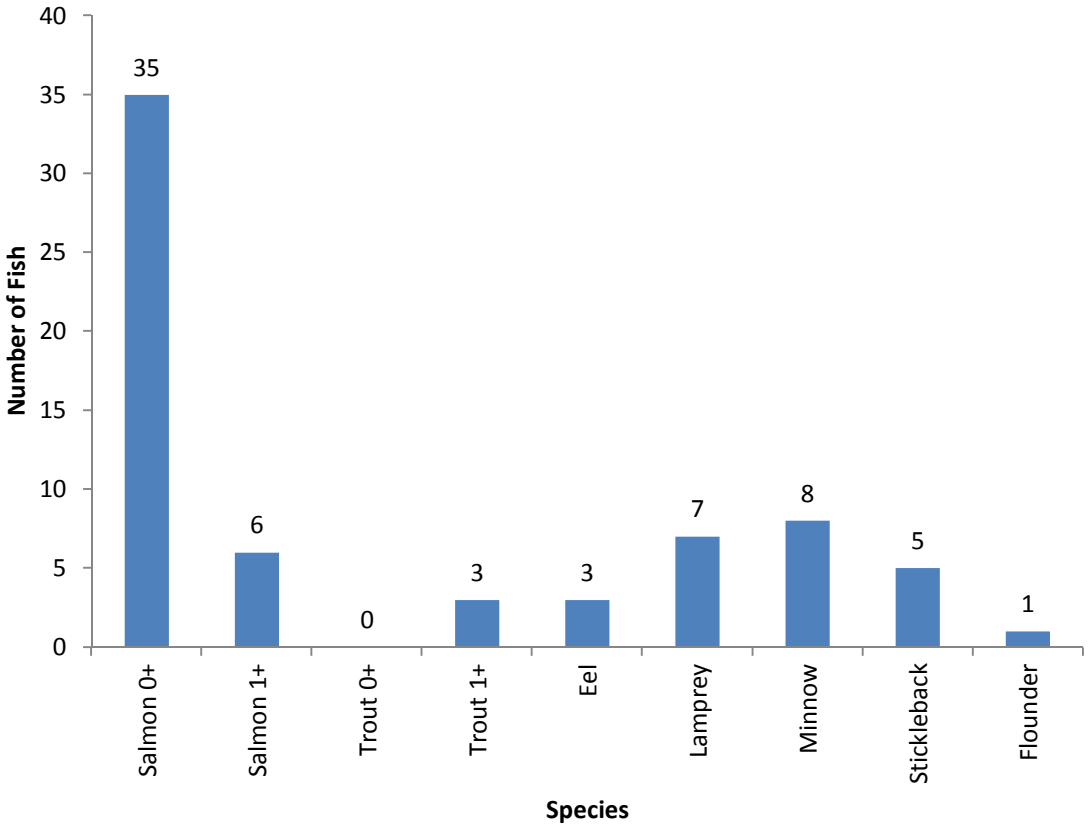

Fig 46. Total catch

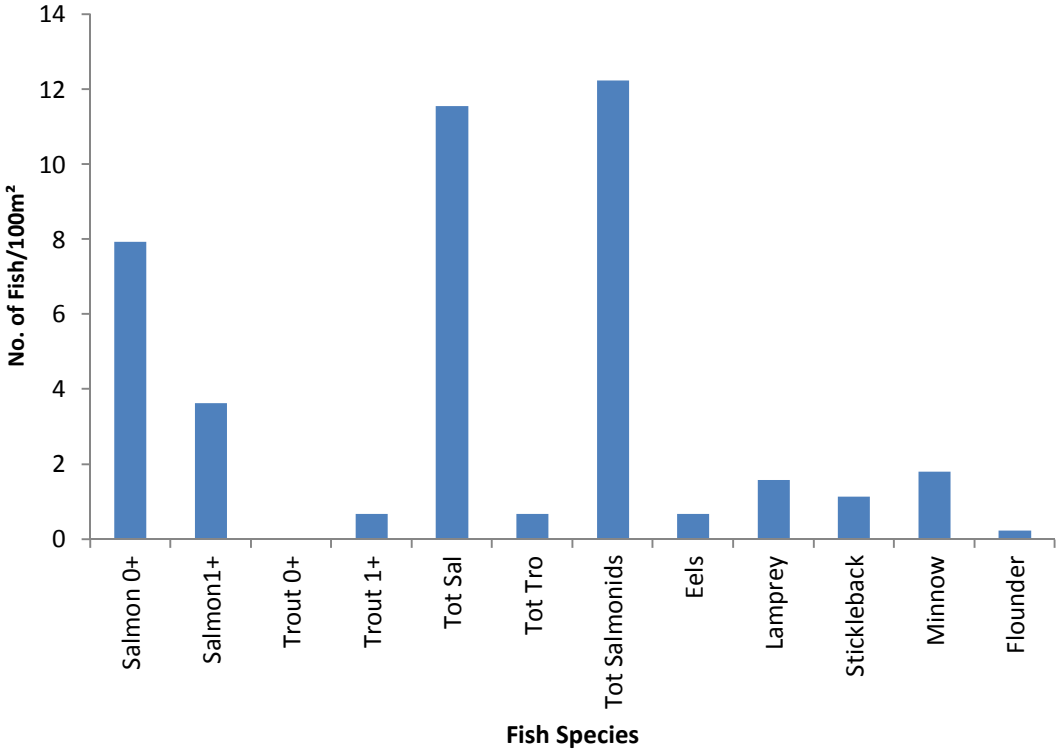

Fig 47. Density estimate/100m^2

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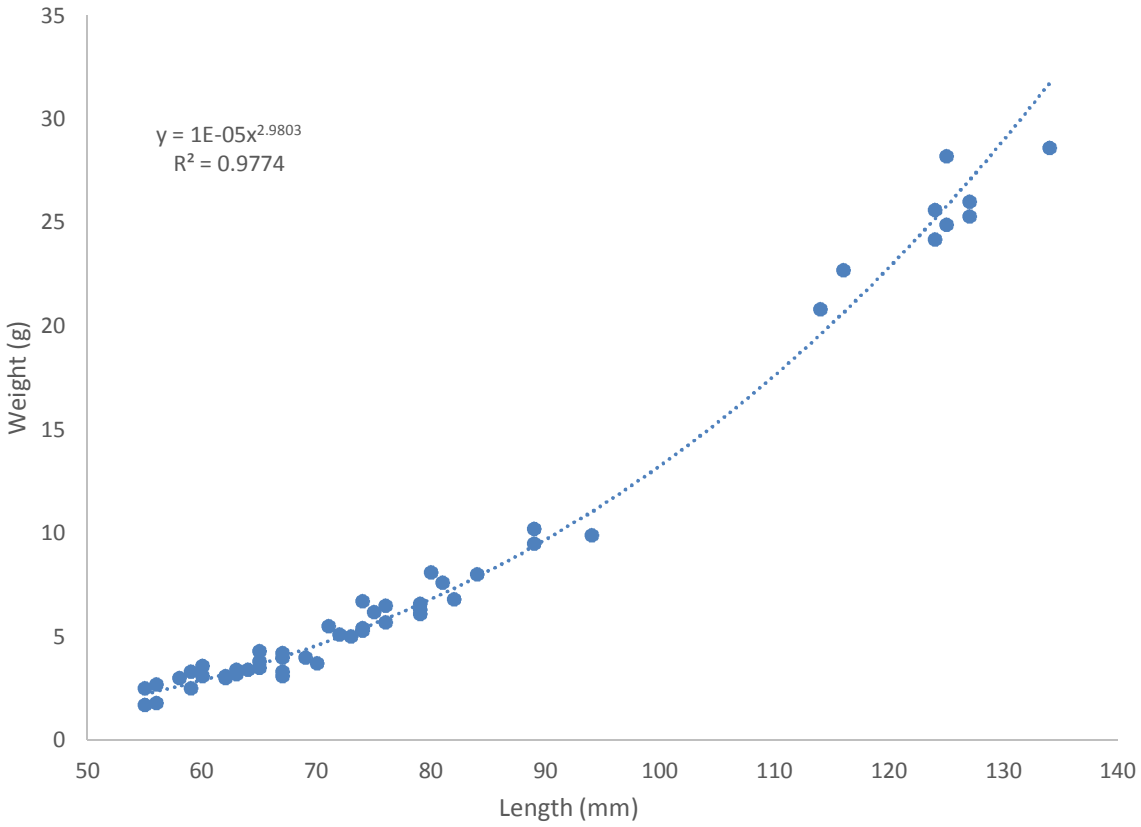

Fig 48. Length weight relationship of all salmon caught n = 51

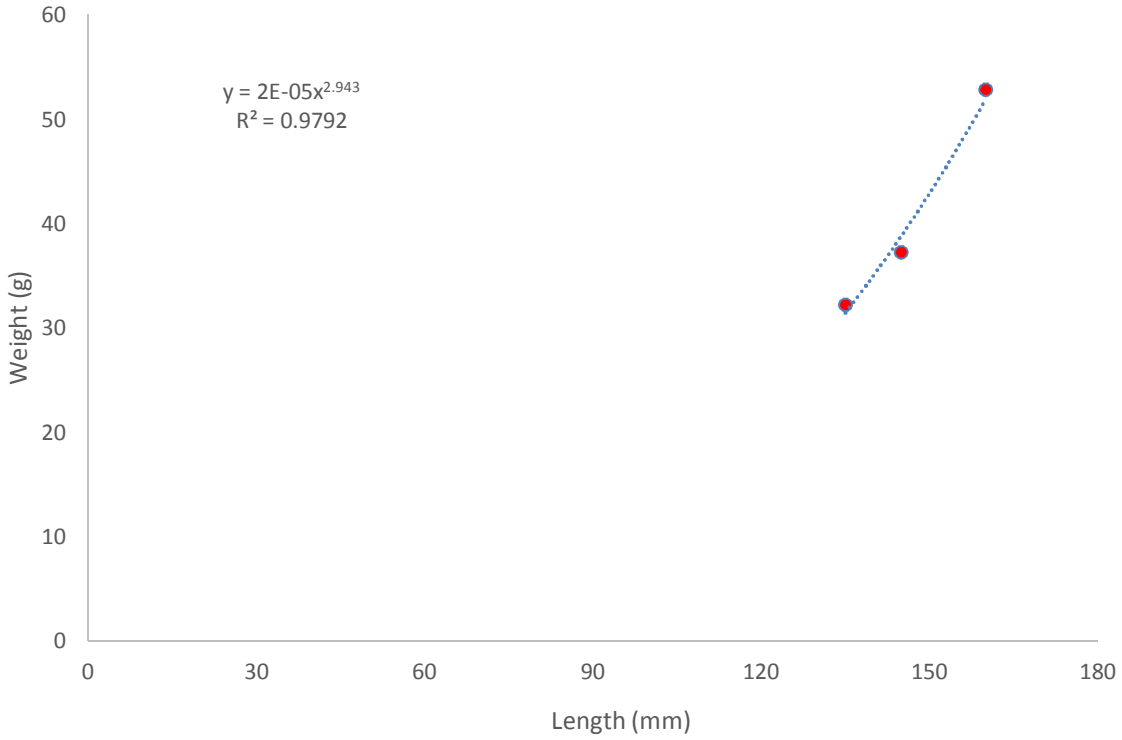

Fig 49. Length weight relationship of all trout caught n = 3

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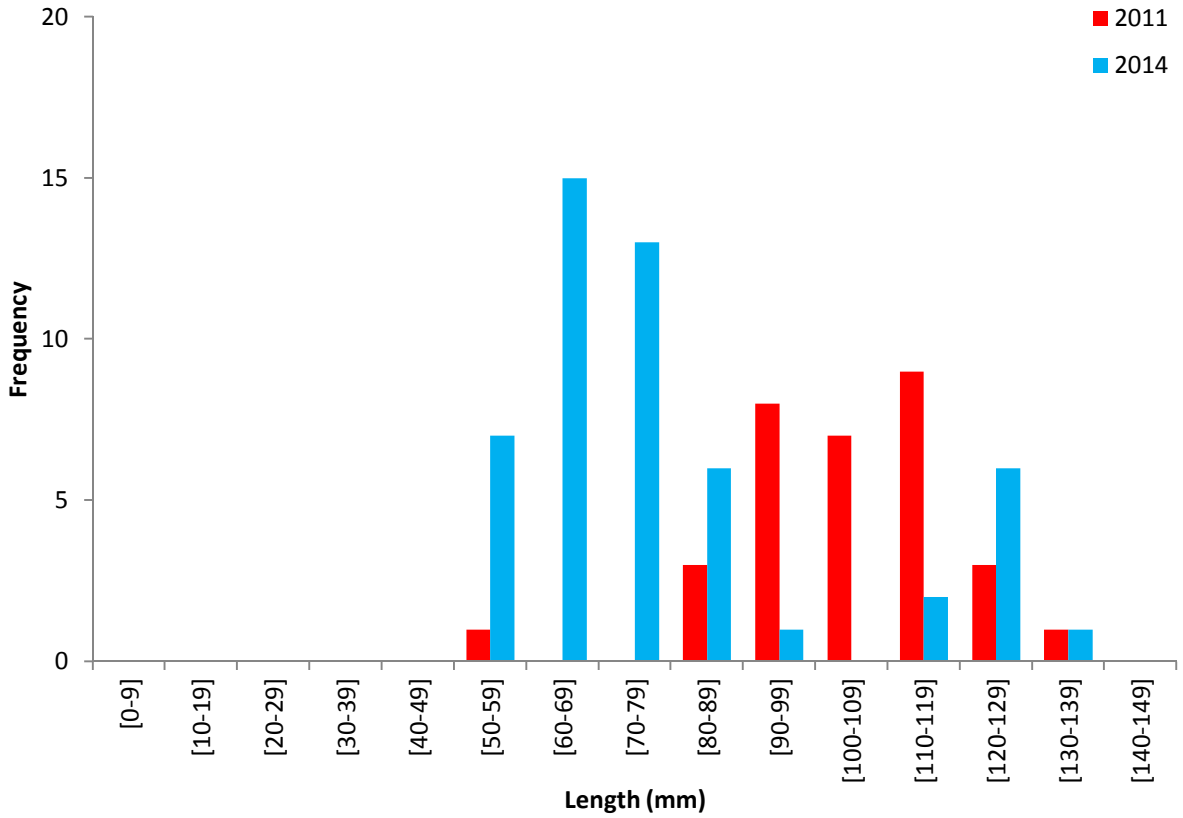

Fig 50. Length frequency distribution for all salmon caught 2011 n = 32 & 2014 n = 51

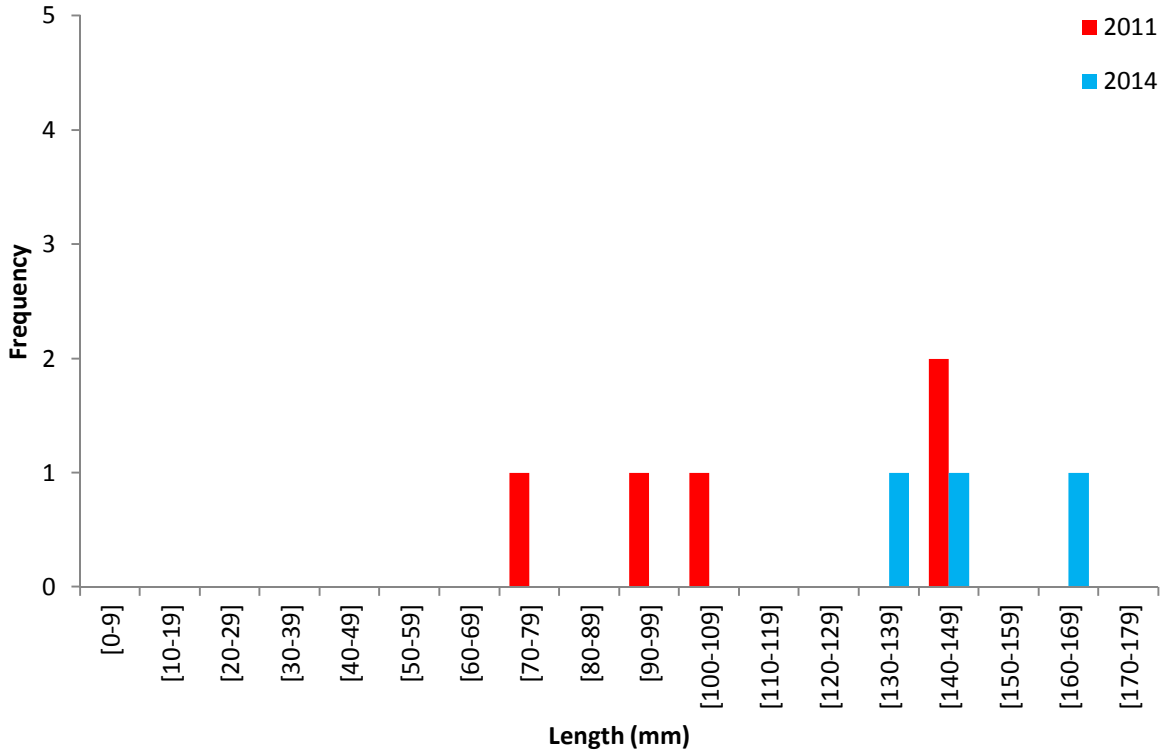

Fig 51. Length frequency distribution for all trout caught 2011 n = 5 & 2014 n = 3

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This site is composed of grade 3 spawning habitat (50%), grade 3 nursery habitat (30%) and grade 3 holding habitat (20%).

This site is within a designated watercourse and is classified as a major maintained channel with extensive earthen flood embankments on both sides of the river. The river flows through a deeply incised channel which has been heavily drained. Both banks are heavily colonised by Himalayan balsam with the left hand bank also heavily colonised by Japanese knotweed. Both banks demonstrate active erosion in places possibly as an impact of the invasive species. This site is also impacted upon by a high litter/rubbish burden.

Potential programmes of measures should include the sensitive removal and treatment of non-native invasive species, ensuring recolinisation by native species, reconnection of the river to the floodplain, introduction of large woody debris and a litter pick to remove waste from the watercourse and riparian area.

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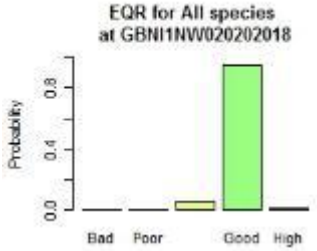

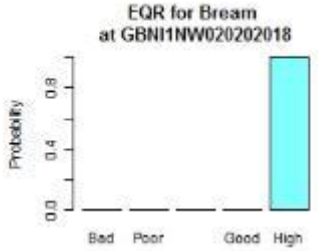

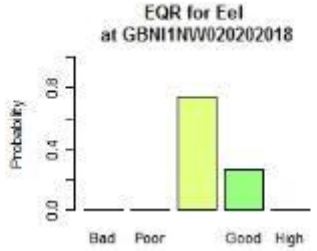

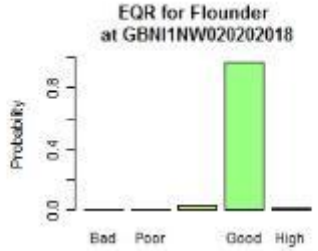

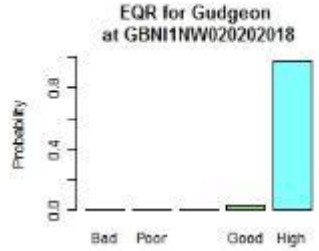

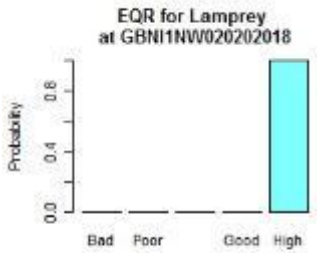

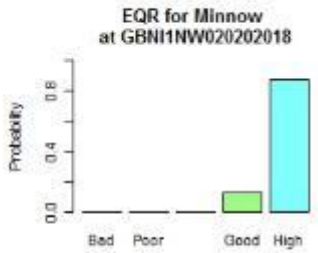

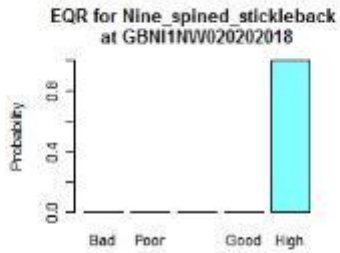

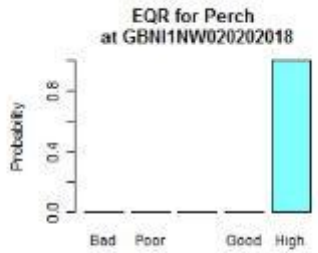

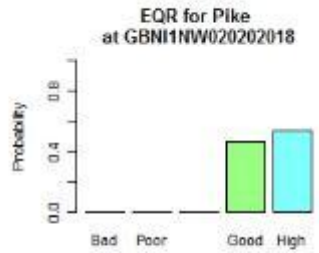

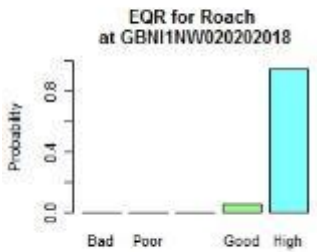

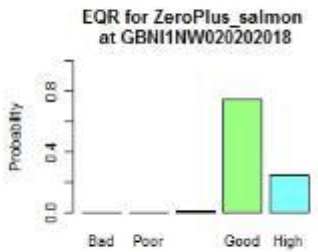

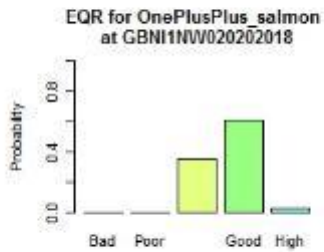

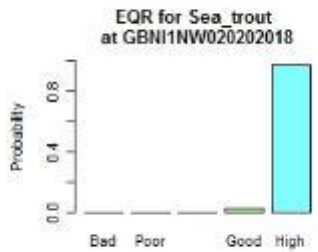

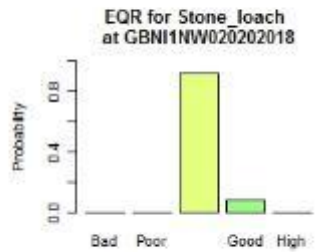

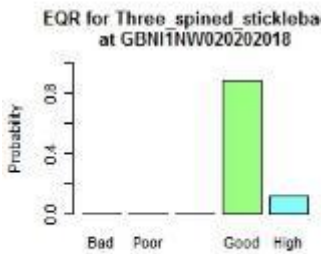

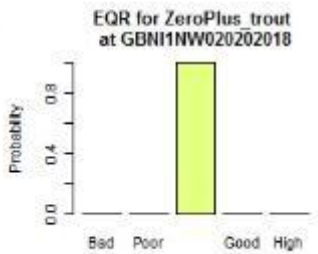

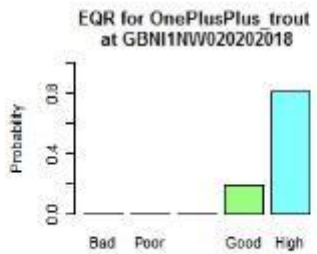

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4.0 OVERVIEW OF WFD FISH SURVEILLANCE RESULTS

The results for WFD river fish monitoring within the Loughs Agency areas from 2008-2014 are outlined in the table below. In 2014 a total of seven WFD river fish surveillance monitoring stations were monitored. All seven were in Northern Ireland. Classifications are outlined in the figure below. FCS2 (Ireland) was the primary classification tool from 2012, prior to this classifications were based on professional opinion. No additional waterbodies were classified using FCS2 in 2014.

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Site Code	Year of 1st Survey	Catchment	Classification						
			2008	2009	2010	2011	2012	2013	2014
F10086	2008	Strule	Good				Good		
F10089	2009	Strule		Mod			Good		
F10076	2009	Owenkillew		Good			Mod		
F10020	2009	Burndennet		Good			High		
F10014	2009	Glenmornan		Mod			Good		
F10626	2009	Newry		Mod			Good		
F10644	2009	Killbroney		Mod			Poor		
F10077	2009	Owenkillew		Good			Good		
F10763	2009	Skeoge		Poor			Poor		
F10022	2010	Burndennet			Good			Mod	
F10049	2010	Derg			Good			Good	
F10079	2010	Glenelly			Good			Mod	
F10115	2010	Camowen			Good			Good	
F10170	2010	Roe			Good				
F10029	2013	Mourne						Poor	

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Site Code	Year of 1st Survey	Catchment	Classification						
			2008	2009	2010	2011	2012	2013	2014
40B020400	2010	Bredagh			N/A			Mod	
01M010100	2010	Derg			N/A			Poor	
01S020200	2010	Finn			N/A			Mod	
F10111	2011	Camowen				Good			Good
F10045	2011	Derg				Good			High
F10128	2011	Drumragh				Good			High
F10101	2011	Fairywater				Good			Mod
F10148	2011	Faughan				Good			Poor
F10072	2011	Owenkillew				Good			High
F10171	2011	Roe				Good			Good
F10025	2012	Finn					Mod		
F11204	2012	Newry					Mod		

Table 9. WFD fish surveillance stations surveyed by the Loughs Agency 2008-2014

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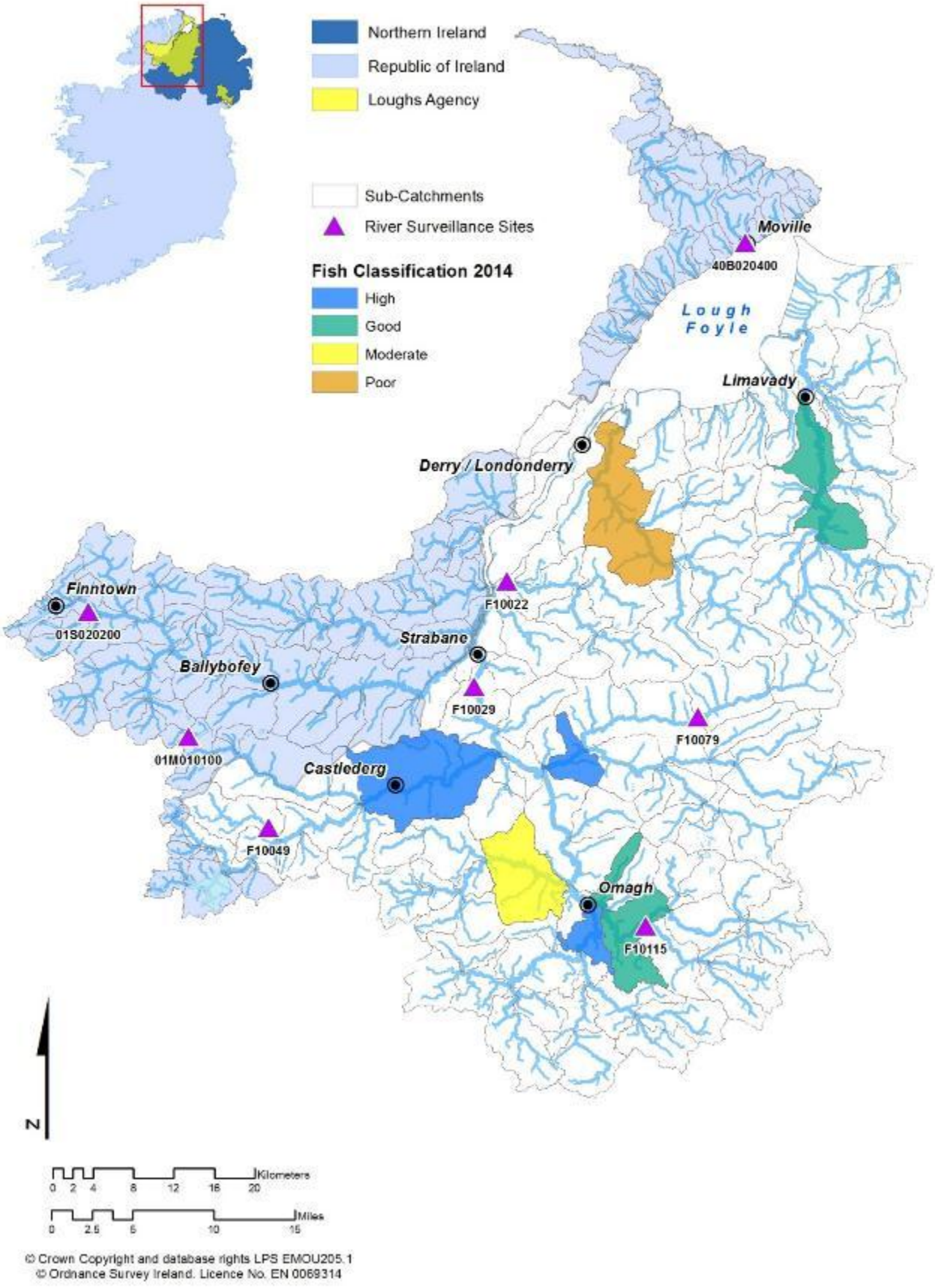

Fig 52. Loughs Agency WFD fish surveillance water body classifications 2014 Foyle area

5.0 SEMI QUANTITATIVE/SALMON MANAGEMENT PLAN CLASSIFICATIONS

For classification in 2014 the NI WFD Fish Group continued to adopt the set of rules for deriving indicative fish classifications for waterbodies in which annual semi quantitative/salmon management plan electrofishing surveys are conducted. Within the Foyle and Carlingford areas approximately 500 sites are semi quantitatively surveyed annually. The ability to derive indicative classifications greatly facilitates the ability to highlight pressures within specific waterbodies and can assist with the development of programmes of measures. The refined rules as of January 2013 are listed below.

1. Only use if there are a minimum of three sites per water body - suggest a minimum of the three largest rivers for which data is available – important to record the stations used.

2. Classify according to the dominant salmonid species within the water body where adequate historical data is available.

3. Classify if ≥ 66% of sites agree

4. Classify as Good or better, moderate or Poor or worse

5. Use the most recent years data

Site	In Agreement	SMP Class	WFD Class
Roe	Yes	**Good**	**Good**
Faughan	No	**Good**	**Poor**
Derg	No	**Good**	**High**
Owenkillew	No	**Good**	**High**
Fairywater	No	**Unclassified**	**Moderate**
Drumragh	No	**Moderate**	**High**
Camowen	No	**Unclassified**	**Good**

Table 10. 2014 method comparisons

The maps below provide an overview of results for the application of this method within the Foyle and Carlingford areas in 2014. GIS shape files containing the raw data behind these maps including site id's has been provided to NIEA.

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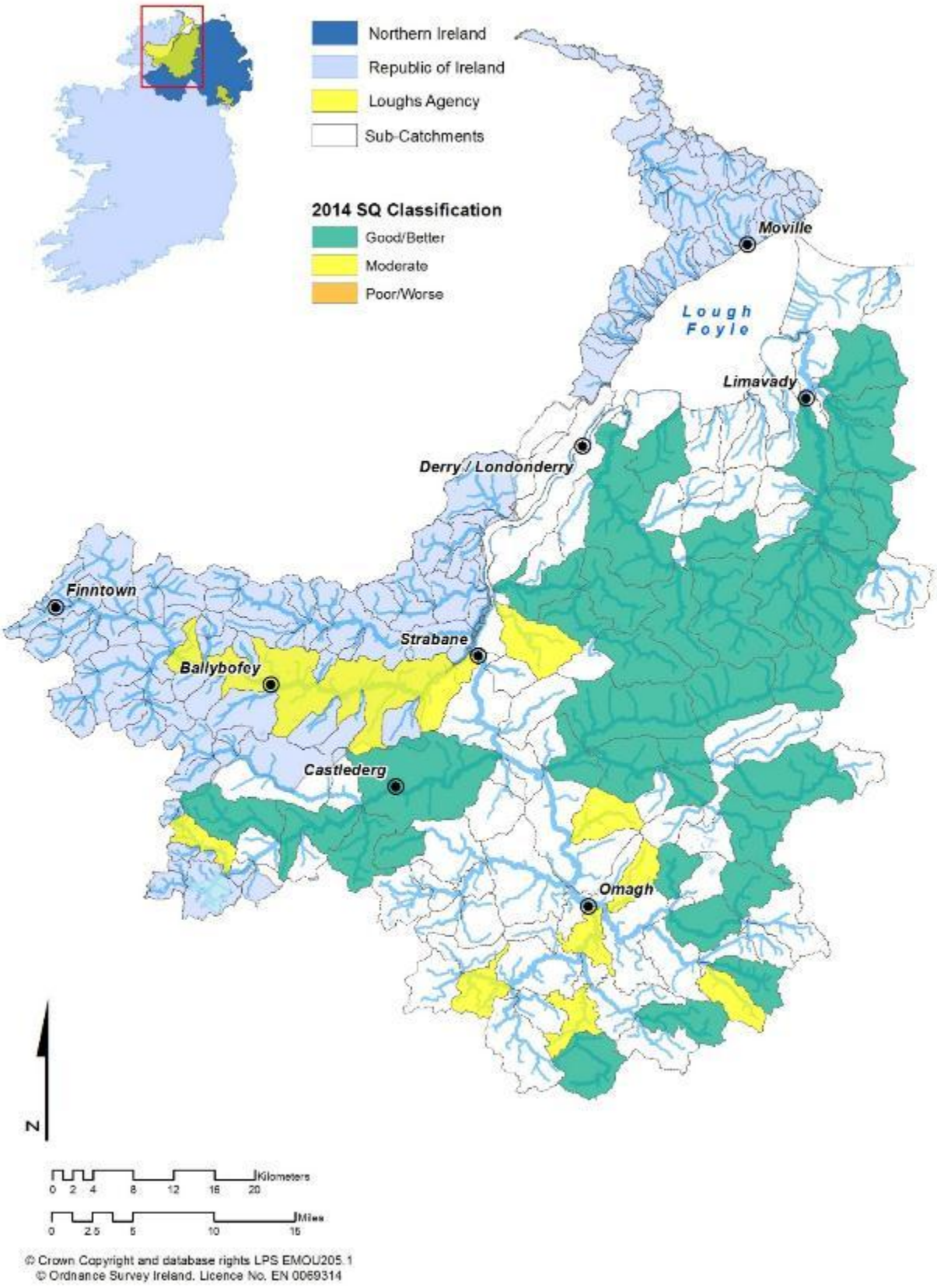

Fig 53. Foyle area Semi quantitative/salmon management plan derived indicative water body classifications 2014

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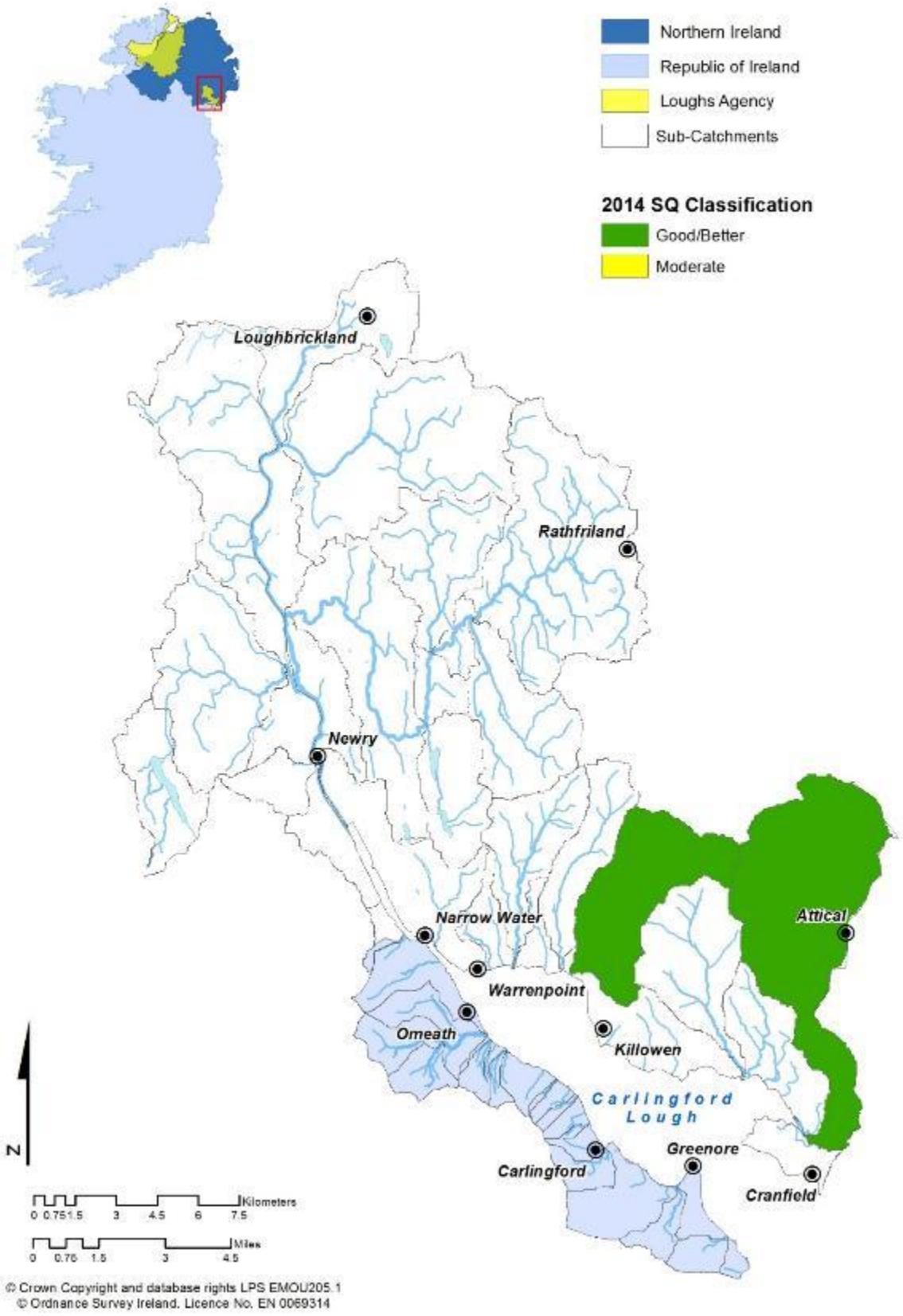

Fig 54. Carlingford area Semi quantitative/salmon management plan derived indicative water body classifications 2014

6.0 CONCLUSION

From 2012 classification has been predominantly based on the FCS2 (Ireland) model. This has replaced the professional opinion classification method as the dominant classification method. A professional opinion over ride exists to correct classifications based on a paucity of information including the presence of barriers downstream to a monitored site. The professional opinion override was not utilised in 2014.

2014 marked the last year in the first full monitoring period/cycle of the Water Framework Directive. In 2014 a number of large river sites were monitored using the multi method approach. The key recommendation coming from this report for future monitoring is that the sampling of large river sites using the multi method approach should be curtailed in favour of single pass electrofishing at suitable wadeable sites. Electrofishing only is the recommended survey method. It is also recommended that when it is not possible to install stop nets due to excessive flow that a single pass survey within a defined area is conducted

The FCS2 (Ireland) tool has passed the intercalibration process and has now been fully adopted for use across the island of Ireland. Further refinements may be made to the model in the future to incorporate issues such as full consideration of barriers downstream and acceptance of different types of survey data. Adoption of the FCS2 (Ireland) model and completion of the first cycle of Water Framework Directive fish surveillance monitoring marks an end to a very positive beginning for WFD compliant fish monitoring in the rivers of Northern Ireland.

A degree of flexibility will need to be maintained in collecting and analysing fisheries data which can be utilised for WFD classification purposes and to ensure future development of the model.

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