

### Introduction

This report describes the status of the salmon and sea trout populations in the Wye catchments. Bringing together data from rod catches, stock assessments and juvenile monitoring, it will describe the factors limiting the populations and set out the challenges faced in the catchment.

Action tables set out habitat improvements to restore freshwater productivity of salmon and sea trout populations. These tables also include some work which will be carried out by our partner organisations, not just Natural Resources Wales (NRW).

NRW has a duty, defined in the Environment (Wales) Act 2016 to have Sustainable Management of Natural Resources (SMNR) at the core of everything that we do. By applying the principles of SMNR in all of our activities - from agriculture, forestry and flood defence to development planning - we are undertaking catchment-wide initiatives that will deliver for fish stock improvements. Our reports highlight the importance of considering the whole catchment when identifying and addressing fisheries issues; and of working with partners.

NRW is committed to reporting on the status of salmon stocks in all of our principal salmon rivers for the Salmon Action Plans and condition assessments under the Habitats Directive in SAC rivers; all fish species in all of our rivers are reported for the Water Framework Directive (WFD). This report will fulfil these commitments and provide an informative and useful summary of stock status and remedial work planned, for our customers, specifically anglers, fishery and land owners; as well as our partners.

### Catchment

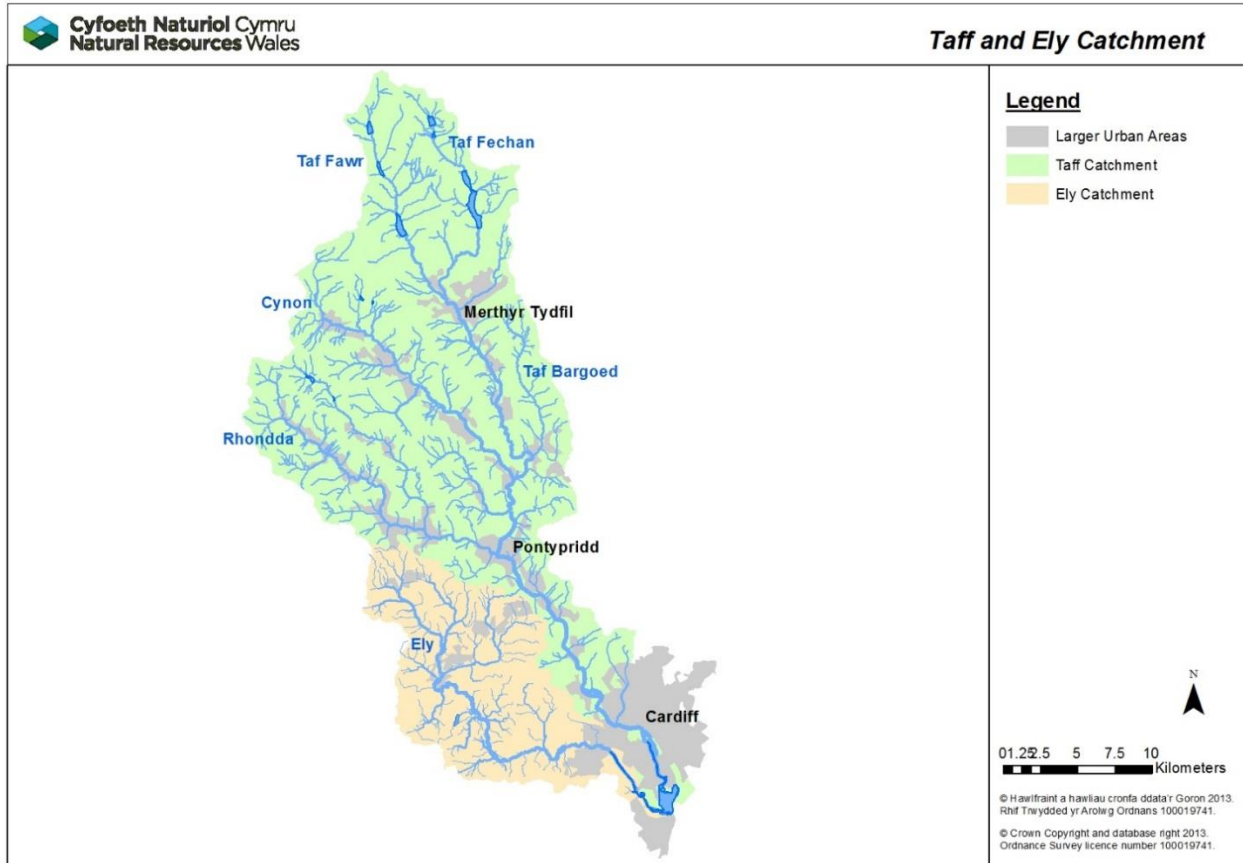
The River Taff rises as two rivers (Taf Fechan and Taf Fawr) on the open moorland and forestry plantations of the Old Sandstone escarpment of the Brecon Beacons, before joining to form the Taff north of Merthyr Tydfil. The Taff is joined by the River Cynon at Abercynon and the River Rhondda at Pontypridd whilst falling through its narrow urbanised valley. It then flows in a south easterly direction through the narrow limestone gorge at Taffs Well. From here it cuts a green corridor through the suburbs of the Cardiff plain to the Severn Estuary. The 40 mile river falls at an average gradient of 1:100, which, although steep, is typical of the South Wales valleys. The headwaters of some of the main tributaries are impounded by public water supply reservoirs.

The River Ely flows in a south easterly direction for 25 miles to its confluence with the Taff in Cardiff Bay. The northern half of the Ely catchment is characterised by uplands of up to 380m, cut by deep, narrow valleys. Further south, the Ely valley opens out into a meandering lowland river valley.

The confluence of the rivers is impounded by the Cardiff Barrage. The barrage, which was completed in 1999 has created a freshwater lake. Access to the rivers for migratory fish is now via a fish pass through the barrage.

Throughout the Taff and Ely there are many man made barriers which have severely restricted access for migratory fish, and which had effectively eliminated migratory fish from both rivers. In recent years almost all of these barriers have been removed or made passable

with fish passes. Few impassable barriers remain, plans are in place to make passable or to mitigate impact of those remaining few.



The Cardiff Bay Barrage fisheries programme, which funded the monitoring and stocking of salmon on the rivers prior to, and since bay impoundment, has now matured into a different form of mitigation programme. Stocking of salmon ceased in 2013, funding is now redirected to fish access and habitat improvements.

Due to the presence of reservoirs impounding the upper Taff and Taf Fechan; the barrage; and substantial urbanisation and flood alleviation work throughout the catchment; much of the River Taff is considered as 'heavily modified' for EU Water Framework Directive (WFD) classification purposes. This description is recognition that parts of the river may need achievable targets set, a lower goal of good ecological potential (GEP), rather than good ecological status (GES) which is the normal targets for relatively unmodified river reaches.

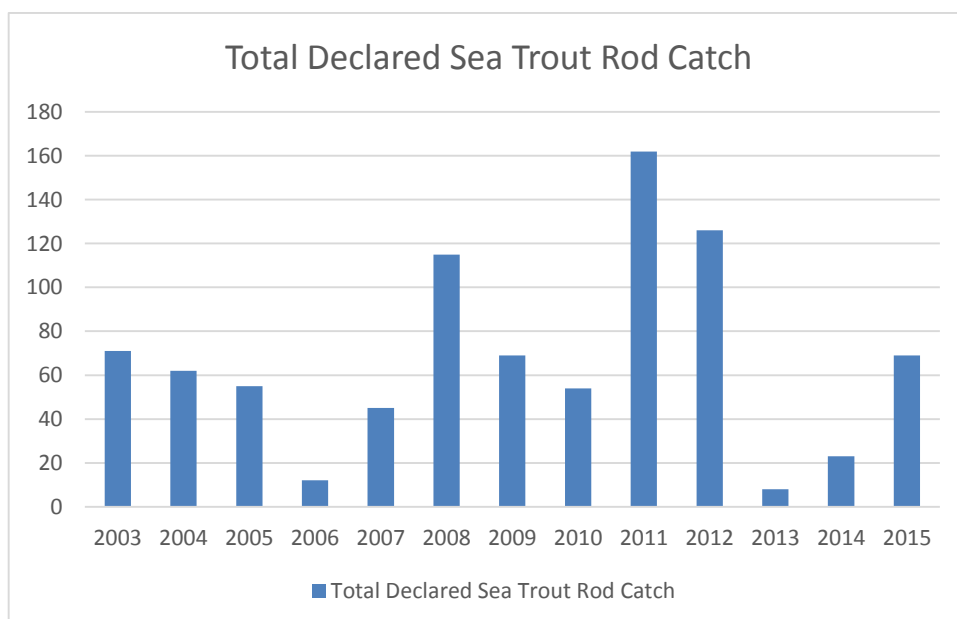
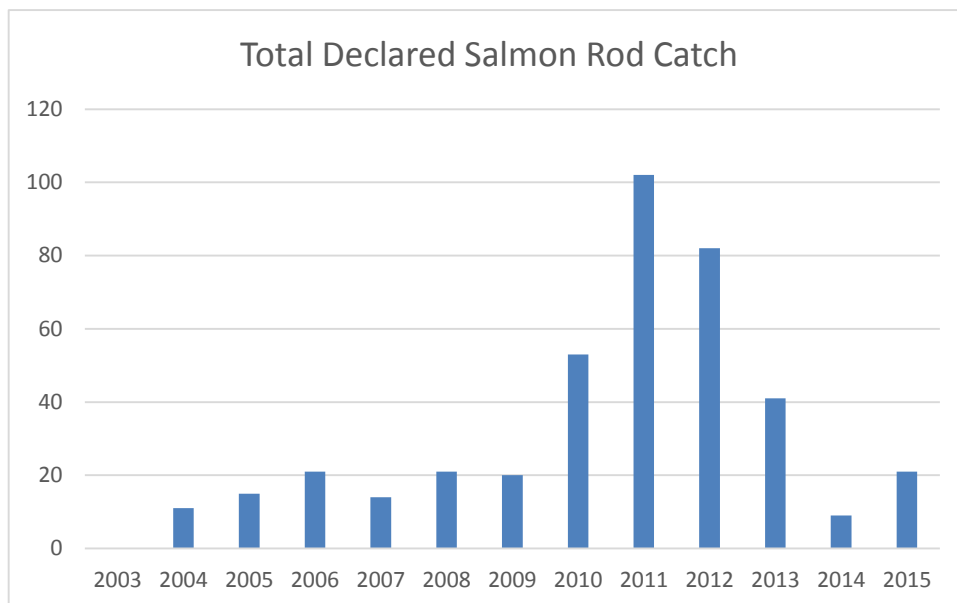
The legacy of historic pollution, impoundments and development around the rivers coupled with recent barrage construction has taken its toll on migratory fish stocks. Both recovering rivers, the Taff and Ely do now support naturally recruiting salmon and sea trout, albeit in relatively low numbers for the size of the catchment.

As part of efforts to improve stock numbers it is now illegal to kill salmon or sea trout in the Taff and Ely, all fish are returned alive to the river.

## Rod catches

The following graphs show the total declared rod catches of salmon and sea trout on the Taff, there are typically no returns from the Ely. The salmon angling effort on the Taff is low; few anglers target salmon in the catchment, correspondingly, rod catch is also low and subject to significant bias. Declared salmon rod catches are variable over the period from 2003, with the highest catches reported in 2011 and 2012.

Declared sea trout rod catches are also variable, although generally higher in number than salmon, and show similar peaks in catch around 2011 and 2012. Sea trout are underperforming for a river the size of the Taff; declared catches are still low – just 69 in 2015. It is thought that the barrage has impacted the sea trout population more significantly than the salmon population.

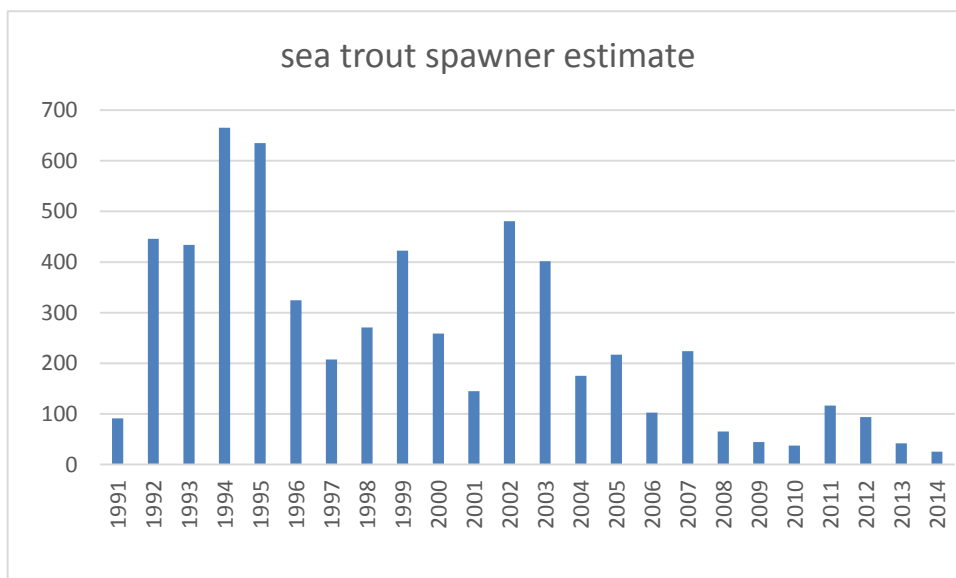
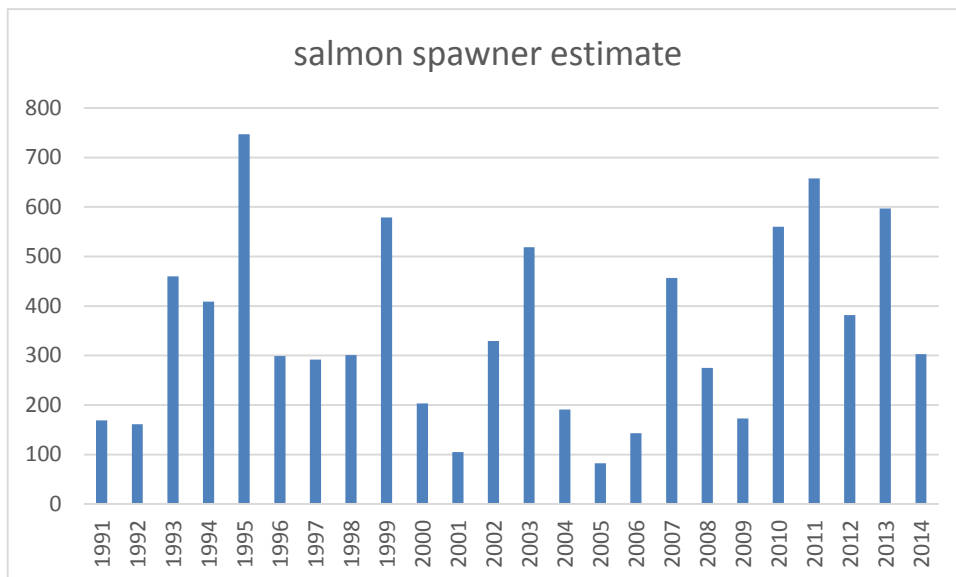


## Fish trap data

Since 1991 a fish trap has been operated at either Blackweir or Radyr on the River Taff. Variable trapping effort has been extrapolated to give an annual estimate of Taff salmon and sea trout adult numbers, shown in the graphs below.

It is interesting to note that rod catch for sea trout has exceeded the trap catch at times, e.g. in 2011. We believe this is due in part to the very large brown trout that we now find present in the river which may be misidentified as sea trout due to their size. Furthermore, the discrepancy could be compounded by the presence of a prime fishing area just below the trap which in the past, before 100% catch and release, might mean fish were being removed before reaching the trap.

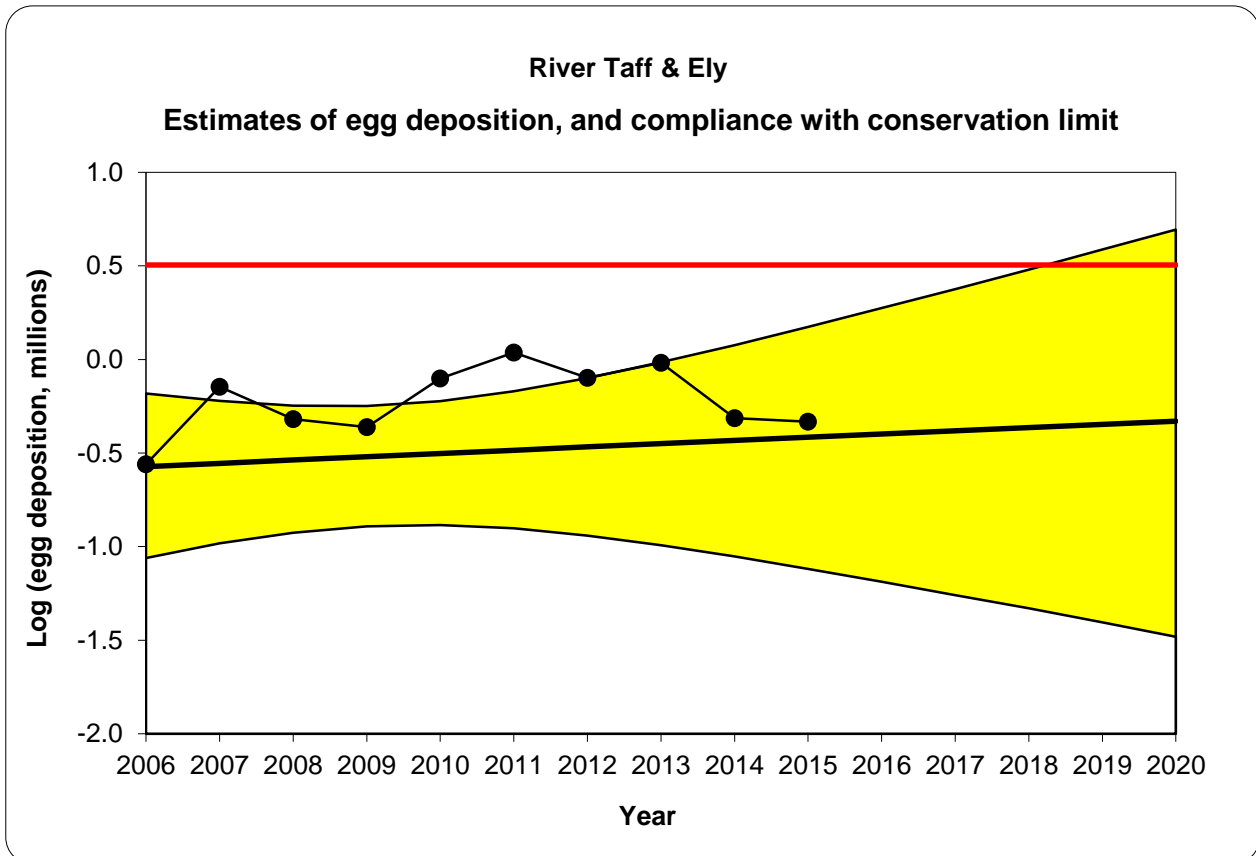
Due to the installation of a hydropower system on Radyr weir there was no fish trapping in 2015. We are due to restart trapping, at the new Radyr fish pass and trap, in spring 2016 for a full year assessment.



## Stock Status

### Conservation of Salmon

Salmon stock status is assessed through the use of 'Conservation Limits' which provide an objective reference point against which to assess the status of salmon stocks in individual rivers. The numbers of salmon a river can produce (and consequently the catches that the stocks support) are a function of the quality and quantity of accessible spawning and rearing area. This is why, in general, big rivers have larger catches and have correspondingly bigger total spawning requirements than small rivers. Thus, for any given rivers there should be an optimum level of stock which the CL seeks to protect. The Conservation Limit represents the number of eggs that must be deposited each year within a given catchment in order to conserve salmon stocks in the future. The egg deposition estimate for the Taff is calculated using numbers of fish caught in the trap rather than rod catch, as in other catchments. In 2015 the trap did not run and rod catch estimates have been used as a surrogate.



The Conservation Limit for the Taff/Ely is set at 3.19 million eggs, represented by the red line on the graph. The current number of eggs being deposited (estimated at 0.38 million) is far below the conservation limit, and the Taff/Ely salmon stock is classed as '**at Risk**'. In 5 years time, the predicted status of the salmon stock is '**Probably at Risk**'.

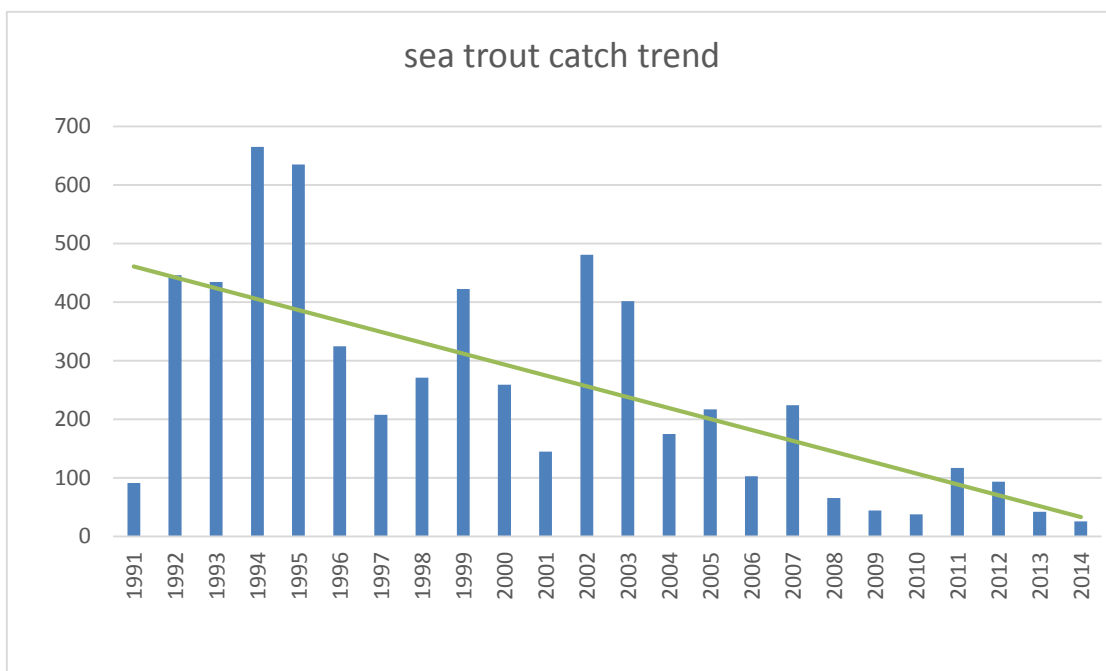
To describe the estimate of compliance as salmon available to spawn, we would need around 2000 salmon running the rivers to meet the conservation limit, our estimate for 2015 (based upon rod catch) was 245 salmon, although as mentioned before there is some

inherent bias using rod catch for the Taff and the estimate would likely have been higher had we have been able to use trap data.

### Conservation of Sea Trout

The national approach to sea trout stock assessment is to use a three year rod catch trend compared with previous 10 years to make an assessment. However, having a fish trap gives us a more accurate estimate of fish numbers, this we consider a better means of assessing temporal trend. The graph below shows that fitting a simple linear trend line to the spawner estimates from the trap, describes the significant downward trend in sea trout entering the river. **This assessment (excluding 2015 as trap data unavailable) describes a stock at risk.**

These data are based upon a known constant fish trapping effort, between April and December inclusive.



## Juvenile Abundance Monitoring

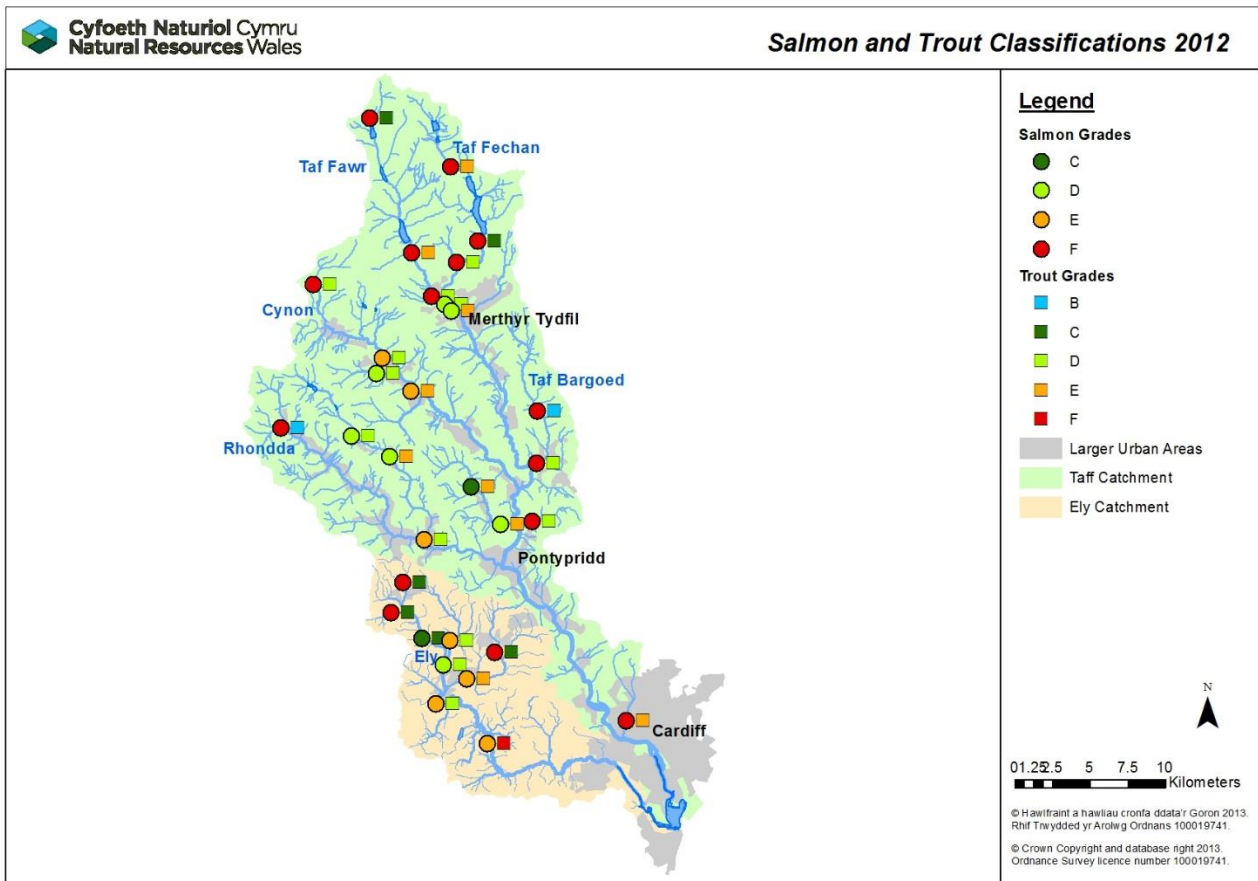
Only three sites in the Taff and Ely are monitored on an annual basis. The table below shows the 2015 survey results.

The classification refers to the National Fish Classification Scheme (NFCS), which has been developed to evaluate and compare the results of fish population surveys in a consistent manner. The NFCS ranks survey data by comparing fish abundance at the survey sites with sites nationally where juvenile salmonids are present. Sites are classified into categories A to F, depending on densities of juvenile salmonids at the site. The following table shows the values and classification of NFCS.

River Name	Nant Mychydd	Taf Fechan	Taff Fawr
Site Name	Royal Mint	Cyfartha Castle	Gellideg
NGR	ST 04098 84965	SO 03759 07241	SO 02905 07795
Site Code	E001	T002	T004
Date Fished	23/06/2015	24/06/2015	25/06/2015
Survey Type	Q	Q	Q
0+ Salmon Density (fish/m <sup>2</sup> )	29.3	0	0.6
Classification	C	F	E
>0+ Salmon Density (fish/m <sup>2</sup> )	7.1	0	0.6
Classification	C	F	E
Overall Salmon Classification	C	F	E
0+ Trout Density (fish/m <sup>2</sup> )	12.9	9.3	8.8
Classification	C	C	C
>0+ Trout Density (fish/m <sup>2</sup> )	25.3	10	9.7
Classification	A	C	C
Overall Trout Classification	B	C	C
Stream Width (m)	4.5m	6m	6m
Actual Fished Area (m <sup>2</sup> )	225m <sup>2</sup>	300m <sup>2</sup>	330m <sup>2</sup>
Other species	Bullhead, eel, lamprey (river/brook)	Bullhead	Bullhead

GRADE	Descriptor	Interpretation
<b>A</b>	Excellent	In the top 20% for a fishery of this type
<b>B</b>	Good	In the top 40% for a fishery of this type
<b>C</b>	Fair	In the middle 20% for a fishery of this type
<b>D</b>	Fair	In the bottom 40% for a fishery of this type
<b>E</b>	Poor	In the bottom 20% for a fishery of this type
<b>F</b>	Fishless	No fish of this type present

Every six years a full spatial programme is undertaken, comprising a further 38 sites. This was last done in 2012 and the map below shows the results from these surveys.

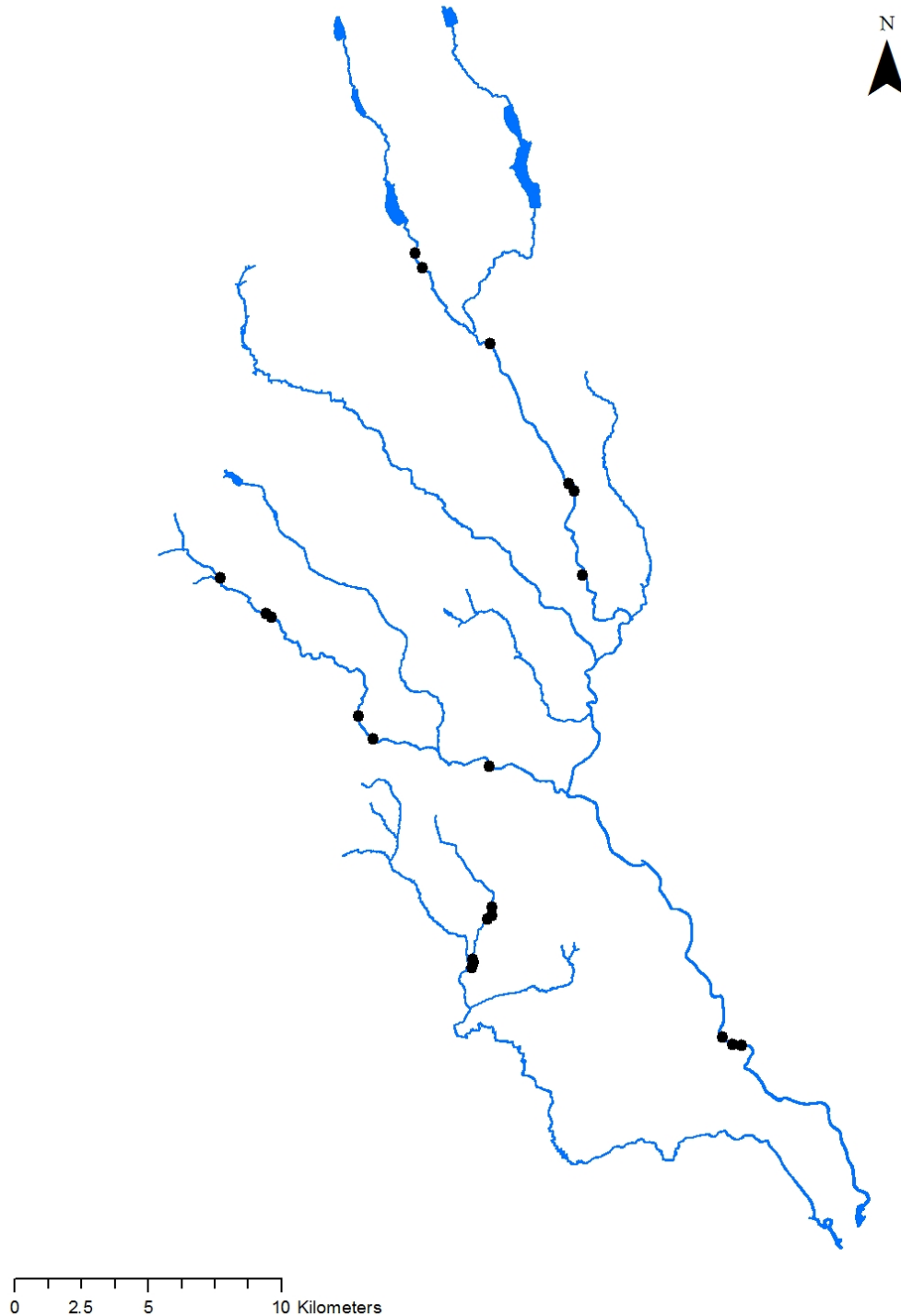


This map describes the Rhondda Fach and Cynon as having salmon present, this is likely to be due to stocked fish. The more recent assessment (see below distribution map), carried out after stocking had ceased in the catchment, gives a better description of 'wild' salmon population.



## Juvenile salmon wide distribution within Taff / Ely

As part of the assessment of barriers to migration some simple presence surveying is carried out to gain an overview of salmon distribution. The areas with no salmon present clearly pointing towards future improvement needs. The following map shows the results of the 2015 surveys, highlighting where juvenile salmon were caught.

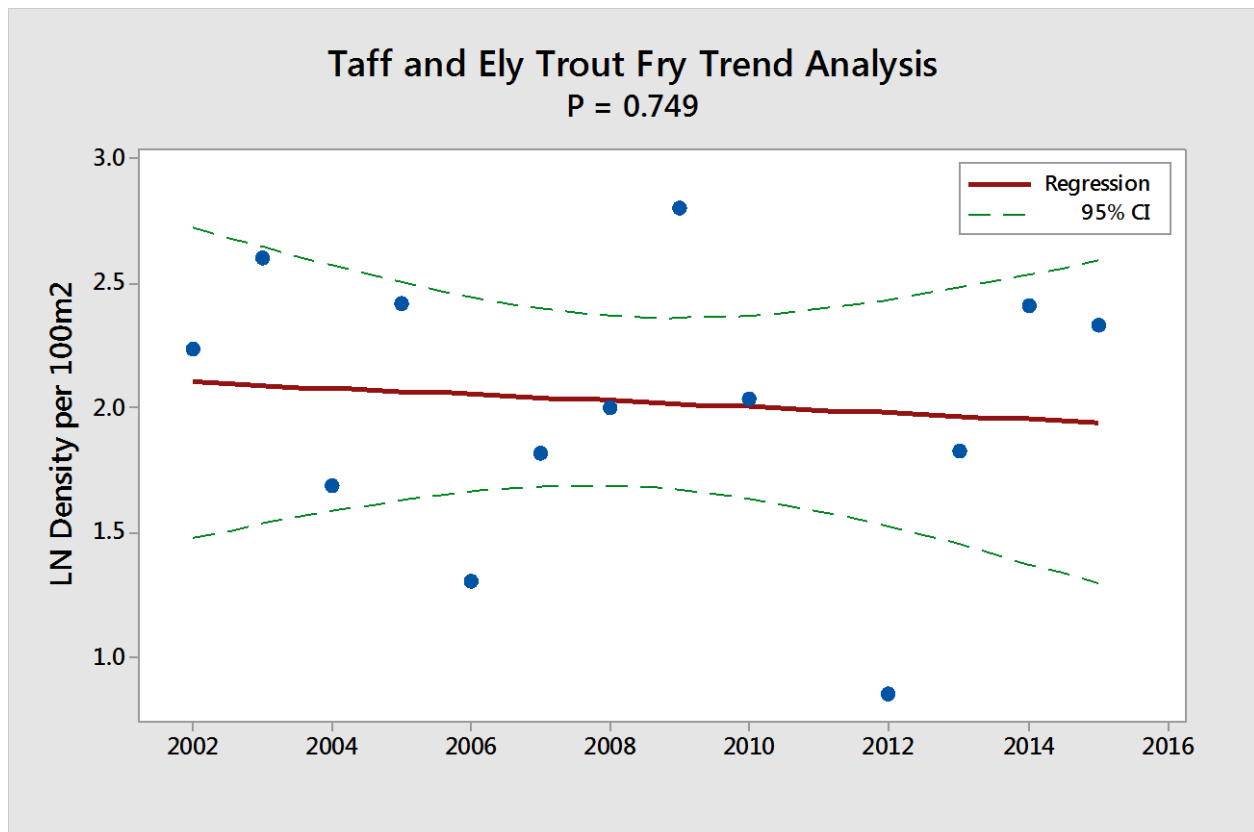


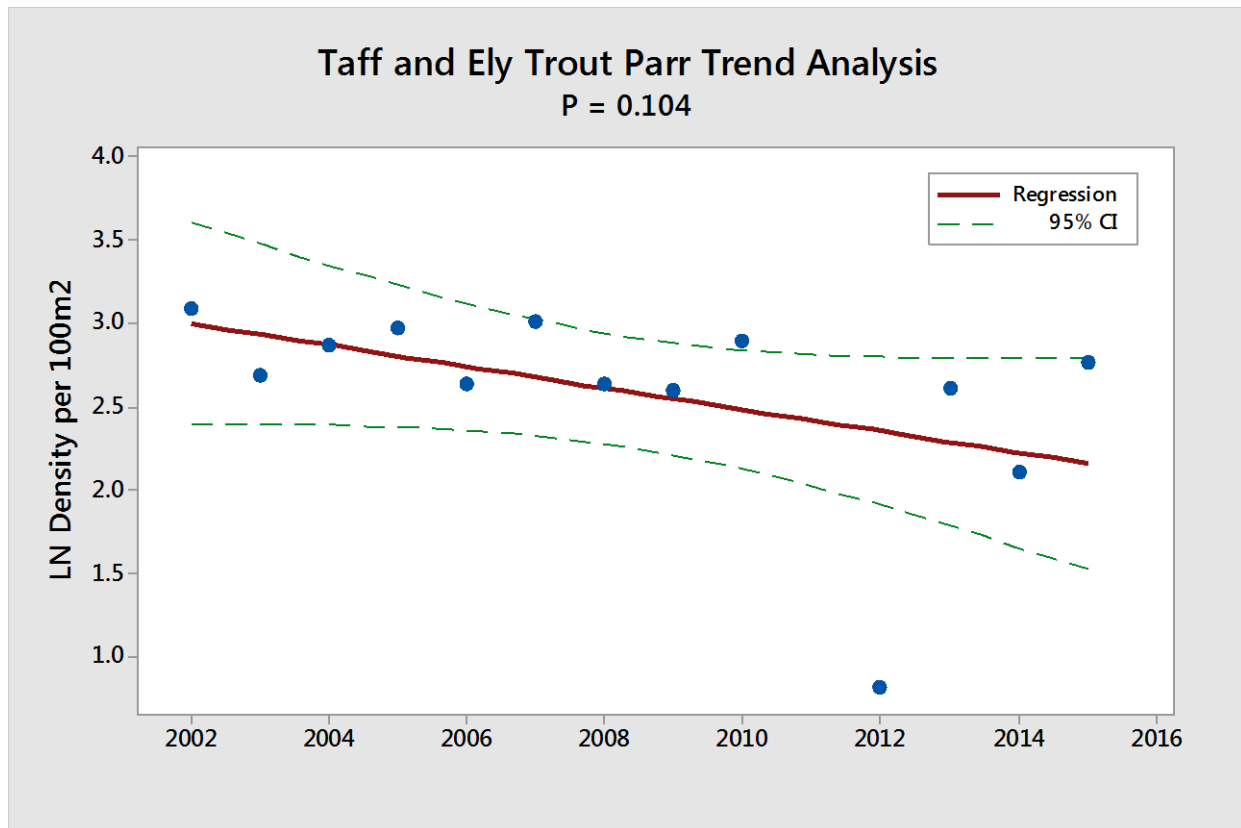
## Juvenile Trend Analysis

Trends in the brown trout populations of the Taff and Ely were assessed as one population due to the limited number of consistent data available – as such these analyses should be viewed with caution and only considered alongside the other methods of population assessment in this report. Quantitative data from the three temporal sites from 2002 onwards were used in the analysis. The following graphs show the results from these trend analyses.

No assessment was made for salmon due to the effect of the significant stocking programme on the survey results.

Overall densities of juvenile brown trout in the Taff and Ely catchments have fluctuated over the years since 2002. There is no evidence of any trend in fry densities over this time, but there does appear to be a downwards trend in trout parr densities, albeit not statistically significant ( $P = 0.104$ ).





## Fisheries Actions – Taff and Ely

Site	Action	Benefits	Lead	Partner(s)	Timescales for delivery
<b>Cynon</b>	Delivery of 12 fish passage improvement schemes on partial barriers to upstream migration.	More habitat accessible to salmon and trout. Increased population size and viability.	NRW	SEWRT RCT DCWW Landowners	By 2020
<b>Rhondda</b>	Delivery of 32 fish passage improvement schemes on partial barriers to upstream migration	More habitat accessible to salmon and trout. Increased population size and viability.	NRW	SEWRT RCT DCWW Landowners	By 2020
<b>Nant Clydach</b>	Delivery of 6 fish passage improvement schemes on partial barriers to upstream migration. Riparian and instream habitat improvements. Improve access into the Clydach at confluence with the Taff	More habitat accessible to salmon and trout. Increased population size and viability.	NRW	SEWRT RCT DCWW Landowners	By 2020
<b>Bargoed</b>	Delivery of 3 fish passage improvement schemes on partial barriers to upstream migration above Millennium Lakes	Benefits will be mainly for the brown trout above the Millennium Lakes and flood defence scheme on the lower river. More habitat accessible and an increased population size and viability.	NRW	SEWRT MTCBC Landowners	By 2020
<b>Taff Fechan</b>	Delivery of 7 fish passage improvement schemes on partial barriers to upstream migration. Spawning habitat reinstatement in the upper reaches; gravel introduction, instream and riparian habitat work.	More habitat accessible to salmon and trout. Increased population size and viability.	NRW	SEWRT MTCBC DCWW Landowners	By 2020
<b>Taff Fawr - upstream of Fechan confluence</b>	Review and monitor fish passage improvement work undertaken at 6 sites. Spawning habitat reinstatement in the upper reaches; gravel introduction, instream and riparian habitat work.	More habitat accessible to salmon and trout. Increased population size and viability.	NRW	SEWRT MTCBC DCWW Landowners	By 2020

## Fisheries Actions – Taff and Ely

<b>Main River Taff</b>	Delivery of 27 fish passage improvement schemes; technical fish passes, weir removals, easements on barriers to upstream migration	New technical fish pass constructed at Radyr Weir in conjunction with the Cardiff hydropower scheme will improve passage efficiency. Associated fish trap will enable monitoring of adult salmon, sea trout migration	NRW	SEWRT Cardiff CC RCT MTCBC DCWW Landowners	By 2020
<b>Ely Catchment</b>	Delivery of 9 fish passage improvement schemes on partial barriers to upstream migration	More habitat accessible to salmon and trout. Increased population size and viability.	NRW	SEWRT RCT DCWW Developers Landowners	By 2020
<b>Whole Catchment</b>	Enforcement action to reduce illegal activity. Delivery of the multiple partner environmental crime awareness initiative in the Taff Valley.	Reduction in illegal activity on catchment through intelligence led work.	NRW	SW Police Angling Clubs	Ongoing
<b>Whole Catchment</b>	<b>Water Framework Directive</b> We will continue to monitor the status of the environment and investigate causes of failures. Refer to Severn River Basin Management Plan <a href="https://www.gov.uk/government/publications/severn-river-basin-district-river-basin-management-plan">https://www.gov.uk/government/publications/severn-river-basin-district-river-basin-management-plan</a> for more details	Water environment protected and improved.  More WFD waterbodies achieving Good Ecological Status.	NRW	SEWRT Groundwork DCWW KWT	Ongoing

NRW Natural Resources Wales

SEWRT South East Wales Rivers Trusts

DCWW Dwr Cymru Welsh Water

KWT Keep Wales Tidy

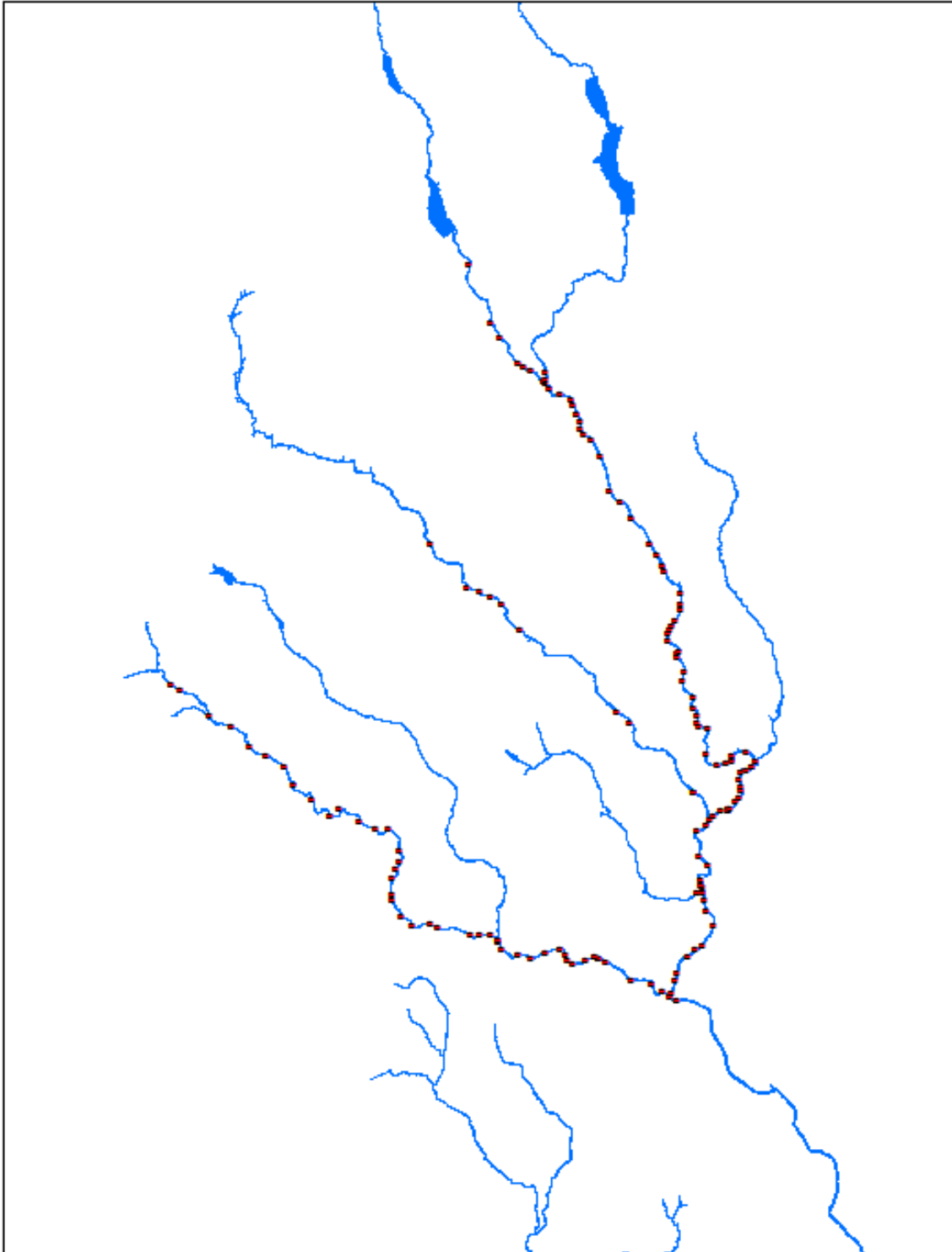
RCT Rhondda Cynon Taff

MTCBC Merthyr Tydfil County Borough Council

Cardiff CC Cardiff County Council

## APPENDIX

Radio tagged salmon distribution on the Taff upstream of Pontypridd – surveyed in 2013



# APPENDIX

## Barriers to salmon and sea trout migration (man-made and natural)

