## 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.

Actions set out habitat improvements to restore freshwater productivity of salmon and sea trout populations. These actions include 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 Wye rises from an altitude of 741m in the Welsh mountains at Plynlimon and at 250km in length it is the 6$^{th}$ largest river in the UK. The principal tributaries are the Elan, Ithon, Irfon, Lugg and Arrow, and the Monnow. The Lugg and Arrow rise in Wales and then flow east through England before joining the Wye at Hereford, in addition significant parts of the Monnow catchment and main river Wye also lie within England.

Land-use in the catchment is predominantly agriculture (with some woodland and residential areas). Higher grounds and poorer soils to the north and west supporting largely monoculture conifer forestry and pastoral farming, give way to higher quality and more intensive arable agriculture in the south and east of the catchment. In the upper catchment the headwaters of the Elan River are impounded, creating the Elan Valley system of reservoirs.

The Wye catchment is one of great ecological value. It has many SSSIs and the main river and many of its tributaries are designated as a riverine SAC under the Habitats Directive for ten rare or threatened nationally and internationally important species. These species include seven fish species - Atlantic salmon; allis and twaite shad; brook, river and sea lamprey; and bullhead.

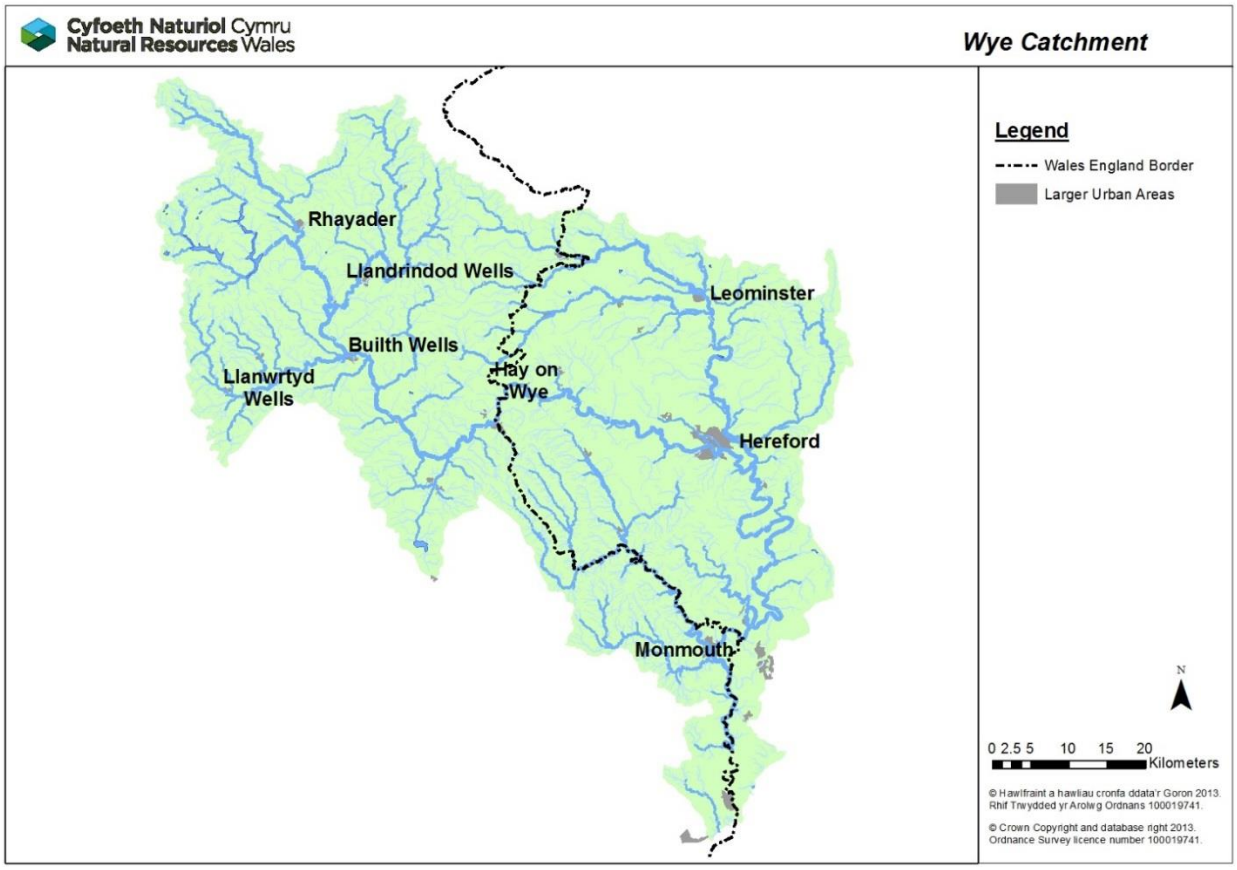


*Figure 1. Map showing the Wye catchment*

The River Wye is a well-established and nationally significant salmon rod fishery. Salmon catches have declined in recent years with the most recently published England and Wales catch statistics describing a rod catch for 2020 of 607.

Salmon are found throughout the Wye catchment except in the upper reaches of the Elan, above the reservoirs. Fish passes installed at numerous weirs across the Lugg and Arrow, and at Osbaston on the Monnow have opened these catchments and have resulted in wider salmon distribution and the inclusion of these catchments in the Salmon Conservation Targets.

The Wye catchment has suffered from declining rod catches, and after some years of promoting voluntary catch and release, a Wye specific byelaw was introduced in 2012 which mandated the release of all rod caught salmon and sea trout.

A small number of sea trout are caught on the Wye (26 fish in 2020). Like the neighbouring river Usk the Wye is not known for sea trout and has never had a significant rod catch.

The River Wye and its tributaries are also a locally important brown trout, coarse fish and grayling fishery.

## Rod Catches

The following graphs show the total declared rod catches of salmon and sea trout on the Wye and Catch Per License Day. CPLD is an estimate of the average catch per fishing day on a catchment.

**Salmon Rod Catch –** Since 2012 rod catches had been stabilising and prospects were looking good for Wye salmon. Unfortunately, like many Atlantic salmon river stock, in 2018 the catch collapsed. An increase to 607 salmon caught in 2020 has not seen a sustained increase into 2021. Provisional catch returns, for 2021, of 318*(Wye Salmon Association, WSA)* – 319*(Wye and Usk foundation, WUF)* is the lowest salmon rod catch recorded on the Wye.

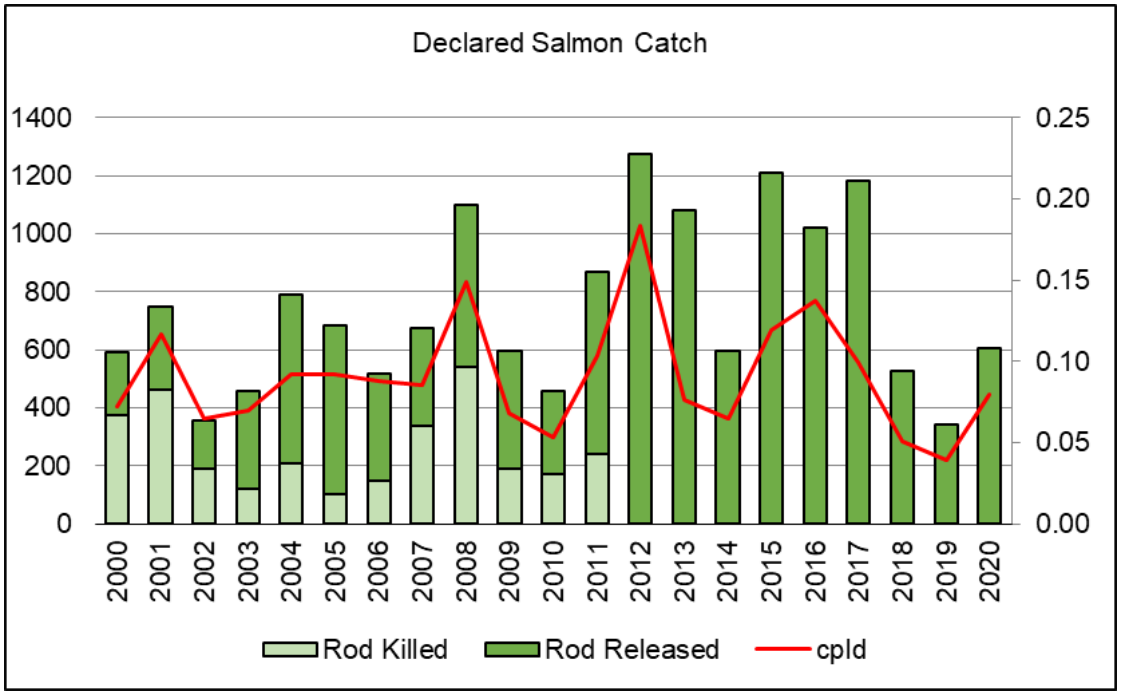


*Figure 2 Declared salmon catch 2000 - 2020*

**Sea Trout Rod Catch –** Many rivers across Wales have seen declines in sea trout catches, this trend is not reflected in the Wye catch, the catch has consistently been low and remains so.

The Wye does not have a sea trout fishery, little or no targeted sea trot fishing occurs. This small catch is likely due to the few sea trout that enter the Wye rather than the lack of targeted angling effort. The Wye along with the nearby Usk and Severn, all draining to the Severn Estuary, have no history of supporting large sea trout fisheries. The main salmonid angling focus is salmon, and brown trout in the upper reaches and larger tributaries.

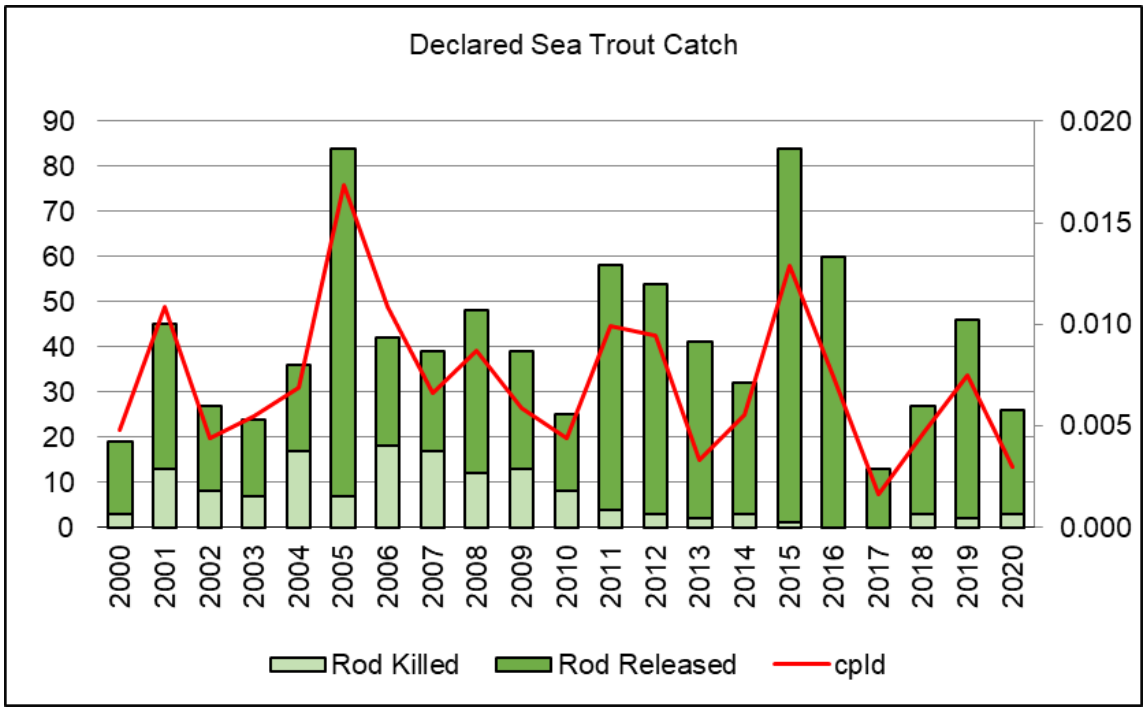


*Figure 3 Declared sea trout catch 2000 - 2020*

**Net catches**

There are now no net fisheries operating within the river Wye.

There is one Heritage Lave net fishery operating in the Severn Estuary adjacent to the mouth of the river Wye. In 2020, following a Habitats Directive Regulation Assessment (HRA), this fishery was not allocated licences to kill salmon for the 2021 season.

## Stock Status
## Conservation of Salmon

Salmon stock status is assessed using 'Conservation Limits' which provide an objective reference point against which to assess the status of salmon stocks in individual rivers.

This is calculated by applying assumed angling exploitation rates to catch data to derive run estimates; adopting standard sex ratios and weight-fecundity relationships to generate egg deposition figures. 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. Therefore, 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 to conserve salmon stocks in the future. The CL for the Wye catchment is 38.57 million eggs.

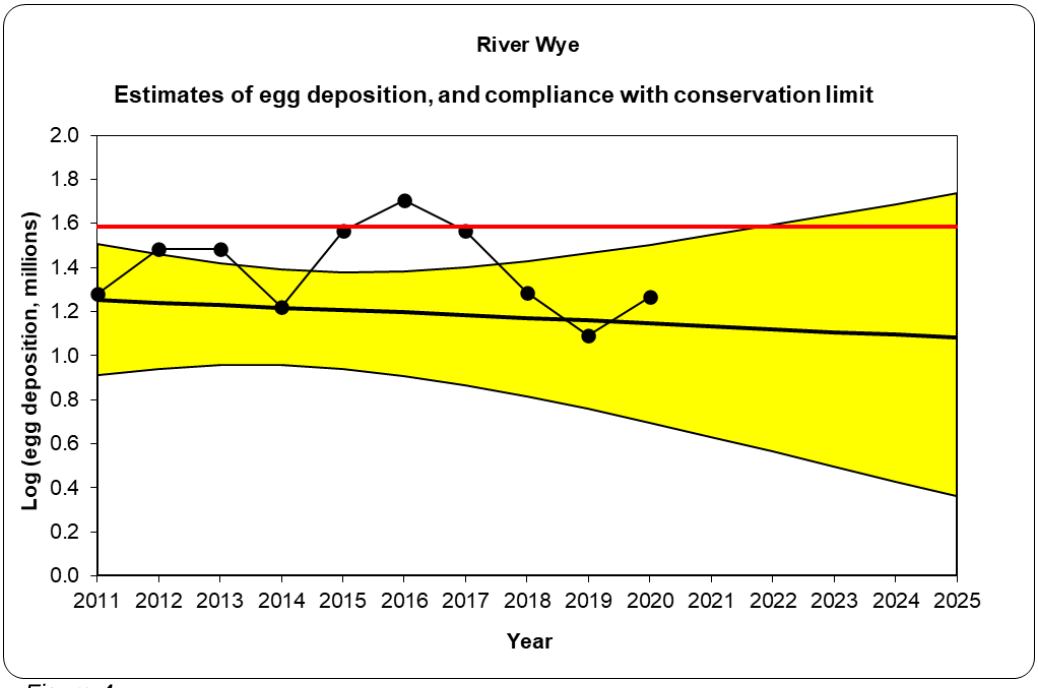


*Figure 4*

Are enough salmon eggs being deposited to conserve stocks in the catchment?

The red line represents the number of eggs required to be deposited to sustain a healthy salmon stock. The black trend line and its confidence limits (the yellow band) is fitted to the most recent 10-year series of egg deposition estimates (2011-2020). The assessment of stock status for the Wye describes a declining (current) status from probably at risk in 2019 to at risk in 2020.
*Further assessments which include the 2021 estimates will show no improvement.*

- Current number of eggs being deposited puts stocks **at risk**
- In 5 years' time the predicted status of salmon stocks will be **probably at risk**
- Based on current data, and the projection of the graph, the stocks of salmon on the Wye will continue to **decline** **(uncertain trend)**

*Predicted 2021 compliance estimates.*
*Using rod catch estimates provided by WSA and WUF we have estimated egg deposition will be in the region of 12 million eggs. This 12 million is clearly an annual failure, well short of the 38.57 million egg deposition CL target for the catchment.*
*We have today (08/11/21) run this estimate through the compliance model. The output suggests status would be an 'at risk' salmon stock in both 2021 and 2026 with a marked downward trend in egg numbers over the last decade. This prediction if correct sees a shift downwards in the Wye stock assessment, predicting an at risk stock now and into the future.*
*Please note these data are only provided here as an early indicator, these are not based on official rod licence returns data. Numbers will vary when we have finally complied the official returns in the new year. Status MAY differ slightly when final returns are available but based on our experience, we believe change to either current or predicted status of 'at risk' are unlikely.*

**Conservation of Sea Trout**

In contrast to salmon, no established methods of setting Conservation Limits or similar have been available for sea trout. In the absence of such analysis, NRW and the Environment Agency have, for several years, routinely applied a fishery-based assessment to the principal sea trout rivers. This method – used previously in this report - utilises time-series of angling catch per unit effort (CPUE) data ('catch per day') to examine sea trout performance on a river-by-river basis.

Recently an alternative stock-based assessment method has been developed by NRW and is applied here. This utilises angling catch data to derive run and egg deposition estimates for sea trout in much the same way that similar data sets are used in Conservation Limit compliance procedures for salmon assessment.

**Further details on this method are given in the recent Technical Case supporting net and rod fishery byelaw proposals on all rivers in Wales and the cross-border rivers Wye and Dee (see: Technical case for fishing controls to protect salmon and sea trout)**

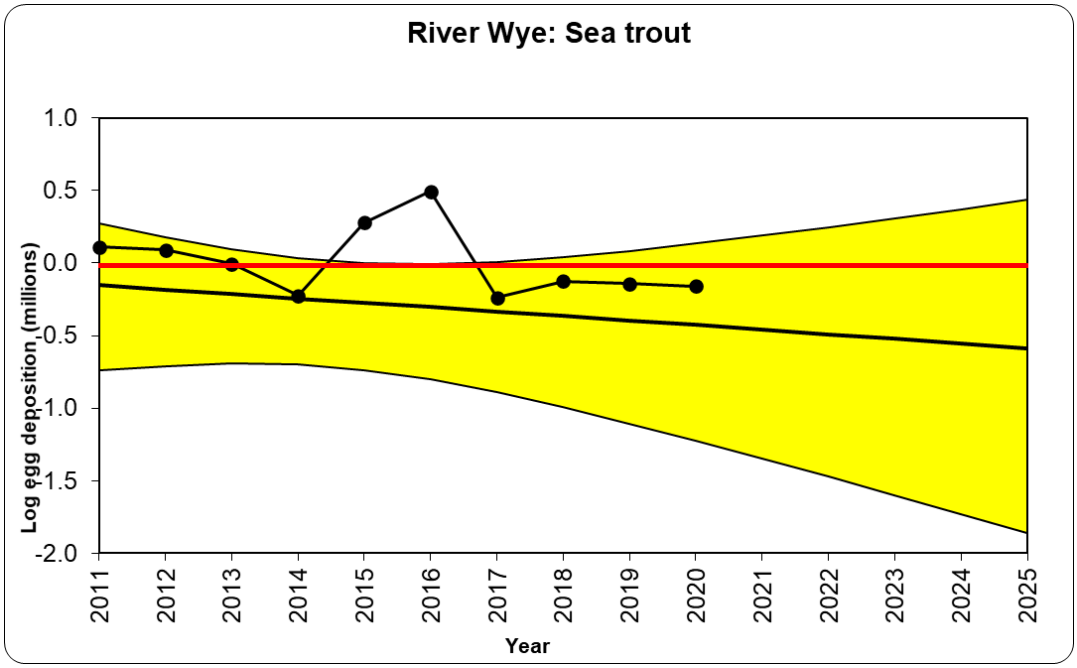


*Figure 5*

Are enough sea trout eggs being deposited to conserve stocks in the catchment?

The red line represents the number of eggs required to be deposited to sustain a healthy sea trout stock. The black trend line and its confidence limits (the yellow band) is fitted to the most recent 10-year series of egg deposition estimates (2010-2019).

- Current number of eggs being deposited puts stocks **probably at risk**
- In 5 years' time the predicted status of salmon stocks will be **probably at risk**
- Based on current data, and the projection of the graph, the stocks of sea trout on the Wye will continue to **decline** **(uncertain trend)**

## Juvenile Salmonid Monitoring Programme

In 2021 the temporal (annual) survey programme consisted of 24 sites in Wales. All the sites were surveyed using a semi quantitative (SQ) single run technique. We use the temporal data to look at trends in juvenile salmon and trout densities, and to give an idea of spawning across the whole catchment. A further 2 tributary sites were also surveyed for Water Framework Directive (WFD) purposes. The results of all these surveys can be found in Appendix 1.

The surveying programme (and responsibility for the catchment) is split between Natural Resources Wales (NRW), who are responsible for the Welsh Wye, and the Environment Agency on the English side.

The Wye and Usk foundation also carry out targeted salmonid monitoring, completing an extensive programme of timed surveys to monitor habitat improvements and fish pass effectiveness.

## Salmon and Trout Classifications

The following maps show the results of NRW routine juvenile salmonid population surveys and the spatial distribution of salmon found by WUF in 2021.

The symbols display the National Fish Classification Scheme (NFCS) grades which have 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 across Wales and England 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.

| Grade | Descriptor | Interpretation |
|---|---|---|
| **A** | Excellent | In the top 20% for a fishery of this type |
| **B** | Good | In the top 40% for a fishery of this type |
| **C** | Fair | In the middle 20% for a fishery of this type |
| **D** | Fair | In the bottom 40% for a fishery of this type |
| **E** | Poor | In the bottom 20% for a fishery of this type |
| **F** | Fishless | No fish of this type present |

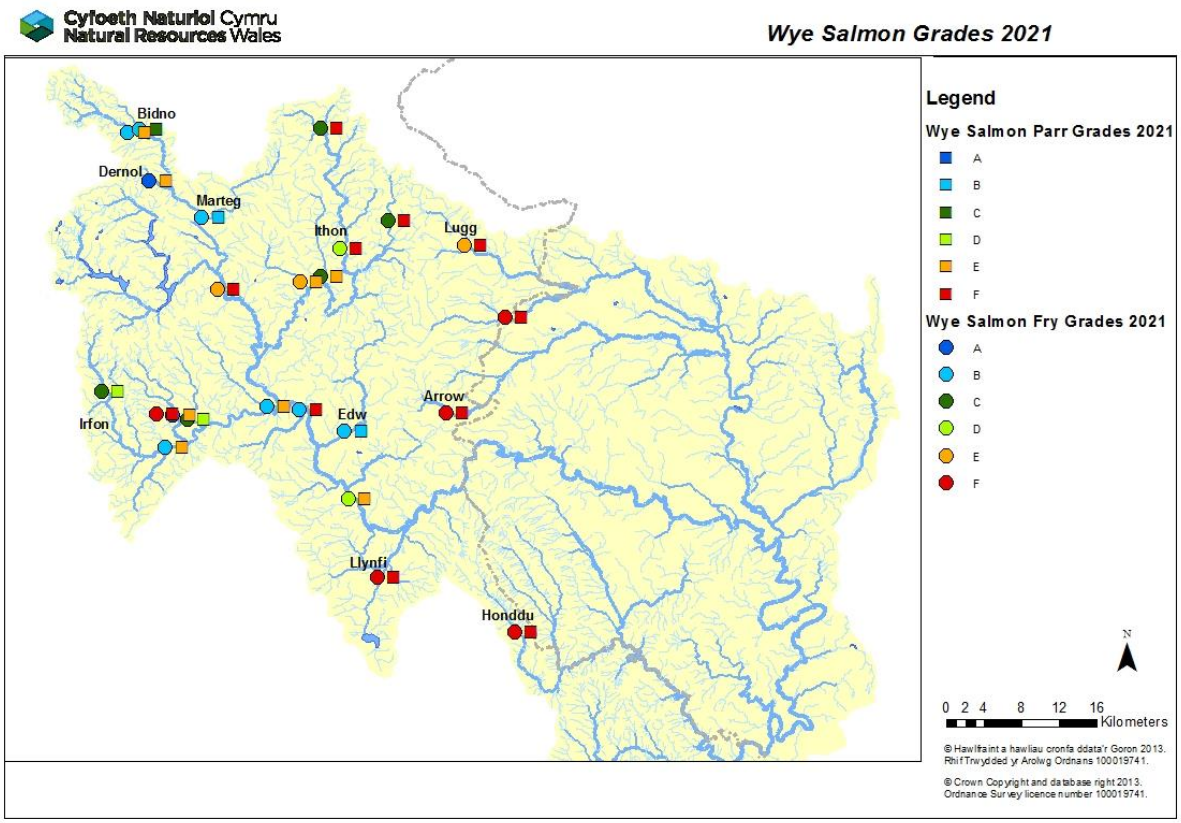


*Figure 6 Map showing the juvenile salmon grades and locations of sampling sites on the Wye catchment 2021.*

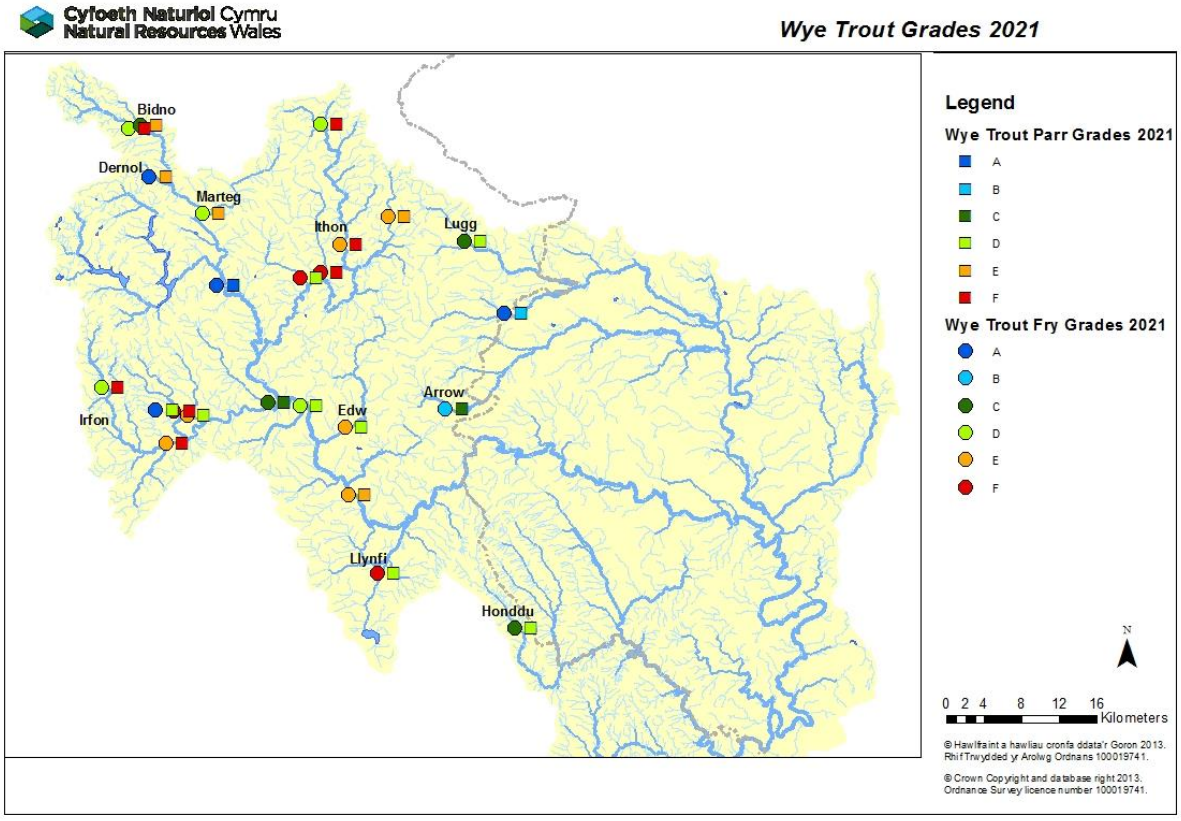


*Figure 7 Map showing the juvenile trout grades and locations of sampling sites on the Wye catchment 2021.*

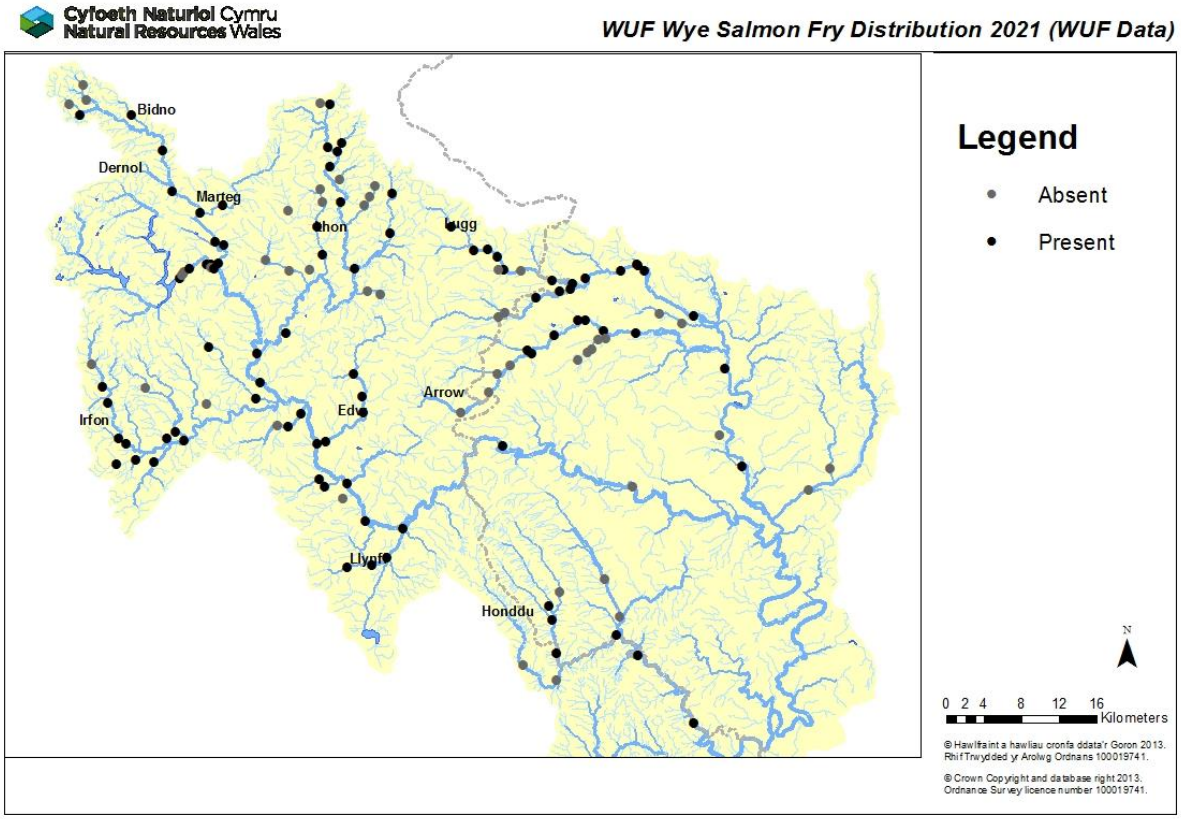


*Figure 8 Map showing the distribution of salmon fry across the Wye catchment 2021.*

## Juvenile Trend Analysis

The graphs below show a simple comparison of average salmon and trout densities across the Wye catchment; since surveying began in 1985 and focussed on the last ten years.

NB – the data shown here are only sites in the current Welsh monitoring programme; not every site in the programme was done every year; no surveys were done in 1996 or 2001, and only the Irfon catchment was surveyed in 2011. Quantitative and semi-quantitative density estimates are included in these trends and the catchment averages; the former derived using 2 or 3 run catch depletion survey technique and the Carle and Strub calculations, the latter using an NRW derived multiplier for single run surveys. This means that the graphs, and the catchment averages below will differ to those presented in previous reports.

## Salmon

Whilst recent years have seen a decline in densities, possibly in river survival related, the 2021 survey results for salmon fry (0+) have held up better than might have been expected. Poor adult run estimates not being reflected in spawning distribution.

The sites within our temporal monitoring programme include stretches of river which were recently inaccessible and salmon numbers at these sites were expected to be zero. These zeros generally driving down the averages displayed in the graphs below. Like WUF survey results we have now found salmon on the upper Lugg. It is good news that this quality habitat is now accessible to salmon. Other sites are yet to be so lucky, some remaining impacted by barriers, the Arrow, Hindwell Brook, Honddu (Monnow tributary), Einon and the Llynfi all returned no salmon during surveying.

Salmon parr are not faring well at our survey sites. These sites were originally selected as sites to assess spawning, so parr number might normally be relatively low if the habitat favours 0+ fishes. However, this survey season averaging 2 salmon parr/100m² is particularly poor. Many sites had no salmon parr present at all.

This may reflect a general issue with parr habitat throughout the catchment resulting in poor survival, or perhaps just limited to our survey sites. We will be looking more closely at the habitat suitability at our surveys sites and using HABSCORE methodology compare predicted fish (salmonid) densities with observed.

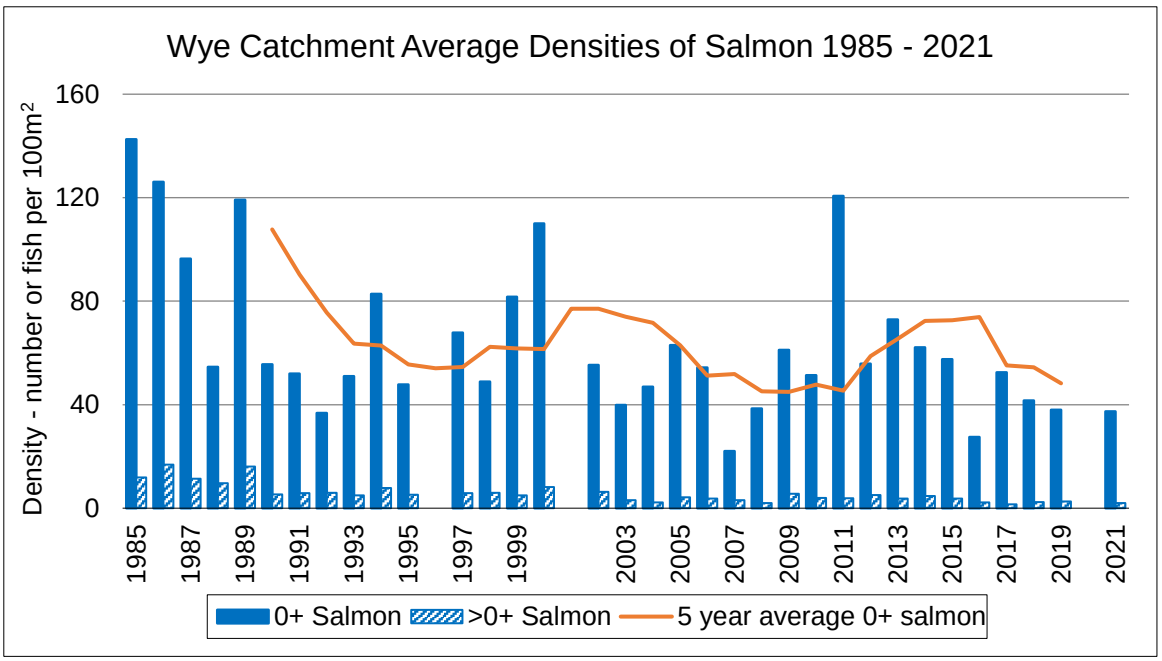


*Figure 9*

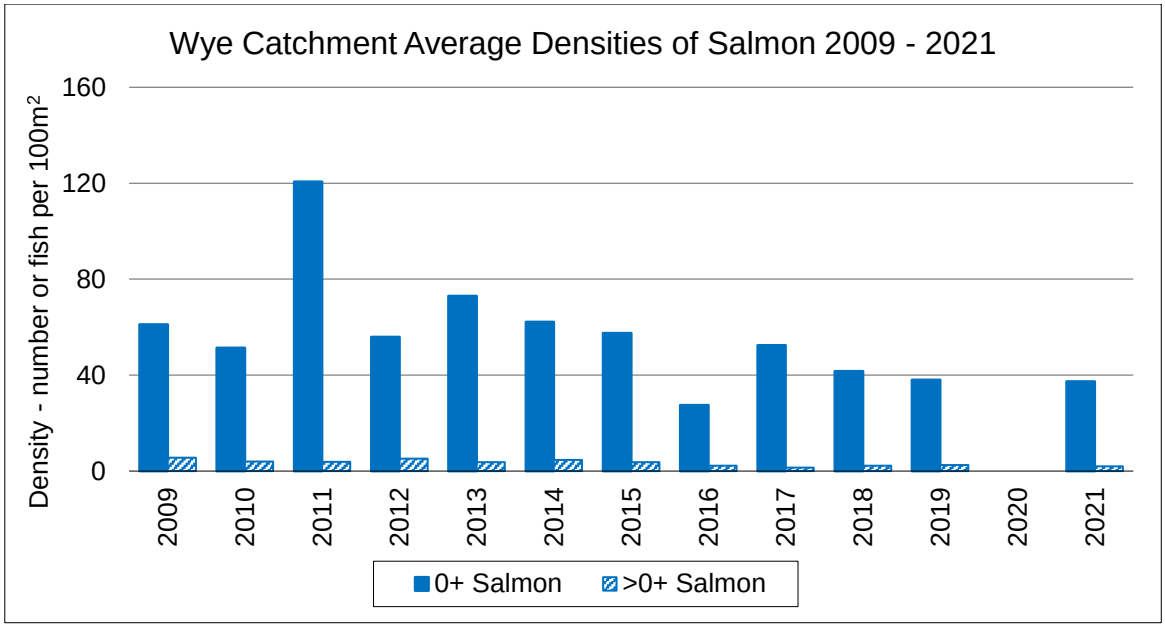


*Figure 10*

## Trout

From the below graphs the trout fry densities appear stable. Stable but low densities are perhaps not what we would want but may be right for these sites. Further habitat assessment will shed more light.

Trout parr appear little changed in recent years but looking back to the 80's double or triple the population might be expected at these sites. Has in river survival or predation impacted these larger fish, up to date habitat assessment will describe if habitat is the limiting factor.

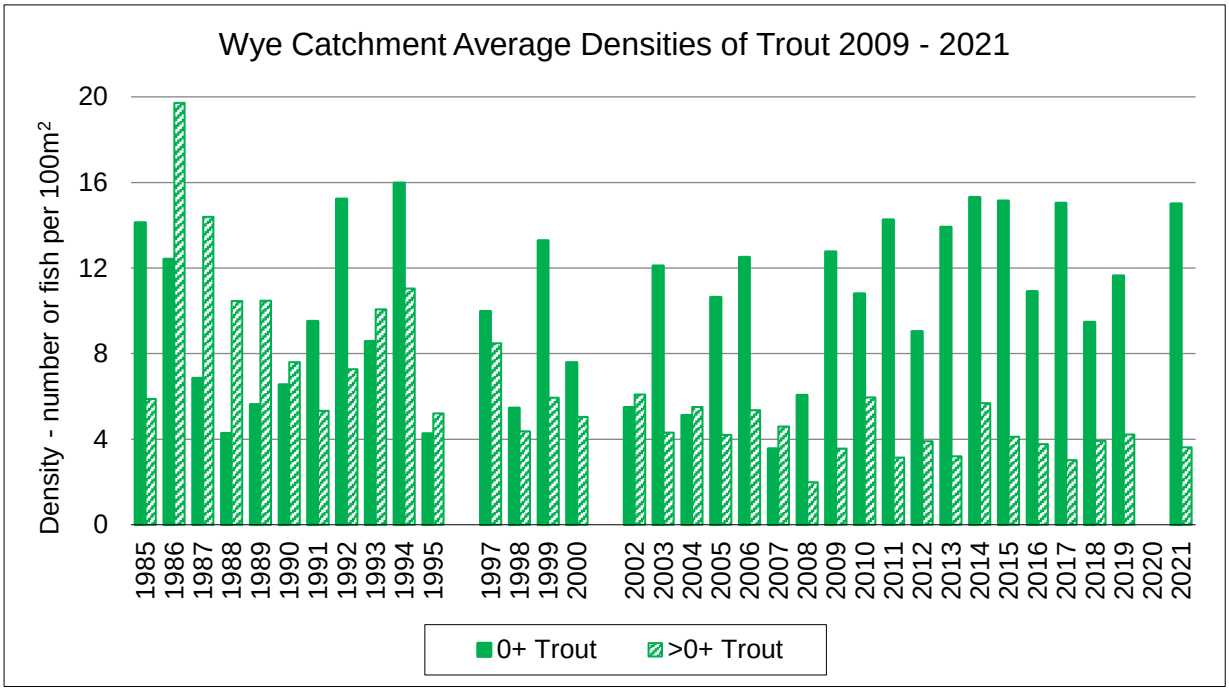


*Figure 11*

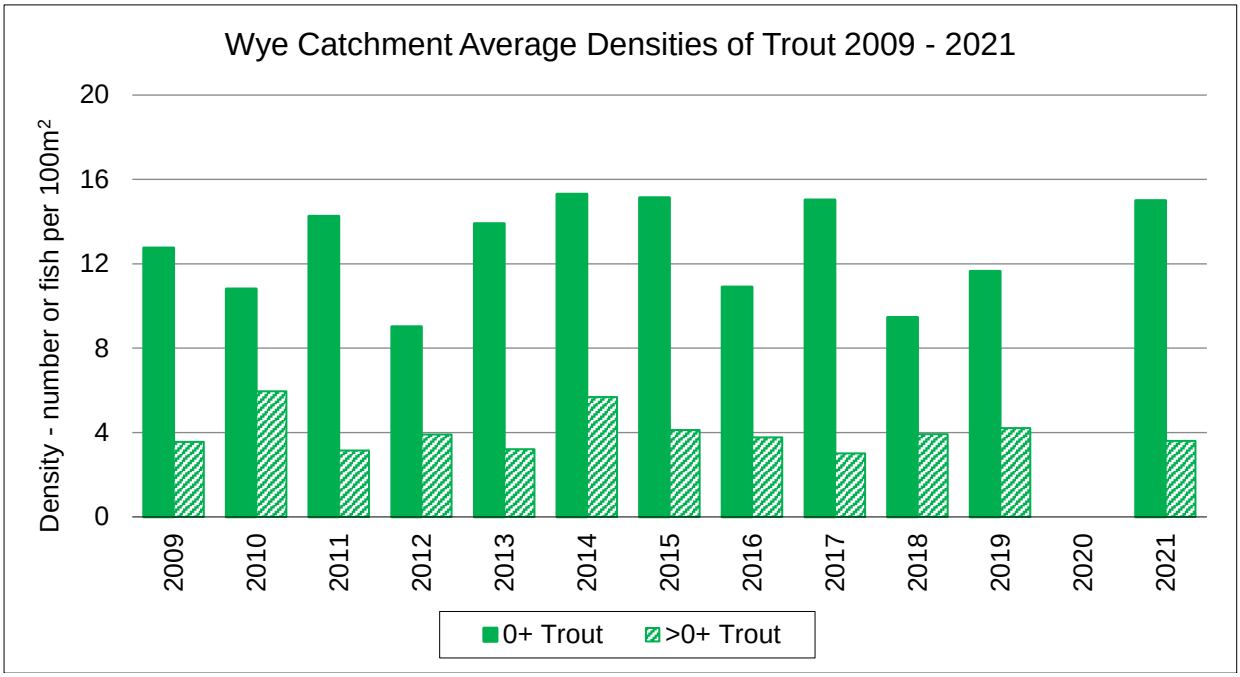
Wye Catchment Average Densities of Trout 2009 - 2021
Density - number or fish per 100m²
20
16
12
8
4
0
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
0+ Trout
>0+ Trout

*Figure 12*

## Appendix 1 – Survey data and classifications

Salmon and Brown Trout classifications for 2021 Wye temporal sites.

| River Name | Site Code | Survey Type | 0+ Sal Grade | >0+ Sal Grade | Overall Sal Grade | 0+ BT Grade | >0+ BT Grade | Overall BT Grade |
|---|---|---|---|---|---|---|---|---|
| Dernol | W001 | SQ | A | E | C | A | E | B |
| Marteg | W002 | SQ | B | B | B | D | E | E |
| Llanwrthwl Dulas | W003 | SQ | E | F | E | A | A | A |
| Ithon | W004 | SQ | D | F | E | E | F | E |
| Clywedog | W005 | SQ | C | E | C | F | F | F |
| South Dulas - Irfon | W007 | SQ | B | E | C | E | F | E |
| Garth Dulas | W008A | SQ | C | D | C | E | D | E |
| Chwerfri | W009 | SQ | B | E | C | C | C | C |
| Duhonw | W010 | SQ | B | F | C | D | D | D |
| Edw | W011 | SQ | B | B | B | E | D | D |
| Sgithwen | W012 | SQ | D | E | D | E | E | E |
| Lugg | W014 | SQ | E | F | E | C | D | C |
| Hindwell | W016 | SQ | F | F | F | A | B | B |
| Honddu | W020 | SQ | F | F | F | C | D | D |
| Wye | W025 | SQ | B | E | C | D | F | E |
| Bidno | W029 | SQ | B | C | B | C | E | D |
| Ithon | W032D | SQ | C | F | D | D | F | E |
| Aran | W033 | SQ | C | F | D | E | E | E |
| Dulas - Ithon | W035A | SQ | E | E | D | F | D | E |
| Cammarch | W043A | SQ | A | E | B | F | F | F |
| Einon | W044B | SQ | F | F | F | A | D | B |
| Llynfi | W047E | SQ | F | F | F | F | D | E |
| Arrow | W052 | SQ | F | F | F | B | C | B |
| Irfon | W095L | SQ | C | D | C | D | F | E |

## Appendix 2 - Fisheries actions

- Within the **Salmon and sea trout plan of action for Wales 2020**, there are listed a plan of actions.

  The Plan includes:

  1. Evidence
  2. Managing exploitation
  3. Protecting stocks through effective enforcement
  4. Tackling physical habitat constraints in the freshwater environment
  5. Safeguarding water quality and quantity
  6. Addressing land management, and associated risks to water quality
  7. Addressing predation on salmonids: fish-eating birds and seals
  8. Understanding marine pressures
  9. Understanding new and emerging potential pressures

  These actions are extensive and generic across Wales, more detail can be found via this link https://naturalresources.wales/about-us/strategies-and-plans/salmon-and-sea-trout-plan-of-action-2020/salmon-and-sea-trout-plan-of-action-for-wales-2020-areas-for-action/?lang=en

- **The Fisheries habitat restoration project summary document (2020/2021)** This document describes habitat work delivered in 2020/21

- **River Wye rod fishing byelaw review.** The current 'Wye' byelaws, which mandate catch and release for all salmon and sea trout on the River Wye, expire on 31st December 2021. The method restrictions contained within the 'Cross Border Rivers' byelaws remain in place until 2029. We have assessed options and proposed a set of replacement byelaws for the Wye. The statutory consultation period on these proposals is now closed and we will shortly be submitting our application for confirmation of the byelaws to Welsh Government. We would hope that they are able to make a decision quickly and in time for the start of the 2022 fishing season. We will publicise the decision as soon as we are informed.